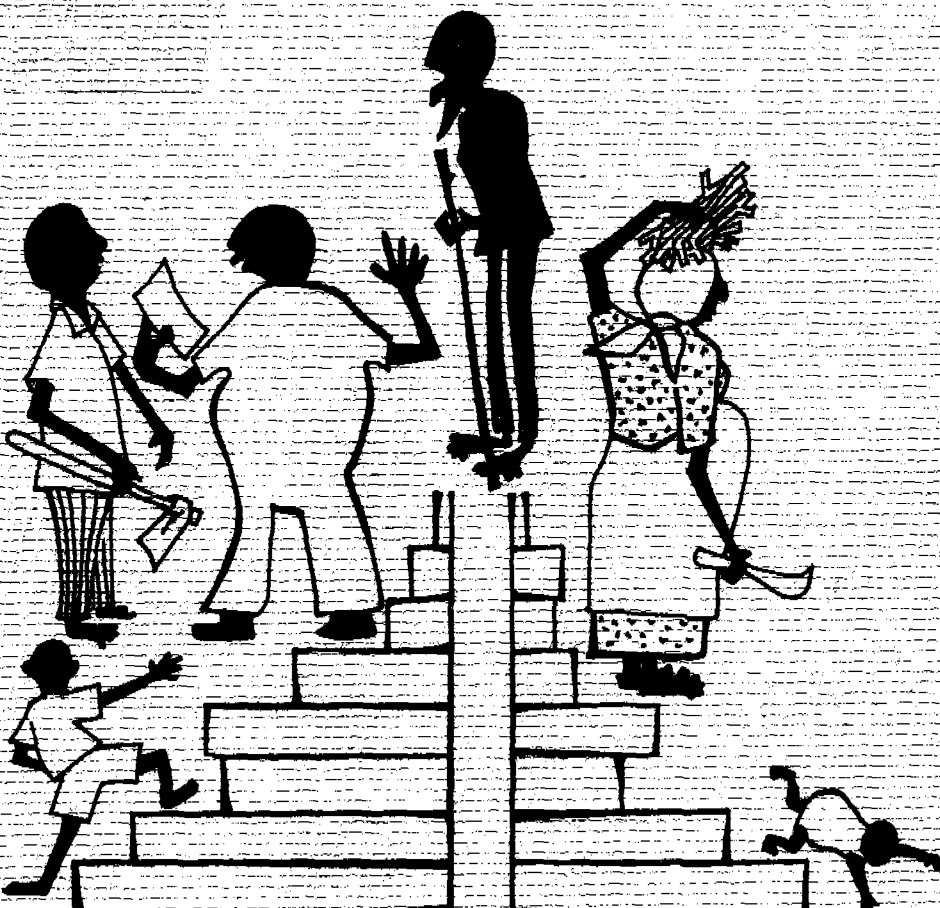
COMMUNITY HEALTH



edited by

C.H. Wood · J.P. Vaughan · H. de Glanville

RURAL HEALTH SERIES 12

AFRICAN MEDICAL AND RESEARCH FOUNDATION

COMMUNITY HEALTH

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AFRICAN MEDICAL AND RESEARCH FOUNDATION

Published and printed by the African Medical and Research Foundation
P.O. Box 30125,
Nairobi,
Kenya.

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CONTENTS

FOREWORD

As Director of Preventive Health Services, Tanzania Mainland, I am pleased to have the opportunity of writing a foreword to this book on community health.

The purpose of the book is to supply health workers with relevant teaching material based on local conditions. Its production is opportune for us because we are currently re-thinking our health-delivery systems in relation to the World Health Organisation's goal of health for all by the year 2000. Poor developing countries like Tanzania have to rely more and more on paramedicals if primary health care is to become a reality for rural populations. A book like this one relates to local realities and can help a great deal in teaching.

I am aware of the difficulties of producing a community health book that is up to date in all respects. Another census, changes in administration, development in health services, can all make some subjects out of date before the book is published.

I wish, however, to congratulate AMREF for its continued endeavour to provide East African countries with relevant teaching materials. It would be a great help if all those who use this book would send in their comments and criticisms and thus help the editors and publishers to keep it up to date.

K. N. M. Mtera
Director of Preventive Health Services,
Tanzania Mainland.

ACKNOWLEDGEMENTS

This book has been through a very long period of evolution since the early draft chapters were first written and circulated to training schools for trial use and comment. The comments received have stimulated, helped, delayed — and even hindered! — the production of the final edition. Chapters were added, revised, rewritten, or produced as separate volumes in this series of manuals. The remaining material was again revised at workshops and distributed for further trial. During this long process health science and services have developed and changed. At last the editors called a halt to further comment and have produced the present edition. While accepting responsibility for any errors ourselves, we would like to thank all the following people who have contributed:

Dr Ahmed
Mr Bantje
Dr Bhachu
Dr Brooke
Mr Choudhry
Dr Eshuis
Dr Hart
Dr Huenges
Dr Joachim
Dr Kagimba
Mr Kalimenje
Dr Kent
Dr Kisanga
Dr Kreysler
Dr McCusuer
Dr McMahon
Mr Magissa
Dr Maletnlema
Dr Manschot
Mr Mapunda
Dr Massawe
Mr Massawe
Dr Mavuru
Mr Mbelwa
Dr Mbilu
Dr Mfinanga
Dr Ngoda
Mr Obers
Mr Pryor
Mr Scotney
Mr Seda
Dr Shoo
Dr Smith
Dr Swai
Mr Tuluhungwa
Dr van Amelsvoort
Dr van Arkle
Dr van Etten
Dr Vennema
Mr Woods

We would also like to thank the many unnamed individuals — medical assistant students, doctors, administrators, and the whole production team — for their contribution to this team effort.

We are grateful to the staff of the Tanzania Ministry of Health, especially Dr Tarimo, Dr Chiduo (now the Honourable Minister), and Dr Mkumbwa for their encouragement and support.

In addition we would like to acknowledge the financial support of OXFAM, DANIDA, and USAID at various stages throughout the production.

Finally we ask the forebearance of all the contributors and those who need this book for the delays in its completion.

INTRODUCTION

Health is a more difficult concept than disease. When we try to think of it our thoughts are usually in negative terms – the absence of disease. We think first of ourselves or a child. To extend these thoughts beyond ourselves and our families to the whole community – diseases of the community and then community health – is a very necessary exercise for all health workers.

We know that we have to learn about the structure (anatomy) and function (physiology) of the body before we can understand its malfunction, or disease (pathology). We also know that there are many types of disease that affect the body in different ways and require to be managed in different ways.

Similarly, before we can appreciate the problems of a community we must know something about community structure (demography) and function (sociology). We have to learn about the patterns of disease (epidemiology), and the organization and administration of different services that may be provided for the whole community (e.g. environmental control, immunization, child spacing, nutrition and education) or for special groups in the community (e.g. mothers and young children, school children, workers and the handicapped).

This book attempts to cover all these different aspects of community health in one volume. The book was started at the suggestion of principals of medical assistant training schools who found difficulty in teaching community health without an appropriate book which brought together information otherwise only found in scattered papers, reports, and books, or gathered from other people working in the same field.

We suggest that during basic training you should work through the book in the order in which it is presented. This can be seen in the Contents list (page v) which shows chapter and section headings. Having studied the book as a whole, individual problems and topics that arise during your work can be looked up by means of the Index at the back (page 471).

We hope that this book, by increasing health workers' understanding of the communities of which they are members, will contribute to the better health of those communities. We are, nevertheless, very aware of the book's shortcomings and ask all those who use it to return the Comments sheet at the back indicating what they would like to see changed, deleted or added.

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J. P. Vaughan
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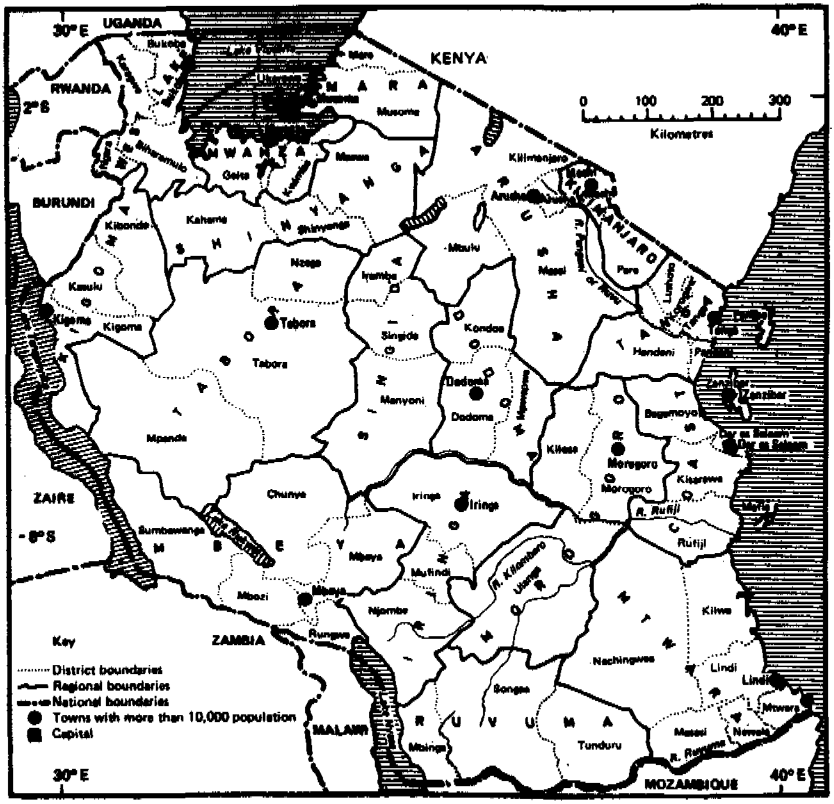


General map of Tanzania, 1967

Chapter One

INTRODUCTION TO COMMUNITY HEALTH

1.1 WHAT IS COMMUNITY HEALTH?

Community health is the part of medicine which is concerned with the health of the whole population and the prevention of diseases from which it suffers. It does this by making a *community diagnosis* of which diseases are important and which can be prevented, and then suitable control programmes are organized. The problem of how to do this arises when there is only a *limited amount of money* to be spent on the medical services. The limited amount of money makes it necessary to work out which among the important and preventable diseases are the *priorities*, and then to decide on the most effective control programmes that can be afforded.

PLANNING MEANS DECIDING ON PRIORITIES

The medical services have traditionally been organized around curative medicine, like that carried out by dispensaries, outpatient departments, and hospitals. These services offer help to sick people who come and ask for it, but they do very little for those who do not come and do not ask. For those people who come, curative medicine can cure some diseases, reduce some suffering, and prevent some deaths, but it can do very little to alter the number of new cases of an illness which occur in the community. For instance, curing children of kwashiorkor or gastroenteritis will have little effect on the number of new cases in the future. To control the number of new cases, we have to start before the people become sick. This is *preventive* medicine. To practise effective preventive medicine it is necessary to make some simple health services available to all those who might get sick.

In this chapter the theory of community health is presented by studying the stages in the development of diseases; the levels and available methods of prevention; the health needs and demands of a community; the concepts of population coverage and at-risk groups of people; and the organization of basic health services. The need to make a community diagnosis in order to select priorities for community health programmes is outlined. Subsequent chapters will go into more detail about the people of Tanzania, the population structure, the diseases they suffer from, and the available health services.

COMMUNITY HEALTH REQUIRES:
MORE PREVENTIVE MEDICINE
SPECIAL COVERAGE FOR THOSE AT RISK
PRIMARY HEALTH CARE FOR EVERYONE

1.2 HEALTH AND THE DEVELOPMENT OF DISEASE

The *health* of people is usually discussed in terms of the *diseases* they suffer from. Most people make a *full recovery* from diseases, but some suffer damage to their bodies and may have permanent *disability*. If the disease is very severe it may lead to *death*. The relationship between health, disease, disability, and death is shown in the diagram on page 4.

At first the person is well and *healthy* (top left). Ideally this is how they should continue throughout life—on the pathway of health. But then sometimes something begins to go wrong—a disease process starts in the body such as an infection with tuberculosis or a lack of food containing sufficient protein. At first, although the affected person has started on the pathway of disease he will be unaware that anything is wrong—that is to say the disease is subclinical or pre-symptomatic. For example, if there are tuberculosis bacteria in the lungs it will be several months before they begin to produce symptoms, or if there is a shortage of protein in the diet it will take weeks or months before the effects become obvious.

Sometimes some diseases remain subclinical and then heal before they have produced any symptoms at all. Some of the infectious diseases such as cholera, hepatitis, and enterovirus infections are particularly likely to do this.

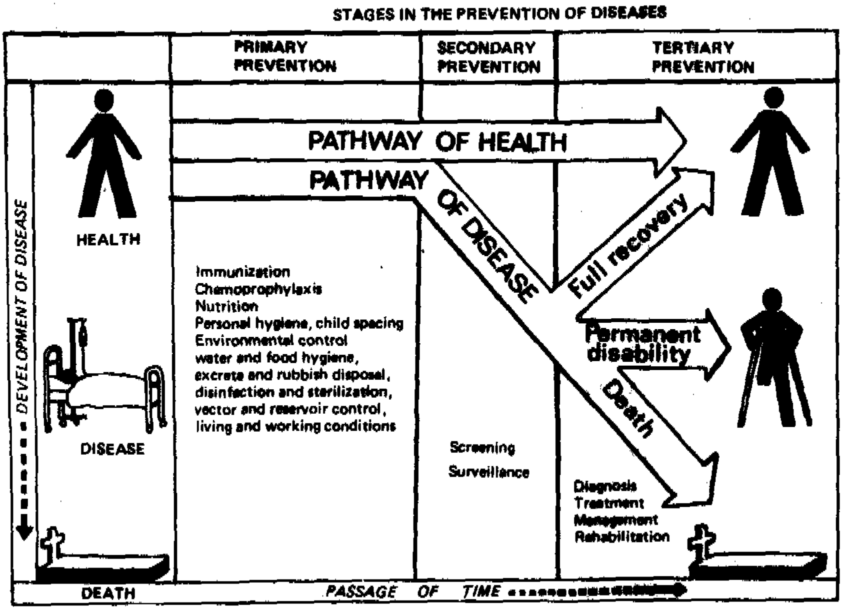


Fig. 1.1 The pathway of health.

When the symptoms of a disease start and are recognized by the affected person, we say it is *clinical*. Even when the symptoms of a disease first begin, such as a fever, a cough or diarrhoea, many people ignore them and hope they will go away. If the symptoms persist, people may try to treat themselves or consult a local mganga. They may live too far away, or feel too ill to travel, or they may not believe that the health services can do them any good, or they may dislike the medical worker for some reason. There are many reasons why people may wait a long time before going for help.

BY THE TIME A PERSON HAS SYMPTOMS THE DISEASE IS ALREADY WELL ADVANCED

The clinical stage of illness is the one we usually know best, since most outpatients and inpatients are at this stage. People complaining of various clinical symptoms are diagnosed and treated daily at dispensaries, health centres, and hospitals. If the disease is severe and not properly treated, the patient may eventually die. Even if he does recover he may have a disability for the rest of his life, such as a damaged lung from pulmonary tuberculosis, a paralysed arm from polio, or an amputated leg from a severe injury. However, most of those who are cared for will have a full recovery of health.

1.3 METHODS OF PREVENTION

It is a popular saying that 'prevention is better than cure'. If the three stages in the development of a disease are considered, it becomes obvious that the best sort of prevention is *before* the person becomes ill—before he starts down the pathway of disease. This is called *primary prevention*. Primary prevention can be provided by a combination of methods mainly aimed at people and the environment in which they live.

Primary prevention methods *through people* are:

- immunization
- chemoprophylaxis
- nutrition
- personal hygiene
- good health behaviour
- child spacing.

Environmental control methods are:

- safe water supplies
- good food hygiene
- safe excreta and rubbish disposal
- disinfection and sterilization
- vector and animal reservoir control
- good living and working conditions.

Fig. 1.2 Examples of primary prevention.

PRIMARY PREVENTION KEEPS PEOPLE HEALTHY

The next best time for preventing disease is after it has started but before symptoms have appeared—before the patient has diagnosed himself as sick. This stage of disease is called pre-clinical or subclinical or pre-symptomatic. Prevention at this time is called *secondary prevention*. Obviously it is often not possible to say precisely when a disease started or when the patient first noticed symptoms. This is particularly true for some of the chronic illnesses like tuberculosis, malnutrition, and anaemia. The process by which we try to find these subclinical cases is known as *screening*. Examples are weighing babies and young children to see if their weight falls into the nutrition danger area; examining urine and faecal specimens of school children for parasites; examining pregnant women for early signs of complications in their pregnancy. *Screening is only valuable if the medical services can do something to help the affected person.* An effective treatment must be available, and if it is not the screening should not have been done at all.

Another form of screening is the *tracing of contacts* of a person with an infectious illness such as tuberculosis or leprosy, to see if anyone else in the family or among friends also has the disease. When a regular record is kept of the number of new cases of disease, like measles or meningitis, it is possible to see if a control programme is working or to detect an epidemic early. This is another form of secondary prevention called *surveillance* and it covers the whole community.

SECONDARY PREVENTION
DETECTS DISEASE EARLY BY SCREENING
AND STARTS TREATMENT PROMPTLY

WEIGHING BABIES *SCREENING SPECIMENS*

Fig. 1.3 Examples of secondary prevention.

When a person himself recognizes that he has symptoms and is ill, then diagnosis and treatment, or *tertiary prevention*, become important. Most of the curative work of outpatient and inpatient services is concerned with this stage of disease. The methods are based on *diagnosis* and *management* of the disease. The aim is to reduce any suffering, to cure the disease completely, and to prevent disability. If there is some permanent disability like blindness or paralysis, then special rehabilitation services may be necessary.

TERTIARY PREVENTION DIAGNOSES, TREATS, AND REHABILITATES

The various methods of preventing disease are summarized below:

Primary prevention

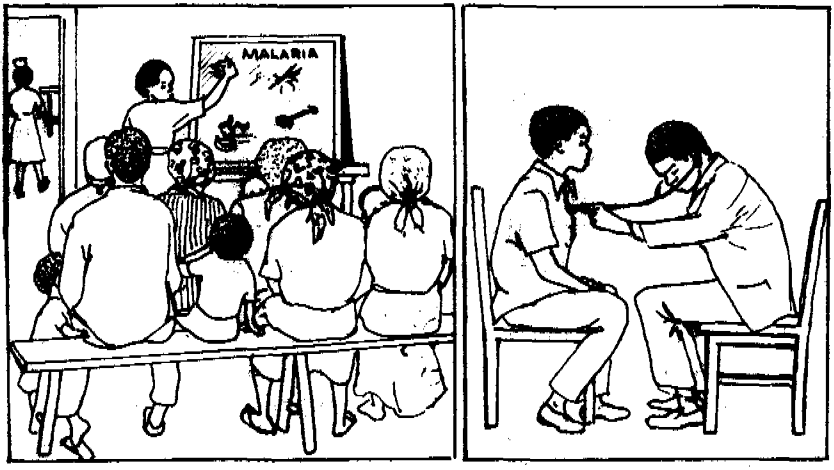
Personal	Environmental
Immunization	Safe water supplies
Chemoprophylaxis	Food hygiene
Nutrition	Excreta and refuse disposal
Personal hygiene	Disinfection and sterilization
Good health behaviour	Vector and reservoir control
Child spacing	Good living and working conditions

Secondary prevention

Early detection of disease by screening
Contact tracing followed by prompt and effective treatment
Surveillance

Tertiary prevention

Diagnosis
Treatment
Management
Rehabilitation



EDUCATION OF PATIENTS *DIAGNOSIS AND TREATMENT*

Fig. 1.4 Examples of tertiary prevention.

1.4 HEALTH EDUCATION AND PREVENTION

Health education is essential if people are to learn how to live a healthy life and avoid diseases. It helps people care about their own health and take part in organizing health services and disease control programmes. Health education can help people realize that health and health services are a basic human right for everyone, and it can help them understand the importance of health services for development.

In primary prevention health education enables people to value their health, and to know about diseases and how to make the best use of the organized health services, such as MCH clinics. It can motivate them to practise hygienic personal habits and healthy behaviour for themselves like using safe water, mosquito nets, and child spacing. It can encourage people to care for their own environment, such as water supplies and excreta disposal. Health education can also help medical workers understand what the people want and by working together they can develop a healthier life.

In secondary prevention health education can help people understand and value different screening procedures, such as those involved in MCH services. It can help people recognize the symptoms and signs of important diseases like leprosy and tuberculosis earlier, and it can help them co-operate in reporting diseases in surveillance programmes for such diseases as measles, rabies, and malaria.

Health education in tertiary prevention can help people understand diseases better and co-operate with the medical services so that they carry out their treatment properly—for example, continue with treatment for tuberculosis until cured. While people are attending for treatment, health education can also teach new knowledge about how to prevent diseases such as malaria and gastroenteritis.

Health education is not a one-way process; it is not just medical staff telling people what to do. People can help us understand their situation, their needs and their demands, their culture and environment, and through this better understanding we can help them to a healthier life.

HEALTH EDUCATION IS NEEDED AT ALL LEVELS OF PREVENTION

1.5 NEED AND DEMAND FOR HEALTH SERVICES

What group do we actually mean when we talk about the 'population' of a health centre? Is it the staff who work at the centre, or the people who come to the outpatient clinics? No, it is all the people, about 50 000, living around the health centre. This is the community that the health centre, dispensaries, and village health workers are supposed to help. Why bother with all the 50 000 people, when the health centre is busy enough already taking care of those people who do attend? There are several answers to this question:

1. For every person who comes to the health centre and dispensary there are many more who do not come for various reasons. These people—the *non-attenders*—may also be in need of medical attention but may not come for different reasons, such as they live too far away, there is no one to look after the children or shamba, they are too sick to travel, or they distrust the medical services. These people who do not come need medical attention just as much as those who do come.

2. A disease has already started by the time a person has symptoms and attends the health centre for treatment. It would have been better to prevent the disease from happening in the first place. If all the young children in a village receive measles immunization the number who suffer from measles and its complications, like pneumonia and diarrhoea, could be greatly reduced. The best way to prevent disease is to reach the healthy members of the whole community before the diseases do.

3. Some diseases cannot be successfully prevented and some services cannot work well in a community unless most people change the way they live. If a village decides to improve its water supply or help run its own MCH clinic, it needs the co-operation of the whole community. This co-operation can only come about if everyone is involved and not just the few who are sick and actually attend the clinics.

A useful way of looking at a community is to consider both their *needs* and *demands* for health services.

The *demand* for health services comes from the various problems for which the people seek help, whether they treat themselves, see a mganga or attend the health centre. These problems are first diagnosed by the people themselves when they say 'I do not feel well', or 'I am weak, I cannot go to the shamba'. Their illnesses have already progressed as far as producing symptoms.

The *need* for health services comes from all the health problems that actually exist in a whole community of about 50 000 people.

These problems all need some action—whether it is by the people themselves, by the health services, or by both working together. This action is not necessarily being demanded but might include such things as looking after undiagnosed and untreated infections, difficulties with deliveries, infant feeding and malnutrition, immunization, refuse disposal, or mosquito control.

The health needs of the community are like a hippopotamus in the water; the part we see above the surface is only a small part of a much bigger animal.

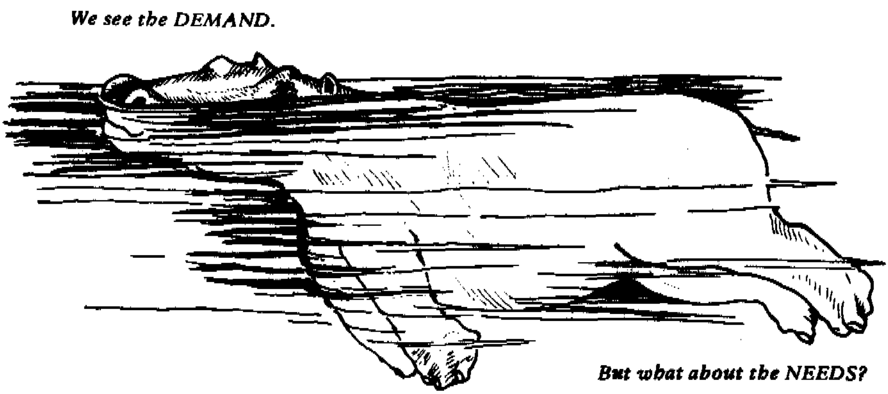


Fig. 1.5 Need is often much greater than demand.

HEALTH CENTRES ARE RESPONSIBLE FOR THE HEALTH NEEDS AS WELL AS THE DEMANDS OF THEIR WHOLE POPULATION

1.6 POPULATION COVERAGE

The aim of community health is to reduce and then keep down the number of new cases of disease in the whole population. Curative services are concerned only with sick individuals. The more we work back towards the earlier stages of the disease process the more important it becomes to involve everyone in the community, particularly those with any special risks of getting disease.

If we are to prevent disease and to keep people healthy then we need to think about the health needs of the whole community and not just about those who demand services at the clinics. This is where the idea of *population coverage* comes in. We must find out what percentage of the population with a health need are actually being helped by the different health services. For instance, what percentage of the pregnant women come to the antenatal clinic? What percentage of the two-year-olds have had measles vaccine? What percentage of all people have access to a reasonable water supply? What percentage of the community live within 5km of a dispensary or health centre?

It is only through the effective use of preventive medicine, preferably *primary prevention*, together with good population coverage of all those in the community who are at risk, that the medical services can actually reduce the incidence of many of the common diseases. This is particularly true for infectious diseases and malnutrition.

The importance of knowing the total population and then estimating the population coverage becomes clear if we think about reducing the incidence of new cases. This is why it is so important to base the health centre services on a good knowledge of the local population. This is further explored in Chapters 2 and 3.

WE NEED TO KNOW WHAT PROPORTION OF THE PEOPLE ARE BEING COVERED BY THE HEALTH SERVICES

1.7 HIGH-RISK GROUPS IN THE POPULATION

Every man, woman and child is at risk of getting ill and dying, but some groups are *more at risk than others*. These are called high-risk groups. Not only are some people more at risk of getting some diseases but some also make less use of the health services than others—they are at high risk of not getting treated. These high-risk groups can be defined by certain features that are common to the group. Such features may describe *people*, or the *places* they live in, or particular *times* of the day, month, or year.

Some may use health services less often than they could, like young children, leprosy patients, and those who live far away. If these groups are known, the health services can spend extra resources—like time, staff, buildings, mobile clinics, effort, and money—in helping them, rather than putting the few available resources into caring only for those who live nearby and come as outpatients. We can thus concentrate more of our medical activities on those who really need them.

SOME GROUPS OF PEOPLE HAVE HIGHER RISK THAN OTHERS

Who are the high-risk groups? (Examples 1 to 8 concern *People*, 9 and 10 *Place*, and 11 *Time*.)

1. *Mothers* (1/5 of the whole population) are more likely to get complications in pregnancy and die in childbirth.

2. *Infants and young children* (1/5 of the whole population) have a very high number of deaths because they suffer from malnutrition and a lot of infections like measles, gastroenteritis, and malaria.

3. *School children* (1/5 of the whole population) are also very likely to get childhood illnesses.

4. *Some workers* may have extra risks or hazards, for instance accidents in factories or with agricultural machinery and insecticide poisoning amongst crop sprayers.

5. *Old people* suffer from chronic and degenerative diseases like bronchitis, heart failure.

6. *Contacts* of an infectious disease like tuberculosis or leprosy.

7. *Different cultural and economic groups*, such as subsistence farmers, are more likely to suffer from famine if crops fail. Life in rural areas obviously differs from that in towns.

8. *Different local beliefs and customs* affect how people care for their health, what they do when they are ill, and what use they make of the health services.

9. *Different geographical areas* have particular diseases or certain diseases are commoner there, such as trypanosomiasis in Tabora.

10. *People living far from medical services* are at high risk because they are less likely to use the services. Availability of roads and transport will also make a lot of difference. The rainy seasons may make travelling to clinics difficult.

11. *At particular times of the week, month, or year* people are more at risk of certain diseases, like malaria following the rains, or road accidents after drinking at the weekend.

1.8 THE ORGANIZATION OF HEALTH SERVICES

No country has enough trained medical staff and money to run all the health services it would like. The resources for the development of the health services are limited and health services must compete with other priorities like education, agriculture, and water. The problem is how to use these limited resources so that everyone in the population gets some benefit and those who are at high risk of getting diseases receive special attention. Hospitals are very expensive to build and maintain, and since they practise tertiary prevention they have little effect on the incidence of the common diseases. However, hospitals are, and always will be, needed for the small proportion of the community who are very sick.

Fig. 1.6 It takes two hours to walk 10km.

CCM—the national political party—and the government of Tanzania have decided to put greater emphasis on preventive medicine and the *basic health services* that all people need. This means organizing the services to provide more primary and secondary prevention for the whole population. This is being achieved by building more dispensaries and health centres so that most of the people of Tanzania will be living within about 10km of a dispensary, health centre, or hospital, and also by a programme of training village health workers and encouraging community participation in health activities. It is not proposed to build any more hospitals in the next few years. The way the health services are organized largely determines how much emphasis is given to preventive medicine and how effective community health programmes can be. It is important, therefore, to understand how they work and this is explained further in Chapter 5 on the organization of the health services in Tanzania.

> BASIC HEALTH SERVICES
> SHOULD BE AVAILABLE TO EVERYONE

1.9 THE BASIC HEALTH SERVICES

The basic health services are those that should be provided by dispensaries and health centres. They represent the minimum level of health services that should be available to the majority of the population. They have also been called 'essential health services' and are incorporated in the most popular current term 'primary health care'. They include special care for women and children, who are the largest high-risk groups.

It is generally agreed that basic health services should include:

(a) *diagnosis and management* of the common and less severe illnesses, with referral to hospital for severely ill or problem cases

(b) *health education* for the whole community on the common diseases and how they can be prevented and on the health services and how they can be used (see Chapter 12)

(c) *maternal and child health (MCH) services.* Nutrition and child spacing are often incorporated into MCH services (see Chapter 14)

(d) *environmental control* of food, water, excreta, refuse, housing, vectors, and diseased animals (see Chapter 8)

(e) *communicable disease control* of common and important diseases like measles, tuberculosis, malaria, schistosomiasis (see Chapter 13)

(f) *basic statistical data collection* for defining the common disease problems of the area and how the health services are working (see Chapters 6 and 7).

The services for special groups are explained in Chapter 15. These are not usually the work of a dispensary or health centre, but the staff need to know something about them so that they know which patients to refer.

The details of curative and hospital services are not considered any further in this book as they are covered in books on clinical medicine.

At the dispensary and health centre all these basic services are not separate but are *integrated* into one service. However, there are *specialized* units in the Ministry of Health that organize national programmes for curative services, health education, MCH, nutrition, family planning, environmental health, communicable diseases, and statistical data.

1.10 PRIMARY HEALTH CARE

Amongst developing countries Tanzania has been in the lead in starting a national primary health care programme for village health services. The most acceptable definition for primary care is that recently produced by WHO:

> Primary health care is a practical approach to making essential health care universally accessible to individuals and families in the community in an acceptable and affordable way and with their full participation.

The people who are being trained to offer this essential or basic health care are the village health worker (VHW)—previously called village medical helper (VMH)—working in each village; the rural medical aid (RMA) and maternal and child health aid (MCH Aid) at the dispensary; and the medical assistant (MA) and other staff at the health centre. The VHW is chosen by the members of the village, and is responsible to them. The participation by the people in their own village health programmes is an essential element of primary care. The VHW belongs to the village more than to the government health services, although the whole health programme in a district is under the professional supervision of the district medical officer. He should also take part in health aspects of rural development, as well as offering the simple basic services listed in Section 1.9. If VHWs are men they may not be able to organize village MCH activities but they could have a great influence on local environmental health. People should be able to get primary health care through a VHW, dispensary, or health centre within a few kilometres of their houses, and usually they should not have to pay anything.

1.11 INDIVIDUAL SICKNESS AND COMMUNITY HEALTH

When thinking about health and disease we often think about ourselves or some other person or child we know. Is that person well or has he got a disease? Is it severe or mild? Is the disease new or old, and is he likely to take a long time to get better? Has anyone else in the family or community got a similar illness?

Some people, families, or communities appear to have more sickness and deaths than others, such as more children with or malnutrition, or more young people with tuberculosis or anaemia. Such observations about health and disease patterns in a community and what can be done about them lead to the practice of community health, or public health.

To help an *individual person*, it is necessary to collect some *basic information* about his state of health, or what stage the disease or diseases that he may be suffering from have reached.

This is done by history taking, physical examination, and investigations. This is followed by making a *diagnosis* of what is wrong. Knowing what help is available, a plan is then made of the best way to help this patient, that is the *management* and *rehabilitation*. He should then be *followed up* to see that the treatment has worked.

The same process is appropriate for the *community*. First it is necessary to collect some *basic information* about the whole community. Then make a *community diagnosis* by deciding what are the main things that are wrong with it; then decide on the most appropriate *community health (treatment) programmes*; and finally follow up and *evaluate* the programmes to see if they have done any good in making the community healthier.

Comparison of problem solving in individual medicine and community medicine

	Individual medicine	*Community health*
1. Objectives	Health problem	Health problem
2. Gathering information	History taking, examinations and investigations	Demographic data, local environment, disease patterns, available health services
3. Best programme	Differential diagnosis and diagnosis	Community diagnosis and priorities
4. Implementation	Treatment and rehabilitation	Community health programmes
5. Evaluation	Follow-up and assessment	Evaluation

For solving community health problems this approach is outlined in more detail in Chapter 6.4.

1.12 BASIC INFORMATION FOR COMMUNITY HEALTH

Where is the information? How is it collected? A great deal of information is already available if people know where to look for it, and if it is not available, then simple surveys can often find out what is wanted.

Information can be obtained from people and records in the local community, the health centre, the district, and other centres like the Ministry of Health. Information should be collected on:

The local people and their environment—the individual, family and community (see Chapter 2).

The number of people and their distribution (see Chapter 3).

The diseases they suffer from—the local pattern of diseases and deaths (see Chapter 4).

The organization of the local health services that handle these diseases in that community (see Chapter 5).

> *BASIC INFORMATION IS NEEDED ON:*
> PEOPLE, POPULATION, ENVIRONMENT, DISEASE PATTERNS, AND AVAILABLE HEALTH SERVICES

1.13 THE COMMUNITY DIAGNOSIS

This is a means of deciding, in consultation with the people, which of the local diseases or health problems are important—which should be given a high priority in the activities of health workers. From a knowledge of the local causes of sickness (morbidity) and deaths (mortality) we can answer the following questions:

- What are the 10 commonest diseases seen in outpatients?
- What is the distribution of the common diseases in the area?
- What is the local distribution of uncommon but important diseases?
- What diseases have been epidemic in the area in the past?
- Which disease is the community most concerned about?
- Which are the most important local health problems?

The next step is to decide which disease can be controlled and which health problems can be tackled. *Give priority to those diseases and health problems for which something effective and practical can be done by the local community, or the dispensary, health centre, or district health staff.* Making a community diagnosis is a way of deciding where the health centre services should put their efforts and resources.

COMMUNITY DIAGNOSIS HELPS DECIDE ON LOCAL PRIORITIES

1.14 COMMUNITY HEALTH PROGRAMMES

When the community diagnosis has helped sort out the local priorities the next step is to decide how to use the effort and resources of the health team to give the greatest effect.

COMMUNITY HEALTH PROGRAMMES EMPHASIZE DISEASE PREVENTION AND HIGH POPULATION COVERAGE

Community health programmes are usually aimed at one of the following:

- *specific disease control* such as leprosy, measles, malaria, schistosomiasis, or tuberculosis (see Chapter 13)
- *general disease control* such as that achieved by environmental health (see Chapter 8) and nutrition programmes (see Chapter 11)
- *high-risk groups of people* such as mothers and children (see Chapter 14) and other special groups (see Chapter 15).

In practice the services are integrated in such a way that all three approaches are often combined, as is seen in the work of the MCH services.

1.15 EVALUATION OF COMMUNITY HEALTH PROGRAMMES

It is important to find out whether community health programmes do what they set out to do.

EVALUATION IS ESSENTIAL

The ultimate aim of any community health programme is to improve the health of the community by reducing the incidence of new cases to a point where a disease is no longer a major problem. It is not easy to measure this. Often the work done by dispensaries and health centres is not measured—it is assumed that they reduce the morbidity and mortality. This is a dangerous assumption and we must always try to measure, as nearly as we can, whether the specific aims of the programme are being met.

Measurement can be made by estimating:

- *Population coverage*
  What proportion of the total population is being cared for effectively by the services? What proportion of the births and deaths in the community was the services *not* involved with? What proportion of the population is within 10km of a dispensary or health centre?
- *Work load of the dispensary and health centre services*
  What are the services doing for those people who do attend? How many new cases of common or important diseases, like hookworm and gastroenteritis, were seen each month? What is happening over a period of time to the total number of outpatient attendances? How many injections are being given? How many laboratory investigations have been performed? How much health education is there?

- *Effects of the treatments given*
  Is the indidence of the common diseases declining? What proportion of the patients were cured, disabled, or died? For instance, what has happened to the figures on gastroenteritis and measles deaths, and to maternal and neonatal deaths? How many referrals were made to the health centre by the dispensaries and how many people were referred on to the district hospital?

Without evaluation we cannot know whether we are doing any good (see Chapter 7).

1.16 COMMUNITY HEALTH TECHNIQUES AND ADMINISTRATION

Community health work requires certain special skills, and these need to be learnt, just as we have to learn how to examine a patient. There are certain essential techniques for working with the local community which are needed to collect basic information, make a community diagnosis, run community health programmes and evaluate how they are working. Some of these techniques are explained in the chapters on people, the population and their disease patterns (Chapters 2, 3 and 4); others are given in Chapter 7 on community health techniques.

As well as knowing the techniques, it is just as important to be able to plan and administer the health services. All the clinical and community health skills of the medical workers will be of no use if they cannot run the services well and Chapter 6, therefore, describes the administration of the health centre services.

MEDICAL STAFF NEED TO BE GOOD ADMINISTRATORS

1.17 THE VALUE OF COMMUNITY HEALTH

It is not possible or even helpful to try and draw lines between what is preventive and what is curative medicine, or individual or community health. When a mother brings a sick child with diarrhoea you advise on both how to make the child better and on how to prevent it becoming sick again. Treating individuals with pulmonary tuberculosis helps to prevent others in the community from getting it. Similarly when we are immunizing one child we do not ignore his sick sister or brother.

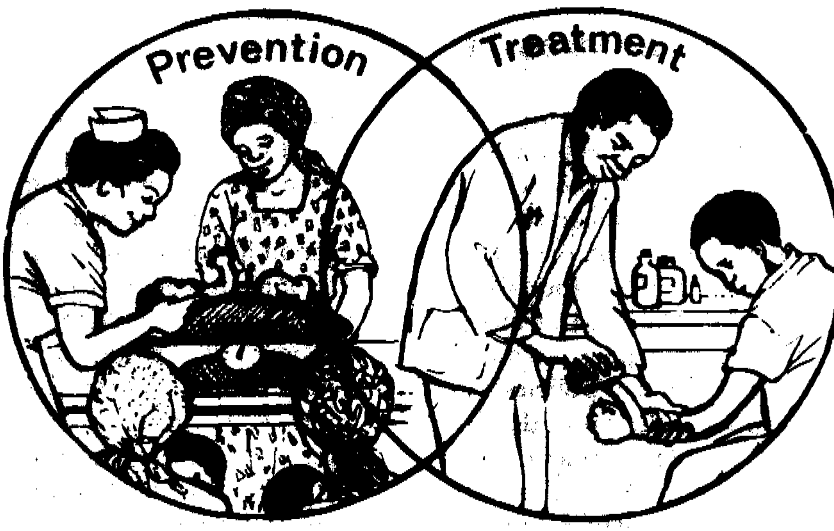


Fig. 1.7 We cannot separate prevention and treatment.

Very often the time and money spent on preventing disease in the community by education, immunization, environmental health, and child spacing has a much greater effect in the end than waiting until people become ill and then spending time and money on treating them.

Although most people agree that preventive activities do more for the community than treating individuals, prevention is not always easy to practise. Firstly we need to have the background knowledge and skills which are the basis of community health; secondly we must believe in its importance; and thirdly we must be able to divide the available time, money, and other resources reasonably between treatment and prevention. *If we are not careful the demands for treatment exhaust our limited resources before we have allocated anything to prevention*. This manual attempts to show practical ways in which community health can be used to good effect.

1.18 HEALTH AND DEVELOPMENT

It is well known that poor people suffer more from ill-health and disease than rich people and that they use the available health services less often. The richer parts of a country also tend to have healthier people and better medical services. These are two examples to show that economic development and good health go together.

However, unless national economic development is accompanied by a fair distribution of money and services, a few rich people benefit at the expense of many who stay poor. Villagization and other development policies aim to bring rural people together to participate in their own development. Improved health must be a part of this development. The CCM has emphasized that health services, education, and water supplies are high priorities for rural development, as well as enough food and proper housing.

It is now believed that medical services, especially the curative services, do little on their own to improve the health of a community. Much more is achieved by everyone having sufficient good food and by simple environmental control. This is why better nutrition and good environmental health are such important aspects of village health services. Also the development of a cash economy, improved agricultural methods, a fair sharing of the land, better educational levels, high adult literacy rates, and improved roads all lead to improved health. Raising living standards through the people's participation in development will lead to healthier communities.

This is why all health workers must be involved in local political and development issues and they must join with the people and other workers to promote good development. All health workers should understand that health matters and medical services are only one part, but a very important one, of rural development. Development plans and services must be integrated with those from other sectors like agriculture, water, and education.

DEVELOPMENT AND HEALTH GO TOGETHER

Chapter Two

THE PEOPLE OF TANZANIA: BEHAVIOUR AND ENVIRONMENT

2.1 INTRODUCTION

Diseases, ignorance, and poverty are together the causes of a lot of suffering and if medical workers are to tackle disease they will also need to understand something about ignorance and poverty. They will be helping people in their daily lives and therefore will need to understand human behaviour and the surroundings in which people live, as both of these have an influence on whether people stay healthy or get diseases. We can only make changes for the better if we understand how people behave and organize themselves as individuals, in small groups like the family, and within larger communities.

The medical worker is also a person and needs to be understood by those with whom he works. He also needs to understand himself, his culture and education; the community he lives in, his family and friends; his medical training, his patients, and how he fits into the health services. All these effect his behaviour, the pattern of his work, and how effective he and his staff will be when working with the community. All people want respect and prestige, but prestige is mostly earned and respect comes from mutual understanding of people and why they behave the way they do.

HUMAN BEHAVIOUR CAN AFFECT HEALTH

2.2 UNDERSTANDING PEOPLE AND THEIR ENVIRONMENT

There are many different ways of trying to understand people, how they behave, and how they are organized. We can learn something from psychologists about how individuals and groups behave, and from sociologists about how society is organized. Geographers can tell us about how people fit into and make use of the land, and political scientists and historians can also contribute to our understanding of the people.

A useful approach for medical workers is to consider all the important *influences* that affect an *individual*, the *family*, and the *community* as a whole. These three parts are shown in the illustration (page 30) with the individual surrounded by immediate and extended family, all of whom are only one part of the larger community. We will return to these three levels in more detail later in the chapter.

Fig. 2.1 The individual surrounded by his family and the community.

Another way to increase our understanding is to examine the surroundings or environment in which the individual, family, and community live and work. The environment contains a very complicated mixture of influences which shape how people live and behave, how different communities function, which diseases they suffer from, and how effective the medical services might be. These influences affect each other and they also affect people. The influences are easier to understand if they are divided into four main groups:

- the biological environment
- the physical environment

- the cultural and social environment
- the economic and political environment.

The biological environment is made up of all things that have life:

- vegetation, such as trees, grass, and crops
- animals, including stock and predators
- insects, particularly mosquitoes and house flies
- infective organisms, such as amoebae, bilharzia, and tetanus.

The physical environment is made up of all the geographical, physical and chemical features:

- the land—mountains, valleys, plains
- type of soil and water
- climate
- altitude
- chemicals and toxic substances.

The cultural and social environment is made up of all the customs, beliefs, and organizations in society:

- customs and beliefs
- family and kinships
- religions
- leadership and power structure.

The economic and political environment is made up of work, money, and government:

- villagization and self-reliance
- rural and urban economies

- CCM and political influences
- development policies.

THE ENVIRONMENT CAN DETERMINE HOW PEOPLE LIVE AND WHICH DISEASES THEY SUFFER FROM

It is very important to realize that people can *change* their environment—this is partly what development is all about. The environment can be made more healthy. However, sometimes man's environmental changes introduce new disease into the area or make existing ones worse, thus making it less healthy.

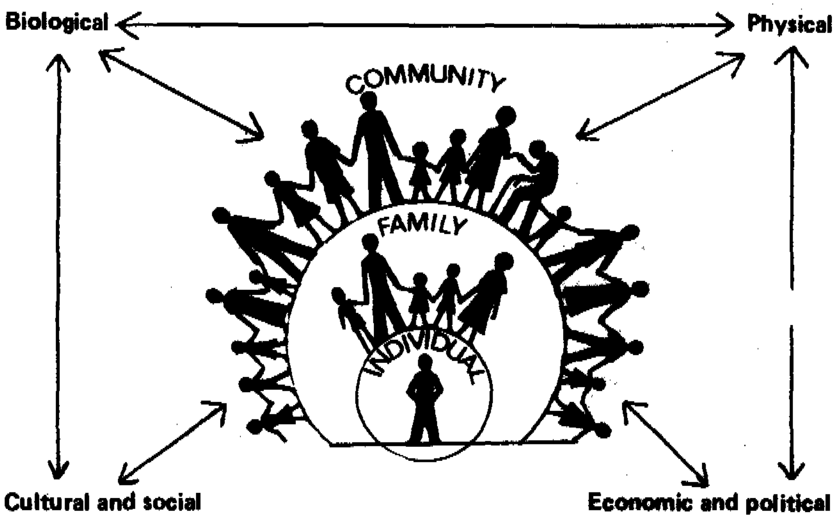


Fig. 2.2 Factors influencing the community.

PEOPLE CAN ALSO CHANGE
THE ENVIRONMENT
WITH GOOD OR BAD RESULTS

Examining the whole situation and looking at the multiple interactions between people, the diseases, and their environment is called an *ecological approach*. The diagram opposite illustrates the many ecological interactions which health workers should think about if they are to understand what makes a community healthy or unhealthy. Each two-headed arrow represents possible lines of interaction. For example, the arrow linking *biological* to *physical* could represent the fact that in some areas there may be overgrazing (biological) resulting in soil erosion and making a desert (physical) which in turn affects the life of the community. Ecology is the study of the balance of all these factors.

2.3 BEHAVIOUR, ENVIRONMENT, AND HEALTH

Some examples may help to illustrate the connections between the behaviour of people and the different environmental influences outlined above and how they relate to health.

Malnutrition in young children is very common in many areas of Tanzania and we know that technically it is due to an unbalanced diet, e.g. a lack of protein, or the child not getting enough food. Eggs, which contain protein, may be available and be eaten by adults, but they are often not given to the young children as they are thought to cause sterility. This is an example of how the customs and beliefs (or cultural and social environment) have an effect on human health. It is no use to show women how to prepare a special baby food on a paraffin stove if all cooking is done on charcoal and they cannot afford paraffin anyway. This is an example of the effect of political and economic environment. Similarly, no amount of health education in schools on the value of beans as a plant source of protein is of any value if the local soil and weather are unsuitable for growing them (i.e. physical environment).

Children frequently die from dehydration as a result of severe diarrhoea. Many of these deaths would not have occurred if the child had been fed from a cup rather than a bottle, or if the water had come from a protected well instead of a pond. These are combined environmental influences—cultural and social, and biological. People find it hard to change their behaviour.

In a coastal area near Dar es Salaam the attendances at MCH clinics were often poor. They were well run by an unmarried trained nurse, and held regularly under a large mango tree. It was then pointed out that married coastal women generally do not discuss pregnancy and childbirth with young unmarried women, and certainly would not look to them for advice. It is also very much against their customs for pregnant women to gather together in the open air where they could be seen by the men of the village. Would the attendance have been better if the clinic had been run by an older, married nurse and held in a private courtyard?

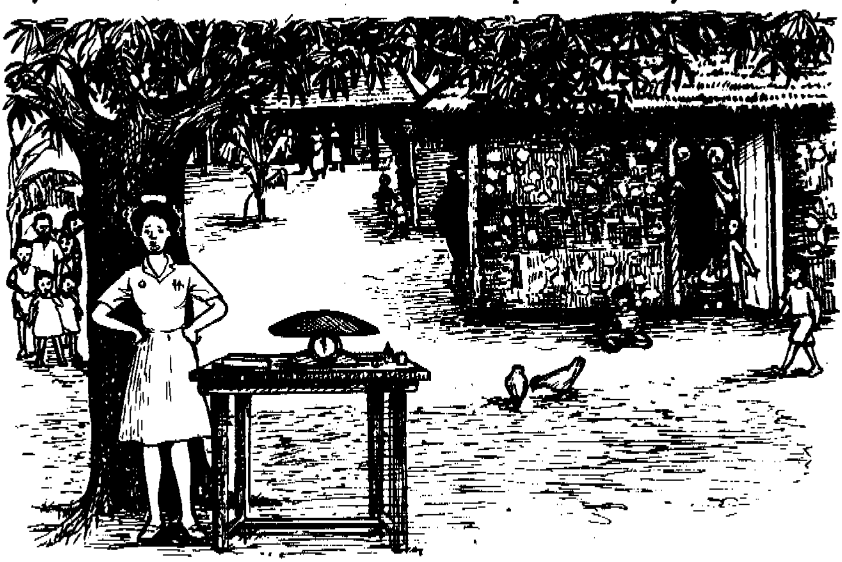


Fig. 2.3 The clinic under the mango tree was not attended because . . .

The habits of the vectors determine the distribution of many diseases, for instance malaria-carrying mosquitoes do not regularly breed above about 1500 metres (approximately 5000 ft). Therefore malaria is usually found below this level. Schistosomiasis may actually be introduced and spread where it did not exist before when irrigation schemes are started for such crops as sugar-cane.

It is very important to involve people in organizing and planning health services. If we tell villagers about the problems at the planing stage, they will more readily support the health services and help to make them function properly. For instance, more than half of all tuberculosis patients never come for treatment and many of these die without ever coming to a dispensary, health centre, or hospital. More than half of those who are started on treatment never complete it.

If the situation were discussed with the local CCM and UWT branches, the ward development committee and influential local leaders, the people themselves might encourage patients to continue with treatment and persuade new cases to present themselves for diagnosis. The community could also suggest ways in which the medical services should be improved to help such patients. It is very important to involve the community as much as possible in establishing, running, and using health services.

ALWAYS CONSIDER THE INDIVIDUAL THE FAMILY THE COMMUNITY

2.4 INDIVIDUALS

All individuals are unique; however, they share many behavioural characteristics with other people and these are often learned as part of a particular culture. Culture is all those things which are learned, shared, and passed on to other generations. One of the most important of these is *language* and there are about 120 local languages in Tanzania. The government is encouraging the use of Swahili as a national language and part of the national culture. The medical worker must be able to *communicate* and when working in an area where another language is widely spoken a knowledge of it will be vital to his work. It is important to be able to show respect and understanding for the people and their culture as well as knowing the local greetings.

We learn our *beliefs* and *customs* about what is right and wrong behaviour in different circumstances from other people as we grow up. These ideas fit together and help explain the world we live in and our place in it. For example, if we had grown up in some rural areas we would have learnt that dead ancestors can still influence the lives of people. If we do not work together and co-operate our ancestors might become angry and cause misfortunes. Some practices and beliefs about sickness and health are related to these beliefs in ancestors or in the power of people to perform witchcraft. If we try to tell people about germs and bad foods we may convince a few, but even they are unlikely to follow new ideas because of their local beliefs. Sometimes people will follow both sets of ideas—the old and the new. They will consult a dispensary for treatment of the symptoms and return to the traditional healer to get rid of what they think is the 'real' cause of the illness.

THE INDIVIDUAL'S ENVIRONMENT LARGELY DETERMINES WHAT CHOICES HE WILL MAKE AND HOW HE WILL BEHAVE

There are also ideas of political significance as well. There are traditional beliefs and customs which an individual needs to know—*leadership* of the community (e.g. religious, political), how *decisions are reached* (e.g. individual choice, family influences, baraza, meetings of elders, local courts), and *local debates and disagreements* that arise because the society is developing and changing. These changes affect bringing up young children, subsistence farming, and many aspects of village life.

2.5 THE FAMILY

Families provide the basic education in language, beliefs, and customs. They also bring up children and provide food, clothing, and shelter.

Fig. 2.4 Children acquire beliefs and customs in the family.

The family emerges from some form of recognized *marriage*, in which husbands and wives have certain rights and obligations. Polygamy is quite common and so a man may have more than one household. In marriage the woman is often regarded as the subordinate partner, and when this does happen it can have an important effect on the medical services. In MCH services, for instance, there might be little use in educating women about better foods and cooking practices if the men have not been asked if they will accept the changes being made. Also women may not be free to come to a health centre, even if they want to.

Beliefs about *sexual relations* within and outside marriage are often strongly held and are usually related to the value of children in the community. The traditional beliefs about abstinence from sexual intercourse, simple contraceptive techniques, and the spacing of pregnancies, are not being practised so much now, and consequently children are being born much more quickly, one after another. The spread of venereal diseases is also largely determined by the pattern of sexual relations and where there are many single males gonorrhoea is likely to be common.

The *extended family* includes other relatives and there are many rights and obligations that are expected from each of its members. Since children grow up as members of a larger group the attitudes and ideas of this wider family become very important. Children may be sent to live with different members. Food and incomes are commonly shared with the extended family, and accommodation may have to be provided for travellers and people looking for work. This has advantages for the rural subsistence economy but can present very real problems (e.g. food shortages and over crowding) to those earning an income and living in urban areas.

THE FAMILY HAS AN IMPORTANT
EFFECT ON HEALTH

Medical workers must realize that there can be *conflict* with the extended family. This is normal but it may become so strong that families become disrupted. Families also change over time. When a man and his wife first marry and they still have no children their economic and social position will be different from when they have young children, and from when these children have grown up, moved away, and have their own families.

2.6 THE COMMUNITY

Communities are groups of people who live in a particular place, such as a village, and who share a common interest in what happens there.

In rural communities almost every person knows everybody else and therefore has a strong feeling of all belonging together. *Public opinion* in a rural community is very important and people are afraid to behave in a way that would meet with the disapproval of most members of the community. All rural communities in Tanzania, as elsewhere, have some kind of *leaders who have authority*. The medical worker needs to know who they are and on what their authority rests. CCM officials and Ten-cell leaders represent the people in the political sphere and also represent the party to the people. Religious leaders may not only be influential in the local mosque or church, but may also be powerful in the local community. The leading elders may be very influential in some matters. The medical worker, like the teacher, is also a local leader and can be very influential.

In urban communities people usually work away from where they live, there is not usually such a strong sense of 'belonging together', and therefore the effect of public opinion on behaviour is not so strong. Patterns of leadership and authority exist in the urban community but they are usually harder to understand. Organizations like religious groups, football clubs, and UWT branches have an important role in bringing people together.

Conflicts between groups of people are a normal feature of communities, and are often based on different beliefs about what should be done, for instance in which village a new dispensary should be placed or who should have a new well. Conflict may also arise over exploitation of one group by another, e.g. labourers by employers, or tenants by landlords. As local leaders, medical workers may be required to help settle conflicts and solve exploitation problems.

Fig. 2.5 Problems are discussed by leaders and elders.

THE COMMUNITY IS MADE UP OF INDIVIDUALS AND FAMILIES, AND HAS ITS OWN ORGANIZATION

2.7 LIFE IN RURAL AREAS

Around 95 per cent of Tanzania's population live off the land and most practise subsistence farming. Agriculture depends upon soils, rainfall, and climate and so its patterns and problems vary in different parts of the country. There are a number of broad zones in Tanzania with similar patterns of life.

1. There is a coastal strip along the eastern coast which is hot and humid for most of the year. There are normally two rainy seasons but they are somewhat irregular. The main agricultural activities are fishing, growing cassava, coconuts, cashews, rice, a little maize, vegetables, cattle raising, etc. However, the soils are generally poor and agriculture is difficult. The hot humid climate does not encourage hard work but does encourage a number of diseases, e.g. malaria, filariasis, and schistosomiasis. The settlement pattern is rather scattered and travel is often difficult in the wet seasons. When people are sick in these seasons they may find it extremely difficult to reach a dispensary or health centre.

2. There is the high mountain country of Kilimanjaro, Arusha, Pare, Usambara, Morogoro, Rungwe, Njombe, Mbeya, and Mbozi. Most of these areas are cooler because of their altitude and they get good rains that are reliable. Some of the areas are volcanic and have good fertile soils, but in other areas the soils are not so good. These are the areas where bananas, maize, and wheat are the main staple crops and where different beans and peas help to provide a balanced diet. These are also the areas where coffee, pyrethrum, and tea have been valuable cash crops. In most of these areas people live in a scattered settlement pattern, each family on its main shamba, but in Usambara and Rungwe there are large villages. Most areas have dense populations and so a great number of people live close to dispensaries, schools, markets, and the like. Enlarged thyroid glands are common in some of these areas.

3. There is a lot of other high mountain and hilly country which is not so fertile and well watered. Much of it grows maize as a food, and tobacco as a cash crop, and also supports cattle if there is no tsetse fly. How developed these areas are often depends on their location. The Makonde plateau and parts of Ruvuma Region, for example, are far from markets and transportation, while much of the area around Iringa is better placed. Some of these areas have trypanosomiasis.

4. There are the 'lakes areas'. These vary considerably—an area like Bukoba is different from Musoma which is different again, say, from Kyela in Rungwe District by Lake Nyasa. But on the whole they get good rains, have some cash crops, and have high population densities.

5. Then there are areas like Sukumaland which cover a large proportion of the country. Here cattle are important whenever there is no tsetse fly, and other agriculture depends upon the amount of very seasonal rain that falls. Sukumaland itself is the major cotton-producing area in the country but other areas, similar physically, are drier and do not support such useful cash crops. Bilharzia is common because of the large number of small ponds and rivers.

6. There are the arid and semi-arid steppes and plains of Masailand and Ugogo. This is very marginal agricultural land where frequent droughts give rise to famine. It is, however, good cattle-grazing country and cattle raising is the principal form of rural economy. Because of this some of the people have tended to be semi-nomadic. The population is scattered and population densities are low. Famine and malnutrition are often problems.

7. There are several other types of areas like the valleys of the Rufiji and Kilombero rivers that have their own special problems and features. However, we will not detail them all.

The purpose of listing these broad categories is that the type of rural economy—the crops that are grown and pattern of work—is nearly always a more important aspect of social life than simply 'what tribe' a person belongs to.

Who does the work?

In some areas planting of crops is done by women while preparing the soil is done by men. Sometimes the women share equally or do more of the agricultural work but then have to do other work in addition, like looking after children, preparing meals, cleaning the homestead and fetching water. Thus their health problems and needs are different from those of the men even if they are not treated differently in practice.

When is work done?
Some farm systems, say with bananas and dairy cattle, have an almost constant pattern of work throughout the year. Others, particularly where there is an annual crop (for example, maize, millet, cotton, tobacco, etc.) grown in a single rainy season every year, have very uneven patterns of work. During some periods, when planting, weeding, and harvesting are done, the whole family may work from dawn to dark every day. At other times during the dry season there may be no work at all.

We must know about patterns of work which can cause health problems. For example, in an area growing maize and millet people are often on a protein-deficient diet at the end of the dry season. A woman knowing that the busy planting season is ahead will wean a nursing child onto what is for him a very poor diet. As the rains start the child may well get both respiratory diseases and malaria—especially because of being malnourished due to early weaning. Then, because the family is so busy and transport is difficult, they may delay seeking medical care. This is particularly likely if it is a long way to the dispensary or health centre and a long wait is common before getting treated. Such a combination of factors can be very serious and often fatal.

Differences in wealth appeared in most rural areas following the introduction of cash crops and cash markets in the colonial period. Wealthier farmers often had more land and employed labourers as well as owning machinery. What should be noted is that while the wealthier usually had fewer real needs from medical services, they were in fact able to use them more often, while the poorer actually used them less, although they probably needed them more. The differences between wealthy land owners and landless peasants are difficult to eliminate and easily recur, especially where land is in short supply.

Other important differences in wealth from area to area have arisen because of their differing potential for cash crop production.

Some areas had good cash crops and their communities became relatively wealthy. Other areas have been less fortunate and the men had to travel to the sisal or other estates and to the towns as migrant labourers in order to get money. In areas like this there are many more women than men, because a considerable proportion of the men are away working. This sometimes leads to special social, economic, and health problems.

2.8 LIFE IN URBAN AREAS

Only a small proportion of Tanzanians actually live and work in the towns, but those who do usually work for a wage with which they have to buy food, clothing, housing, and entertainment. These people also live some distance from the people they work with and they thus have two broad groups of friends, those at work and those near their houses. This is quite different from the rural areas where there is generally only one set of friends. This means that the effect of public opinion may not be so strong in determining how an individual or family behaves. For those on small wages, food is often short towards the end of the month as money runs out. Housing is expensive and often overcrowded, services are heavily used and environmental sanitation tends to be poor. On the other hand better medical facilities are often nearby.

Unlike in the rural areas, the children cannot help grow food or look after animals, and they may have nowhere safe to play. In urban areas where it is quite common for both parents to go out to work this has considerable effects on family life.

2.9 LARGE ORGANIZATIONS

Many Tanzanians these days work for large organizations. These may be government ministries such as Kilimo or Elimu or Afya, or they may be parastatals such as the Bank, or private or co-operative groups. In an organization there are sets of rules governing what is the aim of the organization and what may be done or not done by people in different jobs. Some people in the organization have the responsibility to direct or control the work of others.

A hospital or health centre, as an organization, always has one person in overall charge and other people working with him. What we must remember is that a person who does not have such responsibility in an organization may not fully understand its aim. He may feel that he is not appreciated and not listened to. This can happen in the health services and it is important that manpower is not wasted through inefficient organization. It is important to understand the position of other members of the health team and try to make their work satisfying and meaningful. An organization is a way of mobilizing people to do a complex job. The health service must not frustrate those people who work for it and hence fail to do its job effectively.

Fig. 2.6 All health workers are members of the health team.

The health worker

The health worker is concerned with people. The health worker must, therefore, be involved in the way people behave and the environment they live in. Only in this way will diseases be controlled and the problems of poverty and ignorance be attacked. The health worker can then become one of the most important agents in development. He can do this by showing the people understanding, respect, and leadership, although these will only come about through studying their behaviour and their environment. Through this understanding he will gain prestige and respect from the community he is living amongst.

ALL HEALTH WORKERS ARE MEMBERS OF THE LOCAL COMMUNITY

2.10 THE HEALTH CENTRE AND THE COMMUNITY

The discussion and examples given in this chapter show how necessary it is for health workers to understand the people and their environment. By working together with the community they can play an important role in development in the area.

The people

The first requirement is to *identify* and *understand* the important local beliefs and customs that may affect whether a person is healthy or becomes ill. Question people of all ages, such as patients, medical staff, local leaders, waganga, teachers, etc., so that you can learn as much as possible about local beliefs and customs that may affect health. It may be helpful to consider beliefs and customs that relate to different 'stages' in life—*pregnancy, childbirth, infancy, childhood, early adulthood, adulthood, old age, and death*.

Divide these beliefs and customs into:

- those that promote health

- those that may cause ill-health and disease, and
- those that probably do not affect health very much.

In this way you will learn the important beliefs and customs that can help you in your work and also those that may make it more difficult.

Some of the possible effects that the family and community may have on the health of the individual will become clearer during this process. As people from different parts of Tanzania have different traditions it is important to know which are the main cultural groups in the health centre's population.

The environment

The four main aspects of the environment are:

- biological
- physical
- cultural and social
- economic and political.

Use can be made of these to identify all the environmental features that may be affecting the lives of individuals, families and the community.

Get a map of the area and draw in:

1. Hills and valleys, lakes and rivers, roads and bridges and any major features concerning communication.
2. Villages and main settlements.
3. Health centres, dispensaries and mobile clinic centres, and draw 5km and 10km circles around each.
4. Boundaries for wards, divisions and districts.

Learn about:

1. Local leaders and the power structure.
2. Local progress with villagization.
3. Main cultural and social events of the year.
4. Farming seasons and the trading of food items.
5. Nutritional beliefs and habits.
6. Local climate and rainfall patterns.
7. Water sources.
8. Excreta disposal habits.
9. Local disease vectors and animal reservoirs.

Working with the community

Good relations should be established with the political, government, and local leaders, as they can help with understanding the local people and what things they feel are important. Attending meetings, although time-consuming, can be a particularly useful way of integrating with the leaders and gaining respect for the advice and help that the medical staff can give to the community.

Attend the ward development committee meetings regularly and be prepared to help with the health problems of the area.

Chapter Three

THE POPULATION OF TANZANIA

3.1 INTRODUCTION

We have considered some of the characteristics of people and the environments in which they live, and it is now important for us to consider the total number of people in Tanzania and their distribution.

We need the following information if we want to provide basic medical services for the whole population:

- the total number of people of each age and sex
- the distribution of the population in the country
- the migration patterns

- the number of births and deaths each year
- how fast the population is growing.

The study of the population in relation to its age, sex, and distribution is called 'demography', and we need this knowledge in order to organize and plan effective medical services.

There are two main methods by which we can measure populations. One is a 'census', which is a count of everyone alive at one time. The second is called 'civil registration', which is the recording of all births and deaths soon after they occur. Both methods are used in Tanzania today, but in addition to these two main methods, special surveys asking additional questions may be made in limited areas.

3.2 CENSUSES

The idea of counting everyone in a community is a very old one and such counts have been done for 2000 years or more. Some of the earliest reasons for doing a census included finding out how many men were available to serve in an army and how many people should pay taxes. Nowadays the government requires information for many reasons concerned with planning and development, and many people besides health workers are interested in the information obtained in censuses.

There are a number of ways of taking a census. The earliest censuses were done by gathering everyone together in one place and counting them. This might work in a small community but cannot be used on a large scale. Counting the houses and multiplying by the average number of occupants per house has also been tried. This is not accurate on a large scale but is sometimes useful for making a quick estimate of the likely number of people in a village. In most parts of Tanzania if the number of houses is multiplied by five it gives the approximate number of people in the community.

The best way to do a census, which has been used for the last four censuses in Tanzania, is by going from house to house and asking for information from the heads of the households. This is a big job: it takes many people to do the counting, a long time to do all the working out, and it costs a lot of money. For these reasons it is generally done only once in every ten years. The last time was 1978, and before that in 1967, 1957, and 1948.

(The results of the 1978 census are not available at the time of writing so the figures from the 1967 census have been used throughout this chapter.)

Fig. 3.1 Carrying out a house-to-house census.

3.3 CIVIL REGISTRATION

The recording of births and deaths soon after they have occurred is done locally in a book or 'register'. These registers are supervised by the Registrar General. The entry made in the register can be copied on a special form; the copy is called a 'birth certificate' or a 'death certificate'.

Registers have been kept in Tanzania since 1921 and anyone who wished to register a birth or death could do so. In 1966 laws were passed making the registration of births and deaths compulsory in Dar es Salaam and in most of the regional capitals. After a birth has occurred a parent must go to the Area Secretary's office (or in Dar es Salaam to the Administrator General) within three months and give the names, residence, occupation, and nationality of the parents, and the name, sex, and date of birth of the child. There is no charge for making the entry in the register but the parents must pay shillings 1/- if they want to have a certificate. They may be fined if they do not report a birth within three months, and a complicated 'late registration' form has to be completed and a fee of shillings 30/- paid.

When a death is reported, the name, age, sex, residence, occupation, and nationality of the deceased must be given together with the date, place, and cause of death.

It takes a long time to establish an effective registration system. People have to learn why it is required and how and where to do it. Tanzania's system is still incomplete after 10 years. When the system improves and there are more facilities for recording and analysis, registration is likely to be extended to other towns, and eventually to the whole country.

Special surveys

Surveys may be done in special areas, or in connection with particular activities, e.g. the household budget survey, in addition to censuses and civil registration.

3.4 THE TOTAL POPULATION

At the time of the 1967 national census there were 12.3 million people in Tanzania*. The population was counted by enumerating each household in small geographically defined areas, called enumeration areas. The Central Statistical Bureau in Dar es Salaam was responsible for publishing the results, and Volume I of the Census Report gives the total number of persons in each region, district and enumeration area. The population figures for the enumeration areas covered by a health centre should be available from the district development director or district medical officer.

The percentages of the total population that were in the main age groups (0–4 years, 5–14 years, 15–44 years, and 45 years or more) are shown in the table below. Children 0–14 years were almost half of the population (44%), young children 0–4 years were about one-fifth (18%), and women in the fertile age range, 15–44 years were also about one-fifth (22%). Women and young children therefore made up 40 per cent of the whole population. There were a few more women than men.

The percentage of the Tanzanian population by main age group (1967 census).

Age group (in years)	*Percentage*
0–4	18
5–14	26
15–44	43
45+	13
Total	100

We can also show age and sex structure of the population by drawing what is called a population pyramid (see figure on page 54). The numbers of males and females in each 5-year group have been converted to percentages of the total 12.3 million, e.g. all male

* Preliminary results of the 1978 census now indicate that there are 17.5 million people in Tanzania.

young children (0–4 years) are 9.2 per cent of the total population. In a country like Tanzania which has both a high birth rate and a high death rate this diagram has a typical 'pyramid' shape. When fewer children are born, and most that are live to an old age, the shape of the diagram changes. It has a narrower base, much steeper sides, and only slopes off when many people die after about 60 years of age.

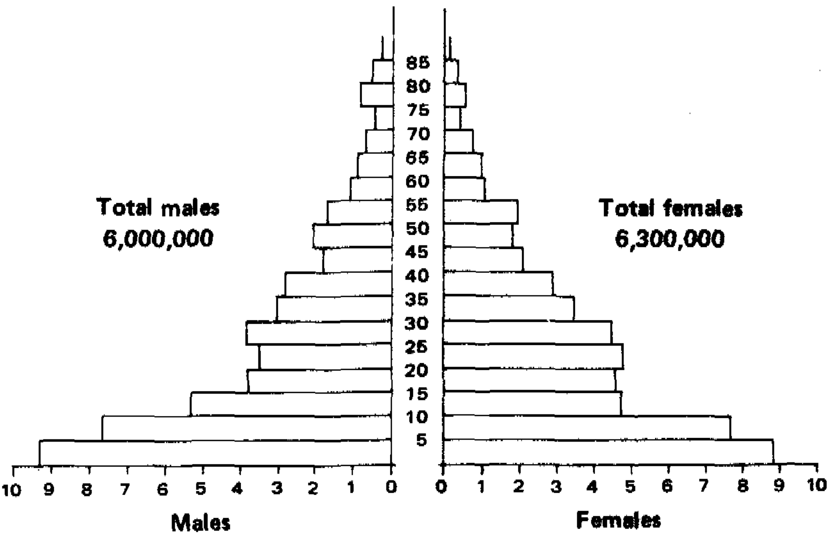


Fig. 3.2 Population pyramid for Tanzania's 1967 census.

POPULATION OF TANZANIA	
YOUNG CHILDREN (0–4 years) ARE	1/5
ALL CHILDREN (0-14 years) ARE	1/2
WOMEN (15–44 years) ARE	1/5
WOMEN + YOUNG CHILDREN ARE	2/5

This breakdown by age and sex is different in various parts of the country. There tend to be more adult males in towns and plantations where there is work. In other places there may be more old people, women, and children.

We can also study other characteristics of the population from the census reports, such as the number of people of different education levels or belonging to different religions, and their migration patterns.

3.5 THE DISTRIBUTION OF THE POPULATION

The map on page 56 (Figure 3.3) shows the average number of persons per square kilometre in each district. This is called the 'population density'. The places with a high population density are around Lake Victoria, Kilimanjaro, Usambaras, Tanga, Zanzibar, Dar es Salaam, Mtwara, and Mbeya; because people tend to be more numerous in the areas where the land is most fertile and where most development has occurred. There are 13 districts with more than 40 persons per square kilometre, and Mzizima has 450 persons per square kilometre. Some of these areas are beginning to experience problems because of too high a population density for the land and jobs available. Central Tanzania, Masailand, and south central Tanzania have low population densities.

This uneven distribution and wide scatter is very important for planning health services, especially when the district medical officer is planning for the work of dispensaries and health centres.

3.6 MIGRATION PATTERNS

We also need to know where people are born and where they move to. By knowing how people move around (migrate) we can estimate the growth (or decline) of the population in an area; we need this for organizing and planning health services.

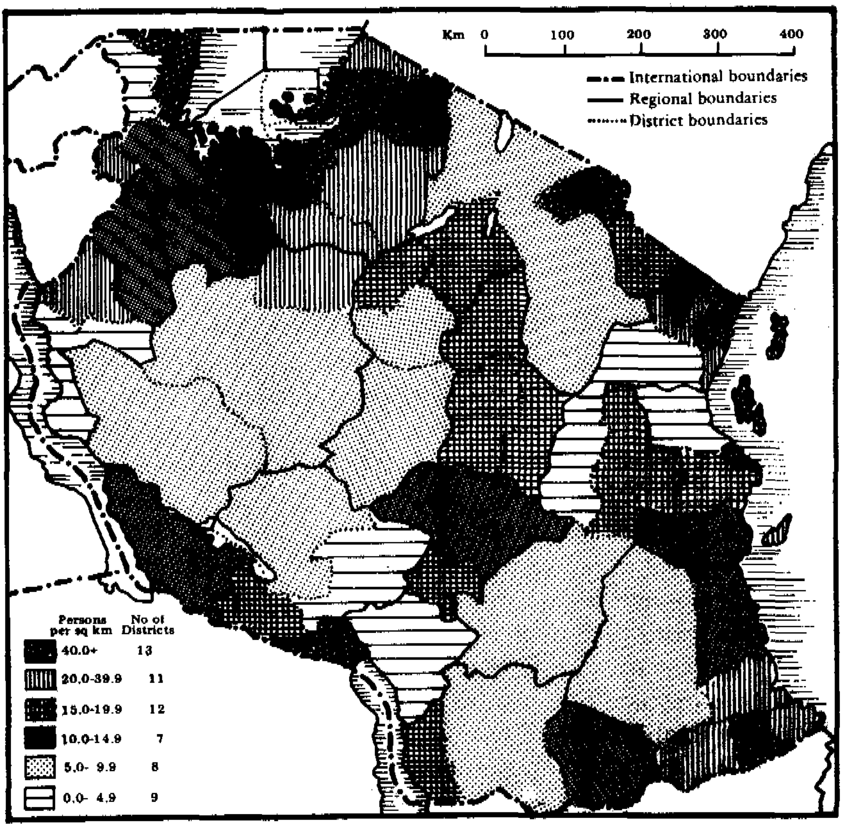


Fig. 3.3 The distribution of the population in Tanzania, 1967.

A total of 450 000 people (3.7 per cent of the total population) living in Tanzania at the time of the 1967 census had been born outside the country. Four hundred thousand of these were from countries bordering on Tanzania and they tended to be living in the peripheral regions. Many of them were refugees.

Some regions at the time of the 1967 census had many people who had come to stay—e.g. Arusha and Tabora, where over 15 per cent of the residents were born outside the region. Dodoma and Iringa had less than 5 per cent from outside. When we examine whether people stayed in the village locality where they were born, we find that 62 per cent of people in Tabora had moved away whereas only 22 per cent had moved from Kilimanjaro. More than 30 per cent of the people in Biharamulo, Mzizima, Nzega, and Pangani Districts had been born elsewhere. These figures show how people move around to find new places to live.

Large numbers of people have moved in the last few years because of the villagization programme. Most people have not moved very far—scattered families have come together and rebuilt their homes in a new village nearby—but some people have moved considerable distances after deciding to join villages a long way off.

Many of the towns had been growing very fast, even though 94 per cent of the people were still in the rural areas. On average one-third of the population of all the towns was born there, a further one-third came from the surrounding regions, and the remaining one-third from other regions.

MIGRATION OF THE PEOPLE IS HAPPENING ALL THE TIME

We must recognize the reasons for migration. Many people have moved to villages or settled in new areas to be near a development project like an irrigation scheme. There is a lot of seasonal movement of people, depending on such things as the planting and harvesting seasons for crops like maize and rice. Pregnant women very often return home to be near their parents for the delivery of the baby, and children may move so that they can help the family or go to school.

Young adult males migrate most often while the young, the old, and women remain behind. Those people who go on to secondary schools or for other training usually leave their home area to live in towns; they often then get work with a large organization or the government.

Nomadic people like the Masai move about all the time, but their movements follow a regular pattern based on the seasons of the year and where their animals can find grass and water. These people are a special problem for the health services.

Fig. 3.4 Migration—leaving the family in search of work.

3.7 BIRTHS AND DEATHS

Births

Even though we do not yet have registration of births from all over the country we can estimate the number of births occurring each year from the census figures. Around 700 000 births occur every year in Tanzania. This is usually expressed as a 'crude birth rate', or the total number of births in one year divided by the total population. Tanzania's crude birth rate is 47 births per 1000 people.

$$\text{Crude birth rate} = \frac{\text{Total births in one year}}{\text{Total population}} \times 1000$$

$$= \frac{700\,000}{15\,000\,000} \times 1000$$

$$= 47 \text{ per } 1000 \text{ population}$$

Deaths

We can estimate all the deaths in the same way and express them as a crude death (or mortality) rate; that is the total number of deaths in one year divided by the total population. There are more than 330 000 deaths per year. This is 22 deaths per 1000 people in Tanzania today.

$$\text{Crude death rate} = \frac{\text{Total deaths in one year}}{\text{Total population}} \times 1000$$

$$= \frac{330\,000}{15\,000\,000} \times 1000$$

$$= 22 \text{ per } 1000 \text{ population}$$

ESTIMATED CRUDE RATES

BIRTHS	47 PER 1000 POPULATION
DEATHS	22 PER 1000 POPULATION

The crude death rate tells us how many people out of a thousand died, but it does not tell us how old they were when they died or what they died from. To make death rates a more useful guide to health conditions it is necessary to know the age at death (age-specific death rate) and if possible the cause of death (disease-specific death rate). These two can then be combined as age/

disease-specific death rates which tell us about deaths due to a particular disease in a particular age group.

3.8 POPULATION GROWTH

The growth of the population in a country or an area depends on the balance between the number of births (and people migrating into the area), and the number of deaths (and people migrating away). Sometimes the total population of an area may actually decline.

First let us consider births and deaths. If we know how many people there are on, say, 1 January and we add the number of people born in the year and subtract the number of people who died during the year, then we can estimate the number of people there will be on the following 1 January. We can calculate this 'rate of natural increase', as it is called, by subtracting the death rate from the birth rate. In Tanzania the rate of natural increase has been 47 births minus 22 deaths, leaving an increase of 25 people per 1000 of the population, or 2.5 per cent each year during the last ten years. *It is now thought to be about 2.7 per cent. At this rate the population is expected to double its size in just over 25 years.*

THE POPULATION OF TANZANIA WILL DOUBLE IN 25 YEARS

Let us now consider migration. The number of people entering and leaving Tanzania as a whole is not large enough to affect the growth rate of the total population very much. However, if we examine what is happening in an area around a particular health centre or in a district, then migration can play a very big part in how quickly the population may increase. Since health centres are usually built in places which are developing, there is likely to be considerable migration into the area and the population for that area will grow faster than 2.7 per cent per year.

There are a number of other factors which influence the rate of population growth. For example, it is obvious that the number of women in the reproductive period of their lives controls the number of births that may occur. Demographers have therefore calculated a number of more complicated fertility rates for women aged 15–44 years.

We can draw a graph of the growth of the Tanzanian population from the early estimates of population and the figures from the last three censuses (see below). We can also estimate future growth from our knowledge of the birth and death rates. From this we can see that the population is likely to be about 17.5 million by 1980, and approximately 25 million by 1990. (See footnote, page 53.)

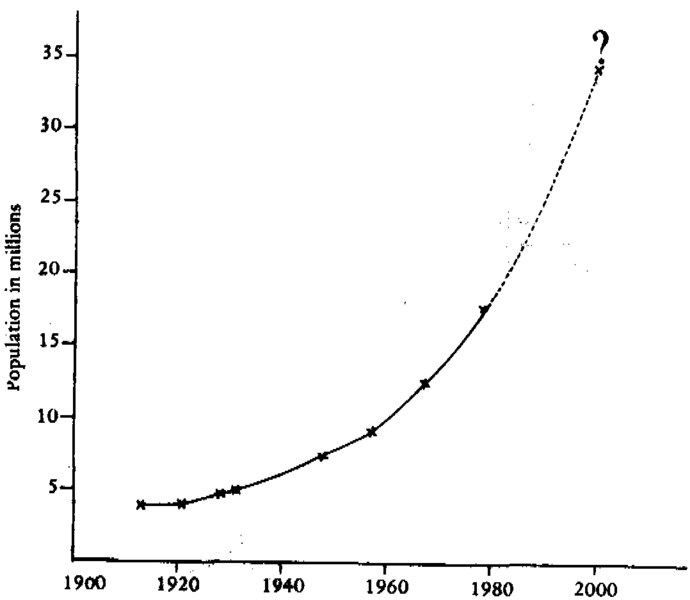


Fig. 3.5 The growth of Tanzania's population.

It is important to understand that overall population growth depends on the *differences between births and deaths*. In the past a high birth rate has been matched by a high death rate. If the two are the same there is no growth of population. If the death rate begins to fall (because of a higher standard of living, better health facilities, etc.) and the birth rate remains high, then the population increases. After the population has increased in this way, the birth rate may fall to about the level of the reduced death rate. In this case the population again becomes stable (see figure below).

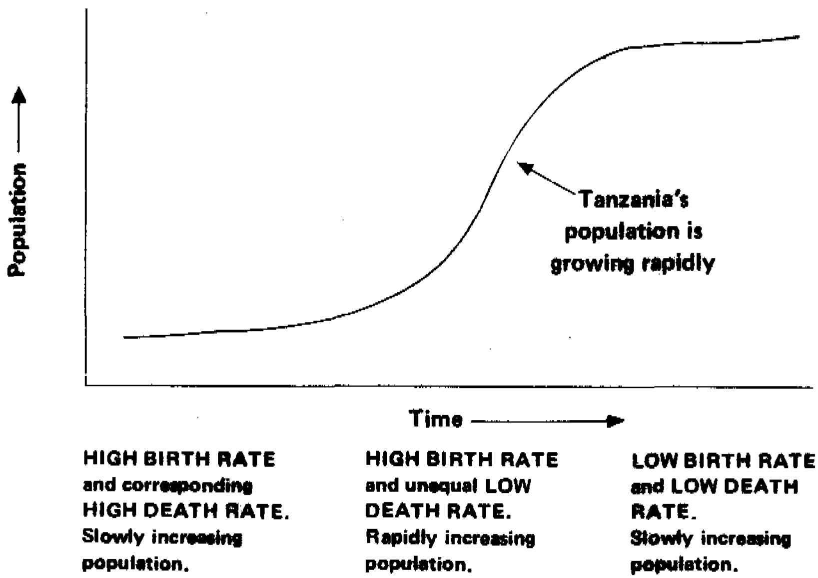


Fig. 3.6 Population growth in relation to changes in birth and death rates.

If the death rate falls (or the birth rate goes up) the population grows faster. If the birth rate falls (or the death rate goes up) the population grows more slowly. The birth rate is usually higher than the death rate so normally (except in special circumstances such as epidemics when the death rate is abnormally high); the population increases.

In Tanzania there is room for a much bigger population. The problem which we face is *not the total size* of the population *but its rate of growth*. It is difficult to provide enough food, schools, jobs, and medical services for everyone in a very fast growing population. Women who are weakened by repeated childbirth, and malnourished children who cannot go to school do not help development. Therefore the government is encouraging the development of *family planning services* throughout Tanzania. These services help families to have the number of children that they want at the time they want them.

THE POPULATION GROWTH RATE
IS MORE IMPORTANT THAN ITS TOTAL SIZE

3.9 WORLD POPULATION GROWTH

In the early days of Man's existence (about 50 000 000 years ago), when some of our predecessors lived at Olduvai Gorge, the rate of growth of the population was very slow. We think the world population 2000 years ago was about 250 million people. It then took about 1600 years for this number to double to 500 million. Since then the rate of growth has been getting faster and faster. There are now (1979) over 4000 million people in the world and this number is expected to double in about 25 years. This very rapid rate of growth or 'population explosion' is illustrated in the figure on page 64.

It is clear that this rate of growth cannot go on indefinitely, or within 500 years each person would have only about one square yard of dry land to stand on! To slow down this rate of growth either *the death rate must go up*—by for instance famine, epidemics, or nuclear wars—or *the birth rate must come down*.

There is much discussion throughout the world as to whether we should just wait and see what happens or whether, now that we have been able to reduce the number of deaths, we should also attempt to reduce the number of births.

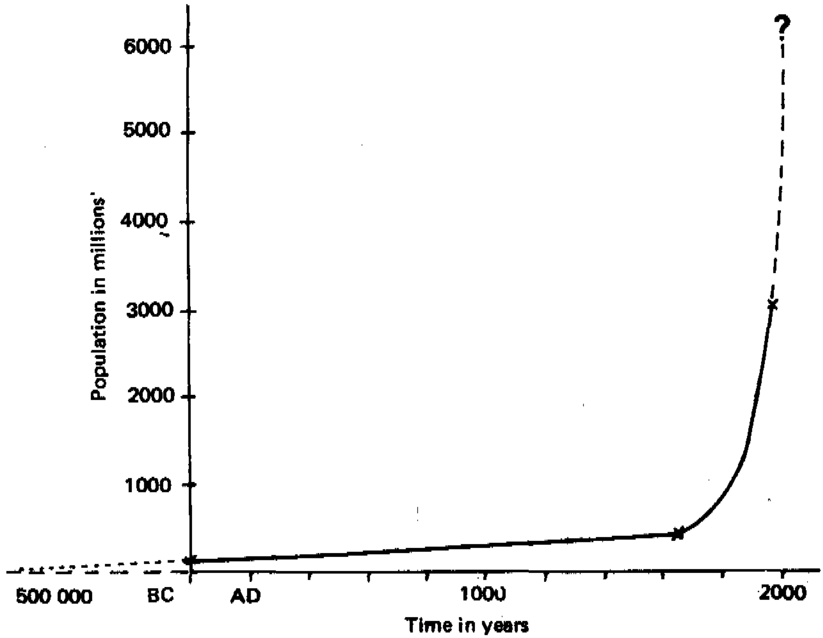


Fig. 3.7 World population: past and estimated future growth.

Many governments are developing *population policies* aimed at slowing the rate of growth of the population by trying to reduce the birth rate so that they can more easily raise the standards of living for each person.

DEATH RATE UP OR BIRTH RATE DOWN?

3.10 THE HEALTH CENTRE POPULATION

The five-year development plans for medical services in Tanzania aim at one health centre for approximately every 50 000 people and one dispensary for approximately every 7000–8000 people. The actual number of people and the actual size of the geographical area each health centre will cover will be different due to the uneven distribution of the population in the rural areas. Health centres are intended to serve the whole population, not just those who come to outpatient departments or attend mobile clinics. To prevent diseases the health centre must be concerned with the healthy as well as the sick population. Preventive measures will not be sufficient to reduce the number of new cases of diseases occurring in an area if not enough of the healthy population is being cared for (insufficient 'coverage').

> THE HEALTH CENTRE IS RESPONSIBLE FOR
> THE HEALTH OF THE WHOLE POPULATION
> IN ITS AREA

Defining the population

There are two useful ways we can define the population to be covered by a health centre. Firstly we can outline the *administrative boundaries* of the area that the health centre is responsible for. If this has not already been done, do it after a discussion with the district medical officer. The boundaries should be the same as those of the local census enumeration areas if possible. It is good to use 'natural' geographical boundaries like sparsely populated areas or a line of hills. The second way is to draw *circles around the health centre* with 5, 10, 15 and 20km radii. The distance of people's homes from the health centre makes a big difference to how often they use it, and since it takes about 1 hour to walk 5km, these circles should also indicate travelling time for the patients.

In the West Meru Rural Health Centre in Arusha District 22 000 people live within 5km of the health centre, and a further 35 200 people between 5 and 10km from the health centre (using figures from the 1967 census). Thus, a total of 57 200 live within 10km of the health centre. If we consider Kibaya Health Centre in Masai District, we find that only 800 people live within 5km of the health centre and only 1400 people live within 10km of the health centre.

These two health centres obviously have very different problems. At West Meru a large population lives close to the health centre, whilst at Kibaya people have to travel long distances to reach the health centre, and mobile clinics may have to be used to extend the coverage of the health centre services.

Determining the total population

1. *The 1967 Census.* The total number of men and women for each enumeration area covered by the 1967 census is available in Volume I of the Census Report (see Section 3.4). If the administrative boundaries coincide with a number of enumeration areas, the totals for each area can be added together. However, since 1967 very probably the population will have grown in size due to natural population increase and maybe also from migration into the locality because of the villagization programmes. The present population size can be *estimated* as follows (assuming migration has not been large):

   If the population growth rate is assumed to have been 2.7 per cent per year (27 per 1000), we can calculate

1967	1000 people
1977	1300 people

   If the 1967 population of a health centre was 50 000 people, population in 1977 would be

   $$50\,000 \times \frac{1300}{1000}$$

   $$= 65\,000$$

i.e. in 10 years the health centre population will have increased by 15 000.

With local knowledge this estimate could be modified to take into account migration in and out of the area.

This method is most suitable for estimating the total population in the administrative area, but the population within 5, 10, and 15km is probably best estimated by one of the following methods.

2. *Counting houses.* The average number of persons per household is about five, so that counting houses and multiplying by five will give an approximate estimate of the total population. However, this method can be very misleading in areas where families may have more than one house, such as one in a village and one near a shamba.

3. *Counting through Ten-cell leaders.* If the home villages of all the Ten-cell leaders are marked on a map, an approximate total population figure can be arrived at by asking each Ten-cell leader to enumerate the people in his cell. This could be a good method of enumerating the total population living 0–4km, 5–9km, 10–14 km, and 15km or more from the health centre.

Total population by main age groups

Assuming that the age structure of the theoretical 50 000 health centre population is similar to that for the whole of Tanzania (see table on page 53, and Section 3.4), the total number of people in the main age groups would be as follows: 18 per cent of the total population are young children aged 0–4 years, so that the number of children of this age in the 50 000 would be:

$$\frac{18}{100} \times 50\,000 = 9000 \text{ children}$$

The calculations would be the same for the other age groups, which gives 13 000 children 5–14 years old, and 11 000 women aged 15–44 years. (See table on page 68.)

A health centre population of 50 000 by main age groups.

Age (years)	*Total*
0–4	9 000
5–14	13 000
15–44	21 500
45+	6500
Total	50 000

Population distribution
Although a good general knowledge of the population will be built up over time as medical workers come to know the area they work in a map is very useful for planning and explaining to other people.

We can show the population distribution on a large-scale map in several ways. The distribution of the homes of the Ten-cell leaders will give only an approximate idea because the number of households per Ten-cell leader is so variable. The total number of people in each cell could be labelled on the map. Or a label with the total population of each village written on it could be put on the map at each village site.

Migration
There are not usually any figures for local migration since it is difficult to count people as they move around. If you have a good general knowledge of the area and your patients you will notice any changes in the tribal groups attending outpatient and mobile clinics and these will tell you about local population movements. The district development director and the district medical officer may have some good additional information.

Births and deaths
If we assume that the Tanzanian birth and death rates (see Section

2.7) apply to the health centre population, we can estimate the total number of births and deaths occurring in the area.

For instance:

Births

$$\frac{47}{1000} \times 50000$$

= 2350 births per year

or approximately 45 births per week.

Deaths

$$\frac{22}{1000} \times 50000$$

= 1100 deaths per year

or approximately 20 deaths per week.

Remember, however, that the local birth and death rates may differ quite considerably from those for Tanzania as a whole, and medical workers may have to modify these estimates from local knowledge.

How large an area

In practice it is very difficult to collect good figures about the whole population, unless the population density is high and they are all living close to the health centre. It is best to concentrate on particular areas, such as:

- within 5km of the health centre and dispensaries

- villages
- an area where there are particular health problems, like people working on development projects and irrigation schemes.

The other main approach is to cover particular sections of the whole population such as:

- mothers and young children (40% of the total population)
- schoolchildren
- tuberculosis and leprosy patients.

These two approaches can be combined to give manageable-sized populations that the health centre could effectively help. For instance, it might be a good plan to try to give coverage for all mothers and young children within 5km of the health centre and dispensaries, and in the large villages. Mothers and young children from outside these areas would be seen if they came, but no special efforts would be made to reach them. You could also try to reach all tuberculosis and leprosy patients in the whole population of 50 000.

Health centre population checklist

1. Obtain or draw a large-scale map of the area for the health centre and its satellite dispensaries.

2. Define the population geographically by
   (a) administrative boundaries
   (b) circles with radii of 5, 10, 15, and 20km from the health centre and 5 and 10km from the dispensaries.

3. Determine the local population within the administrative area, and within the bands of 0-4km, 5-9km, 10-14km, and 15-19km from the health centre by:
   (a) census—based on 1967 national census figures
   (b) house count

(c) enumeration through Ten-cell leaders.

4. Calculate the approximate numbers of people aged 0–4, 5–14, 15–44, and 45 years for the total defined population.

5. On the large-scale map mark in Ten-cell leaders and their populations, together with villages.

6. Estimate migration patterns.

7. Work out approximate numbers of births and deaths that should be occurring per week in the defined health centre population.

8. Define which groups of people the health centre activities are going to be concentrated on.

Chapter Four

THE PATTERN OF HEALTH AND DISEASE

4.1 INTRODUCTION

The 'pattern of disease' means the frequency and distribution of diseases and their *importance* in causing sickness and death. Many of the important diseases such as malnutrition and tuberculosis are preventable. Other diseases, however, cannot be prevented and so only curative treatment can be used against them. The important aim with this non-preventable group is to prevent the person from dying and to limit the degree of disability that he may be left with for the rest of his life.

Those diseases which are important and widely distributed in Tanzania, and for which there are effective and practical control measures, should be the ones with a *high priority* for preventive action. They are the ones on which effort and resources should be spent.

4.2 FREQUENCY AND DISTRIBUTION OF DISEASES

Some diseases tend to occur more frequently at certain ages and in particular groups of *people*. Some are more likely to occur in certain *places* in Tanzania and at particular *times* of the year. Thus the frequency of diseases can be described by referring to how often they occur in different people, in different places, and at different times.

Those diseases which are present the whole time in the community (e.g. tuberculosis and malnutrition) are called *endemic*. Those which can give rise to an unexpectedly large number of new cases (e.g. cholera and meningitis) are said to be *epidemic*. New cases of endemic diseases occur fairly regularly, but in epidemics the numbers of new cases (incidence) rise sharply. *Sporadic* diseases are those that occur occasionally and irregularly.

FREQUENCY IS THE NUMBER OF CASES OCCURRING IN A CERTAIN TIME

Here are some examples of the frequency and distribution of diseases.

Tuberculosis is an example of an endemic disease; new cases are constantly being found and it is widely distributed. It causes a lot of ill health and deaths, particularly in children and young adults.

Plague is an example of a sporadic disease that may occasionally give rise to small local epidemics. It is localized to small areas of Tanzania.

Measles occurs in young children and 50 per cent of them have been infected by 18 months of age. It occurs widely throughout Tanzania, in the rural and urban areas. Although it is endemic, the numbers of new cases may show considerable seasonal variations during the year. Measles is also likely to become epidemic for no apparent reason.

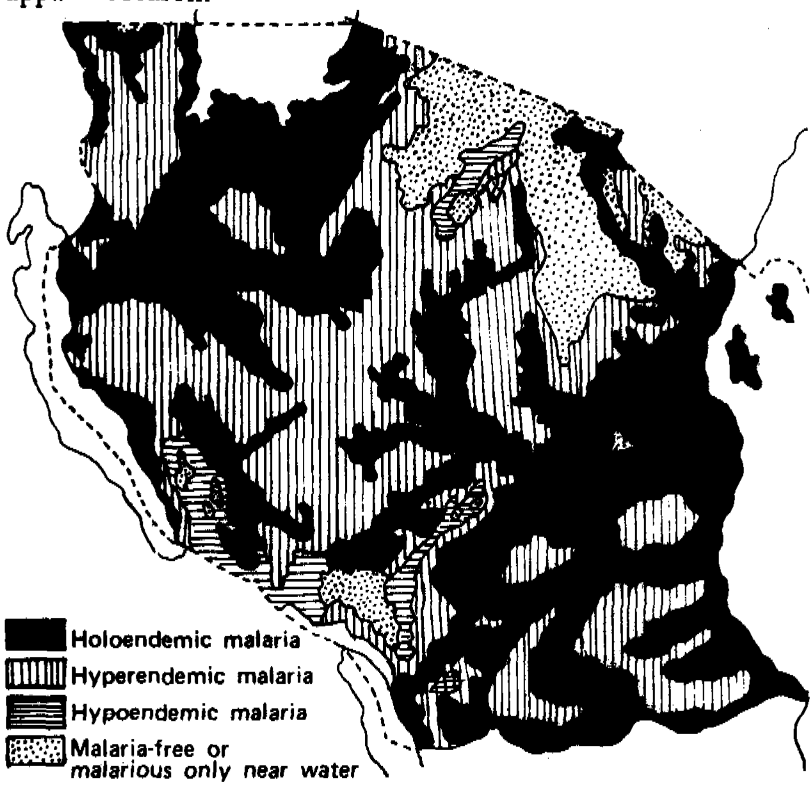


Fig. 4.1 The distribution of malaria.

Malaria is a rather complex disease. It is endemic in most parts of Tanzania, but malaria endemicity is subdivided according to whether transmission occurs all the year round (holoendemic), occurs at a high rate most of the year (hyperendemic), or only occurs at low rates (hypoendemic). The Tanzanian coastal area is *holoendemic* with a higher malaria incidence and mortality in young children. The number of cases is highest after the rains, when it is easy for mosquitoes to breed.

In some inland and higher parts of the country mosquitoes can only breed at certain times of the year (usually after the rains) and transmission rates are low. These areas are called *hypoendemic*. Malaria affects all age groups and particularly those living near mosquito breeding sites. Adults may die of malaria in a hypoendemic area while they are unlikely to do so in a holoendemic area.

Other areas of the country have an intermediate situation with high transmission rates most of the year but not all the time. These are called *hyperendemic* areas. (See Figure 4.1, page 74).

Although the tsetse fly and animal trypanosomiasis are widely distributed in Tanzania, human trypanosomiasis is well localized and only occurs in those people who live or travel in the more remote areas, such as hunters and honey gatherers. There is no particular seasonal pattern. Local epidemics may occur (see Figure 4.2, page 76).

DISTRIBUTION IS WHO? WHERE? AND WHEN?

4.3 WHICH DISEASES ARE IMPORTANT?

The importance of a disease in a community can be indicated by a combination of the following three factors:

- the number of new cases that occur or may occur — incidence
- the average duration of the illness — duration
- and how much disability and death it causes — seriousness

For example, measles has a high incidence; it occurs widely in

Tanzania and throughout the year. The duration of the illness is several weeks, or longer if complicated by malnutrition or pneumonia. It is a serious disease because it causes a lot of deaths and has many complications.

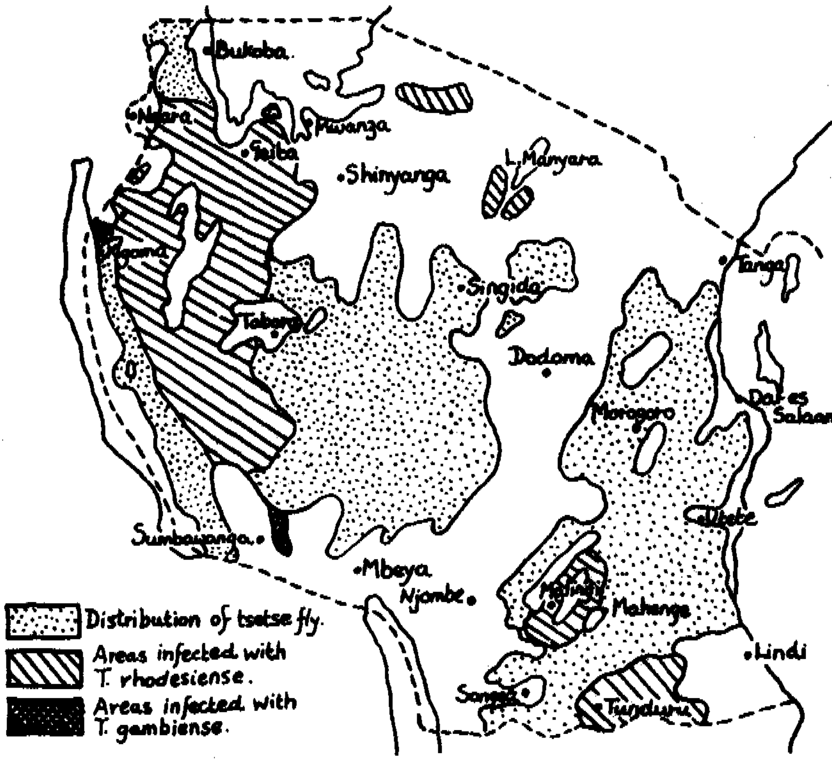


Fig. 4.2 The distribution of the vector and parasite of trypanosomiasis.

Malnutrition is frequent in Tanzania, has a very long average duration (often several months), and also has a high mortality. These two diseases (measles and malnutrition) are therefore important in Tanzania.

Common colds and skin cuts and sores also occur frequently, but they usually last only a few days and are not serious. The importance of a disease in a community may be very different from the importance it may have to an individual. The common cold, for example, may be important to a person when he feels miserable and does not want to work, but as it does not last long and is not serious, it is not an important community health problem. However, even one case of cholera would be very important to the community and the individual!

Some diseases, such as cholera and trypanosomiasis, which are not normally present in a community or country, may still be important because *they may occur there in future*—they are a constant threat and may become epidemic. For such diseases it is obviously important that the control measures are kept up to date.

IMPORTANT AND PREVENTABLE DISEASES SHOULD HAVE A HIGH PRIORITY

4.4 INCIDENCE AND PREVALENCE OF DISEASES

This will be considered again in more detail in Section 7.3, but it is important at this stage to differentiate between two different basic kinds of counting.

The number of *new* cases or events occurring over any specified period of time is called *incidence*. Examples are new cases of tuberculosis diagnosed in one year, or the number of pregnant mothers registered for the first time (new attenders) at the MCH clinics in one week.

INCIDENCE MEASURES NEW CASES DURING A PERIOD OF TIME

Incidence is the best measure of what *changes* are occurring in the disease pattern, or in the use that people are making of the services, or both.

The *total* number of cases at a particular point in time is called the *prevalence*. For example, the total number of patients on the tuberculosis register who were being treated on 1 January will show the prevalence of diagnosed tuberculosis.

Prevalence measures the size of the problem that the medical services have to deal with and is a useful measure for administrative purposes. Prevalence is of great use with the more chronic conditions that only change slowly, like leprosy, but for those diseases that have a short average duration, like measles, gastroenteritis and pneumonia, it is more useful to use incidence measures.

PREVALENCE MEASURES ALL CASES
AT ONE POINT IN TIME

The differences between *incidence* and *prevalence* can be summarized:

Incidence shows the number of new cases over an
Interval of time. It is usually used to record
Intense, short-lived diseases.

Prevalence shows the total number of cases at one
Point in time. It is usually used to record
Protracted or chronic diseases.

4.5 SOURCES OF INFORMATION

Information about people who die from a particular disease, *mortality*, or who suffer from certain diseases, *morbidity*, is usually obtained from hospitals, health centres, and dispensaries. Until recently only hospitals have been required to send detailed information to the Ministry of Health. Health centres and dispensaries have been required to report to the district medical officer some of the major diseases, like leprosy and tuberculosis, and any unusual outbreaks. Unfortunately the types of diseases and their true incidence in a district may not be accurately reflected in the information sent in by medical units, because many people who fall sick may not attend these medical units, especially in the rural areas. The accuracy of the information about those that do attend depends on how good and conscientious the medical staff were in making diagnoses and compiling the reports.

Information about mortality is only available for the deaths which occur in hospital. This is probably only about one-sixth of all deaths.

The main sources for data on morbidity are hospital inpatient admission and outpatient attendance records.

Special surveys have been carried out for some diseases, for example anaemia, malaria, leprosy, tuberculosis, nutrition, schistosomiasis, and trypanosomiasis. The Ministry of Health may also have information about some of the diseases which has not been published. Some research centres are also active, for instance in Mwanza for schistosomiasis, and Amani and Tanga for filariasis and onchocerciasis. Another source of information is from the various hospital and research laboratories. For instance, a register of all cancer patients, diagnosed on tissue specimens, is kept at the Muhimbili Pathology Department.

4.6 MORBIDITY AND MORTALITY DATA

The high infant and childhood mortality rates, together with the sloping shape of the population pyramid (see Section 3.4), indicate that a very high proportion of the deaths are occurring in the younger age groups. Much of the work of hospitals, health centres, and dispensaries will therefore be concerned with infants and children.

The following three tables show the 10 most important causes for hospital outpatient attendances, admissions, and deaths. (It should be noted that different names are used for the same conditions in different tables, e.g. enteritis and diarrhoeal diseases, gastroenteritis, and gastroenteritis (all forms). Malnutrition, which seldom occurs without complications, is recorded as defective nutrition.)

NOTICE THE FIRST THREE IN EACH TABLE

Most frequent causes of OPD attendance at hospitals in 1972.

Causes of attendance	*% of total OPD attendances (which were 7 969 610)*
1. Malaria (all forms)	13.9
2. Enteritis and diarrhoeal diseases	9.1
3. Symptoms of ill-defined conditions	7.8
4. Other diseases of digestive system	6.3
5. Accidents, poisoning and violence	5.9
6. Other diseases of respiratory system	5.3
7. Bronchitis	4.8
8. Ulcers	4.5
9. Inflammatory disease of the eye	3.6
10. Pneumonias	3.2
Total for 1–10	64.4
All others	35.6

This table shows that malaria and enteritis and diarrhoeal diseases accounted for almost a quarter (23%) of all outpatient attendances.

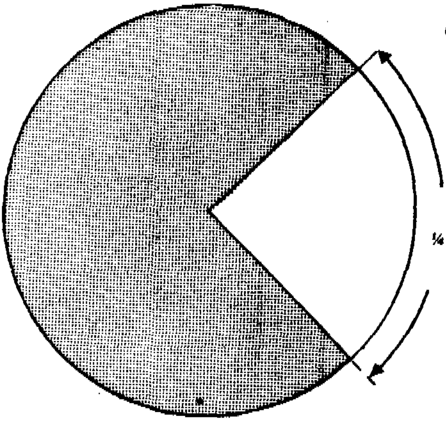


Fig. 4.3 Nearly ¼ of all OPD attendances are for malaria, enteritis, and diarrhoeal diseases.

Most frequent causes of admission to hospital in 1972.

Causes of hospital admission	*% of total admissions which were 484593*
1. Deliveries, complications of pregnancy, childbirth and puerperium	21.9
2. Malaria	8.0
3. Pneumonia	6.5
4. Gastroenteritis	6.5
5. Anaemias (all forms)	5.6
6. Measles	4.3
7. Hookworm	2.6
8. Bronchitis, emphysema and asthma	2.2
9. External causes of injury	2.1
10. Ascariasis	1.9
Total for 1–10	61.6
All others	38.4

This table shows that deliveries accounted for over one-fifth of hospital admissions, and malaria, pneumonia, and gastroenteritis for another one-fifth.

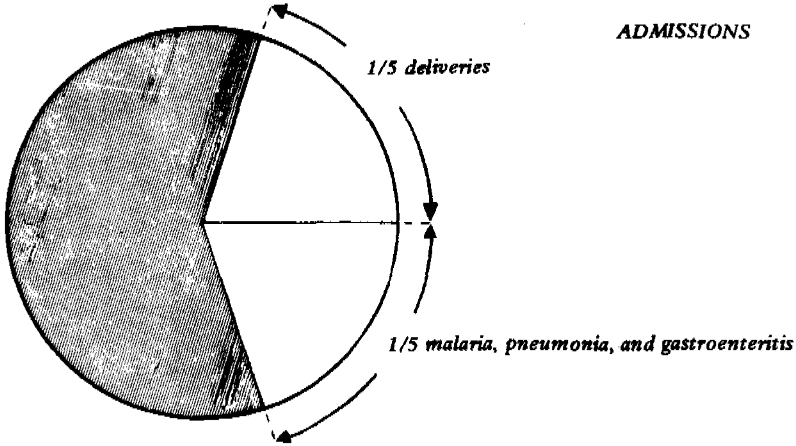


Fig. 4.4 Deliveries account for 1/5 of hospital admissions, and malaria, pneumonia, and gastroenteritis for another 1/5.

Most common causes of deaths in hospitals in 1972.

Diseases	*% of total deaths (which were 51 000)*
1. Pneumonia (all forms)	15.6
2. Measles	10.6
3. Gastroenteritis (all forms)	9.6
4. Conditions of early infancy	6.9
5. Defective nutrition	5.1
6. Tuberculosis (all forms)	4.7
7. Tetanus	4.6
8. Diseases of the heart	4.5
9. Malaria	4.4
10. Anaemia (all forms)	3.8
Total for 1–10	69.8
All others	30.2

The table of deaths in hospitals shows that over one-third (36%) were due to pneumonia, measles, and gastroenteritis.

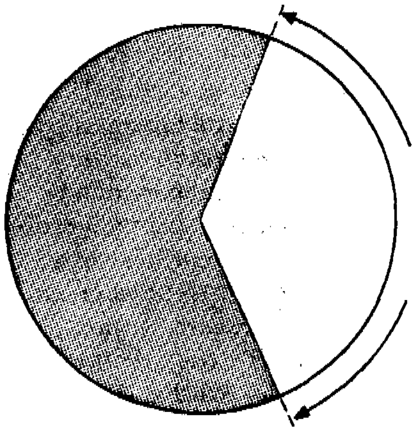


Fig. 4.5 Over 1/3 of deaths in hospital are due to pneumonia, measles and gastroenteritis.

A study of these tables, together with other data, shows two main points:

1. *Communicable diseases, complications of pregnancy, and malnutrition* are the major causes of ill health and deaths in Tanzania. MOST OF THESE CAN BE PREVENTED. The first 10 causes in each table account for approximately two-thirds of all hospital outpatient attendances, admissions and deaths.

1/5 OF ALL HOSPITAL ADMISSIONS ARE FOR PREGNANCIES AND DELIVERIES

2. There is a high incidence in all age groups of the *endemic diseases* such as chronic infections, parasitic diseases, and impaired nutrition. Of these, malnutrition, malaria, hookworm, tuberculosis, and venereal diseases are widespread; bilharzia, roundworm, amoebic infection, and filariasis are more locally distributed. Trachoma and ophthalmia cause a lot of eye disease in some areas.

The *epidemic diseases* do not usually cause a large number of cases nationally, but they always remain a hazard. Smallpox has been eradicated, but measles, meningitis, poliomyelitis, typhoid, cholera, and whooping cough are widespread. More localized are plague, trypanosomiasis, relapsing fever, typhus and rabies.

A knowledge of the local distribution is important, as the following examples show. Malaria and leprosy are uncommon in most parts of Arusha Region. Sleeping sickness is currently a problem in only five districts, namely Kasulu, Kibondo, Hanang, Biharamulo, and Ngara. Onchocerciasis is known to be endemic only in some areas of the country such as Morogoro Region, Mbinga District, Njombe District, and Muheza District. Anthrax is endemic in the cattle-rearing regions of Singida, Arusha, Dodoma, Kilimanjaro, and Shinyanga. The incidence of relapsing fever is highest in Singida and Dodoma Regions. Endemic goitre is present in Arusha, Iringa, Kigoma, Kilimanjaro, Mbeya, and Songea. When a disease is only present in some districts, a search should be made in these areas to define the distribution and look for the reasons why it occurs there. For example, endemic goitre is found in those parts of the country where the available water and vegetables do not contain enough iodine.

4.7 PATTERN OF DISEASE AT THE HEALTH CENTRE

When medical workers have a good understanding of the local people and their surroundings (see Section 2.10) and the health centre population size and distribution (see Section 3.10), they can make maps of the area showing the main geographical features, the positions of the dispensaries and clinic sites, and an indication of the population distribution. When this knowledge is available the pattern of disease should then be investigated.

- What are the 10 commonest diseases seen in outpatients?
- What is the distribution of the common diseases in the areas?
- What is the local distribution of uncommon but important diseases?

- What diseases have been epidemic in the area in the past?
- How important are other health problems, such as those associated with pregnancy and delivery, lack of child spacing, nutrition, water supplies, and poor health practices?

Sources of local information

Local knowledge is very important. Ask local leaders, teachers, medical staff and the departing medical assistant. The district medical officer and the development director may have additional information, and so may people working for Kilimo, Elimu, and Maji.

Health centre reports to the district medical officer and other organizations. Look in the files.

Fig. 4.6 Teachers often have valuable local information.

Outpatients, inpatients, and referrals

A simple analysis of the patient records may give a good idea of local priorities. After a few months' working with outpatients considerable local knowledge can be obtained, providing you ask patients where they live!

Which diseases

Particular attention should be given to the frequency, distribution, and importance of the following.

(a) common diseases like
malnutrition, malaria, gastroenteritis, measles, hookworm, leprosy and tuberculosis, accidents and injuries

(b) other locally endemic diseases like
bilharzia, venereal infections, roundworm, amoebiasis, filariasis, onchocerciasis, trachoma, tetanus

(c) the epidemic diseases like
meningitis, whooping cough, typhoid, cholera, plague, trypanosomiasis, relapsing fever, typhus, and rabies.

Keep graphs for the number of new cases seen each week for:

1. Fevers and malaria
   Diarrhoea and enteritis
   Cough and respiratory infections
   Measles
   (and any other disease that is important locally).

2. New pregnant mothers registering at the antenatal clinic
   Baby deliveries attended at health centre and dispensaries.

Outpatient records

Check how well and accurately these are being kept.

Examine the past disease reports to the DMO. How complete and accurate were they?

Could any improvements be made?

Chapter Five

ORGANIZATION OF HEALTH SERVICES

5.1 INTRODUCTION

In Tanzania the government has recognized the critical importance of well trained staff of all cadres in the development of the health services of the country. There will continue to be a great need for them. Medical assistants will be in charge of health centres and will be responsible, with other members of the health team, for carrying out all sorts of health programmes such as maternal and child health, environmental health, control of communicable diseases, and school health. They will, therefore, need to understand how the health services are organized, both at the local and the national level.

The three things that are fundamental to the practice of good community health are:

- primary and secondary prevention programmes
- good population coverage
- appropriate health services.

We have outlined the role of primary and secondary prevention in Chapter 1, and we shall give the various programmes in more detail in following chapters.

The distance people have to go to get health services is a major factor in determining how much they use them. In practice it is useful to think that not many people will go more than 10km. The figure opposite shows the percentage of people in each district who were living more than 10km away from *any health facility* (a dispensary, health centre, or hospital) in 1971. Some districts like Mafia, Lushoto, and Tanga were very well covered whilst Rufiji, Mufindi, and Masai were only covered poorly. One-fifth of the total population of Tanzania (approximately 2.5 to 3.0 million people) were not living within 10km of any health facility.

HOW LONG DOES IT TAKE TO WALK 10km?

When it comes to distance from a *hospital*, the figure on page 90 shows that apart from people in Kilimanjaro region, three-quarters of those in the rest of the company were living more than 10km away from any hospital in 1971.

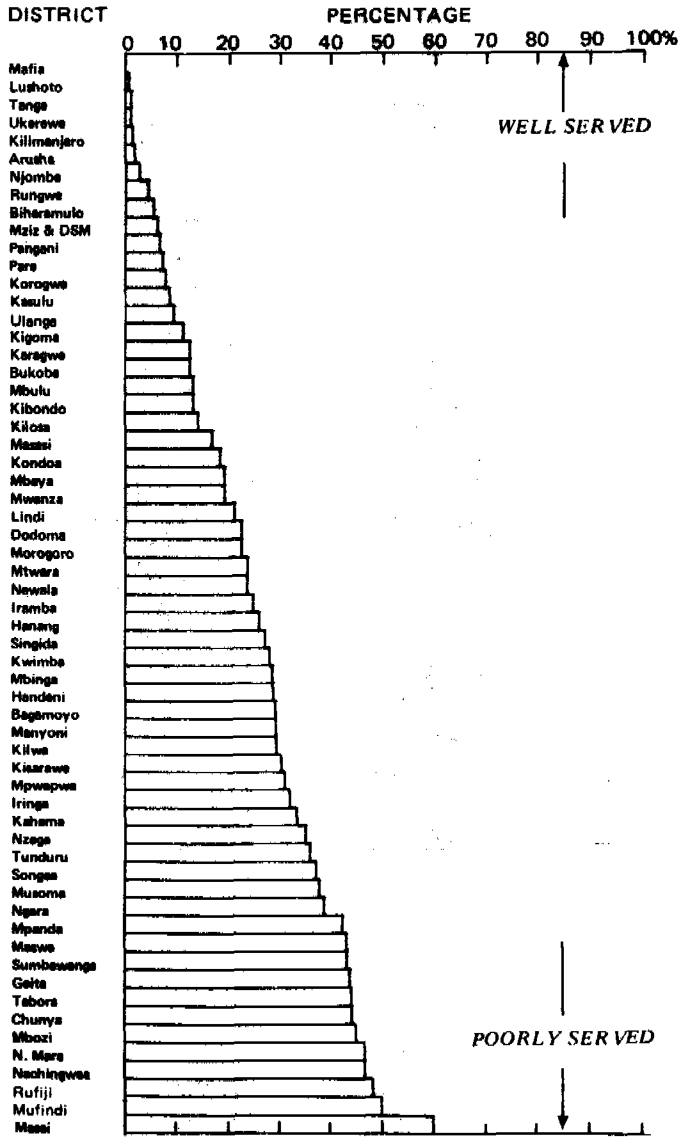


Fig. 5.1 *The proportion of the district population living more than 10km away from a dispensary, health centre, or hospital (1971).*

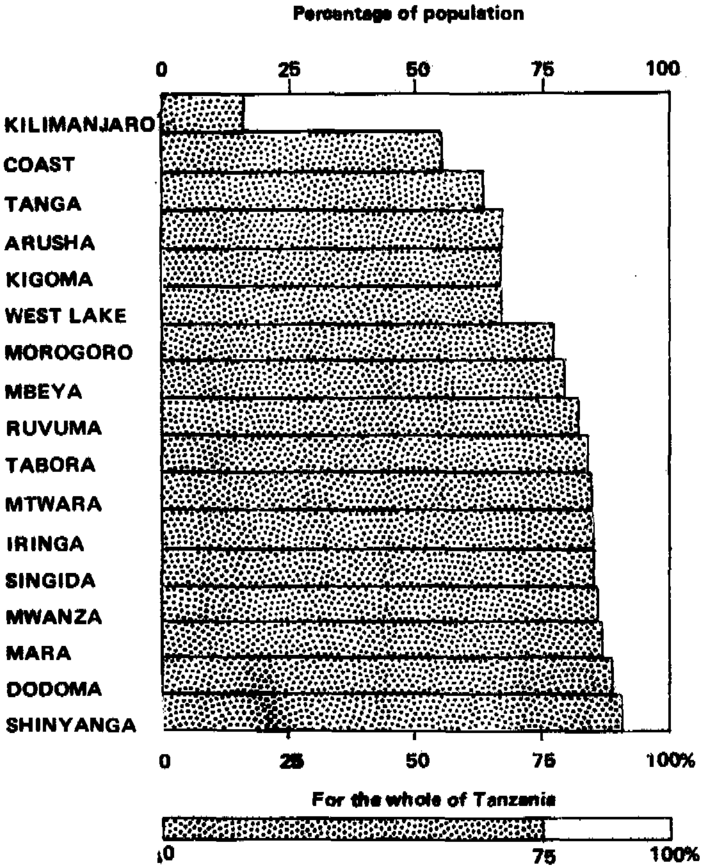


Fig. 5.2 The proportion of people in each region living more than 10km away from any hospital (1971).

There has probably been some improvement since these figures were collected, because they have already been used in planning where new facilities should be built. The Ministry of Health plans to extend the coverage by increasing the number of dispensaries and health centres. This will give nearly everyone better access to basic health services.

Ideas about delivery of health services have been changing especially in the last 10 years. We now think it more important to have more smaller units, dispensaries, and health centres, closer to where people live than more hospitals.

The modern idea of a good health service stresses two main points: firstly that preventive and curative services must work together as an *integrated* service, and secondly that the most important form of health care is *primary health care* at the village level. This means that preventive measures and early treatment can be available closer to the people's homes.

PRIMARY HEALTH CARE SHOULD BE FOR EVERYONE

5.2 THE ROLE OF MEDICAL STAFF

The roles of the medical assistant and rural medical aid are changing. Originally, they were regarded mainly as helping the medical officer, as assistants to help him with the ward routines and outpatients in busy district hospitals. The first medical assistants were trained to work in hospitals and were called hospital assistants or clinical assistants. With the change in the pattern of health services, their roles have completely changed. They are no longer just assistants to a medical officer: they are key people in their own right, medical workers with their own defined responsibilities. They are in charge of health centres and their satellite dispensaries and the health services for populations of about 50 000 people.

Medical assistants and rural medical aids may also work in hospitals, doing clinical duties or helping with special tasks like anaesthetics. They may also occasionally be involved in specialized programmes or administration. Their work is more complex and varied than it used to be. They are trained for a wider range of functions and they are also expected to act as leaders in initiating, organizing, administering, and supervising community health activities. Some of their tasks and functions in this new role are discussed below.

The work of medical staff at a dispensary and a health centre

The medical assistant is in charge of a health centre and the care of the health of the people within his area. He supervises and assists the rural medical aids at the surrounding dispensaries and the village medical helpers. He should hold staff meetings, make plans, allocate the work among the staff, and sort out any private problems among staff members.

When allocating work among the staff it is important to get the right people doing the right jobs. It is helpful to remember two rules:

- *lower the job* to the 'lowest' person capable of doing it properly
- *raise the person* to the highest jobs he is capable of doing properly.

LOWER THE JOB RAISE THE PERSON

Maintaining good *staff relations* so that work goes smoothly is a very important function. *Administration* also includes ordering drugs and equipment, keeping health centre records and statistics, and supervising the care of valuable equipment such as the Land-rover or the microscope.

The medical assistant has a great deal of *clinical responsibility*. He must be able to diagnose and treat outpatients quickly and accurately; to care for serious cases admitted to the health centre ward; to judge wisely when to refer cases to hospital; and able to manage any medical, surgical, or obstetric emergency which may arise from time to time.

He spends a large part of his time trying to solve *community health problems*. He attends the ward development committee meetings and is ready to answer questions or give advice on health to the local leaders. He should help the community to find ways and means of solving their health problems. He must supervise the maternal and child health clinics in the whole area, increase immunization coverage, and he should visit all the surrounding dispensaries regularly and assist the rural medical aid with his local problems. Medical assistants and rural medical aids work together in helping the village health worker.

This brief description shows that the work as an *organizer of primary health care* is very varied and interesting. In addition to being a competent general practitioner the medical assistant must also be a good administrator, organizer, and teacher—in other words, a leader within his own community.

> VILLAGE HEALTH WORKERS, DISPENSARIES, AND HEALTH CENTRES ALL PROVIDE PRIMARY HEALTH CARE

5.3 HISTORICAL DEVELOPMENT OF THE HEALTH SERVICE

The development of modern medical services in Tanganyika at the beginning of this century was typical of a colonial society. Thus the first known type of Western medical centre was the *hospital*, introduced from Europe by the missionaries and military people under the German administration (1888–1914). The hospital system was further developed under the British administration (1918-1961). Hospitals for a long time treated mainly government officials and the urban population, particularly the elite. Mission hospitals were gradually built in the rural areas.

No regular medical services were provided for the people in the rural areas, except by a few missionary stations, until the middle of the 1920s. Then a new type of medical centre—*the dispensary*—was developed in the rural areas in 1926 after the establishment of local government (the so-called Native Authorities which were the predecessors of the District Councils). There were 35 dispensaries in 1926 and the numbers grew to 285 by 1931.

Chiefs chose the dressers to staff these dispensaries, and they trained for 3 months in nearby hospitals. Later, in 1936, a school was opened in Mwanza for the training of rural medical aids. Also an 18-month course was started in Dar es Salaam to train medical assistants for hospital and dispensary work. This was the beginning of health worker training in Tanzania.

Hospitals and dispensaries practising mainly curative medicine remained the main medical centres throughout the colonial period, and no significant changes took place until the end of the 1950s. At that time *health centres* began to be established. Further development of the system of health centres came with Independence and the creation of a national health service under the Tanzanian government.

5.4 DISTRICT HEALTH SERVICES

The term primary health care refers to those health services which are essential for meeting the most urgent needs of the population. In the rural areas they are usually provided by village health workers, dispensaries, and health centres (see Sections 1.10 and 1.9 respectively). In Tanzania the district is regarded as the basic organizational unit for the government health services, which consist of dispensaries, health centres, and the district hospital. Village health workers are responsible to the villagers themselves and are not supposed to be under the direct control of the government.

The village health worker, the dispensary, the health centre, and the district hospital form the various stages in what is called the *referral system*. A referral system should work in both directions, but in practice relatively few patients are referred successfully. This is mainly because of the great difficulties in transportation and the fact that many patients are too weak to travel or are frightened to leave their home areas. Sick people who do want to attend hospital often by-pass the dispensary or health centre.

Fig. 5.3 Malaria prevention by the village health worker.

Village health services

Tanzania is expanding its scheme for village health workers so that each village should eventually have its own medical worker able to handle many of the urgent and minor illnesses like malaria, gastroenteritis, and skin infections, and also able to deal with environmental health, communicable disease control, and health education. The DMO will be in charge of training programmes and co-ordinating their professional activities, but the village health worker will be responsible to the village leaders.

PATIENTS SHOULD BE TREATED AS CLOSE TO THEIR HOMES AS POSSIBLE

This will not be the same as putting a dispensary in every village, but it will mean that villagers' minor problems will be taken care of nearer their homes so that often they will not have to go to the dispensary.

More importantly, the village health worker should have a constant influence on the villagers, promoting preventive measures such as protecting water supplies and controlling mosquito breeding sites. He will also be closely concerned with village development activities.

Dispensaries

The dispensary provides basic health services for approximately 6000–7000 people. These units provide medical care for the vast majority of Tanzanians. For example, more than 35 million of the 55 million total outpatient attendances recorded in all the various medical centres in 1971 were in dispensaries.

Among the main *functions* of a dispensary are:

1. Treatment of simple disease and short illnesses by outpatient and sometimes inpatient care. It also provides emergency treatment of

serious illness, until the patient can be referred to a health centre or hospital.

2. Taking part in immunization and community health programmes, including environmental health and control of communicable disease, e.g. leprosy, tuberculosis, etc.
3. Maternal and child health work, including normal deliveries (in dispensaries which are equipped for these).
4. Health education and collection of basic statistics.

The staff of a dispensary (grade A) will include:

1. One rural medical aid in charge of the dispensary (grade B dispensaries with rural dispensary assistants in charge will gradually be replaced).
2. One maternal and child health aid (MCH aid).
3. One general-purpose labourer and cleaner.
4. Sometimes a health auxiliary.

Fig. 5.4 Dispensary staff.

The number of dispensaries had increased to about 950 by Independence in 1961 and to 1430 at the end of 1971. For government planning purposes the Ministry of Health suggests, as a target for development of rural health services, that one dispensary should serve a population of 6000–7000. In some districts, like Kondoa in Dodoma Region and Newala in Mtwara Region, the populations per dispensary were about 19000 and 29000 respectively, whereas other districts in Tanga Region already had populations of 6000–7000 per dispensary. Therefore one of the main priorities in the coming years is to build dispensaries in areas which need them most urgently, such as Dodoma Region. At the same time, the M Ministry of Health intends to improve the conditions of the rural health services by increasing the number of dispensaries to 2000 by 1980, or one dispensary for about 6000–7000 people throughout the country.

A DISPENSARY FOR 7000 PEOPLE

Health centres

Health centres have been developed in Tanzania since 1958 to provide rural familes with all the basic health services they need, nearer to their homes. They were developed as units where curative and preventive medicine are practised together, because this is difficult at hospitals and dispensaries built mainly to treat sick patients. It should also be cheaper to treat suitable conditions at health centres than at hospitals.

The functions of a health centre can be described as follows:

1. Provision of curative services by providing treatment for outpatients and a limited number of inpatients (a health centre may have up to 40 beds). It also receives difficult cases sent from its surrounding dispensaries, and in turn refers patients it cannot treat to the hospital.

2. Provision of community health by organizing maternal and child health and immunization services, communicable disease control, environmental health, and health education.

3. Supervision by visiting the nearby ('satellite') dispensaries, to give advice and to co-operate in common programmes.

4. Health centre and dispensary staff will help supervise and advise the village health workers and village development activities.

The staff of a health centre will consist of:

1. Medical staff—a medical assistant in charge and one or two rural medical aids.

2. Nursing staff—B-nurses and an MCH aid.

3. Health staff—one health auxiliary.

4. Technical staff—ideally a pharmaceutical assistant, a laboratory assistant, and a dental assistant.

5. Supporting staff—a records clerk, a driver, and one or two labourers or ward orderlies.

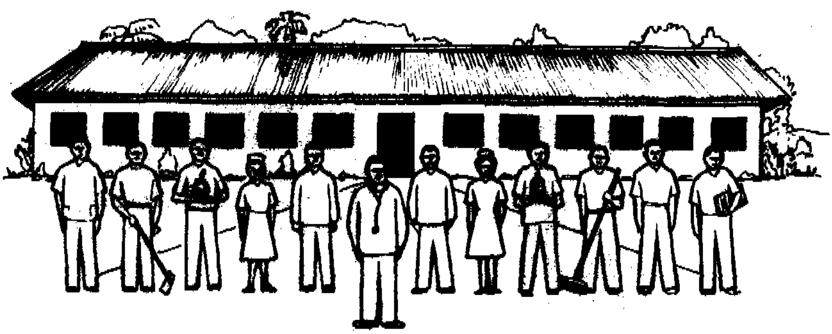


Fig. 5.5 Health centre staff.

The number of staff will depend on the size of the health centre, the population it covers, and how far away it is from a hospital.

The government target is one health centre for approximately every 50 000 people. At the end of 1971 there were 90 health centres and about 200 more were still needed. Plans for building more health centres were included in the 1975–1980, Third Five-Year Development Plan.

A HEALTH CENTRE FOR 50 000 PEOPLE

District medical services

The administrative headquarters of the district is usually at the district hospital, which at present has up to 120 beds. There are no specialist doctors at district hospitals. The hospital's *functions* can be best described by looking at the duties of a *district medical officer* (DMO), which include the following:

1. *District administration:* The title 'district medical officer' refers particularly to the officer's responsibility for *all* health centres within the district including:
   (a) supervision of all medical units (government and voluntary agency) such as dispensaries and health centres, by regular visits, supervision, and advice to the staff concerned.
   (b) organizing and encouraging community health activities such as immunization, mother and child health care, control of communicable disease, environmental health, and collection of good statistics. All these activities except maternal and child health care are delegated to the 'district health officer' and a number of health auxiliaries. In some districts separate schemes have been introduced in which specially trained people work to control one or two diseases—e.g. leprosy, tuberculosis, malnutrition, etc.

2. *Hospital work:* The DMO is responsible for organizing all medical activities such as inpatient and outpatient care, and special clinics—e.g. maternity and children's clinics, tuberculosis clinics, etc. He has general medical duties which means that he must be able to practise medicine, paediatrics, surgery, and obstetrics and gynaecology.

3. *Training:* The DMO should provide in-service training for hospital staff and, on his regular safaris, for the staff of dispensaries and health centres, and should also organize refresher courses for rural health staff.

4. *District planning:* The DMO is responsible for co-ordinating all health services planning in the district in co-operation with the district development director and the staff responsible for other development planning such as agriculture, education, and water supply.

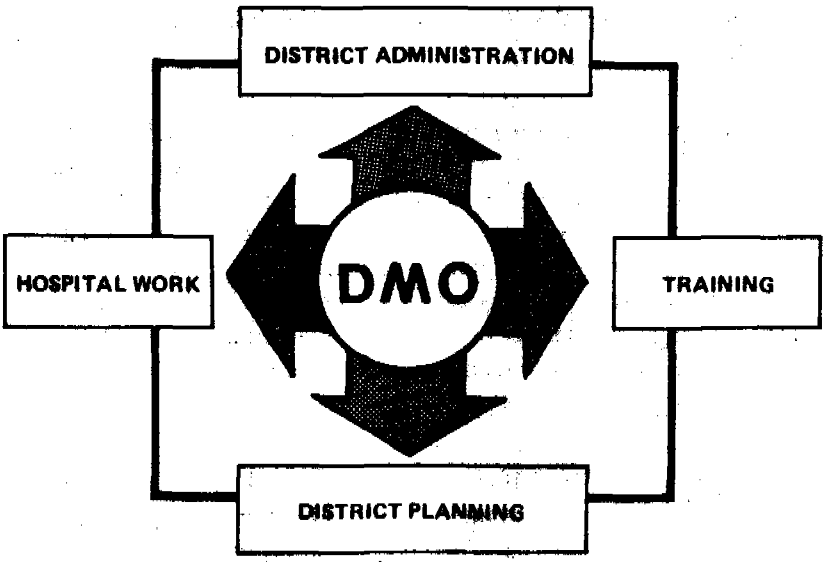


Fig. 5.6 The duties of a district medical officer.

The staff of a district hospital will include:

1. Medical staff—one or two medical officers (including the DMO) or assistant medical officers, one or two medical assistants and sometimes a rural medical aid.

2. Nursing staff—including grade A and grade B nurses, and nursing assistants/orderlies.

3. Additional staff—such as technical staff for the laboratory, Xray, pharmacy, etc.
4. Administrative staff—clerical, drivers, cleaners, etc.

Other hospitals

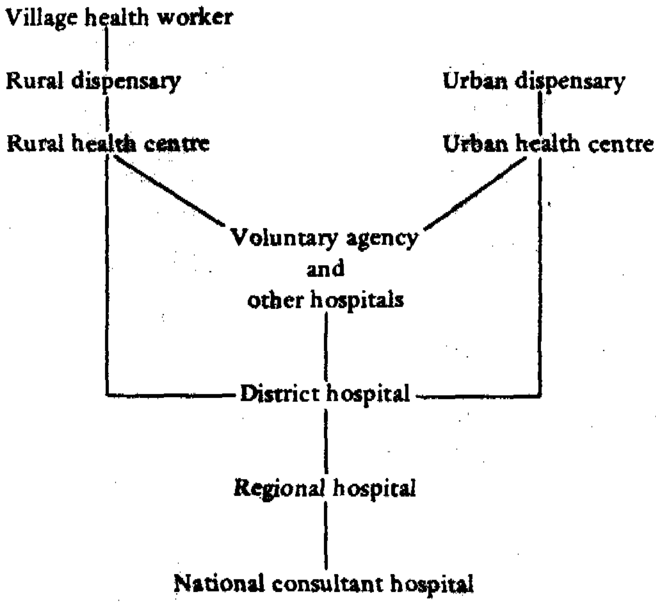
We must briefly mention other types of hospitals. The government target of one hospital bed for every 1000 population has already been reached and new hospitals are only needed to keep pace with population growth. Existing hospitals are also being improved. In Tanzania the hospital system comprises the following types of hospitals:

Consultant teaching hospitals (also known as national hospitals), which have a wide variety of specialists and facilities to treat difficult cases. There are three national hospitals in Tanzania: Muhimbili in Dar es Salaam, which trains medical students, Grade A nurses, and Xray technicians; Kilimanjaro Christian Medical Centre, Moshi, which trains assistant medical officers, nurses, ophthalmology assistants, and laboratory assistants; and Bugando Hill Hospital, Mwanza, which trains medical assistants and nurses.

Regional hospitals, which are located in the regional capital and are equipped with 200–400 beds. A regional hospital has some specialists—usually one for surgery, and another for obstetrics and gynaecology—and can therefore receive complicated cases which cannot be treated in the district hospital.

Voluntary agency hospitals which are run by non-government organizations such as churches. They usually have their own sources of money, although they may receive government grants. These voluntary agency hospitals make up quite a large part of all the hospital facilities in Tanzania.

The relationship of all these health services is illustrated in the diagram opposite:



Mobile services

The mobile health services were expanded in 1969 and 1970 to give better distribution of services in the rural areas, particularly in remote areas where there are no dispensaries or health centres. It was intended that medical workers from the district headquarters and health centres should make regular visits once or twice per month to the villages.

The functions were:

1. to care for the under-five-year-olds
2. improvement of water supplies and housing conditions
3. health education, and immunization
4. to provide treatment for minor illnesses.

They were expensive to run (mainly because of high transport costs) and organization of staff and supplies was difficult. It was also not at all certain that their work was effective. So the Ministry of Health decided not to use them very much, and to upgrade and build more dispensaries and to train more village health workers instead. Full mobile teams will therefore be needed less and less, though supervisory staff will always need to travel around and support village services.

Private medical practice
It is the government policy to discourage and control private practice. There are now relatively few private general practitioners. Their activities have been approved, and their salaries are being brought in line with government service.

Traditional medical practitioners
There are many such practitioners and their methods of treatment vary enormously. They are well respected and are allowed to charge fees for their work. There have been attempts to organize an official body to represent them, but there is no official policy for co-ordinating their activities with the government health services. Traditional midwives are also numerous and well respected.

Village health workers will have many opportunities to co-operate with traditional practitioners, but there may also be a conflict of interests in such small communities.

5.5 TRAINING PROGRAMMES

The training of *'tribal dressers'* began in 1926 and of rural medical aids in 1936. The first medical assistant school was started in 1928 with an 18-month course; and in 1936 this course was extended to 3 years. The training of nurses and midwives did not start until 1944. The cadre of health auxiliaries was introduced in 1952 and a school for assistant health inspectors was started in 1962. No training programmes for the higher cadres of medical workers such as grade A nurses, health officers, assistant medical officers, and doctors were available in Tanzania during the colonial period.

The main grades of medical workers being trained since Independence are shown in the table below.

Medical workers of Tanzania.

Entry level	*Medical*	*Nursing*	*Health*	*Paramedical*
Std. 7	Village health worker (3 months)	Nursing assistant		
Std. 7	Rural medical aid (3 years)	B-nurse (3 years) MCH aid (18 months)	Health auxiliary (18 months)	Laboratory assistant (1 year) Pharmaceutical assistant (1 year) Dental orderly
Form 4	Medical assistant (3 years)	A-nurse (4 years)	Health officer (3 years)	Laboratory technician Pharmacist Dental assistant (3 years)
Form 4	Assistant medical officer (MA + 2 years)	Nurse tutor (1 year) Public health nurse		
Form 6	Medical officer (5 years)			
Post-graduate	Specialist medical officer (MO + 3 years)			

N.B. Changes in the entry level and duration of courses occur from time to time.

5.6 MANPOWER

Manpower deals with the number of staff needed in the health services. There was always a shortage of staff in the colonial period and for some time after Independence because there were not enough training centres. In the last 10 years there have been more staff, though there are still not enough. For example, in 1975 there were only about 700 rural medical aids for over 1500 dispensaries. This meant that less than half of the dispensaries were staffed by a qualified RMA, leaving the remainder with a dispensary assistant in charge. In 1975 there were about 485 medical assistants, which is only a quarter of the number required for the future health centres and other institutions. At the end of 1975 there were slightly over 600 medical officers. In 1971 there were almost 1000 A-nurses, about 3850 B-nurses, about 150 health officers, and 350 health auxiliaries.

The distribution of staff over the country, however, is important, as well as how many there are. At the end of 1975 an estimated 60 per cent of all doctors were working in towns, particularly in Dar es Salaam. There was also an uneven distribution of the remaining medical staff over the various parts of the country. For example, Dodoma, Mbeya, and Shinyanga Regions had relatively few doctors while there were relatively many in Kilimanjaro, Tanga, and Arusha Regions.

The policy of the Ministry of Health for manpower and training is to give priority to the rural areas and the rural health staff. The number of rural medical aids in particular will be increasing rapidly, reaching about 3000 by 1980. To reach this number, 11 more training centres are to be built, making a total of 16 schools for rural medical aids. In addition, the present number of medical assistants is to be increased to over 1000 by 1980. To support the rural health services, the training of MCH aids and health auxiliaries is also being expanded. No big changes are to be expected in the number of A- and B-nurses, health officers, and doctors in the near future, as these cadres are at reasonable strength and there is not enough money to increase them also.

5.7 EXPENDITURE ON HEALTH SERVICES

Health services have to share the national budget with other ministries. In 1961 health received about 5 per cent of the total. The annual expenditure on health services then averaged Tanzanian shillings 18/- per person, but this varied from shillings 90/- in Dar es Salaam to as little as shillings 2/- in some rural areas. In 1975, this expenditure had only risen to about shillings 25/- per person per year.

From 1970/71 to 1974/75 the hospital services' share of the budget came down from 80 per cent to 60 per cent while the rural health scentres' and dispensaries' share went up from 9 per cent to 19 per cent; preventive services increased from 5 per cent to 12 per cent and training went from 2 per cent to 6 per cent.

Drugs, dressings, and medical equipment use a large proportion of the health budget, especially if they have to be imported from abroad. It is important to know about the cost of drugs, and to be careful in prescribing and using them. (Guidance on the most suitable drugs to use and details of relative prices in Tanzania can be found in the AMREF manual *Therapeutic Guidelines*.)

DRUGS AND DRESSINGS ARE EXPENSIVE

The larger the unit a patient attends, the higher the cost of caring for him. For instance, it is approximately three times more expensive to look after an inpatient for one day in a district hospital than it is at a rural dispensary. This is an important reason why the common and preventable diseases should be treated as near as possible to the patient's home (see table on next page).

The capital and recurrent cost of different medical facilities and the cost of one inpatient day (Tanzanian shillings, 1971).

Facility	*Capital investment*	*Recurrent expenditure*	*Cost of one inpatient day*
Rural dispensary	35 000	25 000	4
Rural health centre	400 000	150 000	7
District hospital per bed	25 000	5500	13
Regional hospital per bed	50 000	10 300	24
Consultant hospital per bed	100 000	19 000	50

5.8 THE VOLUNTARY AGENCIES AND THE NATIONAL HEALTH SERVICE

There are still a few private practitioners in the towns of Tanzania. There are also medical workers employed by parastatal organizations and by the occupational health services. Most of the health services, however, are provided by the government and the voluntary agencies (mainly churches), as shown in the following table (page 109), and the government provides the greater part of the rural health services.

The voluntary agencies' hospitals and dispensaries have now been integrated into the national health services. The government, realizing the need for their services, is giving financial support called 'grants-in-aid'. These grants are given according to:

- the number of hospital beds available
- the number of qualified Tanzanian staff
- the number of students training.

Several of the integrated voluntary agency hospitals now operate as district hospitals. When this happens medical services are provided free of charge, unlike many other church hospitals, which charge patients small fees for their expenses. Most of the staff in these 'designated district hospitals' are, however, usually still employed by the organization concerned.

Agencies providing health services of various kinds in Tanzania (December 1975).

Institutions	*Government*	*Voluntary agencies*	*Parastatal*	*Total*
Hospitals	62	60	6	128
Hospital beds	10 500	8500	–	19 000
Health centres	150	–	–	150
Dispensaries	1550	330	–	1850

5.9 THE MINISTRY OF HEALTH

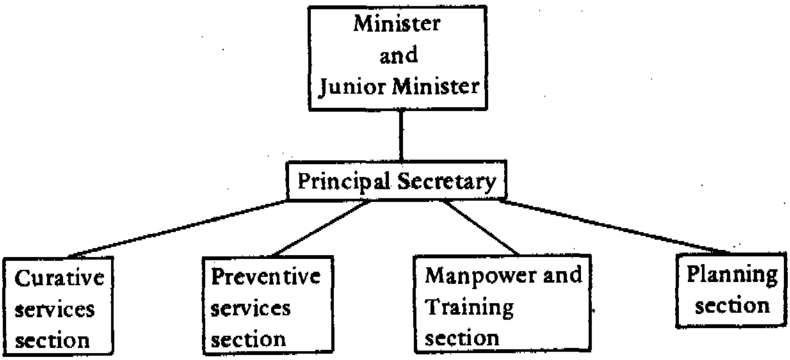
The Minister and Junior Minister represent the Ministry of Health in the Cabinet and Parliament. They are responsible for the co-ordination of all the activities of the Ministry. They have to be elected in their own constituencies and then appointed by the President before they can take office. The Principal Secretary is the head of the Ministry's administration and is the most senior civil servant in the Ministry. He is appointed and his employment as a Principal Secretary is not affected by elections, unlike the Minister and Junior Minister.

The various activities of the Ministry have been allocated to four different sections:

1. curative services

2. preventive services
3. manpower and training
4. planning.

The officers in charge of these sections, together with the Principal Secretary, form the backbone of the headquarters staff.



5.10 NATIONAL AND REGIONAL GOVERNMENT

National government

The health section is only a part of the total government administration, which covers agriculture, education, water development, rural development, commerce, industries, etc. We need to know something about the organizational structure of government administration and its workings in order to understand the operation of health services. This is particularly important for the leaders at the various levels in the health services—i.e. district medical officers and medical assistants.

The structure of government administration described here has existed since July 1972, when the government introduced its policy of decentralization and regionalization.

Government is now divided into two levels: a national and regional level. At the *national level* there are, among other things, the Cabinet of ministers, the Parliament, and the headquarters of the various services and institutions. For example, the Ministry of Health in Dar es Salaam is responsible for national health services such as those provided by the three consultant hospitals in Dar es Salaam, Moshi, and Mwanza, and in the training centres. The national authorities also issue general guidelines for the development of the regions.

Regional administration

In view of the medical assistant's and rural medical aid's positions in the rural health services, it is important that they should understand the goverment administration at the *regional level*. The policy of decentralization means that regions, together with districts, should plan and implement their local development activities as well as administer their local affairs with a minimum of control from Dar es Salaam.

In the regional organization the most important leaders are:

1. *The regional commissioner* (RC) who represents the government at the regional level and who is responsible for general policy and for political education.

2. *The regional development director* (RDD) who co-ordinates development in the region. He is the chief executive officer in the region, similar to a Principal Secretary in a ministry. In managing the regional development he is assisted by three *staff* officers and about ten *functional* officers. The regional medical officer is one of these ten.

At the *district level*, the regional structure is repeated, with slight modifications. There is an *area commissioner* (AC) co-ordinating the political and executive functions of the government within his district. The *district development director* (DDD) is the chief executive for the development of the district and provides overall leadership for the district's programme. In managing the district, the DDD is assisted by three staff officers and a small team of functional officers. The district functional officers include agricultural development, livestock, education, engineering, land, medical, and villagization development officers.

For the *ward* there is the *ward executive officer*, responsible for general policies and political education as well as co-ordination of development programmes in the villages. There are no staff officers at this level but there are a few functional officers, representing the most important ministries at a local level.

Regional and district organization.

	General policy and political education	*Co-ordination of development*	*People's participation through*
Region	Regional commissioner	Regional development director, assisted by Staff officers, Functional officers	Regional development committees
District	Area commissioner	District development director, assisted by Staff officers Functional officers	District development and planning committees
Ward	Ward executive officer	Ward executive officer assisted by a few Functional officers only	Ward development committee

To encourage the people's participation in development, the new government structure includes *development committees* at the village, ward, district, and regional levels. These committees are composed of representatives of the government, CCM, and the people.

THE PEOPLE MUST PLAY THEIR PART

5.11 RURAL HEALTH SERVICES AND WARD DEVELOPMENT

The rural health staff are mainly concerned with problems and development at the ward level. The *ward executive officer* is head of the ward. He co-ordinates the activities of the various ministries represented at this level. The main ministries are: Agriculture, National Education, Health, and Water, Energy and Minerals. All these ministries send their representatives (functional staff) to the *ward development committee*, which also includes representatives of CCM and Ten-cell leaders. This committee should meet once a month. Its main function is to discuss development priorities in the villages such as the construction of roads to remote areas, improvement of water supplies, construction of schools and dispensaries, and organization of adult education and health education campaigns.

The medical assistant or rural medical aid attending a ward development committee should present health problems there. Vaccination, health education campaigns, better nutrition, better hygiene, are the sorts of subjects to discuss at this committee. Both health staff and villagers, through their representatives, should bring proposals for health improvements in the ward to this committee.

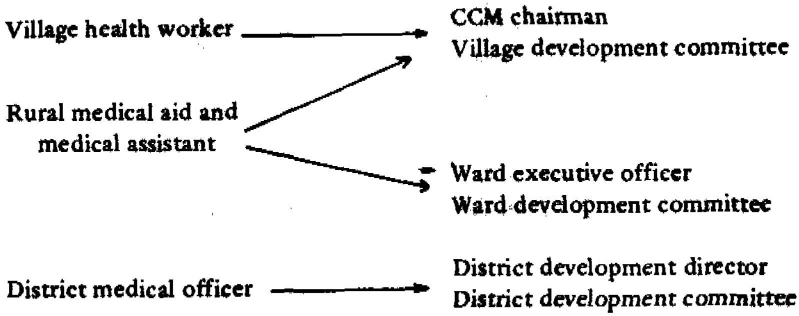
The committee itself has no funds to finance the various projects that are discussed. It used to be almost entirely dependent on self-help and locally collected money to implement development plans in the ward. Since decentralization, however, it may receive funds from the Regional Development Fund through the DDD. For example, the medical assistant may propose a certain project to the committee, such as the building of a latrine or a vaccination campaign, and if the committee approves the project it can ask for money. Since there is not enough money for everything, however, self-help schemes are still often needed.

SUPPORT YOUR VILLAGE AND
WARD DEVELOPMENT COMMITTEES

It can be seen that the health staff's position in local government administration is mainly determined by their relationship with the ward authorities like the ward executive officer and the ward development committee. In addition to these authorities, the health staff needs regular contact with the district medical officer; the DMO co-ordinates all health development in the district and he should pay frequent visits to the health centres and dispensaries for consultations and supervision. The DMO is the person particularly responsible for professional and technical problems, but the DDD and his staff may be consulted about problems to do with personnel and finance.

SUPPORT YOUR
VILLAGE HEALTH WORKERS

The village health workers are members of their village development committees. They are responsible for health aspects of village development. They are closely involved in the life of the village, so it is extremely important that medical workers co-operate with them and give them good professional, technical, and political support.



DEVELOPMENT AND BETTER HEALTH CAN GO TOGETHER

Chapter Six

ADMINISTRATION OF HEALTH CENTRES AND DISPENSARIES

6.1 INTRODUCTION

The purpose of administration in rural health services is to develop good basic health services for the surrounding community and to enable the medical staff to do their work efficiently and happily.

If the staff are to care for the whole community, and not just those people who come and ask for help, it becomes important to know the local community and the countryside, its population size and distribution, the diseases they suffer from, and how the local services have been organized. An approach as to how this may be done has been outlined in the first few chapters.

GOOD ADMINISTRATION NEEDS A GOOD KNOWLEDGE OF THE LOCAL COMMUNITY

The development of the local health services takes place at the district and at the ward level. Medical assistants and rural medical aids will be mainly involved with the ward, as was outlined in Section 5.11. They will need to apply their skills in organization and administration for the benefit of the whole ward if they are to be influential and locally important people.

The medical assistant deals with the district medical officer and with the district office about various aspects of his administration, including financial control.

The general purpose of this chapter is to consider several important areas of administration that need special attention at the local level, to make suggestions for improvements, and to give examples.

6.2 STAFF MANAGEMENT

One of the major causes of inefficiency in a unit with several staff is differences in personality, competence, and interests. The senior person 'in charge' of the unit must recognize that this is a special and important problem on which he must focus his attention. He must plan his approach so that these differences have as little effect as possible on the smooth running of the unit. For instance, two of the staff may never get on with one another. One of the nurses cannot write reports well. Another is unnecessarily severe on junior staff. The microscopist always arrives late and this annoys everyone else.

Fig. 6.1 Microscopist arriving late.

All these are personal matters that need understanding, a firm word, encouragement, or discussion before deciding on the best solution.

Allowing free *discussion* before making a decision is very important. Even the most junior staff may have good ideas and they certainly like to have an opportunity to discuss them when it affects their own work. More important, if a member of the staff puts forward an idea he is much more liable to accept the final decision if it has been discussed and argued about openly. Even the medical assistant or rural medical aid may make suggestions that, for good reasons, are not agreed to by the other staff. If there has been full discussion they can then accept the decision gracefully.

Of course, some unpopular decisions have to be made without discussion, and others may have to be made against the opinion of the majority of the staff after open discussion. These should be as few as possible for the sake of the unit's morale.

DISCUSSIONS HELP MAKE A TEAM

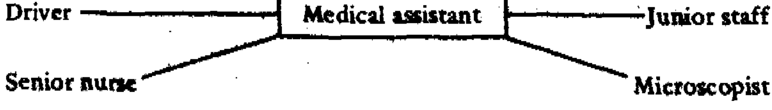
A high level of morale among the staff is important—the feeling that all are working together with one purpose, doing it well and enjoying it, and all are willing to help one another more than may be laid down by 'regulations' or 'the government'.

The medical assistant can help by recognizing everybody's place in the health team and by encouraging them in their work. Most of his daily contact may be with the nurses or the health auxiliary, but a regular talk with the most junior sweeper may be surprisingly valuable to both. The sweeper is pleased that his part in the team is recognized and he is often able to make constructive suggestions about his own and other people's work.

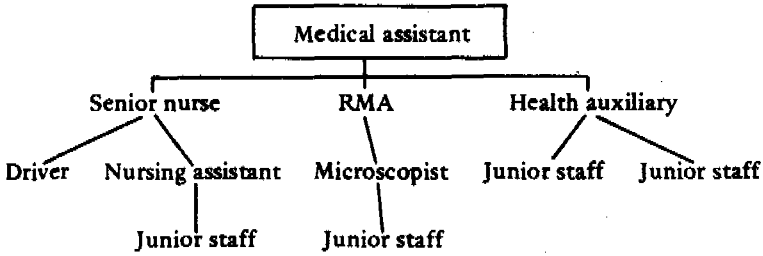
This leads to the question of an *open* method of administration. This means that all staff can come to the senior person in the unit, at any convenient time, with complaints, suggestions, or problems. In a *closed* system these matters must be discussed with the immediate head of each section who then brings the matter up at a *specific time pre-arranged for such discussions*.

The following diagrams show these two methods:

Open system (everyone has direct access to the medical assistant).



Closed system (access to the medical assistant only through their immediate senior).



The open system is less convenient for the person in charge but may give a more rapid solution to any difficulties. It is very important that section heads are consulted and informed when their juniors present ideas or complaints. A difficult member of the junior staff can easily stir up trouble if he is handled wrongly. The medical assistant should avoid getting involved in unimportant matters.

The closed system is easier for the person in charge but is less flexible and problems often remain unsolved for an unnecessarily long time.

We suggest that a start be made with the open system, but only after a full explanation to all staff, as this is not the traditional method and it is not easily understood straight away.

Alternatively a mixture of the two systems may be tried. For example, the medical assistant may make himself available to all staff, but only at a particular time of day, say 7.30–8.00 a.m.

The role of discipline in staff management is described in Section 6.14.

6.3 PLANNING AHEAD

When people are busy it is quite understandable that they think mainly about their immediate problems. They often think little about what happened yesterday unless it relates to what has to be done today. Similarly, they may not have much time to think about tomorrow while busy getting through today. This is a mistake. The person in charge needs to sit down for a short time once a week, either by himself or with one or two colleagues, just to think about what has to be done in the days, weeks, or months ahead, and even about next year. What needs to be done has to be decided and planned ahead of time.

> TO PLAN IS TO CHOOSE
> *– Nyerere*

Staff planning is vital. Are the present staff numbers sufficient for the services? What holiday arrangements have been made? Are there any particular staffing problems that might arise? Training programmes and teaching seminars for the staff will need organizing. When is a good time to have them? What should they cover? Which staff should be sent off for further training?

Discussions with local leaders and attendance at local meetings are vital if the health services are going to be involved in local development. Who needs to be contacted and which meetings must a staff member attend?

A work and maintenance schedule for the vehicle is another obvious example of the need to plan ahead. Maintaining drug supplies is another. Both of these are covered in later sections.

Dispensaries have to be visited regularly but this can only be done if time is made available in the schedule well ahead.

The DMO wants a monthly report and has perhaps said he wants all the statistics included and the report ready by the first week of the month. Someone must be put to work on this in good time at the end of each month. Then there is the annual report: it is well worth making sure that throughout the year you are collecting all the information and figures you need for this.

If buildings need repair, then details may have to be provided before a certain date, and estimates obtained. The annual estimates may provide an opportunity for the medical assistant to request further equipment for the health centre, such as a new refrigerator for vaccines, drug boxes for the MCH clinic safaris, a new earth auger. If the request is not made in time, then these items will not come for another year and the standard of service to the community may fall.

THINK AHEAD

There is a great need to look ahead, and to plan policy and changes if the health centre is going to function efficiently and keep up with the development changes that are occurring in the community.

6.4 SOLVING PROBLEMS AND STARTING PROGRAMMES

It is not easy to be a good administrator, it usually needs a lot of thought and practice. One useful way of seeing the need for good administration is when an important problem has to be tackled or a new community health programme started. The problem-solving approach is based on the following steps:

1. determine what has to be done — objectives
2. find out the facts — information
3. decide on the best solution — programme
4. put the solution into practice — implementation
5. check up on the results — evaluation

The following is a practical example of how the management of patients with leprosy might be improved.

	Action	*Example*
Step 1	Determine objectives —what exactly is to be done?	To start a leprosy programme.
Step 2	Get the facts —is it really important enough to have priority over other problems?	some RMAs have reported increasing numbers of cases during the last 2 years. Examination has confirmed that they are leprosy;
	—review previous records, reports from other stations	4 dispensaries showed a total of 13 cases in 1975 but in 1978 had 48 cases. RMAs also report that they feel many others are around;
	—find out what rules and customs apply	leprosy patients do not want to go to a leprosarium; they think leprosy is due to eating eggs as a child, or to spells being put on them; also other reasons;
	—talk with people concerned, get opinions and feelings	the people want leprosy patients sent away; health centre staff don't want to have a clinic; patients want treatment at the health centre but not at dispensaries because they feel RMAs don't know about leprosy;
	—what is available (money, staff, accommodation, transport)?	there is no extra money; the health assistant will help, and of course MA; the DMO will give his Landrover once a month to hold clinics in the dispensaries; government provides drugs free.

	Action	*Example*
Step 3	Decide on the best solution —fit the facts together	there is a need; it is going to be difficult to persuade all groups to agree to this; it is going to be possible to get something started as transport is available;
	—what alternative actions can be taken? Which is the cheapest one? Which method will people accept easily?	(i) do nothing; (ii) ask DMO to help (he won't; he's too busy); (iii) it will be cheaper when all RMAs are good at leprosy management so that regular visits are not necessary;
	—are all necessary equipment/staff available? If not, when will they be?	MA and HA able to start visits immediately; drugs will be obtained from DMO; he will give his vehicle when needed;
	—has official approval been obtained? Do the staff agree?	DDD and DMO agree; RMAs all agree except one; local leaders, after a very long meeting, have agreed to it starting, but two of them do not agree; all the health centre staff now understand (the arrival of the RMO, quite by chance, helped, as he discussed the whole subject).
Step 4	Take action (implementation) —inform immediate senior, all staff concerned, the authorities, the people	all informed and meetings held;
	—appoint leaders and supervisors	CCM chairman appointed leaders in each of the four worst areas;

	Action	*Example*
	—stimulate enthusiasm for the job, supervise, keep an eye on progress.	all RMAs encouraged to make special efforts; 2 CCM chairmen who are very good public speakers have held meetings to support it;
	—when problems start, don't lose faith	unfortunately three patients developed severe reactions to DDS at one dispensary and one died; the others are recovering in hospital but 20 fewer patients turned up at the dispensary for several months.
Step 5	Check results (evaluation) —have the objectives been achieved? How could improvements be made next time?	127 patients now attend but there are no patients from 3 villages where cases have been seen; drug reactions should have been foreseen and arrangements for dealing with them made with DMO; a seminar should have been held with RMAs and DMO as some silly mistakes have been made that could have been avoided. Give a word of thanks to all concerned.

Now let us consider another example where these steps were not taken.

The health auxiliary reports briefly to the medical assistant that the health centre incinerator is not working and asks if he can go ahead and get it mended. The medical assistant, who has just been shown a sputum smear by the microscopist and thinks it shows plague bacilli, tells him to carry on. Four months later the medical assistant gets a note from his DMO asking him to explain a bill for shillings 1128/- for 'repairs' at the health centre. After a week the medical assistant finally discovers that this refers to the incinerator. He finds that the work has not been done but the bill has already been paid. On further investigation, he finds that the incinerator has not been used for nearly two years, and that the staff burn all the refuse in a pit every day quite satisfactorily. Even if the incinerator was repaired they would not use it as the nurses complain that the smoke blows straight into the labour ward. The keen health auxiliary, without consulting junior staff, had gone ahead on the instructions of the medical assistant and efficiently obtained a contractor, got an estimate (shillings 1128/-), and ordered the work to be done. The contractor had sent in the bill but not done the work.

It may be useful to check the steps that could have been taken in this example against the list on problem solving above.

6.5 THE DMO AND LOCAL LEADERS

A great deal of what the medical staff do needs the support of the DMO and the co-operation of many local leaders, such as Ten-cell chairmen, the area commissioner, school teachers, NUTA personnel, and so on.

The DMO should be making regular visits to the health centre and dispensaries to see the staff, learn what is being done, see problem patients, improve clinical and administrative techniques, and check up on certain details. The staff *should try to make the best use of these visits*. This is the time to bring up any difficulties. It is so easy to forget details that it is wise to make a list of questions for the DMO (of course the medical assistant should have tried to solve some of these problems himself before the DMO's visit). Keep a list and add problems to the list when they arise—not on the morning the DMO is due to arrive.

The new microscopist has no Ziehl-Neelsen stains. Could the DMO obtain some for him? The health auxiliary is a very good worker but about once a week he goes off and gets drunk so is not fit for work the next day. What can the DMO advise? There seems to be a lot of dental caries in the area. Can anything be done? Twelve patients have appeared in the last month with photophobia, bleeding gums, pain in the feet, and cough. Has the DMO any ideas?

Such problems can be put to the DMO. He may not know all the answers but if the medical assistant has gone as far as he can with each one he is entitled to ask for assistance.

The local leaders need to be sought out and asked for their help and advice. It is better not to wait for them to come with complaints first. Their help is essential for any group activity, like latrine building, an immunization campaign, or better school meals for the children. You will often have to persuade them or explain to them medical needs that they do not understand. This happens particularly when what needs to be done goes against their beliefs or customs—the misunderstandings we meet about leprosy are a good example of this.

Of course some local leaders may be difficult, though most are helpful. The MA and RMA must get to know them and plan to do what they believe will be best for the whole community.

ASK LOCAL LEADERS FOR HELP AND ADVICE

6.6 STAFF TRAINING

There are two main kinds of training for medical workers, *basic training* before the job starts, and *in-service training*, which continues whilst the person is at work. New medical ideas and techniques are developing so quickly that it is no longer possible to learn all that is necessary in one basic course. So *staff supervision and in-service training become very important*. It is now necessary for all medical workers to keep on learning new ideas and techniques throughout their working life.

GOOD SUPERVISION IS PART OF IN-SERVICE TRAINING

Basic training is organized by one of the main schools of the Ministry of Health, but students may come to your health centre or dispensary to see the kind of work they will do and how it is organized. We should all be willing to teach our colleagues. For instance, some of the training of village health workers could be undertaken at dispensaries and health centres.

In-service training should be provided for all members of the health team. Junior workers such as clerks, sweepers, and drivers will all need to be trained while they are doing the job. Training will also increase the pleasure they get from their work and add to their loyalty to the health services. Nurses, health auxiliaries, rural medical aids, and medical assistants will all benefit from the training that comes from careful supervision and encouragement of their work.

IN-SERVICE TRAINING IS NEEDED FOR ALL HEALTH WORKERS

Training seminars for the staff are nearly always very popular. They may be organized by the DMO for the whole district and may cover such things as:

1. discussions on difficulties that may have arisen
2. new programmes, such as family planning
3. improving diagnosis of some uncommon diseases

4. learning about new treatments and drugs

5. proposals for new health service developments in the area

6. relevance of recent CCM policy for ward development.

Another useful way of training is to release one member of staff for a week or so to attend a training programme organized elsewhere, on something like leprosy and tuberculosis control. He can then come back and instruct his colleagues. Another possibility is for staff to change places for a short while. An RMA working at the health centre can relieve another RMA at a dispensary; the dispensary RMA can come and work at the health centre. Similarly, an MCH aid can benefit from time spent at the health centre or dispensary.

6.7 TRANSPORT

Good transport is absolutely essential for carrying out community health programmes. It is just as essential as the microscope in the laboratory.

Good transport is so vital that considerable care must be taken in organizing its use. It is the only way by which health centre staff can supervise dispensaries in their area and therefore serve the whole of the population.

TRANSPORT IS ESSENTIAL: LOOK AFTER IT WELL

The health centre will almost certainly have only one vehicle and plans for its use must allow for the following times when it may be away:

- visits by the supervisory teams (e.g. the team of medical assistant, nursing staff, and microscopist)
- visits to investigate problems in certain areas, or to hold special meetings
- regular mobile clinics
- emergency cases to be transported to hospital
- regular servicing of the vehicle.

There may also be other calls on its services. It may be valuable to make out a monthly plan for use of the vehicle. A planned visit to a dispensary or mobile clinic that is cancelled at the last moment may cause considerable distress to patients who have come a long way to see the visiting team, and this can happen if only one vehicle is available. Some people feel that at least two vehicles are necessary if such regular commitments are made. Transport costs are very high, however, and present government policy specifies that mobile clinic activity should be reduced in order to save money.

The driver of the vehicle needs to be supervised regularly. Is he driving carefully at all times? Does he maintain his vehicle properly by doing regular checks on the battery, oil, radiator water, petrol, and tyre pressure? These should be done every morning before the vehicle is moved. The pressure in the spare tyre should be tested from time to time and certainly before a long safari. Is the jack in the vehicle at all times? The medical assistant in charge must make it his duty to know about these things and investigate them himself occasionally. The driver should usually be responsible for the regular service checks.

The driver should keep the log book up to date but the MA should check it to see the various entries are correct.

Drivers are just as human as the rest of us but exposed to more temptations than most other people. Controlling one of the few vehicles regularly visiting rural areas may give them a feeling of importance and power that some of them may abuse. In general it is better to trust the driver (as other staff), even giving him extra responsibility that he does not expect, than to check up on him so closely that he feels like a criminal. If you do this he may behave like one. Try to build up mutual confidence with him, but do not forget the temptations he has to make extra money illegally.

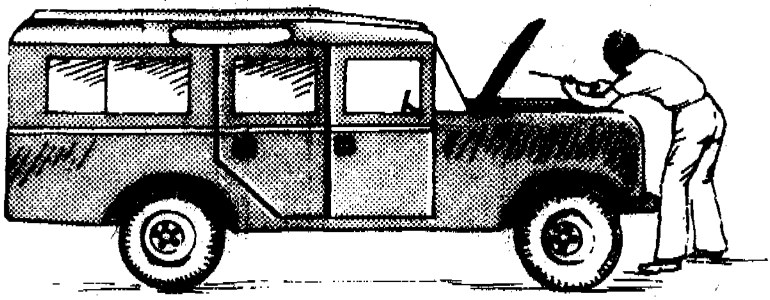


Fig. 6.2 Driver making checks on the Landrover.

6.8 RECORDS, LETTERS, AND REPORTS

Reporting on MCH is described in Chapter 14.8.

OPD patient record
The name, address, age, history, examination, laboratory test results, treatment, and the appointment for the next visit have to be recorded. These records are generally kept according to *number*, and the patient keeps a *number card* with his name, which enables his record to be found in the OPD files.

In general people should be seen in the same order they arrive at the OPD in order to prevent complaints of favouritism, but the staff should check the line of waiting people a few times each morning so that no seriously ill patient has to wait for three hours before being attended to. On the other hand, pressure from important local figures for priority in treatment can be difficult to manage, and no hard and fast rule can be made for dealing with this problem.

ENCOURAGE GOOD RECORDS BY USING THEM

Daily attendance register
This is kept in order to record the number of different diagnoses made each day; it applies to first visits only. This information is used for the monthly *disease statistics return*. This also includes inpatient statistics.

Injection register
This is kept in the injection room for recording all injections. It is an excellent means of checking on the use of antibiotics. A regular check of the injection register may tell you whether too many injections have been given where tablets might have been sufficient (for example with penicillin, chloroquine).

Penicillin vials can easily disappear, so it is worth checking on them in several ways. Let all the staff know you are doing it.

Inpatient cards
A filing system similar to that for OPD cards must be kept so that previous inpatient records can be found if patients are readmitted. Make sure the diagnosis is written down, as well as symptoms and signs, laboratory results, and some day-to-day progress comments. Let qualified medical staff write medical details, if possible. Let clerks write data, names, addresses, and copy these again from OPD records onto laboratory forms. Clinical staff should not have to copy routine data onto other forms, as this is liable to make patients wait unnecessarily.

Referring patients

When patients are referred to a hospital a letter should be sent with the patient giving his name, age, a brief clinical picture, and what treatment has been given. Treatment details are the most important of all.

Fig. 6.3 Referred patient with letter to the DMO.

Day and night reports

These are written by the senior nurse on duty. The medical assistant should read them carefully and follow up points as necessary.

Notifiable diseases

Remember about notifiable diseases. Remind your recording staff to inform you immediately if any notifiable diagnosis is made.

Files and letters

As there is normally no office clerk and no typewriter in a rural health centre the medical assistant will probably write all the letters himself. There will be hardly any confidential correspondence but he needs a lockable drawer for occasional confidential letters or reports.

The medical assistant is also responsible for filing.

All letters on the same subject, even if written to different addresses, should be on the same file. In this way one keeps all related correspondence together. (A letter about the RMA may be written to the Ministry, another to his former station in Kilosa, and another to his new station after transfer to Bukoba.) On the other hand, one may write to the same address on various different subjects. In this case each subject should have a separate letter, each being filed in a different file. This is the only way in which a matter can be properly dealt with and recorded. So one letter is written about the annual increment of the driver, and another letter on the annual increment of the nightwatchman. Put the subject of each letter under the letter-head (address) and underline it. *Letters written about one subject, and the incoming answers, are all put in the same file.*

Number each page in the file at the top on the right with serial numbers. Every incoming and outgoing letter has its fixed position and number, which should not be changed again. Each file should have a file number, e.g. File No. 1: General policy; No. 2: Monthly returns; No. 3: Annual returns; No. 4: Estimates; No. 5: Allocations; No. 6: Transport; and No. 7: Equipment. Make at least two carbon copies of each letter. Carbon copy No. 1 goes into the appropriate file. Carbon copy No. 2 goes into a serial file, in which copies of *all* outgoing letters are kept, no matter what their subject. So, the second carbon copies of *all* letters are kept in the serial file in the order they were written. This is extremely useful in order to be able to check correspondence that cannot be found, for whatever reason, in the main files.

Carbon paper and writing paper cost relatively little, but rewriting an old report takes time and labour. So, if in doubt, it is always better to make an extra copy of a letter or a report which may be needed in the future.

Fig. 6.4 MA writing a letter with two carbon copies.

Handing-over notes

On leaving a unit handing-over notes are written that give a general short review of the unit, its history, present operations, financial situation, staff, transport, and buildings, with references to file numbers and file entries for detailed information. Include references to important recent circulars from the Ministry, or district administration. A summary must be written of outstanding questions, or problems that the incoming medical assistant will probably have to face soon after his arrival.

6.9 FINANCE AND BUDGETS

Budget allocation

Money is given through an *allocation*. This is a sum of money that the district development director provides for the medical assistant to cover expenditure within a stated period for a certain group of things. Such a group of things is a subhead (or 'vote') such as water, transport, or uniforms. The sum is actually allocated on a special form sent from the district office.

Information about allocations and other aspects of financial matters can be obtained from the financial staff of the district office. Monthly returns are made to this office and salaries paid there.

Payment vouchers and local purchase orders

Nearly every payment in government service is made by a *payment voucher*, not in cash. This is an authority to the local treasury to pay the supplier by government cheque, which the supplier can then cash at a bank. To make an official purchase (unless it is very small), a *local purchase order* (LPO) has to be completed. After the delivery of the goods, a copy of the LPO has to accompany the payment voucher.

Vote control—keeping the accounts

Vote control is a term for the regular checking and handling of the amounts of money in the various subheads. It is fairly simple to work out the sums remaining if proper records have been made and entries have been kept up to date. For example, in checking on a particular subhead, first add up the amount spent already in the current financial year. If this is subtracted from the allocation it gives the *gross balance.* It is also important, however, to know what the *commitments* are, e.g. outstanding LPOs. These are the sums of money expected to be spent on goods already ordered but not yet received—the outstanding obligations or liabilities. Then if the commitments are subtracted from the gross balance this gives a figure for the *net balance*, which is the amount actually available for further purchases. An example would be:

Allocation for the subhead 'Transport'	
1st July–31st December	Shs 10 000
Paid on petrol, garage bills till 30th September	Shs 6000
Gross balance	Shs 4000
Less commitments for spare parts not yet received, total	Shs 1000
Net balance	Shs 3000

For *salaries and wages* a salary or wages sheet is prepared, stating the names of the employees, rate of payment, and the number of days each has worked during the month or fortnight.

Every month a ***monthly financial return*** has to be completed stating expenditure during the month on each subhead. It is sensible to include both gross and net balances in it. Remember that commitments for labour are often overlooked—the staff have to be paid until the end of the allocation period, unless, of course, notice of termination of employment has been given.

Estimates

These are proposals for expenditure during the next financial year. They are requests for money and the medical assistant may be required to submit them in writing for his unit.

The estimate for any particular subhead will rarely be less than the previous year's allocation. If an increase is requested *it is necessary to support it with a detailed explanation as to why the increase is necessary.* It is really worth taking time over this and doing it well, or the request may be refused.

Petty cash and the imprest account

Petty cash is a small amount of money kept in every unit to make payments of small sums for which it is inconvenient or impossible to make payment vouchers. For instance, a separate payment voucher would not be used for shillings 5/- worth of firewood.

Petty cash for such purposes is usually made available by an *imprest account.* (This system may not be in operation everywhere.) A fixed amount is permitted, say shillings 300/-, which can be held for payment of small sums. These have to be accounted for and then the full sum of shillings 300/- can be replenished at the local treasury when necessary.

For example, the DMO informs the health centre that a sum of shillings 300/- is agreed for the imprest. The medical assistant then presents the necessary documents authorizing this to the local treasury and obtains shillings 300/-.

Over the next few days he buys:

30 oranges	Shs 10/-
4 loads of firewood	Shs 20/-
A padlock for the store	Shs 7/-
	Shs 37/-

He then has shillings 263/- left. He then lists the items purchased on a payment voucher and fastens all the receipts to it. The receipts may have to be thumb-printed by illiterate traders and then witnessed by one or two other people. The whole document is then presented to the treasury and the shillings 37/- collected, making the imprest up to shillings 300/- once more. Only certain items can be purchased on the imprest account and it is important to find out locally what these are, as they may vary from place to place.

Warrants

Travel warrants are documents by which the government guarantees to a transport company to pay the fare for a staff member to whom the warrant has been issued.

Remember that LPOs, payment vouchers, and warrants are *security documents:* they represent money. They should therefore be kept locked up, and the key usually held by the medical assistant.

6.10 BUILDINGS

The maintenance of the buildings of his unit is the responsibility of the medical assistant in charge. He must note the problems—leaking roofs, broken toilets, redecoration due—and report them to the local Ministry of Works representative, who is responsible for the actual repair.

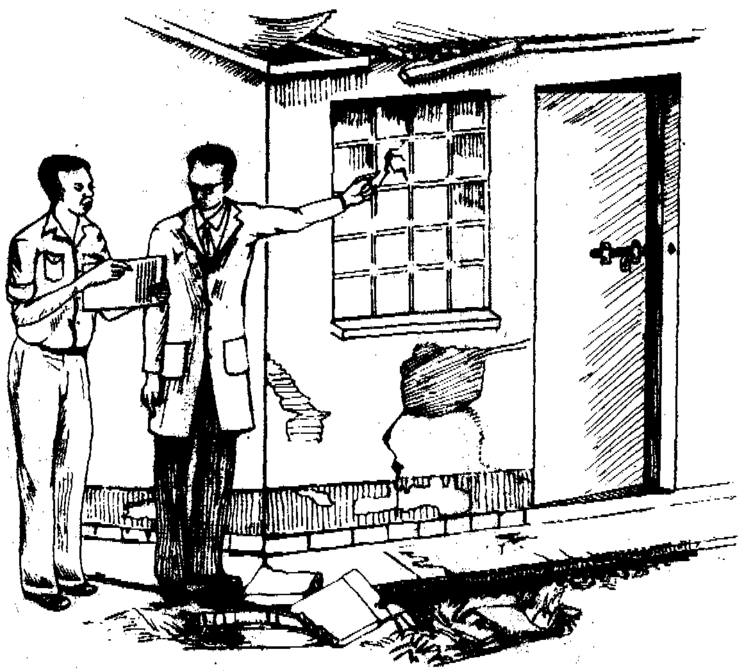


Fig. 6.5 Buildings need regular inspection and repair.

It is valuable to do a formal round of all the buildings, including the staff quarters (if there are any), once a week or once a fortnight, with one or two other staff, in order to check on the general standard of cleanliness. Necessary maintenance can be considered at the same time.

Is there a fire risk? Are there any fire extinguishers and if so have they been filled and checked recently? Are buckets of sand available? What about security? Are the doors closed and locked after duty hours as they should be? Is the watchman doing his job properly? Does he know who to inform in case of an emergency?

6.11 STORES AND SUPPLIES

There is, from time to time, a real shortage of drugs about which an MA or DMO can do little. Often, however, poor administration and indenting contribute to local shortages.

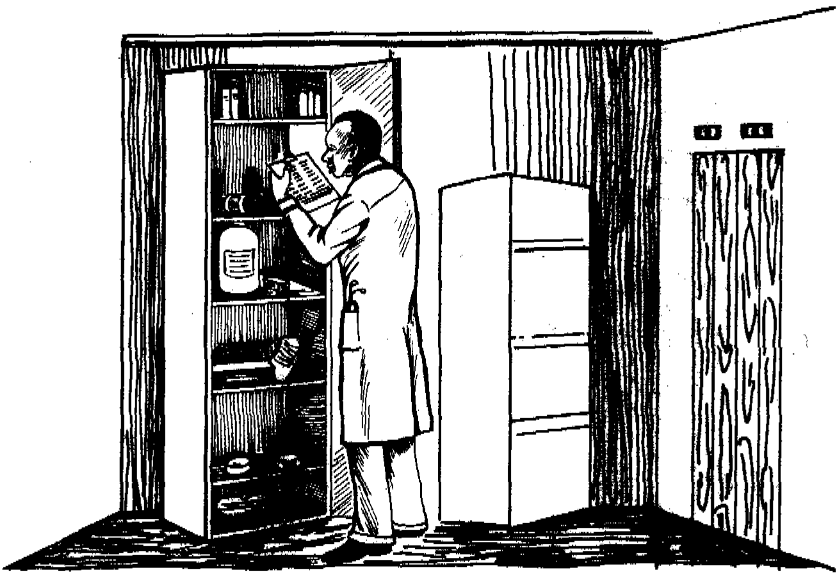


Fig. 6.6 No drugs in the store!

A regular checking system is essential. The first thing to do is to see that a record is kept of all expendable items. This should be in a loose-leaf ledger, with a different page for each item. Each page should have the details of the item: catalogue number, name, date, and quantities of material ordered, delivered, used and in stock.

How much of an item should be stocked? This depends on how often requisitions are sent in, and the time taken for the supplies to be delivered. It is a good rule always to keep enough stock in hand for one requisition to go astray without disaster.

One method that has been used is as follows: divide the space in the store for each drug into two halves A and B. Into B is put the recommended stock for 3 to 6 months (the time till the next requisition). Use drugs from space A, and send in a new requisition when space A is empty. Start now using space B and continue till the requisition is supplied, which will now be put in the empty space A. Continue using B until that is empty, and then again make a new requisition.

A	B	A	B	A	B	A	B
xxx	xxx	x	xxx		xxx	xxx	xx
	xxx		xxx		x	xxx	
x	xxx		xxx		x	xxx	
A in use		A goes empty		B in use		A full, requisition supplied	
B full		Place order for A		A empty, awaiting new stock		B still in use	

Whether this system is used or not, it is essential to make frequent visits to the store to check and see if items are being used more quickly than expected. A regular three-monthly check on every item, with the ledger, to check on the rate it is being used is very worthwhile (see Figure 6.7 below). This should be the basis for all requisitioning..

Fig. 6.7 Making a regular check on the drugs in store.

It is a good idea to make a rule that worn-out or broken parts of expensive or valuable items have to be returned to the store before new ones can be issued. This may apply especially to syringes, or to vehicle spare parts, for instance.

6.12 PROFESSIONAL SECRECY

All medical staff should know that the illnesses of their patients should not be discussed with anyone. They may have to withhold information from senior officers and even courts of law if individual patients do not give their permission for details to be given. (In court you may say you do not wish to tell medical details about a patient, but if the judge or magistrate directly orders you to tell, then you must do so.)

Obviously in health centre work few things will be secret, but all medical staff should try not to talk about patients' illnesses more than necessary. Unnecessary talk can embarrass patients and make difficulties for them.

6.13 MEDICO-LEGAL MATTERS

Medical assistants may have to attend district and magistrates' courts to give evidence about patients whom they have medically examined. Many injuries lead to court cases.

A court will generally only ask a medical assistant questions of fact, and not matters of opinion. For example, he may be asked to say where, how large, and how deep a wound was when he treated it, but he should not be asked what caused it or what later effects it may have. If he is asked such questions he is entitled to say that he does not know, or is not qualified to give an answer.

It is clear that it is important to make careful and detailed notes on any case that you think might go to court. The actual court case may come up many months after the patient was seen for treatment and it may be quite impossible to remember the circumstances unless careful notes were made at the time and then kept safely where they can be found easily.

The medical assistant will be called to court by being issued with a subpoena (or 'summons'). This will be presented by a police officer and will give the date and time he has to attend. He has to sign it, and the police officer then takes the duplicate (see figure on page 144). Once you have signed this subpoena it is an offence not to attend the court when required. In fact, if a friendly and co-operative atmosphere is maintained between the medical assistant, magistrate, and police, it is usually possible to arrange things so that the medical assistant does not waste hours waiting at the court. After all, he is working for the community and many patients may have to wait if he is away from the health centre for a long time.

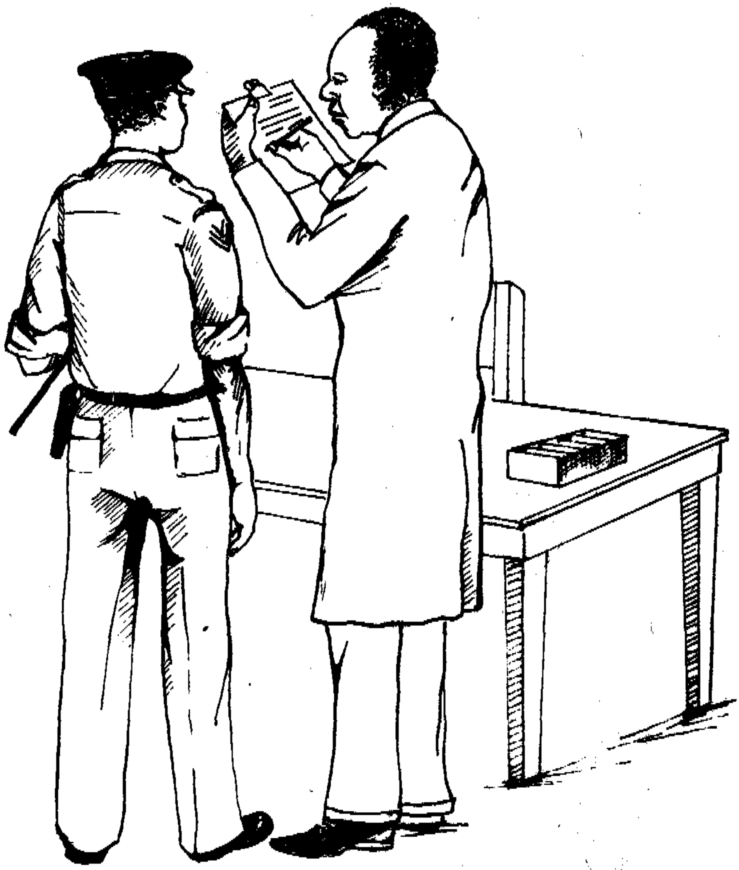


Fig. 6.8 MA signing for receipt of subpoena.

One thing to remember about the subpoena is that the name put on it is that of the person accused. The accused is usually not the person you treated, so it is wise to find out about the case from the police beforehand, so you can take the right notes to court.

You should dress neatly to attend the court and in all ways show respect. When your time to give evidence comes you will be called. First you will repeat the words of the oath, which will be read out to you. Then the police officer (or sometimes a lawyer) taking the case will ask you what you know about the case, and the magistrate will write down your answers. The magistrate may also question you himself. Always think carefully before you speak, and then answer clearly and politely exactly what you were asked. Ask the magistrate's permission to use your notes if you need them. If you have anything else to say, speak always to the magistrate, giving the usual term of respect each time you speak to him. As was said above, you may respectfully refuse to give any opinions. Only registered medical practitioners should be asked to give opinions, and only they may do post mortems and give evidence on them.

You may also be asked to identify drugs or medical equipment that may have been stolen. You should also be able, if the medical officer is absent, to assess mental state, do physical fitness examinations, assess the age of a person, and examine a person for signs of sexual assault.

6.14 DISCIPLINE

Discipline is not simply a matter of giving punishments or dismissing people. It is a much wider matter of every person's understanding of their functions and their personal responsibility in carrying out their job. In a well disciplined health centre the medical assistant in charge has got every member of the staff to function well and confidently and in co-operation with other staff and with the public. This comes much more from encouragement, and the medical assistant taking a genuine interest in each individual, than from punishments. The staff must be encouraged to feel personal responsibility and loyalty to their unit.

The medical assistant can impose minor penalties, but for anything more serious he must complete the necessary forms and send them to the DDD.

The second schedule of the Security of Employment Act is worth reading several times, and perhaps even worth partly learning. There is a mistaken belief that it is only there to protect the worker against unfair penalties. In fact it is of great value to both worker and employer provided it is used properly. It may be helpful to put up the whole schedule on the wall somewhere where all the employees of the health centre can read it or have it explained to them.

The fact that penalties are given in the schedule does not mean that the medical assistant should impose the maximum penalty on every occasion. Everyone makes a mistake or does something silly from time to time, and often a serious discussion of the error is quite sufficient to make him do better in future.

For a second or serious offence, however, it may be necessary to recommend to the DDD that he impose the maximum penalty.

Chapter Seven

COMMUNITY HEALTH TECHNIQUES

7.1 INTRODUCTION

The previous chapters have explained the importance of preventing diseases in the whole population by using appropriate health services. We have stressed the need to understand people, their total number and distribution, their environment, the disease patterns they suffer from, and how the services are organized to deal with them. This information is needed in order to practise community health from the health centre.

It is often referred to as making a *community diagnosis*.

When you want to diagnose a health problem in a patient, you make tests or examinations. For example, you listen to a patient's chest, or you look at a blood smear. These tests help you to decide what is wrong with the patient. When you want to diagnose the health problems of a community there are certain community health techniques, such as surveys, that you use to make a community diagnosis. You use surveys to find out about a population in the same way as you use tests and examinations to find out about an individual outpatient.

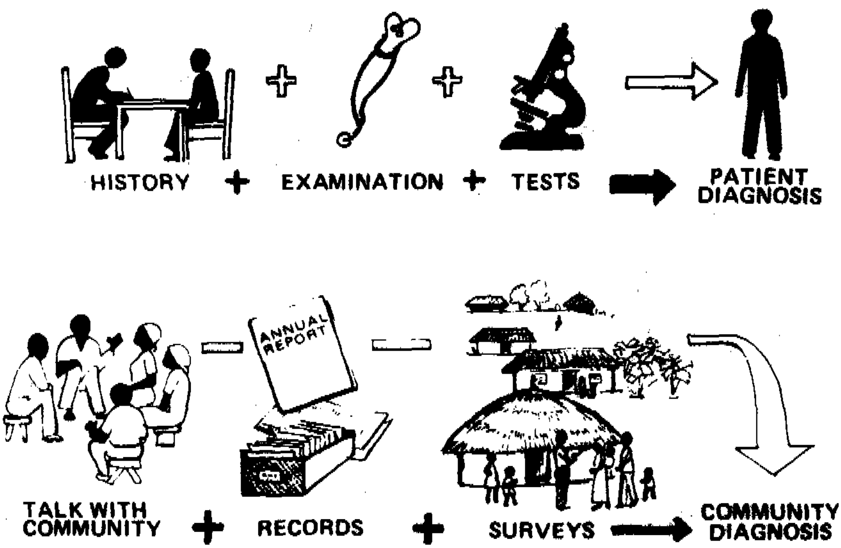


Fig. 7.1 Patient and community diagnosis.

Basically you first need to find out if the health services are effective in:

- o their coverage of the population
- o reducing the number of new cases of diseases
- o reducing the morbidity and mortality of the new cases.

This chapter explains some of the techniques needed to get this information and also how to carry out community health programmes.

7.2 WHERE TO GO FOR INFORMATION

To the local community

Local leaders have information that is not available elsewhere. Listen carefully to what the following people have to say:

- division secretary, ward executive officer, and Ten-cell leaders
- village elders, and UWT members
- Elimu, Kilimo, and Maji staff
- the local waganga.

To the health centre

The medical staff who have been there the longest often know about the services and the local community. Ask the MA, nurses, RMAs, and the driver.

Health centre records and registers for outpatients, inpatients, and clinics provide statistical data. The health assistant will know about the local environment and progress with environmental programmes in the area.

Reports to the district medical officer, and the hand-over reports and summaries should be on the files; these will explain what has been done in the past.

To the district

The district medical officer is in charge of the medical services and can tell you about the overall health situation. There may also be others concerned with the administration of the health centre. Do they have any information or reports to read?

The other principal officer is the DDD; he is concerned with finance, staff, and development plans for the district and can supply further information. As the work of the health centre is only one part of the development occurring in the area, it is important to talk with the other district executive officers.

To other sources

The Ministry of Health may be approached through the DMO for information, particularly about special diseases such as malaria, trypanosomiasis, leprosy, and tuberculosis, and for information about special services such as maternal and child health, nutrition, health education, and environmental health. Registers of different problems or diseases are often kept by specialized clinics or laboratories. Some parastatal, voluntary, or private organizations, such as family planning or occupational health services, keep their own records and can supply additional data.

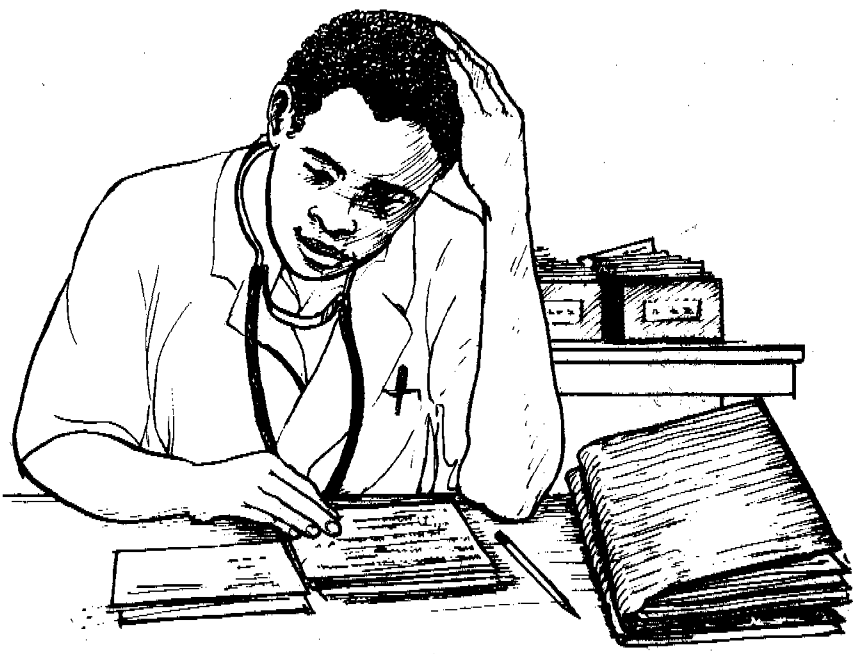


Fig. 7.2 Information is there if you look for it.

Surveys

When the necessary information is not available it can sometimes be obtained by organizing small surveys. These surveys can be very helpful in finding out, for example, the number of people in an area, some of their beliefs and customs, or the prevalence of a particular disease. Section 7.6 deals with surveys in more detail.

7.3 MEASURING DISEASES

Incidence and prevalence

Some of the reasons for counting by incidence (new cases in a certain length of time) and prevalence (all cases at a certain time) were explained in Section 4.4. Incidence is the best measure of what changes are taking place—whether the number of new cases is increasing or decreasing—but prevalence is often used instead because it measures the size of the problem that the health services have to deal with. Prevalence figures are also more often available.

The prevalence of a disease is affected by many factors. If the incidence of disease changes, so the prevalence will change. But prevalence can also change due to patients being cured or dying, or to cases migrating into or out of the health centre population. Also the health services may lose track of some of the cases. These factors do not affect incidence. Whether you use incidence or prevalence measures, it is important to be clear about what you are counting. With diseases like malaria or diarrhoea a person may have several separate attacks in a year and perhaps attend for treatment 2 or 3 times each attack. A tuberculosis or leprosy patient might attend 12 times a year for disease which started a year or more ago. At the antenatal clinic each patient may attend 5 or 6 times during a pregnancy.

What shall we count? People, total attendances, or new attenders? This depends on what we want to measure. If we want to estimate the proportion of the population sick with a chronic disease (prevalence) then we need to know the number of names (people) in the register for that disease. If we want to see how a control programme is working, then we want to know the number of new cases occurring (incidence). This is easy for diseases with separate registers, like tuberculosis, leprosy, or the antenatal clinic—we can easily find out how many new cases were registered in a month or a year. But it is hard to find out from the usual out-patient records the incidence of diarrhoea or malaria. Total attendances might be 500. Going through all the names might show that 200 people made up these 500 attendances. But unless we went through each person's case notes we could not find out the true number of new episodes of malaria.

What do we learn from this? That we should be clear in our minds what figures we can get from usual records and what they mean; also that if we want to know something special, like new cases of malaria, we shall have to make special arrangements in advance to record the information we want.

Reliability of diagnosis

What is a 'case'? Before counting a disease in any way it is important to decide quite clearly how a 'case' is to be defined. Confusion and misunderstanding may easily arise if this is not done. In a malarious area people with fever, headache, and body pains may be called malaria cases, but to count all these as malaria would not be satisfactory. Indeed, the DMO or Ministry of Health would probably only accept these symptoms as malaria if confirmed by a positive blood slide. Rabies is another good example. Many 'cases' of this always fatal disease are reported although hardly any die. What is really being reported is a 'patient who needed anti-rabies vaccine' and only those who died may actually have had rabies. Clear definition of what is a 'case' is very important. If in doubt, check with the DMO.

DEFINITION OF A 'CASE' IS VERY IMPORTANT

Measuring disease by rates

When it is necessary to *make comparisons* between two different areas, or between what is happening in the district now compared with 10 years ago, we cannot simply compare the total number of cases. If district A reports that there are 100 patients registered with leprosy (a prevalence measure) and district B reports 150, in which population is leprosy commoner? Before we can give a proper answer, we need to know the total number of people in each district, i.e. the population at risk. If there are 20000 in A and 60000 in B, we can find how many cases there would be *per 1000 population* in each, and compare the two rates.

A $\frac{100}{20000} \times 1000 =$ 5 per 1000 population

B $\frac{150}{60000} \times 1000 =$ 2.5 per 1000 population

This use of rates shows us that leprosy is in fact twice as common in district A, even though it reports fewer cases. (We could also, if we wanted to, calculate how many cases of leprosy there would be among a full 'health centre population' of 50000 people in each district—5 x 50 = 250 in district A, and 125 in B.)

Important rates to work out for your district are the rate at which children die within their first year of life (the infant mortality rate) and the rate children die between one year and five years old (the child mortality rate).

The infant mortality rate (IMR) measures all the deaths from all the serious illnesses, e.g. malaria, gastroenteritis, pneumonia, measles, that young children get before they are one year old. The IMR is still high in Tanzania—about 160 deaths per 1000 live births. In some countries this figure has fallen to around 50 per 1000, and in a few countries the figure has gone down to less than 20 per 1000. The following formula gives the IMR, which is usually given as the number of deaths in one year:

$$\frac{\text{number of deaths of infants in one year}}{\text{number of live births in one year}} \times 1000$$

The child mortality rate (CMR) is also important because it measures deaths at the age when malnutrition, as well as the other diseases, is common. The CMR is more difficult to calculate than the IMR, because detailed child population figures are required. It is also very high in Tanzania.

Measuring by case fatality

A measure of the seriousness of a disease can be obtained by seeing what proportion of those who get the disease die from it. Virtually no one dies from the common cold, and only a few from influenza, but many die from measles, and everyone who gets human rabies dies. This measure of seriousness is called the case fatality rate and it is usually expressed per 100 (percentage) not per 1000 as in the IMR. (Remember that 5 per 100 (5 per cent), 50 per 1000, or 500 per 10000 are all the same rates. It is only a matter of custom and convenience which one is generally used.)

Case fatality rate =

$$\frac{\text{number of cases who die from a particular disease}}{\text{total number of cases diagnosed with particular disease}} \times 100$$

e.g. if a health centre sees 140 measles cases in one year and 7 die,

$$\frac{\text{number of deaths from measles in one year}}{\text{total number of cases of measles in one year}} = \frac{7}{140} \times 100$$

therefore case fatality rate for measles = 5 per cent.

If 2 people out of 25 bitten by dogs in a year actually develop rabies and die,

$$\frac{\text{number of deaths from rabies in 1 year}}{\text{total number of cases of clinical rabies in 1 year}} = \frac{2}{2} \times 100$$

therefore case fatality rate for rabies = 100 per cent.

RATES ARE USEFUL FOR MAKING COMPARISONS

7.4 DESCRIBING SITUATIONS

When we have detailed knowledge about diseases we can predict which people are most *at risk* of getting them. This helps us to prevent them. The method of studying the distribution and frequency of diseases is called epidemiology and it is based on these questions:

- WHAT is the disease frequency?
- WHO is ill? — people
- WHERE did they get ill? — place
- WHEN did they get ill? — time

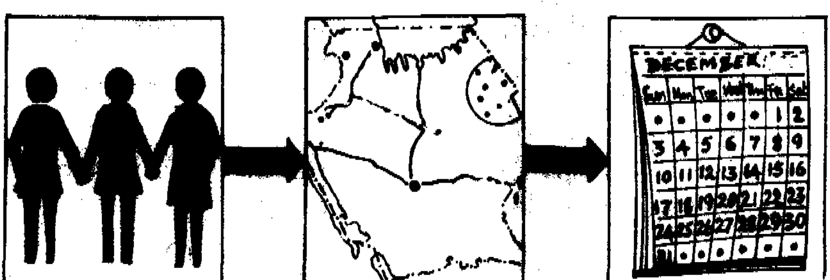


Fig. 7.3 Who? Where? When?

When presented with a problem concerning the general population, or the use they make of the health services, describing the situation by answering these questions helps to make things clearer.

WHO, WHERE, AND WHEN IS A USEFUL TECHNIQUE FOR SOLVING PROBLEMS

Who?

People can be grouped in many different ways. Some of the important ways of grouping them are by:

- age
- sex
- occupation
- income
- cultural and religious groups
- family size
- nutritional state
- immune status.

Other groupings can be used, such as clinic attenders and non-attenders, those with latrines and those without, or normal- and low-weight infants.

Where?

The place where people are living or working may partly determine which diseases they could suffer from and what use they would make of the medical services. This place could be:

- a town, village, or isolated dwelling
- at high or low altitude
- near or far from ponds, wild animals, or toxic substances

- near or far from a dispensary, or health centre.

When?
What time a disease starts, or when someone visits the medical services is useful information. In describing the incidence of cases or events, they can be grouped according to the number occurring in a day, a week, a month, or a year. For instance, new cases of tuberculosis in one year, new MCH clinic attenders registered in one month, new cases of measles in one week, or new cases of cholera in one day.

7.5 HOW WELL ARE THE HEALTH SERVICES WORKING?

The effect of clinical services on an individual patient is frequently checked. For instance, when looking after an inpatient we regularly record his temperature and pulse and watch his condition. In the same way it is necessary to check the effect of community health services by watching and recording the health of the population. This is difficult to do comprehensively, but there are a number of simple ways in which some estimates may be made. This process of maintaining a watch on how effective the community health services are is called *evaluation*.

ARE THE HEALTH SERVICES ACHIEVING WHAT THEY SET OUT TO DO?

The following are examples of simple evaluation:

Keeping weekly or monthly charts of the number of new cases of malaria, gastroenteritis, measles, and tuberculosis—and any other locally important diseases—seen at the health centre. Graphs of the number of new and repeat visits made each week to outpatient and MCH clinics.

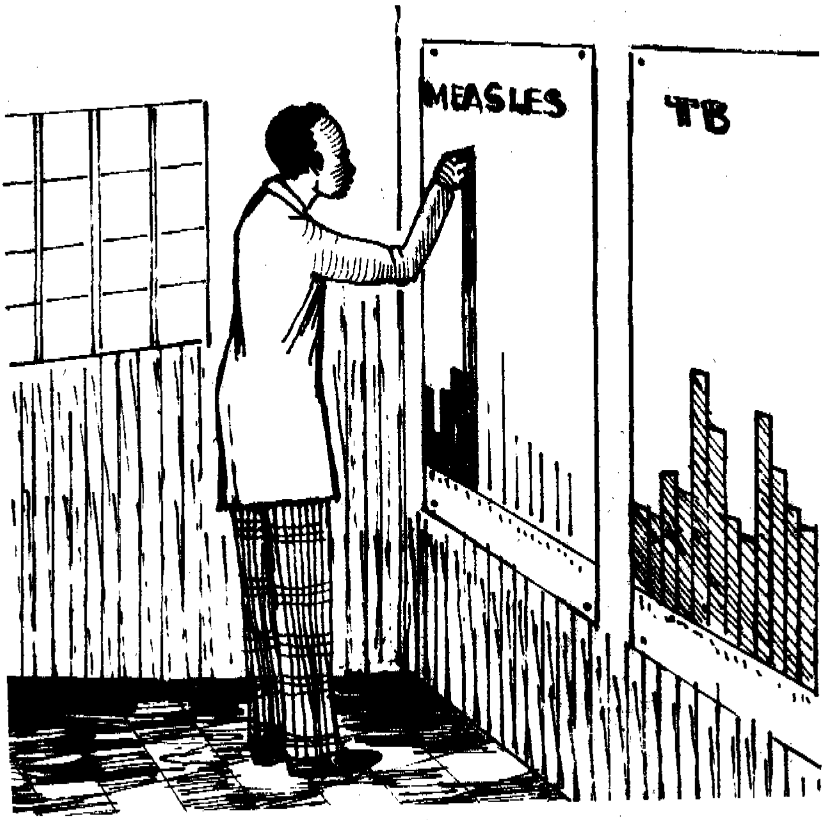


Fig. 7.4 Making wall charts.

Estimating the population coverage by:

1. comparing how many new infants or mothers are registered at MCH clinics compared with the total number of infants or mothers in the population;

2. seeing what proportion of the total population are living within 10km of a dispensary or the health centre.

Graphs of the number of new latrines built in different villages.

A map showing the sites of the wells that have been built.

A useful method of evaluation is to make comparisons. Two of the comparisons for evaluating health services are:

1. to see what happened *before* and *after* a change was made—for instance, before and after a new clinic was established or a new RMA was appointed;
2. to see what differences exist between an area where a new improved service has been introduced and one where it has not—for instance, areas with and without a new dispensary or MCH clinic.

Many evaluations are better made by good judgements than by trying to count something and give a figure. A good judgement is worth much more than bad counting.

Some examples of evaluations that could well be based on judgement are:

How much local community involvement is there in the health services?

What does the community think of the service?

How well have all the jobs been distributed amongst the staff?

Are all the staff thorough and conscientious?

Just as judgements are often used in clinical medicine and a record of them made on the patient's notes, so judgements should be made in community health and recorded in reports and placed on the appropriate files.

EVALUATION MEASURES HOW WELL THE HEALTH SERVICES ARE DOING

7.6 SURVEYS

If the required information about the community is not available in reports or from routine records, a survey should be organized. Before a survey is undertaken, careful thought should be given to what can be done when the information has been obtained. If we collect information just from curiosity and do nothing with it the community will be disappointed and will not be so willing to co-operate with the health service the next time they are asked to help. Make it a rule not to do a survey without providing some service. If, for example, you do a survey to find out the coverage of immunization it is a good plan to offer immunization to those found in the survey who have been missed previously; do this immediately after the survey is finished. This will help any long-term plans for health education or for improving the immunization service.

NO SURVEYS WITHOUT SERVICE

Surveys are carried out for three main reasons:

1. to find people with important diseases, e.g. tuberculosis or leprosy, who either do not know that they have them, or who do know but have not yet been to the dispensary or health centre. This type of survey is often called *screening* for a disease

2. to find out what beliefs, customs, and behaviour people have before organizing a community programme, e.g. for nutrition, family planning, or environmental sanitation

3. to find out how people are using the health services, in order to get ideas about how to improve them, e.g. when, where, and how often would mothers like to have the MCH clinic held.

When planning a survey, it is important to remember:

1. the questions and tests should be simple, and reliable
2. the questions should be acceptable to the people included in the survey, otherwise they may refuse to co-operate
3. the medical staff should be prepared to treat or refer any sick person found during the survey
4. a survey should not screen for disease if there is no effective treatment for the cases found
5. surveys are not usually useful for rare diseases or rare events.

Sometimes it can be very difficult to know what questions to ask and what tests to use. It is wise to discuss your problem with the district medical officer first and then plan the survey with his advice. When you have decided what you want to do, you should pre-test the programme in the field before undertaking the survey.

Cross-sectional and longitudinal surveys
There are two main kinds of surveys designed to collect information. One involves questioning and examining a sample of the population at *one point in time*. This gives prevalence information and is called a prevalence or cross-sectional survey. The one point in time may be a day or several days, and examples might be the collection of blood smears taken in one day for malaria parasite examination or the screening of school children for possible leprosy.

The prevalence rate =

$$\frac{\text{number of cases found at a point in time}}{\text{total population}} \times 100$$

(You can also multiply by 1000 instead of 100 and express the rate 'per thousand'—see page 153.)

The second kind of survey collects information about all the new cases of a disease or events *over a period or interval of time*, like one month or a year. Such surveys give incidence data and are usually called longitudinal surveys. Examples might be the recording of all new cases of measles or tuberculosis, or all new pregnant mothers attending the antenatal clinic for the first time during one year.

The incidence rate =

$$\frac{\text{number of new cases detected in a defined period or interval of time}}{\text{total population at risk}} \times 100 \text{ (or} \times 1000\text{)}$$

It is important to be clear which kind of information is needed —prevalence or incidence—and how it is going to be used. Then it will become clearer how the population to be studied should be defined. This is a very important step before going on to sampling.

Sampling

In a survey there may not be time or the resources to survey all the people in the population or all the people attending the health centre or clinic. In these situations it is best to choose a smaller group of people, a sample, to include in your survey. It is important to select a sample in such a way that it will give roughly the same answer as if the whole population had been surveyed. This type of sample is called an 'unbiased' sample. A sample which gives a different answer from the one which you would get from surveying the whole population is called a 'biased' sample.

BIASED SAMPLES CAN GIVE WRONG ANSWERS

If the question you are asking is 'what is the prevalence of scabies in the health centre population?', you would be wrong to select a sample from people living close to the health centre. These people close to the health centre might have a better supply of water and more knowledge about hygiene, or have been treated, and therefore have a much lower prevalence of scabies than people living far away. They would be a biased sample. If you tried to estimate the prevalence of scabies in the population by examining people in the clinics you would also have a biased sample because these people would probably have a higher prevalence than people in the general population.

When you have thought about influences like these which might bias your sample and decided where to do your survey, you still need to pick an unbiased sample so that everyone in the area population has an equal chance of being in the survey. A very convenient way of doing this is by using the Ten-cell system. An unbiased sample could be chosen from the list of Ten-cell leaders by selecting, for example, every seventh leader on the list and then examining *every family in the cell* to find out the proportion of the children showing signs of scabies. There are many ways of doing this depending on how many people are wanted in the sample and how big the whole population is.

When using this kind of sampling, it is important to use different Ten-cell leaders when another survey is organized. Be careful that you do not only go to helpful and co-operative Ten-cell leaders as this might also give biased results. Sampling is a complicated subject and you should ask for help in selecting an appropriate sample if you are in any doubt. The important thing to remember is that a badly planned survey will produce useless results. Do not attempt it without good advice. If you are involved in a survey planned by an expert, be very careful to follow his directions about selecting the sample exactly, so that you end up with an unbiased sample which will yield useful results.

Response rate

There is another way in which surveys can give wrong answers, even when the sample has been well chosen. This is when only a few of the people selected for the sample are seen. It is important to know what percentage of the people in the sample were actually seen. This is called the *response rate*. In surveys for leprosy, for instance, people who think they have leprosy may hide from the survey team. The medical staff might then send in a report that there was very little leprosy in the area. It is important to remember that the people who do not turn up, or are not seen by the survey, may have something to hide or some reason for not coming.

Fig. 7.5 Man with leprosy hiding from a survey.

As a general rule it is necessary to see at least 75 per cent of the sample selected.

THE PEOPLE YOU DO NOT SEE MAY DIFFER FROM THOSE YOU DO SEE

7.7 ACCURACY OF MEASUREMENTS

We must always try to measure things as accurately as possible.

Most errors are made by the people making the measurements and not by the instruments used or by the patients. This type of inaccuracy or error is called 'observer error'. Different observers very often report different measurements on the same patient—this is called between-observer or inter-observer error. Also the same observer may get different results on the same patient or specimen at different times—this is called within-observer or intra-observer error. For example, blood pressure or body temperature readings are often not accurate, but this is not because of the sphygmomanometer or thermometer!

Fig. 7.6 Leave thermometer in for 2 minutes.

There may also be problems with some instruments such as weighing scales, particularly if the zero reading has not been checked for some time. Other errors may occur while writing down the figures on the record card. Take great care to be accurate both in routine work and surveys.

The two most important ways by which medical staff can reduce the amount of inaccuracy are:

1. for all staff to follow an agreed *standard method*, such as how long the thermometer should be left in the mouth, which blood pressure sounds to listen for, and how to ask the questions in the questionnaire
2. for all the staff to be *thoroughly trained*, and every now and again *checked* to see that they are doing things correctly.

The staff of a health centre will only do good and accurate work if the medical assistant takes trouble to discuss and agree the methods to be used and then trains the staff in these methods and periodically checks their work and the instruments they use. This applies both to clinical work in the centre and also to community health work outside.

Check staff by observing them doing their tasks and looking at their results straight away. Check instruments like the weighing machine by seeing if it always reads the same on different occasions when a standard like a 5kg weight is put on it. If it does not give the same reading it is faulty and it should be checked more fully.

From time to time divide a faeces or sputum specimen into two halves and let the laboratory assistant report on both halves without knowing they are from the same patient. If his work is accurate his reports on the two halves should usually agree.

It also helps to get all staff to sign their initials against any case history, physical examination, or laboratory tests that are done so that it is clear who did them. This is also helpful when checking records for missing information.

STANDARDIZE PROCEDURES,
TRAIN AND CHECK STAFF

Fig. 7.7 A medical assistant checking laboratory results.

7.8 QUESTIONNAIRES

One way of finding out is to ask questions. If we want to find things out from many people, or if several health workers are trying to find out the same thing from different people, it is important to standardize the questions they ask, just like we standardize other procedures. A set of standardized questions is called a questionnaire and is a useful tool for collecting information. Questions are used for collecting information about such things as the size of households, what food people eat, what illnesses they have had, what they do when they have a fever.

A good questionnaire can provide useful information which helps us to make plans for health services and to evaluate them. A bad questionnaire may provide misleading information that is of no use, or even harmful. You can also gain useful impressions from skilful interviewing at the same time as gathering facts in answer to your questionnaire and you should allow extra time for this.

Sources of error in questionnaires

The following are some of the more important causes of inaccuracy when asking questions:

Poor questions

If questions are badly worded they can be interpreted in different ways. ways.

Difficult subjects

People may give misleading or wrong answers to questions about private and personal things. For example, it is easier to answer questions about fever or immunization than it is about leprosy or child spacing practices.

Poor memory

Our memories are surprisingly short. Only major events, like a birth or death, can be remembered for more than a few days. Many people have difficulty in remembering when either events happened, and may not be sure whether something happened, more or less than one year ago. As a rule, do not ask people about minor events like going to a clinic, or what food they ate, etc., more than one week ago.

Observer and subject bias

People asking questions (observers) have a tendency to interpret the answers to fit in with their own ideas. People answering questions (subjects) tend to give the answers that they think the observer wants to hear. For example, if a health worker asks about using water he is likely to be told that people boil water—even if they never do.

Preparing a questionnaire

When preparing a questionnaire there are a number of points to consider:

Number of questions
Many questionnaires are too long. People soon get bored with answering a series of questions. They become inattentive and often they answer without thinking. It is best to start with some simple questions to identify the person being questioned (the respondent, age, sex, village, name of Ten-cell leader), then go on to a few questions that will provide the information you need. Think of the way you will use the information collected when planning the questions. Exclude all questions that will not help your specific purpose.

KEEP QUESTIONNAIRES SHORT

Type of questions
There are two main types of questions: open-ended and closed.

An open-ended question is one such as:

'How could your local MCH clinic be improved?'

. . . .

A space is left for writing down any suggestion made by the respondent in his or her own words.

The same sort of information could also be asked for in a closed or pre-coded way:

Could your local MCH clinic be improved by

a) having it open every day?	YES	NO
b) giving more privacy?	YES	NO
c) allowing local mothers to help?	YES	NO

Open-ended questions have less bias, but it may be more difficult to code and interpret the answers during the analysis.

Interviewers
You may decide sometimes to do all the interviewing for a small survey yourself. Or you may decide to use interviewers to collect

the information if the survey is larger, or if there are language difficulties. Or you may use other health workers, students, or even local teachers or Ten-cell leaders, depending on the kind of information you want to collect. In all cases it is very important to train them to follow the questions closely. Many misunderstandings and errors are introduced when interviewers translate questions into their own language. If this has to be done, everyone must agree in advance on the words of the translation.

TRAIN ALL INTERVIEWERS
TO USE THE QUESTIONNAIRES

Testing the questionnaire
After you have made up a questionnaire, always try it out with your interviewers on a test group before you do the real survey. After the test discuss how people have got on and any difficulties they had. Some questions may have to be altered to make them more clear. It is essential for everyone to understand and agree on the final version.

PRE-TEST ALL QUESTIONNAIRES

7.9 ORGANIZING A SURVEY

Surveys are very important in community health work. Small surveys undertaken by yourself within a health centre or dispensary are relatively easy and quick to undertake. You might study the management of patients with fever, or whether patients understand what to do with their medicines.

If you intend to do a larger survey, such as the coverage of immunization or the prevalence of tuberculosis in the health centre population, you will have to train other interviewers, to arrange clinical examinations and laboratory tests, and visit dispensaries and the community. Such a survey will need more careful planning and organization. Some of the points you will have to cover are listed below in a good order to do them in.

Planning

1. Decide clearly why you need to do the survey.
2. Consult people with the relevant experience—the local people, medical staff, health officer, DMO, etc.
3. Visit the area to obtain preliminary information about the people, their culture, and their environment.
4. Decide what questions, observations, or measurements are to be made, and how to standardize the techniques. Design and pre-test the questionnaires.
5. Choose an appropriate population sample.
6. Make arrangements for money, staff, transport, time, accommodation, etc.

Organizing

1. Obtain co-operation of local people, and ask them to help during the survey.
2. Train staff.
3. Arrange for laboratory facilities.
4. Work out a plan for each survey day.
5. Prepare the questionnaires and forms required.
6. Do a trial survey first to test out your organization if possible.
7. Prepare for any service to be given, e.g. care for the sick, immunization, etc.

During the survey

1. Supervise all staff to make sure they have the necessary equipment, questionnaires, etc., and know what they are doing, and to check that they are working accurately.
2. Supervise senior members of the local population helping with the survey itself. Particularly check attenders and non-attenders.
3. Check that satisfactory service is given.

Evaluation and feedback

1. Analyse the data.
2. Discuss the results with the medical staff and with the population who were surveyed.
3. Write a brief report and include recommendations and what action needs to be taken. Send a copy to DMO.
4. Report your recommendations to relevant committees, particularly the ward development committee, and to the people who were surveyed, or their representative.

7.10 PRESENTING INFORMATION

We often need to analyse information that is collected in routine records, reports, or surveys and present it in a way that it is more useful. 'Raw data' (individual answers to questions, or measurements) left on forms or questionnaires are of little value in that state.

For small surveys the information can be taken off the questionnaire forms and entered on master sheets that will show total numbers of houses visited, number of people seen, number of malnourished children or people with cough, etc. You should seek advice and help for the more complicated forms of analysis needed for larger surveys.

When the figures and results of a survey—or analysis of routine records—are ready they must be presented in such a way that they can be easily understood. There are several methods of doing this. The most usual simple ways are summarized below. For more details on how to do this you should study the *Epidemiology in Community Health* manual in this Rural Health Series.

Frequency tables

A frequency table describes how many people of a particular sort have certain findings. For instance, how many males or females are in different age groups, or how many children aged 5–9 have blood in their urine. It is called a frequency table because it tells us the frequency of the combination of various factors—see the example below. Different columns can show total numbers and rates.

Frequency of haematuria in 125 schoolboys.

Age	*Number of boys*	*Number with haematuria*	*% with haematuria*
5–9	50	25	50
10–14	60	40	66
15–20	15	5	33

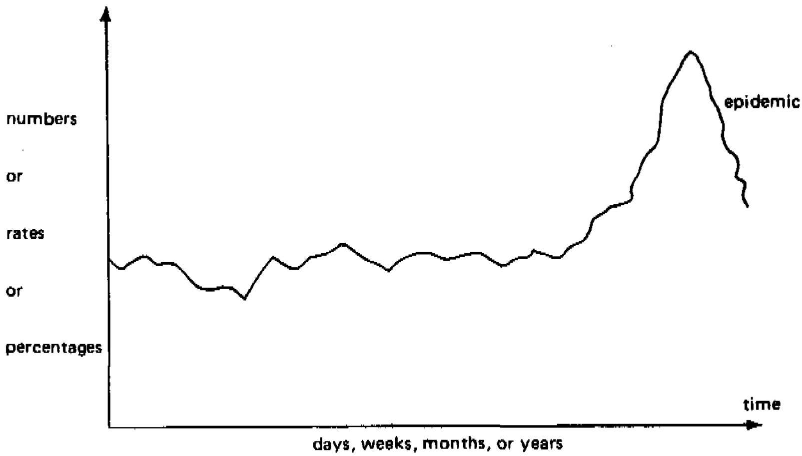
Graphs

A graph is usually used to show changes that have occurred over a period of time, like a month, or several years. For example, it could show the number of outpatient attendances every day for a month, or the number of new cases of a disease each month for a year—see the example over the page.

Bar graphs and histograms

These are sometimes similar to graphs, but use upright blocks instead of lines. On other occasions the upright blocks represent different items or events—see the example on page 175.

Example of a typical graph illustrating frequency distribution.



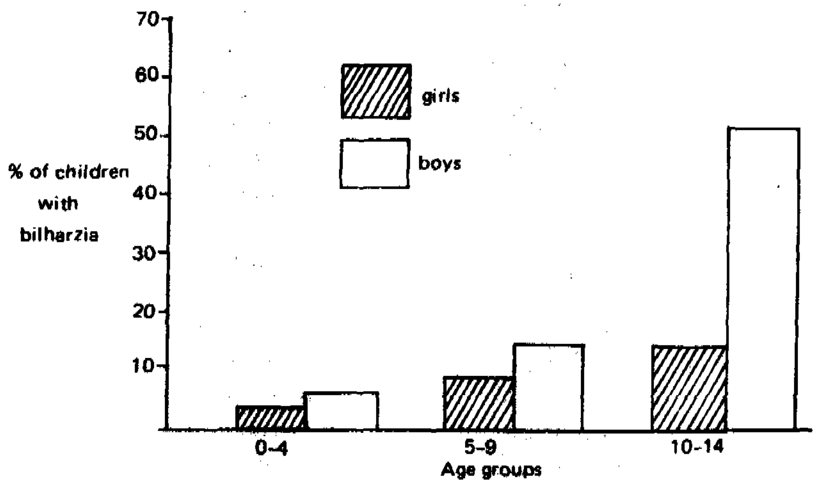
The average

When there are a series of figures from a particular group of people and all are based on the same measurement, for instance, weight, or haemoglobin level, it is very useful to have *one figure that summarizes* all the others. The average, or mean, will do this, e.g. the average weight of healthy newborn babies is around 3.5kg. We calculate it by adding together all the measurements and dividing by the total number of persons or measurements.

The range

This is the difference between the lowest and highest figures in a series. It is often used to indicate the normal range. Lower or higher than this normal range indicates a possible abnormality. This is well illustrated by the Road-to-Health chart. The range also shows how widely people varied from an average. After a survey we might report that average haemoglobin of some villagers was 12.5g/dl, with a range from 6.5 to 15g.

Histogram showing percentage of 180 boys and 210 girls with bilharzia at different ages.



The proportion

This is used to say how much of something, or how many people in a large group, have some particular feature, such as anaemia, or are carrying sickle cell haemoglobin. For instance, a fraction like ¼ or ½ is a proportion of 1, a percentage like 10 per cent or 80 per cent is a proportion of 100, and a rate like 5 or 27 per 1000 is a proportion of 1000. Each one indicates what proportion of all the people have some feature. We usually use a fraction or a percentage for common features and use a rate per 1000 for less common things.

7.11 KEEPING GOOD RECORDS

Good records can help the individual patient and also those organizing the health services. Bad records or records that cannot be found when they are wanted are of no use to anyone.

If too many records are kept, or too much information is required on a record form, all health workers get bored and fill them in carelessly or leave blanks.

The purposes of routine record keeping are:

1. *Individual patient management*
For this we keep the individual patient record. This must have sufficient information to identify the patient—name, age, sex and the name of the Ten-cell leader (usually the best method of locating a patient). There must also be a number for filing if the cards are kept at the health centre. Patients may also keep their record cards themselves. This is often the best way of making sure that the record card is available at any clinic a patient attends. Mothers look after their children's Road-to-Health cards at least as well as records clerks.
The health worker should record the date of attendance, patient's condition, and treatment given and initial the card, so that he can be identified if something is missing or the patient needs to see the same person on his next visit.

2. *Information about disease patterns*
For this we keep a daily register. Records kept at clinics can provide information about the pattern of disease seen in people living around the clinic. If we analyse records kept over a period of time and present them properly we can see how disease patterns are changing and perhaps detect an epidemic in its early stages.

3. *Information for evaluation*
The above records, together with monthly, annual and survey reports help to answer the questions:
What was done?
Who was it done for?
How effective was it?

GOOD RECORDS ARE ESSENTIAL
FOR GOOD HEALTH CARE

Chapter Eight

THE ENVIRONMENT AND HEALTH

8.1 INTRODUCTION

The environment is the collective term used to describe all the living and non-living things that make up our surroundings. This includes the biological, physical, cultural and social, economic and political environment, as described in Chapter 2.

The physical environment consists of air, water, climate, and other physical conditions. The biological environment includes all the living things—the plants, animals, and micro-organisms. The social and political environment is man-made—the family, village, culture, beliefs, politics, and the government.

The health, and even survival, of Man depends on his ability to adjust to his environment. During the process of evolution Man has adapted to a wide variety of physical and biological conditions—to hot and cold climates, to dry and wet regions, to sea level and mountainous areas—each with its own pattern of vegetation and animals. Man has also learnt to a greater extent than any other animal to control his immediate environment by such methods as clothes, fires, and shelter. Man is also altering his environment, sometimes quite rapidly, by population growth, migration, urbanization, industrialization, different methods of agriculture, communications, and so on. Some changes improve the environment while others may damage or destroy it.

This chapter considers some of the important aspects of the physical environment and how they affect the transmission of disease. The availability of water for drinking, cooking, and washing is one of the main reasons why rural communities develop in a particular area. Their sources of water are generally unprotected and easily polluted, especially when the number of people in the area using the same water source increases. Man is the reservoir host for many diseases and the unsatisfactory disposal of excreta leads to an increase in faecal-oral transmission and spread of disease. Inadequate housing, leading to overcrowding, lack of ventilation, and dampness favours the transmission of airborne diseases. Poor siting of houses, too close to where animals are kept, and inadequate disposal of rubbish encourages mosquitoes, flies, and rats and increases the transmission of vector-borne diseases. The use of agricultural chemicals and the waste products of industry may also pollute water, food, and air.

The control of those factors in the physical environment that may cause disease is often called environmental sanitation or hygiene. It is one of the most important aspects of primary prevention. When trying to control the physical or biological environment it is essential to remember that they are only a part of the total environment—social and political aspects must be considered at the same time.

It is a part of the responsibility of all health workers to help improve the environment. This may be done by health education, by setting an example in your own home, or at your dispensary or health centre, or by assisting in various community development projects. For this reason it is essential that you have a little background knowledge of environmental control and are able to do the simple things required in villages yourself. In towns there will be other workers with more knowledge and experience to advise on the more complicated aspects of environmental control. Some of the most difficult environmental problems arise in the rapidly growing unplanned areas of town—the squatter areas or shanty towns—which illustrate again the interrelation of the physical, biological, social, and political aspects of the environment.

CONTROL OF THE ENVIRONMENT IS THE RESPONSIBILITY OF ALL HEALTH WORKERS

8.2 WATER

Water is essential to life. It is a part of every cell and is necessary for most basic functions like respiration and digestion. Water is also a good solvent and many substances, some useful and some harmful to life, may be dissolved in it.

Water can affect health in a number of different ways. Lack of water for personal hygiene may result in the increased transmission of some diseases, called water-washed diseases. Water may carry the organisms of specific diseases, called water-borne diseases. Or it may be necessary in the life cycle of a disease vector—such diseases are called water-related diseases. The important diseases affected by water in these ways are:

Water-washed diseases	– diarrhoea and dysentery – skin diseases (including scabies) – eye diseases (including trachoma)
Water-borne diseases	– typhoid – cholera – poliomyelitis – amoebiasis – hepatitis A
Water-related diseases	– malaria – schistosomiasis – onchocerciasis

When trying to control these diseases we should consider carefully the role that water plays. The water-washed diseases are transmitted by (1) the faecal-oral route due to lack of washing of hands, of eating utensils, and of vegetables, and (2) by lack of personal hygiene—washing the face, eyes, and body. The main cause of this is *lack of water*, which is generally because either there is very little water available or because it has to be carried a long way, requiring time and energy. The water-borne diseases, in contrast, are due to *dirty water* containing the disease organisms themselves.

In preventing the water-washed diseases increasing, the *quantity* of water is important. To prevent water-borne diseases it is necessary to improve the *quality*. As the water-washed diseases are generally more common than the water-borne diseases we can do a lot to improve health if we can make more water easily available. Of course, the cleaner and purer the water the better, but we should not delay increasing the quantity of water just because we cannot obtain the best quality.

Everyone requires about 2 litres of water a day for basic physiological needs; if water has to be fetched ½ mile people will manage with a total of about 6 litres a day; if they can get water from a tap in the compound, they will use up to 25 litres; and where a house is provided with many taps and there are flushing latrines they will use 100 litres or more each a day.

It is the long-term aim of the government to provide piped water for all, but before this happens there are many simple improvements that can be made in village supplies to ensure that *both* a larger quantity and a better quality of water are increasingly available.

GET ENOUGH WATER FIRST; THEN IMPROVE THE QUALITY

Sources of water

Water goes round in a cycle: it falls as rain, and some soaks into the ground while some runs off as streams; gradually much of it collects into rivers and runs into the sea. From the sea, and also from inland lakes and any wet areas such as forests, water evaporates into the air; there it forms into clouds and travels with the wind; finally it falls again as rain. As water goes round this cycle it picks up a number of substances some of which are helpful and some harmful to man.

Every community is concerned about how much rain it will get to supply its water needs. They should also be concerned about what happens to the rain after it has fallen. How much just runs off down to the sea and how much is caught and stays in the area? Water that runs off quickly does the community little good. What is held in the soil, particularly the root systems of forests, will benefit the community over a long time. Water stored like this underground lasts longer than water in surface dams. So trees (forests) are very important to the community and a health worker should try to see that trees are not thoughtlessly cut down for fuel and that more trees are planted than are being cut down.

FORESTS ARE A COMMUNITY'S BEST WATER STORE

Fig. 8.1 Forests are a community's best form of water storage.

Some of the advantages and disadvantages of different types of water as it goes round the cycle are briefly described below.

1. *Rain water*

If collected from iron sheets or tile roofs into gutters and led by pipes into clean, closed tanks this is normally the purest natural water available.

Disadvantages

(a) It is very difficult to collect from thatched roofs.

(b) Gutters and large tanks are required to store sufficient rain water to last into the dry seasons.

(c) The water is 'soft' and does not contain any of the essential mineral salts. It may not taste very good.

2. *Water that falls on high hills* (upland surface water)
The water that collects into streams above where people live is often plentiful and clean and makes very good drinking water. If it can be piped to people living lower down the hills, the water comes by gravity and no pumping is required.

Disadvantages. The source must be protected. If animal grazing or human settlement occurs in the catchment area the water will be polluted. In some places the increasing population has led to shortage of land on the lower slopes of hills and people have moved up into the catchment area, polluting the supply to those living below them.

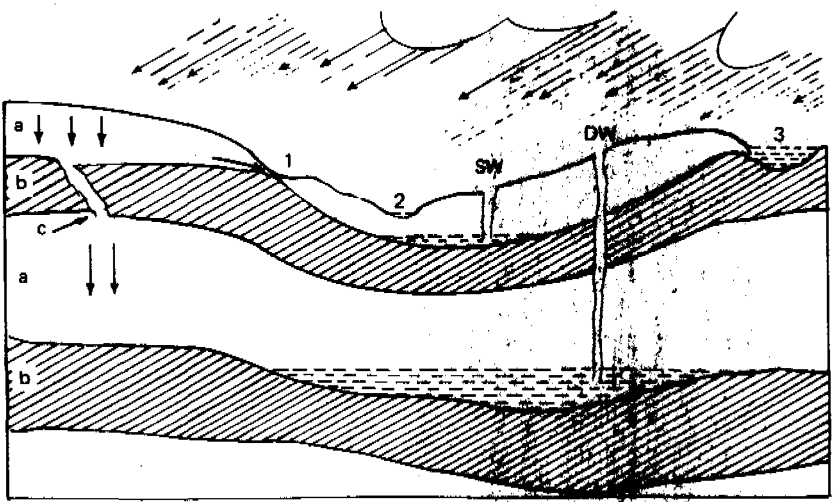
3. *Water in all other areas* (such as plains and on the coastal belt)
Most villages and towns are not on or near high hills where they can get clean water from above the level where people live. Water in these areas, which are most of the country, is of two main kinds: *surface water* and *underground water.*

When rain falls it collects on the surface in streams, rivers, ponds, lakes, swamps, and dams. Some of it gradually soaks down into the ground until it meets a layer of very hard earth or rock which it cannot get through. Such a layer, which may be quite near the surface or quite deep down, is called an 'impermeable layer'. All water above this layer is called surface water. If it emerges as a spring it is called a *shallow* spring: if a well is dug into it, it is called a *shallow* well whether it is 10 or 100ft deep. Water that gets under this impermeable layer is called underground water. If this water emerges as a spring it is called a *deep* spring: if a well or borehole is dug through the impermeable layer into the underground water it is called a *deep* well or borehole.

Surface water
Surface water, whether in ponds, lakes, shallow springs, streams,

or rivers or in water holes, shallow wells, or dams, is the commonest source of water for most people. *Unfortunately it is also the most frequently polluted.* Its advantages are that it is easily accessible; it can be obtained by hand by simple pumps; and the larger lakes and rivers are permanent all the year round.

Disadvantages. This water is easily and frequently polluted as it runs over the ground where humans and animals urinate and defaecate. Also people wash and bathe in it. It may also be polluted by chemicals used in agriculture or industry. Attempts must be made to prevent pollution and also to purify this water as described below.



a Soil – water soaks through	1 Spring	SW	Shallow well
b Impermeable layer	2 Stream	DW	Deep well
c Fault – crack in impermeable layer	3 Lake		

Fig. 8.2 Water may be trapped at various levels underground.

Underground water

As the water soaks through the ground and travels underground it is filtered, as soil is a good filter. Underground water is therefore usually clean and often plentiful and permanent. It may come from a long way away and is not so dependent on local rain. Many rural areas and small towns use this type of water.

Disadvantages

(a) Water from deep wells and deep springs usually dissolves a lot of salts and other minerals and so the water becomes salty, sometimes too salty or 'hard' for any use unless the salts are removed, which is expensive to do.

(b) This water generally needs pumping from great depths, often to tanks or reservoirs before reaching the user.

4. *Sea water*

By the time that water reaches the sea it always contains some salts. These become further concentrated by evaporation and thus over millions of years sea water has become too salty to be drunk without very expensive purification to remove the salt.

Sources of water contamination

It is easier to prevent water getting dirty than it is to clean it. It is important therefore to consider again all the possible sources of contamination *between the time that water falls as rain and the time it is used.*

1. The collecting surfaces for rain water may have leaves, insects, or bird and animal faeces on them.

2. When water runs over the earth it may become contaminated with human or animal excreta, refuse, fertilizers, or industrial waste. This contamination is less high up on mountains and greater nearer towns.

3. Shallow wells may be contaminated by excreta and refuse being washed into them, especially if latrines are nearby.

4. Wells may also be contaminated by the use of dirty containers for drawing water, or by oil from a pump.

5. Rivers, lakes, or dams may be contaminated by bathing, or urinating or defaecating in the water.

6. Even piped water may become contaminated from leaks in the pipes, especially when these pass near foul water or dirty drains.

7. Water may go bad if it is stored for too long in a pot or cistern.

8. Water from any source may become contaminated if it is drunk from dirty or communal drinking vessels.

IT IS EASIER TO PROTECT WATER SOURCES THAN TO CLEAN WATER AFTERWARDS

Protection of water sources

Protection of water means *keeping germs out*. For this we have to make sure that humans (and animals) cannot have contact with the ground above the supply or with the supply itself.

The protection of rain water by the use of gutters, pipes, and tanks has been described. So too has the protection of water falling on high hills, by keeping people and animals away from the catchment area.

There are two other important practical methods of protecting water in wells and springs that can be done quite simply in many villages with the skills and materials available locally. It is an important function of all health workers to try to see that what is needed in this respect is done.

Many people in rural areas still collect their water from unprotected water holes. These are often only 5–15 ft deep and have sloping sides down which people climb to scoop out the water. Dirt and dust are kicked down into the water or get washed in when it rains.

Others collect water from streams that are polluted by people living higher up the stream or from ponds in which animals drink and people wade and perhaps wash.

Older villagers may claim that there is nothing wrong and that they have drunk such water all their life. However, this water is a potential threat to health and the dangers become greater as the population increases and more people use such a supply.

Fig. 8.3 Women using an infected pond as a water source.

Making a protected well

This may be done at the site of an existing water hole or alongside a stream or river at a point where water will filter in from below, but above the level at which it may be flooded. It is important to be as far as possible from a latrine.

It is generally best to dig a well in the dry season when there is little water. This enables the well to be dug deeper.

It may be necessary to keep emptying the first water out to enable the digging to go on. When the well is deep enough, the sides should be built up with stones, cement blocks, or cement rings (large culvert pipes) if available. It is most important to build the sides up above the level of the surrounding ground. This will prevent dirt getting washed in. Then the area outside the wall should be filled in to make a sloping apron. These two improvements—making the well deeper and building up its sides—will by themselves improve the quality of the water a great deal.

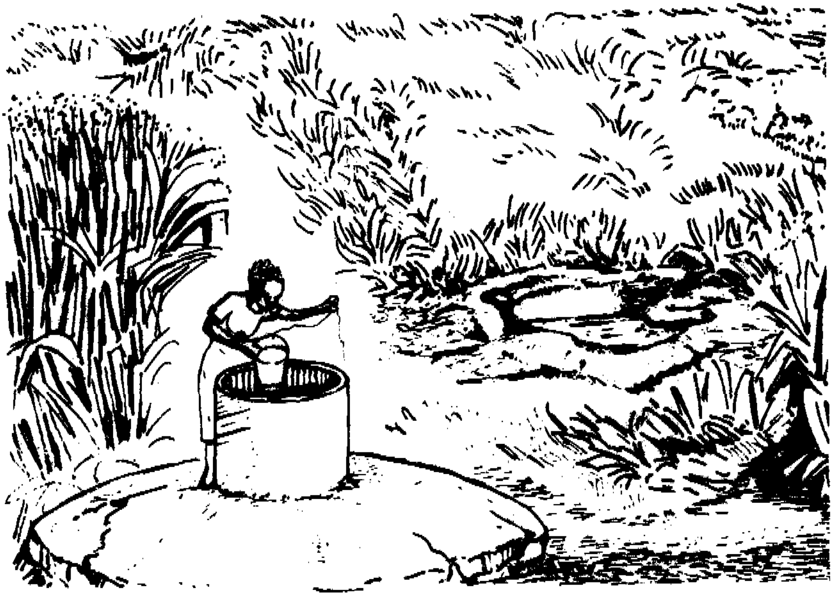


Fig. 8.4 A protected well.

There are, in addition, a number of other improvements that can be made that are very desirable:

1. A waterproof (preferably cement) apron should be built around the top of the well so that water spilt does not run back into the well.
2. The lining of the well should be made waterproof (by cementing) so that only water that has been filtered through the earth at the *bottom* can get into the well.

3. If it is possible to get and *maintain* a pump, then a strong well cover should be made and fixed and the pump attached to it. This will prevent any dirty buckets being used or any other rubbish getting into the well. While it is clearly better to have a cover on a well there is no point in doing this unless arrangements for regular maintenance of the pump can be made. If the well is covered and the pump gets broken people will fetch water from another source with no protection at all, and you end up with a worse situation than when you started.

A well with these safeguards is called a protected well.

Making a protected spring
Springs can also be protected by simple means that can be done by villagers themselves with a little encouragement and advice. A wall can be built around the spring, with an outlet pipe in it, and a cover put over the top (see diagram, page 190). The short piece of pipe is cheap but important. It is much more convenient for filling drums and it eliminates contamination by dipping, just as a pump eliminates contamination of a well by buckets.

While not guaranteeing absolutely pure water these simple measures can greatly lessen the risk of diseases.

Testing water
When new supplies of water are being developed on a large scale it is very desirable to test the quality of the water. The two principal methods of testing are:

- bacteriological analysis
- chemical analysis

For bacteriological analysis water is collected in a sterile 1 litre flask. It has to be refrigerated and analysed within a few hours.

For chemical analysis 4 or 5 litres are collected in any clean container and there is no great hurry. New methods of sampling and field analysis using smaller quantities of water are being developed.

Fig. 8.5 Protecting a spring.

Bacteriological analysis

It is very difficult to find the actual organisms that cause diseases, e.g. typhoid bacilli or poliomyelitis viruses. Instead the most important test is for an organism E. coli (Escherichia coli); this is a normal inhabitant of human and animal intestines and it cannot live elsewhere for very long. If there are many E. coli in a sample of water (ideally there should not be more than 10 per 100ml) this shows the water is being contaminated by excreta. This is a clear danger signal.

E. COLI = FAECES = DANGER

Chemical analysis

This involves testing for a number of different substances. Some, such as ammonia, are also indicative of contamination with organic matter, often excreta. Other tests can be done for hardness or softness, or for other slats or minerals, which may affect the taste or suitability of water for drinking.

Water purification—simple methods

It should be said again that it is generally easier to prevent water getting dirty than it is to make it clean afterwards. However, there are many occasions when relatively dirty water has to be used, so it is important to know the simple ways of cleansing it.

The main methods used for cleansing water are:

- storage
- filtration
- sterilization

Storage—the 3-pot system

If water is allowed to stand, many of the harmful organisms which may have got into it die because they cannot survive in water for a long time. Also a lot of the suspended matter settles to the bottom. If the water was cloudy (turbid) to start with, the difference can easily be seen; if it was clear, standing will still reduce the number of living organisms although the improvement cannot be seen with the naked eye. Water improvement by storage can be simply done in the home by using three pots for water. Two big pots are used for fetching water on alternate days. The first pot is allowed to stand for 24 hours. Then the clear top water is carefully poured into another smaller pot for drinking and the remaining water used for washing. When the first pot is empty it is cleaned and refilled and allowed to stand for 24 hours again while the second big pot is used in the same way as the first. In this way each day's water has been standing for 24 hours before it is used.

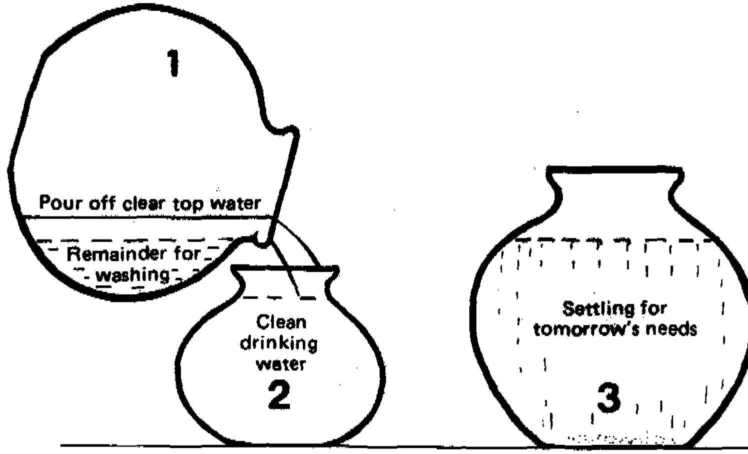


Fig. 8.6 The 3-pot system of water storage.

This method of storage may be done on a larger scale in tanks or on a very large scale in reservoirs. In these cases the water should stand for 3 to 7 days before use.

Filtration

Filtration is the next stage of purifying water. This too can be done on a small scale for a household or on a large scale for a village or town.

The best simple household filter is a candle filter. It is, however, rather expensive. The filter is made of pottery in the shape of a big candle. It also has two containers (see diagram opposite). Water is put into the top one, filters through the pottery candle, and is stored in the bottom one. From time to time the candle is brushed to clean it.

The commonest filter for use on a larger scale is one made of sand. This is made in layers with stones at the bottom, then coarse sand (sand with large grains), and fine sand (sand with small grains) on the top. Sand filters for a public water supply are usually built in concrete containers. For a few houses smaller sand filters in special metal containers may be used.

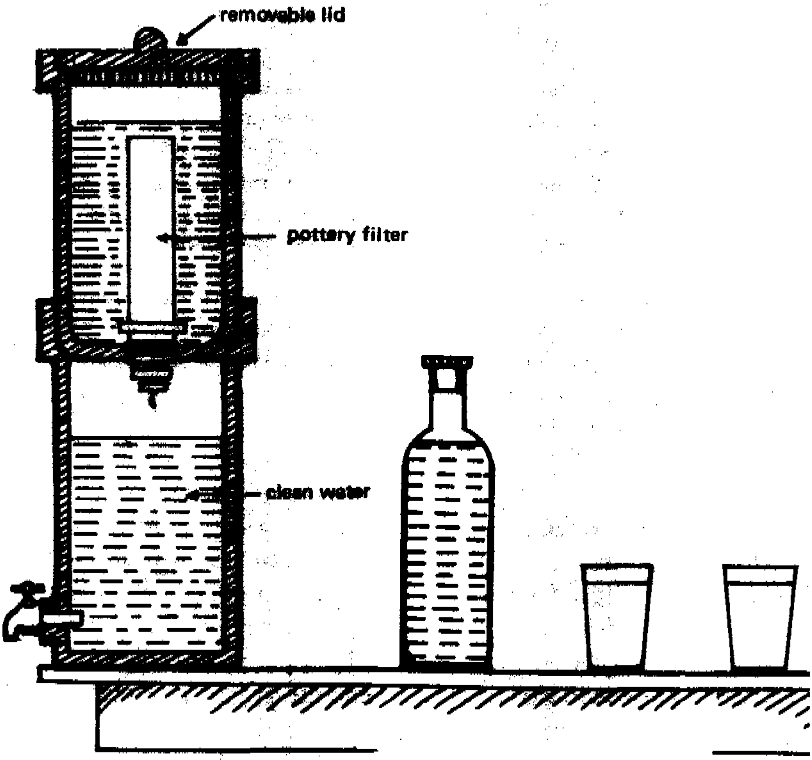


Fig. 8.7 A candle filter.

Sterilization

Sterilization is the final stage of water purification necessary for wholesome drinking water. On a large scale, for big towns, this is done in the waterworks by adding chlorine automatically to water that has been filtered. On a small scale water may be sterilized either by boiling or by adding disinfectants such as chlorine or iodine.

(a) *Boiling* water is the simplest and safest method of sterilization but very few people are prepared to do this regularly. They can, however, sometimes be persuaded to do it if there is an outbreak of water-borne disease. (Because tea is made with boiling water weak tea is an excellent safe drink for small children.)

(b) *Chlorination:* Milton and Jik are two trade names of 1% solutions of chlorine for household use. Two drops to a litre of water will provide reasonable sterilization. Halazone is chlorine in tablet form which may be used as directed by the manufacturers. For more complicated treatment of larger quantities of water you should check with your district health officer for technique.

(c) *Iodine* is an excellent disinfecting agent which may be purchased as 2% tincture of iodine. Two drops are sufficient to disinfect 1 litre of water and iodine tablets such as Globaline and Potable Aqua (commercial names) are also used in the sterilization of small amounts of water as directed by the manufacturer.

Summary

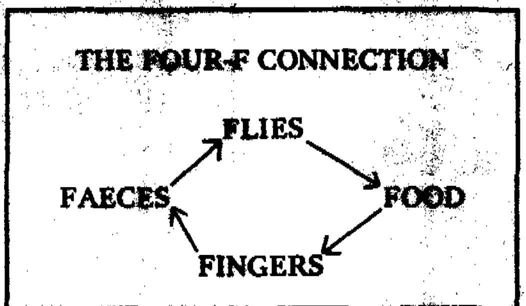
The provision of adequate quantities of safe water near people's homes is one of the most important aspects of primary prevention. Health workers should assist in achieving this aim as well as treating people suffering from *water diseases.* It is not enough to wait until piped water is provided and just to tell people to boil their water—because very few will do so. Instead encourage the simple ways of protecting water sources and of cleansing water.

8.3 EXCRETA DISPOSAL

The hygienic disposal of excreta is important because the infective organisms for many diseases leave the body in the faeces and some in the urine. (Excreta are faeces and urine; sewage is excreta + water + anything else people put down the drains.) Faecal organisms may infect people directly, or sometimes after an intermediate stage, which may be either free-living or in an intermediate host. The following diseases can all be spread from faeces: bacillary and amoebic dysentery; the typhoid fevers; cholera; poliomyelitis; infective hepatitis A; food poisoning; schistosomiasis (intestinal);

and all the intestinal worms. Urine carries the infective ova of urinary bilharzia.

All animals and humans produce excreta and when many people are living together it becomes very important to dispose of their excreta safely. This is because excreta (*faeces*) can be the source of so much sickness in the community if it is accessible to *flies* and *fingers* for transfer to *food*. This is the Four-F connection.



This is often called the faecal-oral route of transmission.

Many people in rural areas still defaecate in the bush. To improve sanitation it is necessary both to provide simple facilities which are cheap and easily made by any family and also to help people understand the importance of using them. There are many local customs and taboos that make this difficult. The health worker must find out what these are in order to be able to change them gradually.

The most important method of excreta disposal in rural areas is the pit latrine, and all health workers should know how to construct a simple latrine and be able to teach people why they are important. In towns, toilets are often the best method of excreta disposal. The construction of these is more complicated and expensive and can only be done by experienced workers.

Pit latrines

A pit latrine (Fig. 8.8, page 196) consists of a hole in the ground, a squatting plate for sitting or standing on when defaecating or urinating, and a hut to give privacy and protection from the weather. The main purpose of the latrine is to deposit faeces where they are safe from flies (and feet and fingers).

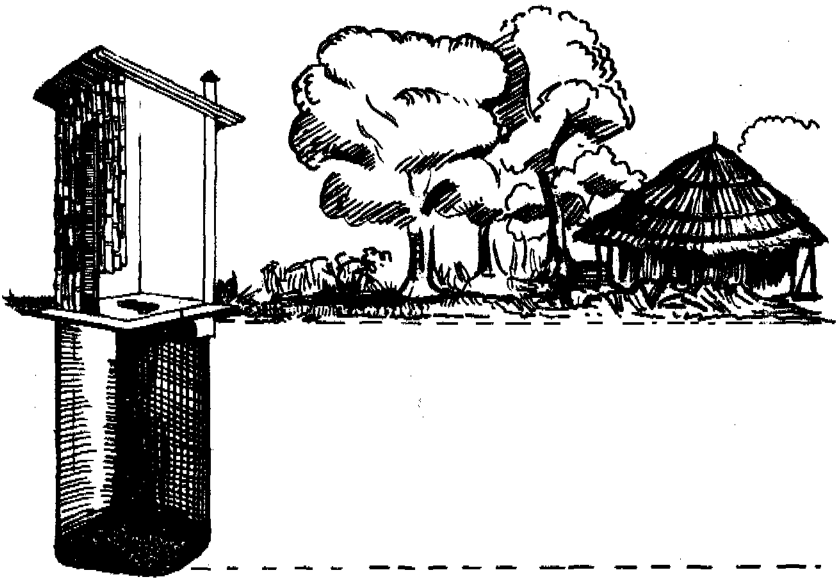


Fig. 8.8 A pit latrine.

A latrine should be situated away from houses, and particularly from sources of water. It must be at least 50 feet away from any water source if on the same level or below it, or more than 100 feet if it is above it. It must be on dry ground where water drains away from it. There should be a storm water drain around it. A latrine works best in firm but porous soil where the water table is not too high.

The pit should be as deep as possible, preferably 12–18 feet. A round pit 3–4 feet in diameter is stronger and less likely to collapse than a rectangular one. If the soil is not firm the pit may be protected by a woven wattle cage or, more permanently, with burnt bricks or cement blocks. The mouth of the pit should be strong to support the cross beams, squatting plate, and hut. It may be necessary to strengthen the top with a circle of bricks or cement blocks.

The floor can be made by covering the cross beams with smaller branches and then earth. It is very difficult to keep the surrounding edges clean in this sort of floor and they may form a breeding ground for hookworm. It is much better and not very difficult to make a concrete slab to put in the centre of the floor over the cross beams. This is easy to wash and keep clean. The standard slab is made in a simple wooden frame 3 feet by 2½ feet and 2½ inches thick. (One bag of cement will make four slabs, so if the sand and stones are collected locally, the cost of the slab is only the same as two or three bottles of beer.) For further details on how to make the slab see Appendix 8.1, page 427.

The hole needs a cover (with a handle) to prevent flies getting in and out and breeding in the latrine. A further method of fly control is to provide a *fly trap*. This is simply a 2 inch plastic pipe at the back of the latrine with a fly-proof screen over its top. Any flies getting into the latrine fly up the pipe towards light and stay there—they do not fly back down and so cannot escape to transmit any disease organisms to anyone.

The simplest hut can be made out of poles and thatch. It should have a roof and a door or hanging sack or mat. More permanent huts can be made from poles and mud, or brick, cement blocks, or iron sheets. There should be no windows, but ventilation just below the roof.

Other types of pit latrine

A bore-hole latrine may be bored with a 12–18 inch earth auger. This is a kind of big screw with which men can dig a hole 15 feet deep in a few hours, if the soil is suitable.

A trench latrine—is a multiple pit latrine. A trench is dug and a number of holes with dividing partitions constructed over it. Temporary work camps often have trench latrines.

Advantages of pit latrines in rural areas

1. Most villages in the country have a lot of space and good soil for the digging of pit latrines.
2. Pit latrines are cheap to construct.
3. They do not need much special knowledge to construct. Local people need just a simple explanation and a little supervision.
4. The materials for construction can easily be obtained locally.
5. Pit latrines do not need a piped water supply.
6. When properly made and used they are clean and produce minimum nuisance.
7. Pit latrines are easy to use and faecal matter is completely disposed of at the same time.
8. A pit latrine when full can easily be covered over and abandoned and another one made without incurring much expense.
9. A filled and covered pit fertilizes the soil, and plants like bananas grow very well over it.

Other dry methods of excreta disposal

Bucket latrines—or pail closets—are a highly unsatisfactory method of excreta disposal. They create the unpleasant job of emptying the buckets into pits or trenches and spillage often occurs, which attracts flies.

Composting pit latrines. New methods of converting faeces to usable fertilizer (composting) are being developed. Two shallow pit latrines are dug but only one used. When the first one is full it is closed and left unused for 4–6 months. At the end of this time the sludge is dug out and used as agricultural fertilizer; it should be dry and crumbly and not offensive by this time. Then the second latrine is closed and the first one used again. Sometimes vegetable refuse (grass, leaves, organic kitchen waste) is regularly put into the latrine pit with the faeces. (For details of construction and operation see *Sanitation without water* by Windblad, Kilama, and Torstensson.)

As such latrines need only shallow pits they are suitable for use in places where the water table is too high for a deep pit latrine or bore-hole latrine to be used safely. If the water table is very high, the pit can be made in a mound of earth and be almost entirely above ground.

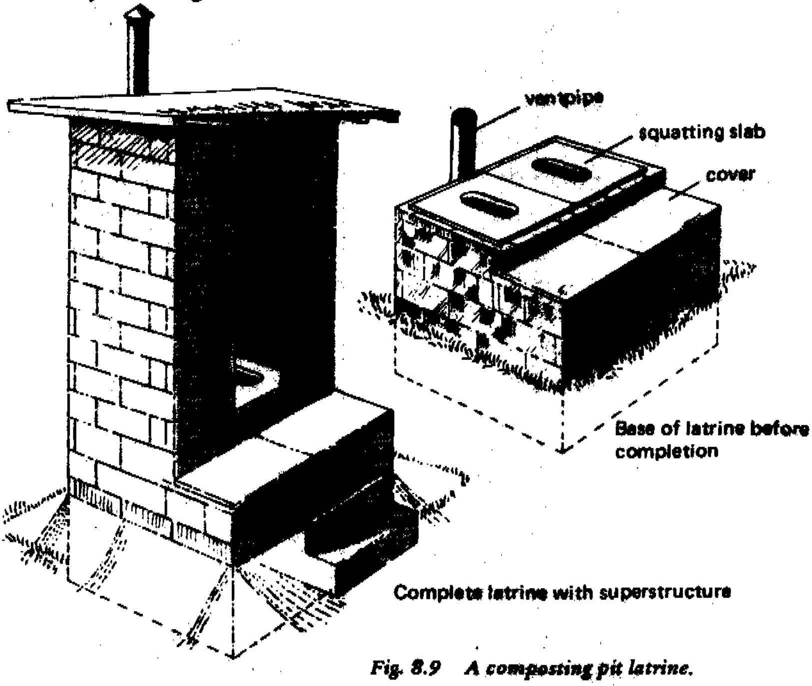


Fig. 8.9 A composting pit latrine.

Flush toilets

Flush toilets, also called water closets, are the most permanent and hygienic method of excreta disposal, when properly used. They are the only reliable sanitary conveniences for permanent buildings, both public and private. However, flush toilets involve a lot of engineering work—drains and sewage treatment works—which is expensive. Flush toilets also need a permanent, continuous, and adequate piped water supply. Any failure of the water supply makes flush toilets useless and dangerous to use.

Water-borne sewage treatment

Water-borne sewage needs 'treatment' before we can dispose of it. The principle of treatment is 'holding' the sewage in an open or closed space for a few days to allow fluids and solids to separate and biological (bacterial) action to turn it into a safer and more usable form.

Small-scale systems—the septic tank

For a house, health centre, or small school a septic tank is a common and suitable method of treatment. The sewage drains into a special concrete underground tank (Fig. 8.10) where solid matter settles to the floor and anaerobic bacteria digest it, producing a relatively small final quantity of solid sludge (so a tank can operate for several years without emptying) and a fairly clear liquid effluent. This effluent still needs further bacteriological treatment to become quite inactive and we usually lead it over stones and sand in underground drains where aerobic bacteria finish the biological decomposition.

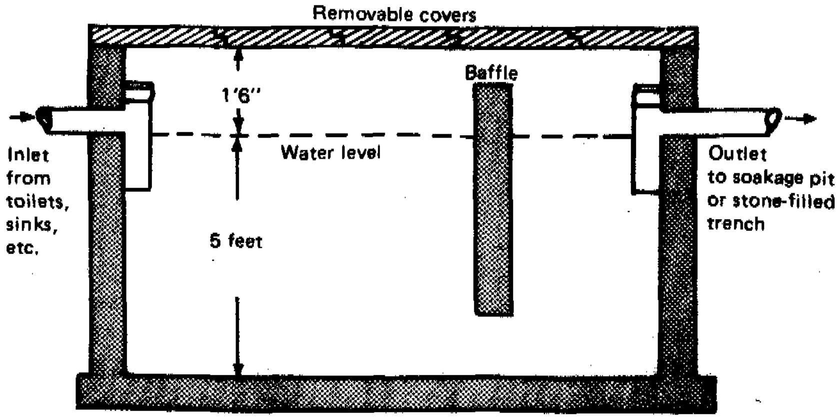


Fig. 8.10 A septic tank.

Larger systems

Where larger numbers are involved we may use sewage 'ponds' or 'lagoons', sited some distance away from buildings, where biological action takes place in the open air. Again the effluent needs further treatment by draining over stones or sand, after which it is clear and inactive and can even flow into a river if desired. Towns use similar but larger sewage 'farms' to treat large quantities of sewage, unless they are on the coast and can send it out to sea.

8.4 FOOD HYGIENE

Food, as well as being essential for growth, development, and energy, may also be responsible for the spread of a number of important diseases. The aim of food hygiene is to prevent food going bad or becoming contaminated at any stage of production, collection, storage, sale, preparation, or consumption.

The commonest form of contamination is from excreta by means of fingers, flies, etc., as described in the last section. Food may also be contaminated from infections of the skin, especially the fingers of food handlers (e.g. staphylococcal food poisoning), from diseases of the plants or animals eaten (e.g. brucellosis, tapeworms, etc.), or from chemicals used either as insecticides on crops or in the preservation of food.

No food remains fresh for very long. Sooner or later when left by itself it starts to decompose—it goes soft and smells and becomes unfit to eat, due to bacterial action.

It is not always possible to obtain fresh food, therefore a variety of methods of preserving and storing food have been developed. If bacteria can be prevented from getting into food, or conditions unfavourable to their development can be created, then food will remain good for a longer time.

Main methods of food preservation

1. Bacteria require moisture, therefore they will not survive

in well dried or smoked foods such as dried spinach or fillets of fish. The drying may be done by the sun or by fire.

2. Saturation of a food with salts or sugar makes it uninhabitable for bacteria. Examples are ham and jam.
3. Cold (refrigeration) prevents dangerous multiplication of bacteria, although it does not kill them. So proper use of refrigeration is another form of food preservation. 'Deep freezing' will keep food for weeks or months; the ordinary part of a domestic refrigerator will keep food for a day or two. Refrigerating is no use, however, if food is allowed to stand about at room temperature long enough to grow many bacteria before it is refrigerated.
4. If we kill all the bacteria in a food and then seal it up to prevent any more bacteria getting into it, the food will not spoil. This is the principle of canning or 'bottling'. The food is first heated to a temperature that will kill all bacteria then, while still very hot, it is sealed in bacteria-proof containers (jars or tins) where it can remain safe for years at room temperature.

Preservation of fish, meat, and vegetables in rural conditions

1. *Fish and meat.* It is a normal practice to preserve fish or meat by *smoking* and *drying*. A wood rack is built in the open and fish or meat is placed on it. Under the rack a wood fire is made which generates heat and thick smoke. The heat dries the food and the smoke coats the outside and also gets inside the fish or meat and acts as a preservative. Sometimes common salt is applied to the fish or meat before smoking to prolong the keeping time.
2. *Green vegetables* such as mlenda can be safely preserved by drying in the sun. They may then be powdered or kept in bundles in tins or other suitable containers for future use.

3. *Beans, peas, etc., cereals and starch foods* can also be preserved by drying.

N.B. Any food preserved by drying must be stored in a dry place until used.

Regulations for food safety

Because of the importance of safe food, laws have been passed to protect the public. The Food and Drugs Ordinance and Regulations cover many aspects of food handling and health officers are generally responsible for enforcing the law. Sometimes various agricultural staff are also involved in inspection.

Meat and milk are the commonest foods to cause trouble, so health officers are required to inspect slaughter houses and dairies and the shops where meat and milk are sold. They may take samples for analysis or condemn unfit food, which must then be destroyed.

Hotels, restaurants, and food shops are also covered by hygiene regulations and have to be inspected.

However, the law by itself cannot protect all food, and health education is extremely important for all who handle food, at any stage from production to cooking.

8.5 HOUSING

Housing may affect health in a number of ways. A combination of dampness, lack of light, poor ventilation, and overcrowding will contribute to the spread of air-borne droplet infections. Earth floors and walls and unscreened windows permit the entry and breeding of bedbugs and mosquitoes. Cooking fires on the floor are hazards to small children. Inadequate space to talk and play, especially in town houses, may encourage fathers and children to leave home, so adding to social problems.

For all these reasons it is important to improve the quality of housing. Official standards for housing are apt to be unrealistic but a great deal may be done by making simple improvements.

Criteria for an adequate village house

1. It should be built on a good site, i.e. on dry ground, not subject to flooding.
2. There should be separate accommodation for humans and animals.
3. It should be dry.
4. It should have adequate light and ventilation.
5. There should be separate rooms for food storage and preparation.
6. Protection against vermin and insects should be attempted by (a) hard floor and walls, preferably concrete and plaster, and (b) screened windows.
7. There should be a good pit latrine.
8. There should be an adequate method of refuse disposal—burial, burning, or composting.
9. There should be a satisfactory water supply, in quantity, quality, and reliability.

In many places mud bricks are an appropriate method for improving houses, stores, latrines, incinerators, etc. They require much less cement or lime and are consequently cheaper than most other building materials.

8.6 REFUSE

Refuse, or solid waste, is produced by Man all the time wherever he lives, works, or happens to be.

The indiscriminate disposal of refuse:

- is unsightly
- produces offensive smells
- attracts insects and vermin—particularly flies, cockroaches, and rats
- may be involved in the spread of disease
- may cause fires
- may cause pollution of air, water, or food.

The amount and type of refuse produced varies greatly from one community to another, and so does the means of getting rid of it. A family living by themselves farming their own land produce relatively little refuse. The little that they do produce should be got rid of by burning or by burying. When people live together in villages, and particularly in towns, more refuse is produced and it becomes a greater health problem unless it is properly stored, collected, and disposed of.

Types of refuse

Domestic refuse
This usually consists of bits of food left over, or the skins, husks, and shells of potatoes, maize, and coconuts; waste paper, including wrapping and newspapers; worn-out clothing and shoes; and broken vessels and utensils such as cooking and water pots, bottles, tins, etc.

Street refuse
This consists mainly of paper and food dropped by the public and commercial refuse around markets, hotels, and other public places. Abandoned wrecks of cars are also found.

Industrial refuse
This varies according to the type of industry. Some of it may be dangerous and need special disposal.

Refuse disposal in rural areas

This is seldom a problem for individual houses because little refuse is produced. What is produced should be put in a pit or burnt so as to keep the area around the house clean.

Shops and eating houses, and especially markets, produce more refuse, however. The health worker should get the support of the village committee and arrange for the refuse to be collected and got rid of regularly, especially after market days. Any of the simple methods described below may be used.

1. *Crude dumping*. This is an unsanitary method of disposal and though commonly used it should be discouraged for the reasons given at the beginning of this section.

2. *Controlled tipping*. This means depositing refuse into depressions or larger holes in the ground. These should be situated at least a quarter of a mile away from the settlement, preferably out of sight and downwind. They should be dry or properly drained. After each day's refuse has been deposited it should be covered over with a firm layer of earth.

3. *Incineration* (burning). This may be done in a variety of ways, some of which are much better than others.

   Simple 'open-air' burning is not very effective. Rubbish waiting to be burnt harbours vermin and gets blown about.

   Some improvement can be made by burning in a trench or a simple mud-brick incinerator. A bin incinerator made out of a 44-gallon drum with fire bars across it and air holes underneath is an effective cheap way of disposal (Fig. 8.11, page 207). More elaborate (and expensive) incinerators built out of brick and provided with chimneys allow more complete combustion and produce less smoke.

4. *Composting*. This is a cheap and convenient method of disposing of refuse which should be used more often. Wet

and dry refuse are heaped in alternate layers, onto a plot about 8 feet square to a depth of about 5 feet, and then covered with grass or earth. Fermentation decomposes the refuse, which should be turned over after 30 days, and again at 60 days. After 90 days the refuse is 'ripe' and may be put on the land as fertilizer.

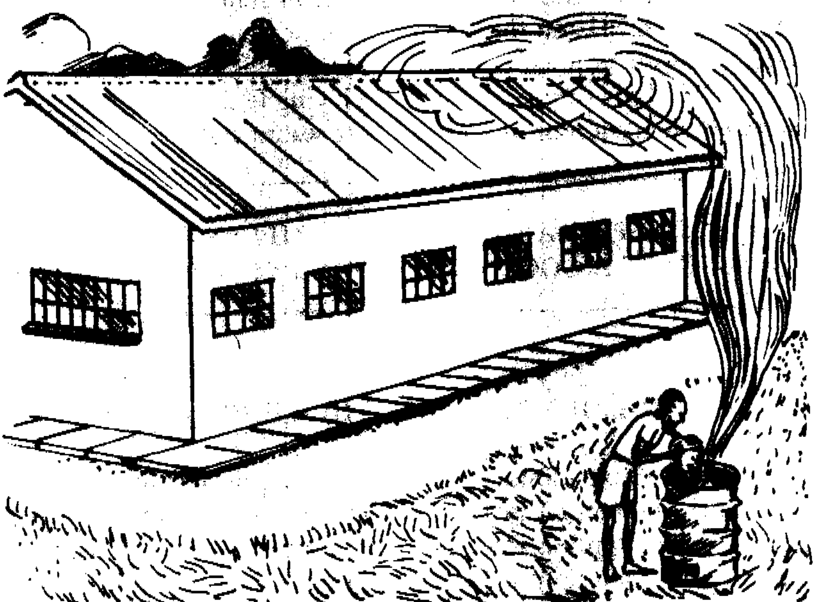


Fig. 8.11 An incinerator.

Refuse disposal in towns

This is much more of a problem. The proper arrangements for storage, collection, and disposal of refuse are expensive. The health department, or sometimes the town engineer's department, may be responsible for refuse disposal but they do not usually have enough money to do the job properly.

Refuse should be stored in proper containers—plastic or metal bins with lids, or polythene bags. There should be enough of them to store the refuse until it is collected. Where many bins are used, as in blocks of flats, they should if possible be kept together on a concrete stand under cover and where dogs cannot upset them.

Collection must be arranged regularly, using either hand carts, tractors and trailers, or more expensive special trucks.

Disposal is most often done by controlled tipping outside the town. In practice these tips are seldom controlled adequately and often cause smells and fires. It is very important that they should be as far away as possible. Large-scale tips may be used for reclaiming land for future use such as playing fields. Other methods such as incineration or dumping out at sea may also be used.

DISPENSARIES AND HEALTH CENTRES MUST SET A GOOD EXAMPLE IN REFUSE DISPOSAL

8.7 CONTROL OF VECTORS IN THE VILLAGE

There are a number of insects and animals responsible for spreading some of the common diseases of rural areas. In addition to protecting water supplies, and improving refuse and excreta disposal, food hygiene, and housing, it is useful to consider what can be done to control the vectors themselves. There are sometimes large national and international programmes for the control of vectors. Their description is beyond the scope of this manual. However, there are also some steps which individuals may take themselves or, better, together with their neighbours or the village community, which can greatly reduce the health hazards involved.

Houseflies

Flies breed and feed on decaying matter such as vegetable refuse, animal carcases, and particularly on faeces. They carry the bacteria from this decaying matter onto human food, skin, and eyes when they land on them. Flies associate with people simply for food. This food may be in the form of food scraps, discharges from eyes or sores, food around the mouths of children, or even faeces on careless hands. By reducing these fly foods we reduce the likelihood of flies associating with people. As with rats, the less you feed them the less they come to you.

The village community should be told of the above fly habits before being asked to help control them by:

(a) All refuse, any decaying matter, carcases, and faecal matter must be properly disposed of by burying, burning, or being properly composted to useful fertilizer.

(b) All house surroundings must be kept clean all the time.

(c) All houses must be kept clean, all food leftovers, etc. should be placed in covered dustbins, or buried immediately.

(d) All food vessels and utensils should be kept clean.

(e) Foods should be protected from flies—food and meat safes are recommended for this purpose.

(f) Village streets, roads and other public areas should be kept clean. This can easily be done by the villagers themselves, providing there is a good organization and proper division of labour amongst them.

(g) Animal-keeping areas like cattle bomas should be away and separate from human settlements.

(h) Above all, people should always wash themselves after using the latrine and before and after preparing food and eating.

ALWAYS WASH:
1. BEFORE PREPARING OR EATING FOOD
2. AFTER USING THE LATRINE

Mosquitoes

Mosquitoes, through transmitting malaria, are the number one killers in rural Africa. To let mosquitoes breed around a house is asking for trouble. Mosquitoes are almost as dependent upon water as fish are. So our best way of control is by drying them to death, that is by removing all possible water breeding sites. The nuisance and danger from mosquitoes can be reduced if every villager does his part to fight them by:

(a) (i) *draining* water holes, ditches, and any accumulation of water in or around the village; or
(ii) by *filling in* holes, ditches, etc., so that water will not accumulate.

(b) *Clearing* bush and grass along water banks and in the village as a whole. Mosquitoes only breed in damp places and long grass prevents these from drying out.

(c) Collecting and *disposing of* all containers likely to hold water—this includes tins, coconut husks, old motor-car tyres, etc.

(d) Sleeping and talking rooms should have windows *screened* with mosquito-proof wire gauze and beds should be provided with mosquito nets.

(e) Use of mosquito repellant coils immediately prior to sleeping time.

(f) Use of insecticide in hand sprays.

DESTROY MOSQUITOES' BREEDING SITES

Bilharzia snails

These help to spread bilharzia (schistosomiasis), which affects almost as many people as malaria. They breed and live in ponds, swamps, and slow-flowing streams and rivers. Villagers can help to control them by:

(a) clearing all vegetation along the water-edges to deny the snails shade and food;

(b) clearing water channels so that water flows faster, thus making snail breeding more difficult;

(c) draining of swamps, water holes, etc., to eliminate breeding sites;

(d) the provision and use of latrines by every villager. Everyone, young and old, must understand the danger of defaecating and urinating in or near water. It is *people* who infect water with bilharzia;

(e) no bathing or swimming in stagnant water;

(f) if molluscicides are available they may be applied routinely by the villagers if other methods cannot be used.

IT IS PEOPLE WHO SPREAD BILHARZIA

Rodents

Rats and mice live and multiply rapidly where there is a low standard of sanitation and where human food is easily accessible. Rats visit people's houses only if they can find food there. Their food may be waste food or any food which is not kept closed up in rat-proof containers. Therefore a village community should do the following to control this nuisance and health hazard:

(a) There must be proper storage, collection, and disposal of all types of rubbish.

(b) All bush and long grass in and around the village should be removed.

(c) Open rodent holes in the village should be sealed with earth or with any other suitable rat-proof material.

(d) Food and food leftovers, etc., should be properly stored in properly closed bins prior to disposal.

(e) Raw food like rice, maize, millet, cassava, beans, etc., should be stored in rat-proof stores outside the main building. This can be done by constructing a big hut with a rack supported with wooden poles. The supporting poles can be provided with metal sheet-guards (funnel-shaped) so that rats or mice cannot climb up.

(f) When there is a big population of rodents, villagers can hunt them with sticks, etc.

(g) Break-back or cage traps can also be used.

(h) Pets like cats and dogs also help to control rats and mice.

RATS STAY ONLY WHERE THEY ARE FED

Fleas, bedbugs, lice, and ticks
All these are a widespread source of nuisance and ill health. They can be controlled by depriving them of sheltered places in which to breed such as unwashed clothing, the joints of roughly made bed frames, and cracks in mud walls and floors; and by reducing contact with animals. The use of soap, sunlight, and cement in these ways is more important than the use of DDT.

8.8 POLLUTION

Pollution—the spoiling of natural resources like air, food, and water, by contamination with harmful substances—already occurs on a small scale in villages. It occurs on a larger scale in some of the towns of East Africa, and is an enormous problem in many industrialized countries. It threatens to be one of the world's major problems.

Pollution in rural areas may occur from the use of insecticides for agricultural purposes, or from waste from sisal, coffee, or sugar manufacture. In towns, smoke from big industries like oil-refining or fertilizer manufacture may cause a nuisance. Also the effluent from textile factories may pollute rivers and kill off fish.

Though pollution is not yet a very serious problem in East Africa, it is easier to anticipate and prevent it now than to wait until it is bad.

8.9 ENVIRONMENT AND HUMAN BEHAVIOUR

At several points in this chapter we have mentioned that it is important to explain the reasons for any new hygienic practices to the community. In fact no environmental health measure is likely to succeed unless the community believes there is a need for it. All new practices mean a change in people's behaviour and in general people are not at all willing to change their behaviour unless they can see a personal advantage in changing. This advantage may be avoiding disease, making more money, or just being more comfortable, but there must be some attraction to the new idea.

BEHAVIOURAL CHANGES COME FROM WITHIN

Much the best way to introduce any change is to find out firstly what people think about a problem—very probably they do not see it as a problem at all. In that case the first thing to do will be to help them to realize, by talk and discussion, that there is a problem which it would be worth their thinking about. They should then be encouraged to think up possible solutions and, if necessary, guided towards choosing a solution which is technically possible and suitable to the situation. Here the example set by the health staff in their own homes or at the health centre may be a most important way of suggesting something to people without saying anything.

The health staff's aim must not be to obtain an auger and dig a latrine in each compound, nor to get an outside team to come and protect a water source. It must be to work with and talk to people until they come to ask for advice or help in solving their problem with flies, or diarrhoea, or whatever has started to worry them. Environmental changes mean behavioural changes, and behavioural changes must start from inside the people. They must want the improvements, and preferably be ready to help carry them out.

COMMUNITY SUPPORT IS NEEDED
FOR ENVIRONMENTAL CHANGE

8.10 A VILLAGE ENVIRONMENTAL SURVEY

It is useful to have a check-list of the important environmental health practices so that a village or house can be assessed as a start to making any plans for encouraging changes. If the assessment is repeated at intervals, such as yearly, it also provides a measure of how much change has occurred since the last assessment. The following check-lists are only examples; you may wish to use some other questions, and some of those listed here may not be appropriate in the particular community you wish to assess.

KEEP RECORDS TO EVALUATE
ENVIRONMENTAL CHANGE

Check-list for village environmental survey.

Name of village: Haraka
Name of village chairman: Mzee Amko Twende
Location: 16 Kms west of Muxepesi on Bahati road
Communications (roads, buses, post-offices, etc.): All-weather road; daily buses to Muxepesi; post-office; no telephones

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Date visited: 4/8/79
People consulted: Village chairman and R.M.A.
Name of assessor: Tumaini Leo

Type of site: Flat dry site at foot of hills

Approx. no. of inhabited houses: 70
No. of people: 350

Main source(s) of water —distance: Stream from hills runs through village
Other source(s) of water: One well near stream, below village.

Source(s) of pollution: Sisal factory down-stream.

General cleanliness: Satisfactory except for bushes near stream – faeces present

---

Method of refuse disposal: No public system

School—cleanliness, sanitation etc.: New primary school – poor latrines

---

Market—cleanliness: none

Public latrines—cleanliness: none

Butchery—cleanliness, —screening: torn screens – otherwise satisfactory

---

Bars and restaurants: 2 bars
—cleanliness
—kitchen: 1 with kitchen
—refrigerator working: no
—hand washing facilities: none
—toilets: structure OK – but dirty

Availability of building materials —sand, stones, wood: sand in river, stones and timber from hills

---

Date: 4/8/79

Recommendation and advice given: Chairman advised to have bushes by stream cleared. Bar owners, in presence of chairman, encouraged to maintain toilets better.

Check-list for house and compound assessment.

Name of head of household........ Mzee Shido
Name of Ten-cell leader........ Baraka

Date visited 5/6/79
Name of assessor Tumaini Leo

State of compound Cow dung at back – otherwise clean

No. of buildings
–permanent none
–semi-permanent main house and kitchen
–temporary washroom, latrine, cow shelter

Type and state of repair
–roof good – iron sheets
–walls mud and pole, good condition, painted.
–floors Living room – cement. Others, mud

Evidence of vermin
–rats, cockroaches, etc. none

Separate buildings for animals Yes – shelter for 3 cows

Separate kitchen Yes – in poor repair
–cooking fire 3 stones.
–food store/granary maize stored in roof

Separate washroom Yes – in poor repair

Latrine
–slab, cover, cleanliness cement slab, no cover. Shelter in poor repair.

Method of rubbish disposal pit and burn;
–manure manure left in compound

Vegetable garden none

Water source All weather stream
–safe, doubtful, polluted – doubtful
–distance – 600 metres
–method of storage – plastic
–approx. quantity used per day – 8 gallons

Number of permanent residents 2 adults, 3 children } 5

Date 5/8/79 Recommendations and advice given:
Advised to take cow manure to shamba. Make cover for latrine and repair shelter before rains.

Chapter Nine

IMMUNIZATION

9.1 INTRODUCTION

It has been known for many years that most infections protect a person for some time against a second attack of the same disease. This is because the organisms causing the infection have stimulated the body to produce immunity. Any foreign substance in the body that stimulates immunity, such as bacteria or viruses, is called an *antigen*. The immunity produced specifically matches one particular kind of antigen, just as a key matches one particular lock. This is why immunity against one disease, such as measles, does not protect a person from other diseases, such as typhoid or pneumonia.

In this chapter we shall be discussing ways of using immunity to protect people from different infectious diseases. Preventing infectious diseases in children is one of the most important things we can do to improve their health, because infections are the major cause of sickness and death in children. Immunization is a very effective means of primary prevention against certain diseases.

9.2 TYPES OF IMMUNIZATION

Active immunization

We can define immunization as the process of protecting a person from a specific disease. This happens automatically when a person gets an infection and develops immunity. It also happens when a vaccine against a disease is given to someone. This is called *active immunization* because the vaccine is acting in place of a natural antigen.

Some vaccines are made of live bacteria or viruses that have been modified enough *not* to cause a severe infection, but they are still similar enough to the original bacteria or viruses for the body not to be able to tell the difference. We call these *live attenuated vaccines*, which means their virulence and danger has been taken away. Other vaccines are made out of dead bacteria or by modifying the toxins that some bacteria produce. The modified toxins are called *toxoids*, and they have also been changed enough not to cause the person to become sick.

When these vaccines are given to a person, either by mouth or by injection, they act as antigens and stimulate the body to produce the appropriate immunity in about 7–10 days.

ALL CHILDREN SHOULD BE VACCINATED

But because the vaccines are made from dead, or live but attenuated, micro-organisms, or from toxoids, they do not cause an actual disease. BCG and smallpox vaccines, however, do give a definite skin reaction, and other vaccines may cause a slight fever or other mild reaction. Mothers should be warned about these possible reactions or side effects in their children, and told that this means the vaccine is a good one and is working well.

The immunity is largely due to substances called antibodies. These antibodies are made out of protein and may either be fixed in the person's cells (cellular immunity) or may be circulating in his blood. The advantage of active immunization is that these antibodies are the person's own and the body then 'remembers' how each particular antibody was made. If a person is again exposed to an infection he has already been vaccinated against, the body will very quickly make more antibodies to fight off the micro-organisms, usually before they even start growing in the body.

Passive immunization

So far we have only described immunization by the introduction of antigens into the body, either from an infection or vaccine. It is also possible to take ready-made antibodies and to give them to another person. Because the person receiving these antibodies is not making them himself this is called *passive immunization*. 'Passive' means 'inactive', and indicates that the body receiving the antibodies did not take part in making them.

These antibodies may come from many different sources. Most of them come from animals, such as horses, which have been vaccinated to make them produce antibodies against a particular disease. Part of the animal's blood is taken and the serum protein containing the antibodies is separated off, concentrated, and then given to people to protect them from that disease. These preparations are now also sometimes made from the serum of other humans who have had a disease, because of possible adverse reactions when using antibodies from animals. Antitetanus serum (ATS), diphtheria antitoxin, and snake antiserum are a few examples of these antibody preparations.

Another good example of passive immunization occurs naturally every time a baby develops in the uterus of its mother. The mother's blood, containing her antibodies to most of the diseases she has had during her life, comes in contact with the baby's blood in the placenta, and the mother's antibodies pass into the baby's blood and provide him with ready-made antibodies against these diseases for a short time after birth. An important example of this is tetanus: if a mother has been immunized against tetanus, her baby will not get neonatal tetanus even if exposed to the infection.

The advantages of passive immunization are fairly obvious. The person or baby receiving the antibodies does not have to wait for his own body to produce them, as in active immunization. This means he has immediate assistance in fighting against an infection. This is a particular help in such things as snake bite or tetanus infection when we need to help people quickly and cannot wait for them to make their own antibodies. It also helps the newborn who is suddenly exposed at birth to many different micro-organisms which are trying to infect his body.

Unfortunately there are also disadvantages to passive immunization. The biggest of these is that the person receiving the antibodies has not made them himself. Since they are not his own, and there is no antigen stimulating the body to produce more, these antibodies are gone in a few weeks or months and the protection is lost. And since the body did not make them, there is nothing to 'remember' if the body is exposed to that disease again. This means it cannot make antibodies almost immediately on reinfection, as it does after active immunization, but must start right from the beginning. Another disadvantage is that these injected antibodies are themselves foreign or strange protein to the person receiving them. Because of this, they actually serve as antigens themselves, and the body makes antibodies against them. These new antibodies are not made fast enough to have any harmful effect the first time a person is passively immunized, but if a person is given horse or some other kind of foreign antibodies more than once, he may get a severe reaction on the later occasion, and in any case the antibodies will be rapidly destroyed. For this reason a careful history should be taken and a test dose given before giving a passive immunization (e.g. ATS), and the full injection should not be given if the person reacts to the test dose.

Natural and artificially induced immunization

Another way some people classify immunization is by whether it is 'natural' or 'artificial'. By *natural* they mean immunization that occurs normally in a person's life, without vaccines or the assistance of a health worker. We have seen that this happens both when a fetus is developing and gets antibodies from its mother's blood and when a person gets an infection and produces his own antibodies.

By *artificial* immunization they mean any time that a medical worker immunizes a person, either by giving him a vaccine (antigen) or by passively immunizing him with antibodies. We now know there is nothing 'artificial' about the way this happens in the body, as it works in the same way as 'natural' immunization, so it is better to say *artificially induced* immunization.

	Active immunization (long-acting by stimulating antibody production)	*Passive (short-acting immunization by transfer of antibodies)*
Natural immunization	infections	mother's antibodies passed to fetus
Artificially induced immunization	vaccines	animal or human antibodies injected into a person (example: ATS, immunoglobulin)

You can see that natural and artificially induced immunization are just different names for the same kinds of immunization processes, which we have already discussed. Their relationship is shown in the table on the previous page.

9.3 INDIVIDUAL AND HERD IMMUNITY

When an individual is given polio vaccine he is protected against getting poliomyelitis. But the incidence of poliomyelitis in the community is unlikely to fall very much if only a small proportion of newborn children receive their vaccine. This is because there are still enough susceptibles (people who have no resistance to the organism because they have not been immunized or have not had the natural infection) for the natural infection to keep on passing around in the community. The same applies to other vaccines. If immunization by vaccines is to be an effective means of controlling communicable diseases, then at least 75 per cent of the whole population and 75 per cent of the newborns have to be successfully vaccinated. When there are very few susceptibles left the natural infection cannot keep going in the community and the incidence of disease will gradually get less and less until it reaches a very low level. When a high proportion of people are immunized like this, even those few people who have not been vaccinated also get some protection because the disease becomes so uncommon. This is called *herd immunity* and it is mainly effective for those diseases that pass from man to man, such as measles, polio, and pertussis. Herd immunity is not effective for tetanus because it does not pass from man to man and thus there can only be individual protection.

Sometimes vaccination is stopped in a community that has been well vaccinated and where the incidence of a particular disease has fallen to a low level. Then there is a real danger of an epidemic occurring amongst all the new susceptibles being born. This is why it is so important to keep vaccination programmes going from year to year once they have been started.

In order to keep the number of susceptibles at a low level it is obviously important to have a good population coverage with the vaccinations. This will be considered in Section 9.6 later in this chapter.

GOOD POPULATION COVERAGE GIVES HERD IMMUNITY

9.4 ADMINISTRATION OF VACCINES

Live vaccines

Active immunization with live vaccines usually provides good protection after only one dose of each kind of vaccine. The live vaccines currently in wide use—*BCG*, *measles*, and *polio*—are all very active. Because the polio vaccine actually contains three different types or strains of the polio virus, it is necessary to give it 2–3 different times so each strain will have several opportunities to stimulate antibody production. These different doses should be at least one month apart. The other live vaccines—BCG, and measles—need to be given only once to provide adequate protection initially, though booster doses may be required (see below). Smallpox vaccine, no longer used since the disease was eradicated from the world by 1979, is also a live vaccine.

Dead vaccines

Triple vaccine, or DPT, is a combination vaccine against three different diseases—diphtheria, pertussis (whooping cough), and tetanus. The diphtheria and tetanus part of the vaccine is made from the toxoids from these bacteria. The pertussis part is made from dead bacteria. Because dead vaccines do not stimulate antibody production as well as live vaccines, DPT is given at least twice and preferably three times to give adequate protection. These doses must be spaced at least one month apart. When the second and third doses are given, the body 'remembers' the earlier doses and quickly produces an even higher level of antibodies than before. To assure adequate protection for young children, it is best to give at least two doses before six months of age, and to finish all three doses by 9 months or 1 year. The second and third dose will still work, however, even if given years later—the body has a very long 'memory'. It is never necessary to start a whole course again from the beginning.

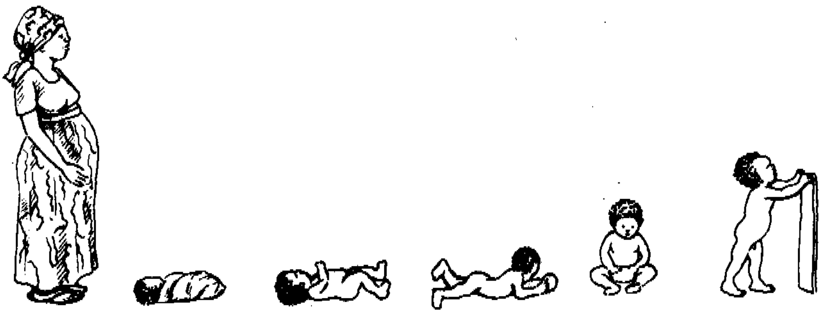
Effect of mother's antibodies

Another important thing to consider when deciding at what time to vaccinate babies is whether the baby still has antibodies from its mother. It is important not to give a vaccine to a baby while he has antibodies against the disease from his mother, because they will inactivate it before it can stimulate immunity. This not only wastes the vaccine, but mothers will then think their babies have been protected from the disease when they actually have not.

The length of time these antibodies from the mother remain in the baby's blood varies considerably for different diseases. The antibodies against BCG do not cross over to the baby, so this can safely be given right away at the birth of the baby. Some antibodies, e.g. against polio and diphtheria, pertussis, and tetanus, do pass over to the baby if the mother has had these diseases or been immunized against them, but they remain for only a few weeks and so these vaccinations can safely begin at 1 month of age.

In the case of tetanus, this passive immunization from the mother can provide very important protection against tetanus infection in the newborn. This *neonatal tetanus* infection occurs when the umbilical cord, or any other part of the baby's body, gets infected with the tetanus organisms. Most mothers have not had tetanus immunization, at least not recently, so they have no antibodies in their blood to pass over to their babies. This lack of antibodies can be cured by giving the mother injections of tetanus toxoid during her pregnancy. She then quickly develops antibodies and these protect the baby.

Measles antibodies from the mother remain longest in the newborn, usually up to 9 months. For this reason measles vaccine will have its best effect if it is given after 9 months. But unfortunately many children in East Africa get measles between 6 and 9 months of age because the antibodies from their mothers do not remain at a high enough level to protect them completely. To prevent this, it is recommended that children be vaccinated for measles at 6 months of age, especially in areas where there are many cases of measles.



Before birth	*After birth*	*1st visit (1–2 months)*	*2nd visit (2–3 months)*	*3rd visit (3–6 months)*	*4th–6th visit (6–9 months)*
Tetanus toxoid (3 injections or 1 booster, to mother during pregnancy)	BCG —below right shoulder	DPT —thigh Polio —oral (BCG if not given at birth)	DPT —thigh Polio —oral	DPT —thigh Polio —oral	Measles —thigh

Fig. 9.1 Immunization schedule for children.

9.5 IMMUNIZATION SCHEDULE

In order to protect children from these infections as rapidly, effectively, and cheaply as possible, we need an immunization schedule. This schedule will certainly change as new developments occur, and even now it is being modified in different areas and circumstances. But it does give a standard plan that is widely used.

The diagram below (Fig. 9.2) shows where the different vaccines are given. Be sure to give BCG on the right shoulder and DPT and measles in the lateral aspect of the thigh.

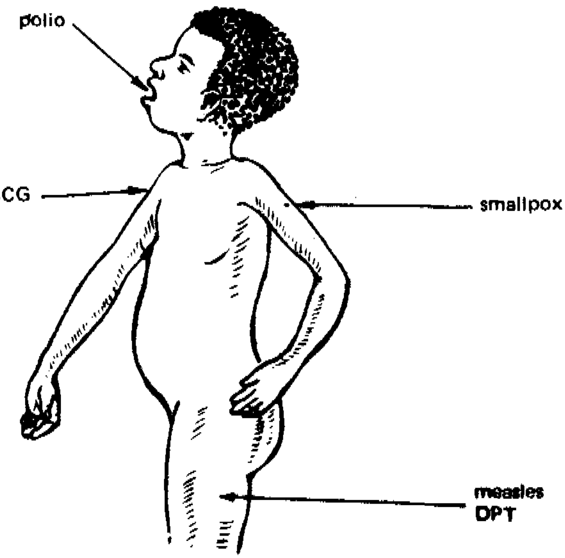


Fig. 9.2 Vaccination sites.

Modifying the immunization schedule

It is not always possible to immunize each child according to the recommended immunization schedule, however carefully one tries. There are several points to keep in mind. Live vaccines can be combined if necessary and all given at the same time. It is best, however, not to give vaccinations to any child more frequently than once a month. This gives the body enough time to produce antibodies and recover from possible reactions from one vaccination before receiving another.

BCG and smallpox vaccine both leave a small scar in the skin when they have been given successfully. Before smallpox was eradicated from the world and smallpox vaccination stopped it used to be the rule in Tanzania always to give BCG below the right shoulder and smallpox below the left. This made it easy to tell whether a person had had one or both vaccines. You will see many people with both scars from pre-1979, but children born since then will only have the BCG scar. In other countries a different place may be used for BCG vaccination, such as the forearm. The important thing is to use a standard site in any particular country.

BY THE TIME HE WALKS (1 year) A CHILD
SHOULD BE PROTECTED AGAINST SIX DISEASES:
DIPHTHERIA, PERTUSSIS, TETANUS,
POLIO, TUBERCULOSIS, AND MEASLES

9.6 IMMUNIZATION BY CAMPAIGNS OR IN MCH CLINICS

A common practice throughout the world is to conduct vaccination campaigns for different infectious diseases. This is most often done for smallpox and BCG, as has been the case in Tanzania, but may also be done for other diseases. The goal of a vaccination campaign is to vaccinate as many eligible people as possible in a specified area. This usually requires special vaccination teams with their own transport and equipment, so it is expensive and administratively difficult. Because of the expense, this type of campaign for giving one vaccine only should generally be limited to special situations, such as during an epidemic in a particular area, or as part of a special campaign. It was the main way used by WHO to eradicate smallpox.

A much more economical way of vaccinating many people is by an integrated campaign through the dispensaries and health centres. This is one of the aims of MCH clinics. In an integrated programme, one team or health institution provides all the different vaccinations to each person through a series of visits to the clinic. Wherever basic health services exist, like the rural dispensaries and health centres in East Africa, this kind of integrated vaccination programme is recommended. The main problem with this approach, however, is that the population coverage of susceptibles may be poor because only a few mothers and young children actually attend the MCH clinics. Where most mothers attend these clinics with their young children, then the coverage can be good. The development of MCH clinics is of great importance.

INTEGRATE VACCINATIONS INTO MCH CLINICS

9.7 IMMUNIZATION CAMPAIGNS

Immunizations should be carried out in all MCH clinics as a part of their routine function. Because not enough newborns are brought to MCH clinics at the present time, however, it will also be necessary to carry out regular immunization campaigns, particularly in areas where there are no clinics. In the event of an epidemic of measles it may also be important to carry out a special immunization campaign.

For regular campaigns it is necessary to:

1. Define the geographical area to be covered.
2. Decide which age groups are to be covered for each vaccine.

3. Estimate the numbers of persons who will need vaccination. The number of children born during the previous year can be estimated for rural areas by using the crude birth rate. The total remaining alive at the end of the year will be approximately five-sixths of this, as one-sixth will probably have died (at an infant mortality rate of 150 per 1000 per year). Add to this figure an estimate of the proportion of children left unvaccinated from before.
4. Estimate the vaccine doses required and add 10 per cent more for wastage, losses, etc.
5. Check availability of funds for travel and subsistence allowances for staff. Book transport and arrange for any necessary maintenance before the campaign.
6. Check that refrigerators can make sufficient ice and freeze cold packs quickly enough for the campaign.
7. Check with the static dispensaries, clinics, and the MCH services what immunization they have managed to carry out in or near the area.

Ideally we should like to evaluate the campaign by seeing if the incidence of one of the diseases has been reduced. But this is impractical and evaluation will have to be done by calculating the coverage. Do this by calculating the number of doses of each different vaccine that were given and then dividing this total by the estimated number of people that were eligible for immunization in the defined population, i.e.

$$\frac{\text{total doses of particular vaccine given}}{\text{estimated eligible population}} \times 100 = \text{percentage coverage}$$

This figure should be at least 75 per cent for a good herd immunity and population coverage.

Alternative evaluation methods are:

1. For BCG, scar counts can be made on a population sample at 6 to 12 weeks after the vaccination itself, to find the percentage who have scars.

2. For measles, polio, pertussis, tetanus, and yellow fever, blood samples can be collected from a population sample and examined for antibody levels in a specially equipped laboratory. This method needs expert help.
3. Samples of the vaccines being used in the clinics and campaigns can be analysed in special laboratories to see how potent the vaccine still is before it is given to the people. This method also needs expert help.

EVALUATE YOUR IMMUNIZATION CAMPAIGN BY POPULATION COVERAGE, NOT JUST BY THE NUMBER OF VACCINE DOSES GIVEN

9.8 REFRIGERATION AND THE COLD CHAIN

It is essential to ensure an unbroken cold chain for the vaccines, from the producer to the person being vaccinated. If the vaccines get too warm their potency can be seriously affected, particularly those containing live organisms, like polio and measles. On the other hand, vaccines made from toxoids (i.e. tetanus and diphtheria) and suspended dead organisms (i.e. cholera and TAB) must not be frozen as this will reduce their potency. *Every vaccine must be stored at its own correct temperature all the time.*

THE COLD CHAIN MUST NOT BE BROKEN

For an effective cold chain and vaccine supplies:

- The central cold store should have storage space for approximately a year's supply of vaccines and they should be kept under continuous refrigeration.

- The regional cold store should have adequate refrigeration for storage, and for making ice and freezing cold packs for the cold boxes.

- Suitable insulated cold boxes are essential so that vaccines can be kept cold by ice blocks and cold packs while being carried into the field. Gas or paraffin refrigerators and deep freezes cool more slowly than electrically operated ones, and in hot countries they do not work well if the door is opened several times a day, or if large containers of drinking water are put in for cooling. Each time the door is opened cold air is let out and warm air goes in. Top-opening refrigerators are much better as they do not let out the cold air.

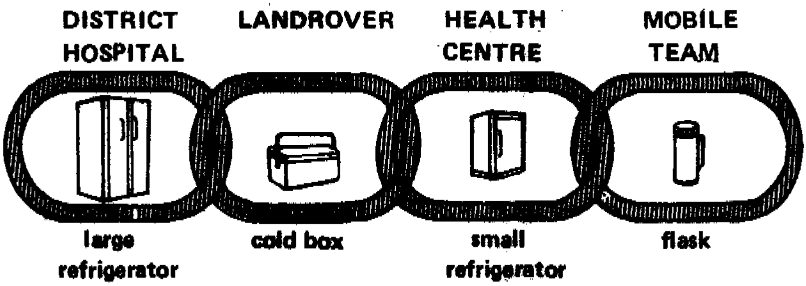


Fig. 9.3 Vaccine must be stored at the correct temperature all the time.

Many parts of rural Africa do not have electricity yet. This means rural health centres and dispensaries must use paraffin refrigerators to store vaccines if they are to provide regular and comprehensive maternal and child health services as outlined in Chapter 14. Many of the rural health centres and some of the dispensaries in Tanzania already have these refrigerators. Unfortunately they are often out of order because of some minor problems.

LOOK AFTER YOUR REFRIGERATOR AND KEEP YOUR COLD CHAIN UNBROKEN

Because there will be more refrigerators in future in rural health units, it is important for all health workers to know how to maintain and use them (for details see Appendix 9.1).

9.9 INTERNATIONAL REGULATIONS

One of the great accomplishments of modern medicine has been the control and even elimination of some of the world's major diseases through mass immunizations. To help maintain this control, certain immunizations are required for international travellers, and the World Health Organization prepares every year a small book which shows the recommended immunizations for anyone who is travelling from one country to another. A certificate indicating immunization status has to be produced to the health authorities on arrival in the new country. Since the important diseases are different in different countries, the immunization regulations are different according to which country a traveller is coming from or passing through and which country he is entering. Yellow fever and cholera are the main immunizations that are required. Most countries have stopped requiring smallpox vaccination since WHO declared the disease eradicated in 1979.

For any immunization to be considered valid for international travel, certain regulations must be followed. The immunization *must be given by a correct technique at a designated vaccination* centre. All district hospitals, as well as some other institutions in Tanzania, are registered as international vaccination centres. A health officer, nurse, or other qualified medical worker may do the immunization, but only under the supervision of a doctor. After immunizing, the international certificate must be stamped with the official government stamp signed by the person responsible.

Each vaccine differs in how soon it becomes valid for international travel after the immunization is given and how long it remains valid. The following table gives these periods. Though some countries recommend a series of two primary cholera immunizations, only one is required for international travel.

	Time after primary immunization before certificate becomes valid	*Time for which certificate remains valid*
Yellow fever	10 days	10 years
Cholera	6 days	6 months

When a revaccination is given before a previous one has expired, it becomes valid immediately and remains so for the normal period of time, starting on the day of revaccination. If the previous immunization has already expired, yellow fever and cholera only become valid after 10 and 6 days, respectively, as in the primary immunization. Many countries no longer require cholera certificates.

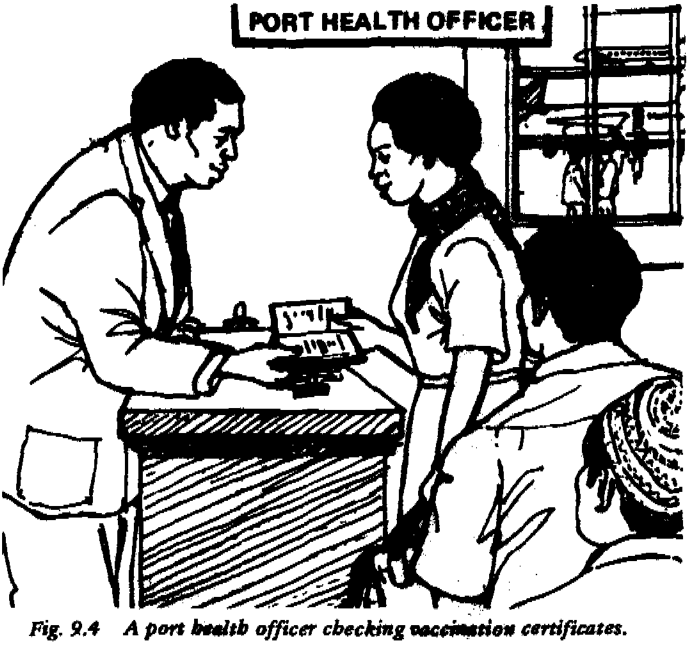


Fig. 9.4 A port health officer checking vaccination certificates.

9.10 IMMUNIZATION DETAILS FOR SPECIFIC DISEASES

Tetanus toxoid

Type
A toxoid vaccine, which may be absorbed on alum so that it remains active in the body for a longer period of time.

Storage
The vaccine should be stored in a refrigerator at 2–10° C where it will remain active for 2–3 years. Use a room thermometer, if available, to check the temperature in the refrigerator or cool box. Outside the refrigerator it should be kept cool and used within 2–3 days. *Do not freeze at any time.*

Administration and dosage
Tetanus toxoid vaccine is given as a deep subcutaneous or intramuscular injection. A dose of 0.5cc is recommended for adults. For children, DPT (triple vaccine) is usually used, which contains tetanus toxoid, and is described later in this chapter. For successful primary immunization, a series of three injections is necessary, and it is usual in adults to wait 6 to 8 weeks between the first and second doses, and one year between the second and third doses. These intervals are not possible, however, when using the vaccine during pregnancy to provide passive immunization of a fetus by its mother's antibodies. In this case it is recommended to give all three doses during the pregnancy with a period of at least one month between each dose. The last dose should be given during the last two months of pregnancy, but at least five days before the expected delivery. A mother who has been immunized in this way once only needs to have one tetanus booster injection during any later pregnancy to stimulate antibody levels high enough to pass on passive immunization to her fetus.

If a person has not had the primary series, and is wounded, he should receive tetanus toxoid plus an intramuscular dose of long-acting penicillin. (Formerly antitetanus serum (ATS) used to be given in these circumstances, but owing to the frequency of reactions this is no longer recommended.)

VACCINATE PREGNANT MOTHERS WITH TETANUS TOXOID

Age and indications
Primary immunization with three injections is recommended as a routine for all infants and any unimmunized pregnant woman. If the full series of three injections has been given once, only one 'booster' dose is necessary to produce high antibody levels again. This booster should be given during each following pregnancy or when an immunized person receives a serious wound of any kind.

Duration of immunity
After full primary immunization, protection lasts for at least five to seven years and possibly for life. In any case full protection is rapidly restored by a booster dose of the vaccine.

Contraindications and complications
There are no contraindications and the only fairly common complication is a moderately painful local reaction at the injection site for 12–24 hours. Warn the mother that this may happen.

BCG (Bacillus Calmette-Guerin) vaccine

Type
A live attenuated bacterial vaccine which is usually freeze-dried.

Storage
The freeze-dried vaccine can be stored in the main part of the refrigerator (+2–10°C) or in the freezing compartment, when it will retain its activity for 1–2 years. Reconstitute using the special

diluent, *chilled* and not at room temperature; otherwise the warmth can kill some of the bacilli. Outside the refrigerator, at room temperature, the unreconstituted vaccine will remain potent for one month. Because of this it can be distributed for use within one month to places that do not have refrigerators. Once the freeze-dried vaccine has been reconstituted, it loses its potency very rapidly and must be discarded after 2-3 hours. BCG is also very sensitive to light and loses much potency after only 3-5 minutes' exposure to sunlight. Therefore both the vials and vaccine-filled syringes must be covered by dark paper or metal foil.

DISCARD RECONSTITUTED BCG AFTER 2-3 HOURS

Adminstration and dosage

BCG vaccine can be given intradermally by a needle and syringe, or by multiple-puncture technique with a Heaf or other type of gun. Different concentrations of the vaccine are used for the intradermal and multiple-puncture techniques, so be sure to *read the label* very carefully and mix the diluent in the right proportion for the technique you are using. The intradermal technique will be described here because it is the most common in East Africa.

The vaccine is reconstituted according to the label and then drawn up into a small, preferably 1ml tuberculin-type, syringe with a small, 26 gauge needle. Clean a site below the *right shoulder*, at the insertion of the deltoid muscle, with soap and water. Then, with the skin stretched between the thumb and forefinger, insert the needle just into the skin with the *bevel up*. Keep the syringe as flat against the skin as possible to ensure a superficial, intradermal, injection. With the needle in place, gradually inject 0.1ml of the vaccine to form a 5mm wheal, looking somewhat like a mosquito bite. If no wheal forms, the needle is probably too deep into the subcutaneous tissue and you should withdraw and try again.

A successful vaccination results in a small red nodule forming during the first week. This will form a small ulcer within 2–6 weeks, which should heal with a scar by 12 weeks. (Tell the mother what to expect.) If no ulcer or scar develops the vaccination should be done again.

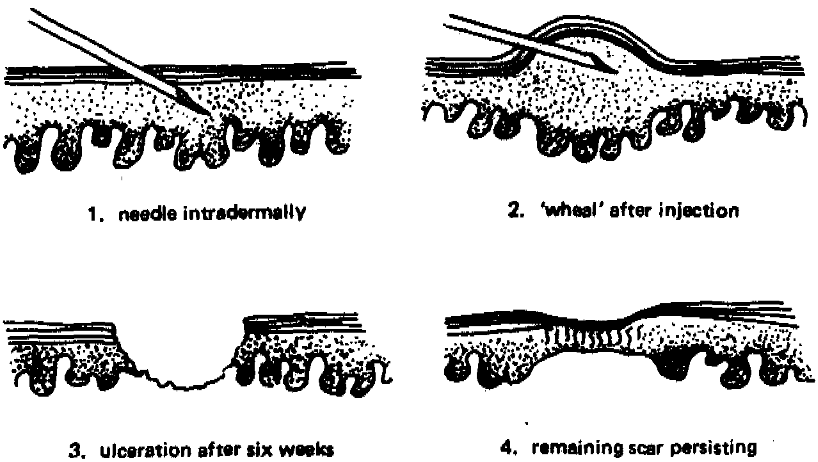


Fig. 9.5 BCG vaccination—technique and result.

Age and indications

BCG vaccine is best given at birth or soon after, when you can usually get a good reaction with the minimum of complications, but it can be given at any other age. In most instances it is not worth doing tuberculin testing with the Mantoux or Heaf test first. It is simpler to waste the vaccine, which is cheap, on those who are already tuberculin-positive than to try and exclude them. If a child below 5 years of age has been chronically ill, however, you should try to investigate for active tuberculosis before giving BCG vaccination. For example, such a child should be treated for tuberculosis rather than vaccinated with BCG if his Mantoux test is positive. Apart from this exception, anyone less than 15 years old who has not had known tuberculosis and does not have a BCG scar is eligible for vaccination.

The acid-fast bacteria causing tuberculosis and leprosy are closely related. Becaue of this, BCG vaccinations are occasionally given to people living in areas where leprosy is common, to help protect them from leprosy as well as tuberculosis.

GIVE BCG AT BIRTH

Duration of immunity
Protection from BCG lasts for many years and it generally does not need to be given to adults more than once. When primary vaccination was given at birth or within the first year, revaccination at the time of starting school and again when finishing primary school is recommended.

Contraindications and complications
Complications can occur if the injection is given subcutaneously and not intradermally as it should be. These complications include enlarged glands in the axilla or above the clavicle which may occasionally break down and discharge. A chronic ulcer may develop at the site of the vaccination if the patient was already sensitized to tuberculosis through previous infection. The complications are not dangerous, and can be treated by giving the patient a course of INH for two months, or sprinkling PAS powder on the ulcer. If the ulcer does not heal with this treatment, refer the patient to a district hospital. Secondary infection may also occur, especially if dirty syringes or needles are used. This is treated by a course of penicillin.

Smallpox vaccine

Smallpox vaccination was the first immunization to be developed and the organism used was similar, but harmless, poxvirus from the cow. The Latin name for cow is vacca, from which the word vaccination has come. Now that smallpox has been eradicated from the world, routine smallpox vaccination has been stopped. A stock of 200 million doses of vaccine is kept by WHO in case smallpox should ever reappear. Probably you will never need to give a smallpox vaccination, but a short description of how it was done is included here for interest.

Storage

Freeze-dried vaccine was the most commonly used form of vaccine. It keeps for a year any where in the refrigerator and for a month at room temperature. It is reconstituted with its own special diluent (chilled) and then keeps for one day if kept out of the sun.

Administration

Vaccination is best done by multiple puncture. The skin over the insertion of the left deltoid muscle, below the *left shoulder*, is cleaned with soap and water and then dried with cotton wool. A drop of vaccine is then placed on the skin and the skin lightly pricked through the vaccine 10–15 times with a 'bifurcated' (double-pointed) needle held at 90° to the skin. If such a needle is not available, any ordinary needle can be used, held at 45° to the skin surface and pressed against the skin 20–30 times. The needle point should jut make a small mark in the skin with little or no bleeding.

Successful primary vaccination shows a small papule by the third day, which becomes a blister by the fifth, and a pustule by one week. It then dries up and forms a scab which later falls off leaving a slightly depressed scar. If these stages do not appear the vaccination has failed.

Revaccination causes a small papule only, or sometimes goes through the stages described above but much more quickly.

Contraindications

We used not to vaccinate children with skin disease such as scabies or eczema because sometimes the vaccination lesions might spread all over the body in such cases.

Triple vaccine, DPT (diphtheria, pertussis, tetanus)

Type
The diphtheria and tetanus parts are made from toxoids. Pertussis is a dead bacterial antigen. Aluminium hydroxide is often added to help stimulate antibody production.

Storage
DPT vaccine should be kept in the refrigerator, but must never be frozen. The vaccine remains active for two to three years when kept at 2–10°C. Outside the refrigerator, the vaccine should be packed in a cold box or ice Thermos. At room temperature the vaccine will lose its potency after 2–3 days and should be discarded. Because of the short life outside the refrigerator, it is best not to take the same vials on more than one mobile clinic visit.

Administration and dosage
A dose of 0.5cc of DPT vaccine should be injected intramuscularly or subcutaneously at least twice, and preferably three times to achieve adequate immunity. Ideally the second dose should follow the first by 1–3 months and the third dose should follow the second by 1–9 months. It is recommended that an additional booster dose be given if the primary course is not completed within one year of the first dose. To avoid major nerves and blood vessels, it is recommended that DPT always be given on the lateral aspect of the thigh. This is now thought to be safer than the once more usual outer and upper quadrant of the buttock.

Age
From 1 month to 5 years, starting as early as possible. DPT vaccine should not be given after the age of 5 years because of the danger that the pertussis vaccine may cause encephalopathy.

Duration of immunity

The first two doses give only partial immunity. After a full primary vaccination of three doses, immunity will last up to 5 years, and even longer if a booster dose is given at 1–2 years of age. Since both pertussis and diphtheria are primarily diseases of children, this protection is generally adequate for them. Tetanus boosters should continue to be given to mothers as a part of antenatal care (see 'Effect of mother's antibodies' in this chapter—9.4).

Contraindications and complications

The injection should not be given to a child with high fever, but otherwise can be given even during minor illness, without complications. It is important *not* to delay immunizations because of minor diseases. Reactions (or complications) are uncommon, although the baby may have a rise in temperature for 24 hours after the injection, and occasionally a painful thigh. This can easily be controlled by aspirin. Reactions may be more common in older children. Warn the mother about a possible reaction.

Polio vaccine

Type

The oral (Sabin) vaccine contains live attenuated virus from all three types of polio. This is the kind used in most countries at present although a killed vaccine also exists (Salk vaccine).

Storage

In the clinic or hospital, the vaccine must be kept in the refrigerator. In the freezing compartment the active life will be up to 2 years; in the main compartment the active life is around 6 months. Outside refrigerator, at room temperature, the life of the vaccine is about 2 days and it must be discarded after this time. Special care must be taken to keep the vaccine cold while on safari and to use it within 2–3 days.

Administration and dosage

Three doses of one drop each, depending on the label instructions, are dropped onto the tongue at intervals of not less than 4 weeks. The intervals between the doses can be lengthened to 2–3 months. It is generally easiest to give the series of three polio doses together with the three DPT doses. Although the vaccine contains all three types of virus, one of the three strains is usually dominant and the immune response will be mainly against that type. Also the polio viruses sometimes fail to compete with other enteroviruses that have infected the gastrointestinal tract at the same time. Giving the vaccine three times, however, overcomes these disadvantages and produces immunity against all three strains of polio in nearly all persons.

Age

It can be given at all ages, but preferably should be begun by 1–2 months of age and not given to children older than 3–5 years.

Duration of immunity

Vaccine should not be given to a child with diarrhoea and vomiting. Otherwise there are no contraindications and there are no complications or reactions to the vaccine. Successful immunization of infants guarantees five or six years' immunity. Booster doses are not essential for the protection of the individual, since naturally acquired immunity takes over when the artificial immunity fades.

Measles vaccine

Type

A live attenuated freeze-dried vaccine. This vaccine is comparatively expensive.

Storage

The freeze-dried powdered vaccine which has not yet been reconstituted should be kept in the freezer compartment of the refrigerator. If necessary it can also be kept in a refrigerator around 2–10°C, or according to the instructions. If stored correctly it will remain active for around 6 months. A few days outside the refrigerator at room temperature will destroy the vaccine. When it is diluted (use only chilled special diluent) and ready for use, it only remains active for 5–6 hours, so never dilute more than you think you will be using at one clinic. *What is left over has to be thrown away.*

Administration and dosage
One intramuscular injection of 0.5cc is recommended (but see below). To avoid major nerves and vessels, it is recommended this be given in the lateral aspect of the thigh. The live attenuated virus is very easily killed and only the special diluent and syringes can be used. Many glass and metal syringes cannot be used. Measles vaccine is also very sensitive to sunlight which can kill the virus very quickly. All vaccines should be kept covered and out of direct sunlight.

Age
Ideally measles vaccine is not given until after 9 months, as the antibodies from the mother remain in the child until then and interfere with the effect of the vaccine. Because many children in Tanzania get severe measles shortly after 6 months of age, however, it is recommended to vaccinate at 6 months of age in areas where measles is common, and if possible to give a booster dose after 1 year of age. Do not vaccinate children older than 3–5 years as they will probably already have had measles and it is a waste of an expensive vaccine.

Duration of immunity
Probably lifelong.

Contraindications and complications
After vaccination a child may get a mild fever after 6–10 days, and occasionally a rash lasting for some days. If a child has severe

malnutrition it is usually better to wait until he has improved a little; or if you do vaccinate, give a booster after he is better nourished. As with most other vaccinations, it is very important *not* to withhold a measles vaccination just because a child has a minor illness. Many children have upper respiratory infections or moderate malnutrition almost continually, so they must be vaccinated during this sort of illness. Measles vaccine may cause fits in epileptics.

MEASLES VACCINE REQUIRES SPECIAL CARE

Failure of measles vaccination

In spite of having been vaccinated against measles, children are sometimes reported to have had measles and parents may complain about this. There can be several reasons for this apparent failure:

- Inactive measles vaccine has been used. It must be remembered that the vaccine must be kept cold all the way from the manufacturer to the patient, which means that is has to be cold on the ship or airplane, in the storehouse, in the customs office, in the Landrover, etc. The vaccine may also be out of date when it finally reaches the patient. The vaccine could also have been inactivated by warm diluent being used, by using the wrong syringes, by being exposed to sunlight, or being left too long at room temperature before being used.
- The child was vaccinated too young, when he still had many antibodies from his mother.
- The child may not have had measles, but some other viral infection with a similar rash and fever.

In these cases, if you are sure the child actually had measles, there is no point in vaccinating again, as the disease itself produces immunity. If the child is less than 5 years old and did not have measles, then revaccinate.

Typhoid, paratyphoid A and B (TAB)

Type
A dead bacterial vaccine which includes three different types of salmonella bacteria—Salmonella typhi (typhoid), and S. paratyphi A and paratyphi B. Many other types of salmonella bacteria exist, but these are the most common ones causing serious infections.

Storage
TAB vaccine should be stored between 4–10°C in the refrigerator. At this temperature, when protected from light, the vaccine will remain potent for 2 years. Outside the refrigerator the vaccine should be carried in a cold box. It will only remain potent for a few days when at room temperature. *Do not freeze at any time.*

Administration and dosage
Like DPT, another dead vaccine, three doses of TAB must be given for adequate protection. Each dose should be given deep subcutaneously and 1.0ml is used for adults or 0.5ml for children under 10 years. The intervals between doses should not be less than 7 days and may extend to 4 weeks.

Indications
Salmonella infections are usually spread by the faecal-oral route through contaminated water, milk, foods, etc. S. typhi only grows in humans, so all typhoid outbreaks originally came from human contamination.

> CONTROL TYPHOID OUTBREAKS BY SANITATION, *NOT* IMMUNIZATION

Because it takes a minimum of 3 weeks to give a primary TAB immunization of 3 doses, the *vaccine has no place* in the control of an outbreak. Its usefulness is when a person or a group of people know well in advance that they are going to be exposed to water or food that is possibly contaminated. In this case they should complete the primary immunization course of three doses several weeks before the exposure. To maintain continued protection it is necessary to receive a booster dose once a year. Because of these limitations, the long-term control of salmonella infections must be through improved sanitation measures.

Duration of immunity

Because TAB is a dead vaccine it is not very effective in producing long-term immunity. After the primary course of three doses, protection lasts for about 1 year, and a booster dose is necessary every 12 months to maintain immunity. Even this plan may only provide partial protection against a severe infection with these three types of salmonella. Of course it provides no protection from any of the many other less common types of salmonellae.

Contraindications and complications

TAB vaccine should not be given if a person has an acute infectious disease, active tuberculosis, or severe heart or kidney disease. It is also contraindicated during the last trimester of pregnancy. The usual reaction is local tenderness and swelling at the vaccination site and a slight rise in temperature for 24 hours, which can be treated symptomatically with aspirin tablets.

Yellow fever

Type

A live attenuated virus vaccine which is commonly freeze-dried.

Storage

It should be kept in a freezer below 0° C, protected from light, where it will remain potent for 1 year. Once it has been reconstituted according to the directions (using chilled diluent), it should be kept below 10° C and must be used within 1 hour. Any vaccine remaining after that, or which has been exposed to excess light or heat, is inactive and must be discarded.

Administration and dosage
The usual dose is 0.5cc subcutaneously for both adults and children.

Age and indications
There have been no known cases of yellow fever in East Africa for many years. Because it was part of the old 'yellow fever endemic zone', however, it is still considered to be an infected area. For this reason it is recommended that anyone from East Africa planning to travel outside their country should receive yellow fever immunization. There is an increased risk of encephalitis after vaccination in infants under 1 year of age, so most countries do not require children to be immunized until after their first year.

Duration of immunity
Yellow fever immunization becomes valid 10 days after receiving the primary vaccination and remains valid for the next 10 years. If allowed to expire it is necessary to vaccinate at least 10 days before travelling again in order to have a valid certificate.

Contraindications and complications
There are three groups of people for whom yellow fever vaccination is not recommended: (1) children under one year of age because of increased risk of encephalitis; (2) anyone with an acute illness; and (3) women in the first trimester of pregnancy because ot possible risk to the embryo.

Cholera

Type
A dead bacterial vaccine, preserved with phenol, which includes several different strains of cholera.

Storage
The vaccine should be stored between 2 and 6°C when it will

remain potent for 18–24 months. Once an ampoule has been opened it should be used within one hour. Opened ampoules kept inside the refrigerator will remain potent for 6–8 hours only and must be discarded after that time. *Do not freeze at any time.*

Administration and dosage

The primary immunization course consists of two injections, given 1–2 weeks apart. The first dose is 0.5cc and the second dose 1.0cc, with children from 1–10 years old receiving half that amount each time. Only one primary dose (1.0cc for adults, 0.5cc for children) is actually required in order to issue a valid certificate, but two doses provide better immunity. All injections should be given subcutaneously. A booster dose of 1.0cc (0.5cc for children) is necessary every 6 months to maintain adequate immunity and a valid certificate.

Indications

Cholera outbreaks spread through human contamination of water and food. As with other similar diseases, long-term control must be through improved sanitation. It is being increasingly recognized that cholera vaccine is ineffective in controlling an outbreak or even in adequately protecting single individuals. For this reason, the World Health Organization has dropped cholera from their list of vaccinations required for international travel, although a few countries still require it. Cholera vaccination is recommended in East Africa only for those who are travelling to countries where it is required or to local areas where an actual outbreak is present.

Duration of immunity

A cholera vaccination becomes internationally valid 6 days after the first dose, or immediately after a booster that is given before the end of the valid period. It remains valid for 6 months only. It is unlikely that in fact the protection it gives lasts as long as this. Much research is being done at present to try and produce a more effective vaccine.

Contraindications and complications
Vaccination is contraindicated in acutely ill people or those with chronic heart, liver, or kidney disease. Local inflammation and redness at the injection site and a slight fever for 24 hours are common reactions which respond to aspirin tablets.

Rabies

This vaccine should not be administered at a health centre or dispensary unless prior arrangements have been made with the district medical officer, who should first see all patients who are thought to need rabies vaccine.

Type
The current vaccines in use are two main types, those prepared from nervous tissue (brain) of animals and those prepared from non-nervous tissue such as duck embryos. In both cases the virus has been killed. They may be in either a liquid or freeze-dried form. (A third type is grown in human (non-neural) tissue culture cells, but it is very expensive and not in general use in Tanzania.)

Storage
The freeze-dried vaccine should be kept below 5° C (or according to the label) when it will remain active for 18 months. Liquid vaccines kept at 5° C or below will remain potent for 6 months. At room temperature the undiluted freeze-dried vaccine will remain active for 1 week. *Once it has been diluted it must be used immediately.*

Administration and dosage
Rabies vaccine for humans is used in two ways: (1) to protect individuals at high risk of exposure such as veterinarians, animal handlers, etc.; and (2) as a form of treatment after a person has been bitten or exposed to a possibly rabid animal. In the first type of immunization, *given before exposure*, the usual course is 3

doses spaced 1 week apart, a booster after 6 months, and then repeated boosters every 2–3 years as long as exposure continues. The size of the dose depends on the particular type of vaccine being used, but usually one ampoule contains one dose.

The second type of immunization course is given *after a person has been bitten or exposed* to a possibly rabid animal. It must be given according to a special standardized plan. The specific indications of when and for how long to give the vaccine are listed in the next section, and depend on the type of wound and whether the animal remains healthy or gets sick or is lost. The usual full course of vaccination is one dose daily for 14–21 days, depending on the recommendations given for that particular vaccine.

Rabies vaccination is usually quite painful and there is also a large amount of vaccine (1.0–2.5 cc) in each dose. It must be mixed well with the diluent by re-aspiration into the syringe or shaking in the bottle. It is then given subcutaneously into a *different site on the abdominal wall for each dose.*

Other control measures and vaccine indications

A very specific plan of action (see Appendix 9.2) has been prepared by the World Health Organization for use in the case of possible rabies exposure. Once actual rabies infection develops it is always fatal so it is very important to act quickly and correctly. Since rabies is present throughout much of Tanzania, it is necessary to use other control measures as well.

The virus is present in the saliva of the rabid animal so *any contact* with this saliva must be viewed as dangerous and the WHO plan followed. Note that the most important control measure is the rapid cleansing of the wound with soap and water, detergent, or even water alone, and then applying a disinfectant. Wounds should be left open, not sutured. Antirabies serum is infiltrated in and around severe bites if it is available. The exact recommendations for different types of exposures are given in the Appendix.

Contraindications and complications
Although a course of rabies vaccine is painful and has possible complications, the 100 per cent mortality from rabies infection means that the vaccine should be used whenever a reasonable chance of infection exists. Complications from the vaccine, besides pain at the site of injection, are a postvaccinal encephalomyelitis causing symptoms of neuroparalysis. If these symptoms begin during the vaccine course, the possibility of discontinuing the vaccination programme should be weighed against the type of exposure and risk of infection. If a vaccine of non-nervous tissue origin is available, the course can be continued with it without further complications.

Antirabies serum
In addition to the rabies vaccine, there are two types of antirabies serum (antibodies) which can be used to passively immunize in the case of a severe exposure. The most common of these is prepared from animals, but an immune globulin of human origin has now also been prepared which causes less complications. Though antirabies serum is not yet widely available in Tanzania, it is important to know about it for future use. When antirabies serum is available it should be used *together* with the vaccine in those who have had a severe exposure. It is important to follow the instructions that come with the serum.

Antirabies serum prepared from animals may cause a serum reaction, just like other animal sera. To avoid this, it is strongly recommended to inject 0.1cc of the serum intradermally first and observe for 10 minutes. If no reaction occurs, the serum can be given intramuscularly and in the wound. Serum prepared from humans does not have this complication.

9.11 SUMMARY OF VACCINE CHARACTERISTICS

The vaccine characteristics are summarized on the following table.

Vaccine	*Type*	*Storage* *Undiluted* *Refrigerator (not freezer)*	*Room temperature*	*Diluted* *Refrigerator (not freezer)*	*Room temperature*
Tetanus	toxoid, may be alum-absorbed			2–3 years	2–3 days
BCG (for tuberculosis)	live attenuated bacteria, freeze-dried	1–2 years *	1 month	2–3 hours	1–2 hours
Smallpox (vaccinia)	live attenuated virus, freeze-dried	1 year	1 month	1 week	1 day
DPT (triple vaccine)	diphtheria–toxoid pertussis–dead bacteria tetanus–toxoid			2–3 years	2–3 days
Poliomyelitis (Sabin)	live attenuated virus, contains three strains	*		6 months	2 days
Measles	live attenuated virus, freeze-dried	6 months *	1–2 days	7–8 hours	5–6 hours
TAB–typhoid paratyphoid A and B	combination of three dead bacteria			2 years	2 days
Yellow fever	live attenuated virus, freeze-dried	1 year *	1–2 days	1 hour	¼ hour
Cholera	dead bacteria, contains several strains	2 years	1–2 days	6–8 hours	1 hour
Rabies	inactive virus, freeze-dried	18 months	1 week	1 hour	¼ hour
	inactivated virus, liquid			6 months	¼ hour

* These vaccines will last longer if stored in freezer. Other vaccines *must not* be frozen.

Method of administration	*Age*	*Contraindications*	*Reactions*	*Vaccine*
subcutaneous or intra-muscular (x3)	antenatal or at any age	none	pain at injection site for 12–24 hours	Tetanus
intradermal on right shoulder	birth to 15 years	known tuberculosis	papule-ulcer scar after 6–12 weeks	BCG (for tuberculosis)
multiple puncture on left shoulder (x 1)	birth or at any age	generalized skin diseases, like scabies, eczema; severe malnutrition	vesicle-pustule-scab-scar 1–3 weeks	Smallpox (vaccinia)
subcutaneous or intra-muscular in thigh	1 month to 5 years	high fever	pain at injection site for 24 hours	DPT (triple vaccine)
oral (x 3)	1 month to 5 years	diarrhoea or vomiting	none	Poliomyelitis (Sabin)
intramuscular in thigh (x 1)	6 months to 5 years	severe malnutrition	mild fever, slight rash, after 6–10 days	Measles
deep sub-cutaneously (x 3)	1 year to any age	acute infections, tuberculosis, heart or kidney disease	pain at injection site, mild fever for 24 hours	TAB-typhoid paratyphoid
subcutaneous (x 1)	1 year to any age	under 1 year of age; acute illness; 1st trimester of pregnancy	mild fever, malaise for 24 hours	Yellow fever
subcutaneous (x 2)	1 year to any age	acute illness, chronic heart, liver or kidney disease	pain at injection site for 24 hours	Cholera
subcutaneous on abdominal wall (x 14–21)	1 month to any age	if encephalomyelitis occurs, discontinue primary course or use duck embryo vaccine	pain at injection site, encephalomyelitis	Rabies

Chapter Ten

CHILD SPACING

10.1 INTRODUCTION

The ability to have children is a requirement for survival of the human race and throughout the history of mankind has always been considered a basic right. Unfortunately many children die from infections, malnutrition, and other diseases, and formerly it was necessary for parents to conceive many children to be sure that at least some of them would survive to become adults.

During this century modern medical advances such as vaccines, antibiotics, and improved nutrition, as well as other aspects of development, have greatly improved the general health status of many people. This means that mothers are more successful in becoming pregnant and bearing children, and that in some parts of the world nearly all children now grow up to become healthy adults. As health services in developing countries extend, the health of their mothers and children should also improve.

This ability of a family to produce many children, most of whom will now have good health and survive, raises many new and complex questions. How many children should a family have, or should that be left to God? Should parents actually choose the *number* of children they want and when to have them? How fast can a country, a city, a village, or even a family, increase its number of people without harming the well-being and development of its members?

Economists, sociologists, politicians, agriculturalists, planners, and many others around the world are now asking all these questions. Many of them are concerned about the long-range effects of the current rate of population growth. Clearly, however, family planning or a population programme are not alternatives to other methods of development. Comprehensive development plans, including population aspects, need to be discussed and developed by each individual country. There is, however, no question about the immediate health advantages of family planning and health workers should concentrate their attention and efforts on this.

10.2 BIRTH INTERVALS AND THEIR EFFECT ON HEALTH

One of the most important factors affecting the health of a mother and her children is the length of time between the births of the children. This interval between births is called the *birth interval*. A short birth interval, around one year, means a mother is nearly always pregnant, and will give birth to many children. A longer birth interval of 2–3 years is better, as discussed below. *Child spacing* is a new term that is being used to indicate this need for the spacing of children, or births, to give longer birth intervals.

It is important to look in more detail at the ways in which child spacing influences the health and development of the family.

The mother

The main burden of raising children usually falls on the mother. She must be prepared both physically and mentally in order to be able to provide her children with a good start in life. Each pregnancy takes a considerable amount of minerals and other nutrients from the mother's body, and she needs not only a good diet but also adequate time in between pregnancies to regain these nutrients. If she does not have this opportunity, the next baby may suffer from less than adequate nutrition from the mother while it is developing in the uterus. Children born after such a short birth interval have higher neonatal and infant mortality rates. As the birth interval lengthens, chances of survival increase.

The mother's own health also suffers from short birth intervals. She is often tired and unable to work hard and care for the older children. This means they must take care of themselves or be looked after by an older sister or relative, which is almost never as good as a mother's own love and care. The mother is also more susceptible to infections and other diseases because of this weakened condition from many pregnancies.

LONGER BIRTH INTERVALS
GIVE HEALTHIER FAMILIES

The children

Even more important than the children who die are those who survive, but without the chance to develop to their full physical and mental potential. During pregnancy, and for the first 1–2 years after birth, the child's brain and nervous system, as well as other parts of the body, are growing very rapidly. If he does not have adequate nutrition, the development of these parts may be permanently affected so that he can never be as bright or as strong and healthy as he should be. This is also true for a child's personality, which is being formed in these early years. If he does not have sufficient love and emotional support from his parents, he may never develop the emotional maturity and stability he should have.

It is not only the youngest child who suffers when there are too many children born too close together. Frequently an older baby must be prematurely weaned from the breast because a new baby is coming. This often results in malnutrition for the older child, because the other available food is not sufficient for his proper growth. The word *kwashiorkor* comes from a West African language and actually means 'the disease of the deposed baby when the next one is born'. In subsistence farming, where the family has only the food from their own shamba to live on, it is usually true that the larger the family, the less food there is for each child to eat.

The father

It is very important that the father also understands the effect of short birth intervals, and their results. He has a responsibility to provide and care for his family and this becomes increasingly difficult with more children. Some fathers may say they need many children to help cultivate the shamba or find other employment to bring in money and support for the family. But it must be remembered that a newborn baby, or even an older child, is not yet a worker, but must be taken care of by his parents and society. He must be fed and clothed, sent to school, and provided for in many other ways for many years before he can make his own contribution by working in the field or factories. A father should be encouraged to remember that the community will judge him as much by the *health* of his children as by the *number* of his children. The respect he gains from having 10 children may become disrespect from having 10 unhealthy children.

Other parents are afraid they will not have anyone to look after them when they grow old. They must be shown that with the aid of better health services more of their children will now live to support them in their old age. Even now many parents can see that their children are more healthy and will become productive adults. Fewer children spaced further apart will mean the father will be able to feed, clothe, and educate them better so they can take a useful place in society.

As President Nyerere has said:

> 'Giving birth is something in which mankind and animals are equal, but rearing the young, and especially educating them for many years, is something which is a unique gift and responsibility of men. It is for this reason that it is important for human beings to put emphasis on caring for children and the ability to look after them properly, rather than thinking only about the numbers of children and the ability to give birth. For it often happens that men's ability to give birth is greater than their ability to bring up the children in a proper manner.'

INVOLVE FATHERS IN CHILD-SPACING DISCUSSIONS

All of these factors point to the value of having a 2–3 year interval between each birth. While a family does not necessarily have to plan on having fewer children, a longer birth interval usually results in smaller families. But these fewer children will be stronger and brighter with better chances not only of surviving but of really succeeding in their lives. They will be like the maize on the right in Figure 10.1 which grows better and is more productive when it is properly spaced.

10.3 CHILD-SPACING SERVICES

It is important to promote the idea of longer birth intervals at every opportunity. Some mothers and fathers may not want to hear anything about 'family planning'—which may mean to them just not having children—but all parents are interested in how to make their children healthier and brighter by giving them a good start in life. The various unhealthy effects of short birth intervals should be explained simply and carefully to both mothers and fathers. The various methods by which they can successfully space their children should be explained at the same time.

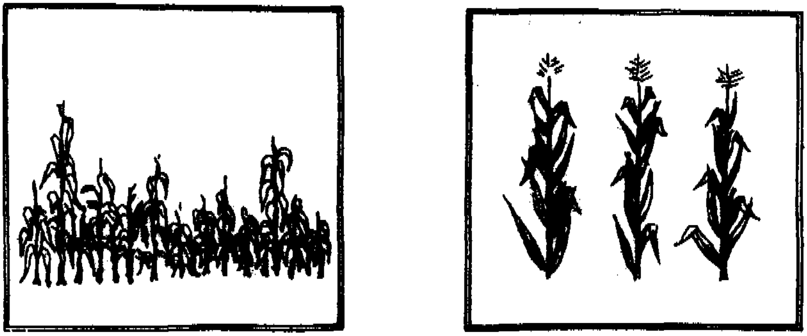


Fig. 10.1 Properly spaced children grow better like properly spaced maize.

This way of promoting child spacing is best done at the comprehensive MCH clinics described in Chapter 14. Even while a mother is receiving antenatal care before she has her baby, she can begin to think about how soon she wants to get pregnant again. At each clinic visit, the future is discussed further, and then after delivery, when she starts bringing her new baby for his clinic visits, she can be started on a child-spacing method to prolong the birth interval before the next pregnancy. By doing child spacing in an MCH clinic, you also remove any embarrassment or fears a mother may have about being seen going to a family planning clinic. It is important to emphasize the safety and convenience of the different methods of child spacing and try to answer any questions or fears a mother may have. Because of the importance of the husband in child spacing decisions, individuals or groups should also be invited to the clinic for discussions or be met at some other place if necessary. You will probably find them more open to the idea of child spacing than their wives think. Child spacing supplies and services should always be available at each MCH clinic from health staff with an interest and knowledge about them. Both the antenatal card and children's growth card in Tanzania have places to tick each time child spacing is discussed at the clinic (see Sections 14.5 and 14.6).

> **PROVIDE CHILD SPACING SERVICES AT EVERY MCH CLINIC**

Other opportunities for discussing both the benefits and methods of achieving longer birth intervals should be looked for. Unfortunately many rumours and stories, which are usually not true, are being told about various child-spacing methods. It is important to answer these objections carefully and in a straightforward way. When possible, find women in the community who have used various methods for some time and get them to help by talking with others. Even other health workers sometimes do not understand about the value of child spacing or the methods, and special discussions may be necessary for them. One of the hindrances to promoting child spacing may be a bad example set by the medical staff. How many of them are practising good child spacing?

10.4 ACCEPTANCE, CONTINUANCE, AND COVERAGE

Acceptance of a child-spacing method is one thing, continuance with it is another. Acceptance without continuance wastes time, energy, money, and hope. So people responsible for child-spacing services should evaluate their own performance according to two rates—acceptance rates and continuance rates:

1. *Acceptance rates* show how many women accepted to start on a method out of the total number of women in this community who *could* be accepting.

   In most communities fertile-age females represent about one-fifth of the total population. So in a community of 10 000 the child-spacing services are applicable to 2000 women. If only 200 women have been persuaded to accept, then the acceptor rate is only 200/2000 = 1/10 or 10%.

2. *Continuance rates*. A woman who takes the pill regularly for a year is counted as one woman-year of continuance. Ten acceptors should, by the end of a year, have produced 10 woman-years of continuance. If all the continuance figures are tallied and averaged we get a rough community continuance figure. This rate is not easy to check, for it requires keeping in touch with all acceptors to find out if they are continuing on the method chosen. But it is very useful in showing the real community coverage with child-spacing services.

3. *Coverage*. When 90 per cent of children in a community have had measles vaccination there is little chance of an epidemic of measles. In a similar way, good coverage of the location with child-spacing services will reduce the number of badly spaced families. Coverage in this case includes *both* good acceptor rates as well as good continuance rates. These rates are a measure of the performance of *both* the mothers and the child-spacing workers.

   Decisions and practices connected with child spacing are thought of as a very private matter. At the same time, child spacing can, and should be, very much a community concern. The more it is seen as a normal open part of that community's culture the easier it will be to promote child spacing to individual families.

10.5 CHILD-SPACING METHODS

Throughout the history of mankind, various methods have been used to prevent or delay pregnancies. In general these are called *contraceptive* methods, from contra (against) and conception (fertilization). There are different advantages, and some disadvantages, to each method, so it is important to help each couple select the method that will be best for them. Five different factors should be considered and discussed when selecting a child-spacing method.

1. *Effectiveness*—this is how successful the method is in preventing conception when it is used regularly as instructed.

2. *Acceptability* to the couple, which includes how easy it is to use and whether it interferes too much with their normal pattern of sexual activity.

3. *Availability*—how easily a woman or couple can continue to use the method without having trouble getting supplies.

4. *Side effects*—what effects may occur and their significance.

5. *Reversibility*—how easily a woman will conceive again when she wants to after the method is stopped.

The success of a particular method obviously depends on all these factors which vary quite widely with the different methods. For example, a very effective method will not work if it is unacceptable or unavailable, and an acceptable method that is easy to use will not continue to be used if it is not effective or has too many side effects.

HELP EACH COUPLE
SELECT THE BEST METHOD FOR THEM

The most important thing, which influences the success of all methods, is the *motivation* that both the husband and wife have to use the method. Some methods, such as withdrawal, require much greater continual motivation than others like the intrauterine device or loop. The motivation of each partner should be evaluated before you can successfully advise which method is best for them.

Contraceptive methods can be divided into four different categories: (a) natural, (b) mechanical; (c) chemical; and (d) surgical. The following is a brief review of the characteristics of each method used in East Africa.

Natural methods

These are methods which have been used for many years, do not require any medicines or supplies, and can be followed without medical supervision.

Rhythm method (safe period)

This method works by not having intercourse when the egg is produced (the time of ovulation) so it cannot be fertilized. To use the method successfully a calendar must be kept and each menstrual period marked on it. The first day of the menstrual cycle is considered to be the day bleeding starts. After several months of regular cycles have been marked on the calendar, it will be possible to predict when the next menstrual period will start.

In a woman who has regular menstrual cycles for 28 days, ovulation usually occurs about 14 days after the beginning of a menstrual period. Since there is some variation in the day of ovulation, and because both eggs and sperm can stay alive for 1 to 2 days, it is necessary to avoid intercourse for 6 days before and 6 days after the estimated time of ovulation. This means there should be no intercourse between day 8 (day 1 is the first day of bleeding) and day 20, or a total of 12 days. Each month the woman should count in advance when this period of 12 days will come and then mark it on the calendar for easy reference.

Effectiveness—not very effective because of irregular menstrual cycles and the difficulty of following the method carefully.

Acceptibility—requires high motivation, which is difficult for many couples, but some people do use it successfully.

Availability—requires no medicines or medical supervision so can be used by nearly every couple.

Side effects—no physiological effects, but there may be psychological effects because of possible strain on the marriage relationship.

Reversibility—completely reversible.

Special comments—this is the only method officially accepted by the Roman Catholic Church, but because of its high failure rate it is not a method of first choice.

Withdrawal (coitus interruptus)

Withdrawal is another natural method of contraception that can also be practised by anyone without medicines or medical supervision. It works by withdrawing or taking the penis completely out of the vagina and vulva before ejaculation occurs. In this way no seminal fluid and sperm are deposited in the vagina so fertilization does not take place. This method requires considerable self-control for the man to be willing to withdraw early and possibly lose some sexual satisfaction.

Effectiveness—fairly effective if used carefully, but there is some chance of a few sperm being released before ejaculation is even near and so before withdrawal.

Acceptability—if a husband is highly motivated this method can be quite acceptable and it does not require any preparation before intercourse.

Availability—requires no supplies or clinic visits.

Side effects—no side effects except possibly psychological strain after a long time.

Reversibility—completely reversible.

Special comments—this can be a useful method in a motivated couple, particularly as a temporary method, if supplies for their regular method are not available, or the couple is together only for a short time.

Traditional abstinence after childbirth

In many tribes, couples have traditionally avoided intercourse for a period of time after a baby is born. In some cases this continued for a specific number of months or for the length of time a mother was breast-feeding. This traditional abstinence helped to delay another pregnancy for a reasonable period. As these customs gradually change it is important to introduce modern methods of child spacing to take their place.

Mechanical methods

The intrauterine contraceptive device (IUCD or IUD) works by interfering with fertilization or implantation in the uterus. The traditional mechanical methods of contraception work by putting some kind of barrier between the penis and the cervix so sperm cannot enter the uterus. These methods all require some kind of supply or clinic visit.

Intrauterine device (IUD, IUCD, loop, coil)

The intrauterine device is a small curved or coiled piece of plastic, which is placed inside the uterus. It is inserted by putting it inside a plastic tube (introducer) in which it is temporarily straightened. It is important not to leave it in the introducer too long or it loses its springiness, which increases the chance of it falling out later. After the introducer has been inserted into the uterus, the loop is pushed out of the introducer and returns to its original shape; it stays in place by spreading against the sides of the uterus. It can remain in the uterus for a number of years without needing replacement. Each IUCD has two small strings that hang down through the cervix so the woman can check by feeling these to know her IUCD is still in place. Apart from these strings, the IUCD cannot be felt while in the uterus.

It is still unclear exactly how an IUCD prevents conception. It probably acts by preventing implantation in the wall of the uterus. It does not interfere with ovulation or change the hormones in the body so a woman continues to have her regular menstrual periods. And its occasional side effects arise locally in the uterus and do not affect the rest of the body.

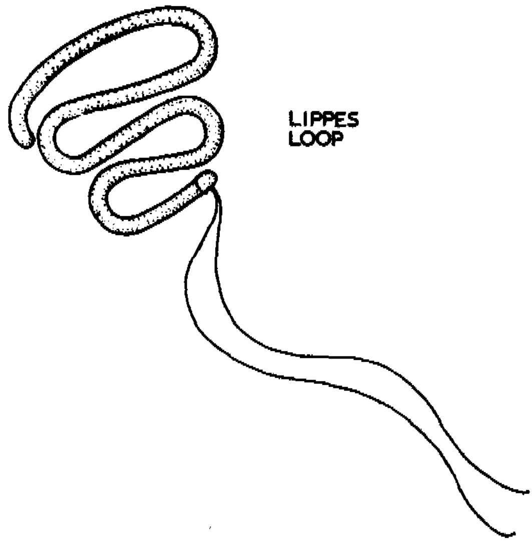


Fig. 10.2 An intrauterine contraceptive device.

IUCDs can be inserted by doctors or nurses who have been trained in the technique. The best time for insertion is about 6 weeks after delivery because a woman is usually still motivated for child spacing, the cervix is soft, and she is not pregnant. The other good time for insertion is during or just after a menstrual period because then the cervix is slightly dilated and the woman is not pregnant.

There are many local stories about complications or difficulties caused by IUCDs. Many of these are exaggerated and frighten other women from using the IUCD. To help avoid these stories and complaints, it is important to explain carefully the true possible side effects. Also, the IUCD should not be used by any woman with the following problems: (1) irregular vaginal bleeding of unknown cause; (2) heavy or painful menstruation; (3) cancer of the uterus; (4) infection in the uterus or vagina, until it has been completely cured.

Effectiveness—very effective because it requires no preparation or thought at the time of intercourse, can remain in place for many years, and has a nearly 100 per cent success in preventing pregnancy.

Acceptability—usually very acceptable because it does not interfere with intercourse in any way. Some jealous husbands are concerned that it may allow their wives to be unfaithful, and occasionally a wife may complain of one of the side effects discussed below.

Availability—the IUCD must be inserted by a trained nurse or doctor at an MCH clinic. This service should soon be available at every health centre. After insertion, the IUCD should be checked at a clinic once a year.

Side effects—the following local side effects may occur with mild or moderate severity:

- increased menstrual bleeding
- slight bleeding at any time of the cycle (spotting)
- vaginal discharge
- increased menstrual cramps
- very rarely, perforation of the uterus may occur during insertion. This is not serious, provided that it is recognized and treated.

Reversibility—whenever she wishes to become pregnant, a woman can have the IUCD removed at a clinic. This is done by simply pulling the threads hanging from the cervix. She then has a normal chance of becoming pregnant.

Special comments—an IUCD has the very great advantage of needing only one decision and action, at the time of insertion; after that it can be almost forgotten about, yet provide effective contraception for many years. It does not interfere with intercourse and should be promoted as a method of first choice in those women without any contraindications.

Condom (Durex, rubber, sheath, etc.)

A condom is a thin rubber tube, closed at one end, that is made to fit over the erect penis. It works by catching all the semen that is ejaculated in the end of the condom so it cannot enter the uterus and cause fertilization. The penis must be withdrawn soon after ejaculation so the condom does not fall off and spill the semen inside the vagina. Most condoms now available are made of very thin rubber and are to be used only once. They can be used without medical supervision and have the added advantage of protection against venereal disease.

Effectiveness–good effectiveness if used regularly each time intercourse takes place.

Acceptability–most couples find the use of a condom quite acceptable although it must be used consistently and may make intercourse not completely natural.

Availability–condoms are available at MCH clinics, chemists, and frequently in other shops.

Side effects–none.

Reversibility–completely reversible.

Special comments–a relatively good contraceptive method, especially for those couples who have intercourse infrequently, e.g. when a husband is working away from home and returns only occasionally. Especially reliable if combined with use of a spermicide (see below).

Diaphragm

This is a thin piece of rubber fitted across a circular spring rim, which is inserted into the vagina where it blocks off the upper part and the cervix. Diaphragms come in different types and sizes and a woman must be examined at a clinic where she can be given the right kind and taught how to use it. Before each intercourse the woman puts spermicidal cream (also available at the clinic) on both sides of the diaphragm, squeezes it into an oval shape, and pushes it up into the vagina until one end is in the posterior fornix and the other lies above the symphysis pubis. It is important that it covers the cervix, and the user has to learn to check by feeling her cervix (which feels something like the end of the nose) *through* the diaghragm rubber. After intercourse, the diaphragm must remain in place for at least 6–8 hours before removal. It can be left in place as long as 16 hours, but if intercourse is desired again during this time, additional spermicidal cream should be inserted into the vagina. The diaphragm is unsuitable for any woman who has a prolapsed uterus or excessively relaxed vaginal walls from many deliveries, or someone who cannot learn how to insert and use it properly.

Effectiveness—fairly effective in someone who is motivated and follows instructions carefully.

Acceptability—difficult to use without adequate privacy and hygienic conditions.

Availability—not used widely in East Africa, but can be obtained at some larger clinics.

Side effects—none.

Reversibility—complete.

Special comments—a possible second-choice method for those for whom other easier methods are unsuitable. No longer very often used.

Chemical methods

These methods use chemicals or medicines to prevent conception. They include hormones taken orally or by injection to prevent ovulation, and special preparations put into the vagina to kill sperm locally.

Oral contraceptives ('the pill')

Oral contraceptives, commonly called 'the pill', have been in use for about 20 years and are now one of the most popular contraceptive methods. There are many different types of pill, but they all contain oestrogen and progesterone hormones in small amounts and work by inhibiting ovulation. They come in packets of 21 or 28 pills, depending on the type, and are taken one each day, starting on the fifth day of menstrual bleeding. In those packets with 21 pills, no pills are taken for 7 days after the packet is finished. On the eighth day after finishing, which is usually the fifth day of the menstrual cycle, a new packet is started. With a 28-pill packet, a new packet is started as soon as the old one is finished (the 7 extra pills are placebos, usually iron pills).

The pills should be taken at the same time each day so a habit is established that helps the woman to remember. If one pill is missed it should be taken as soon as remembered and the next pill taken at its usual time. If more than one pill has been missed, there is a danger of pregnancy and another contraceptive method should be used, as well as the pills, for the rest of that cycle. Since the pills work by changing the hormone levels throughout the monthly cycle, it is very important not to let anything interfere with the taking of the pills. Even if the husband is temporarily away from home, or the woman is sick or travelling, or something else happens, it is still necessary to continue to take the pills every day.

The following are a number of relative contraindications to taking the pill:

- undiagnosed, irregular menstrual bleeding
- cancer, especially of breast or genital organs
- hypertension (high BP)
- recent hepatitis
- severe varicose veins
- history of thrombophlebitis
- heart disease and/or oedema
- diabetes
- psychiatric disorders or depression

Any woman with one of these conditions should be evaluated by a doctor to decide whether she can use the pill or should use some other method.

Effectiveness—one of the most effective contraceptive methods, providing essentially 100 per cent protection if taken regularly.

Acceptability—a very popular method because it does not interfere with intercourse in any way. The only disadvantage is that the woman must remember to take a pill every day.

Availability—pills are rapidly becoming available at all MCH clinics. Enough packets for 3–6 months or longer can be given out at each visit.

Side effects—beneficial side effects include relief of both premenstrual tension and painful menstruation, as well as a decreased menstrual flow. Annoying side effects may include breast tenderness, slight weight increase, and occasional nausea, headaches or, rarely, depression. Women taking the pill should have a check-up once a year at an MCH clinic.

Reversibility—when a woman wishes to become pregnant she stops taking the pills. Normally her ovulation and menstrual pattern return to normal within 1–3 months and she can become pregnant.

Injectable contraceptives ('the injection')

'The injection' (Depo-Provera) consists of a progesterone hormone only and acts in much the same way as oral contraceptives to stop ovulation. A dose of 3ml (150mg) is given intramuscularly every 3 months. This completely stops ovulation so the woman does not have *any* menstrual periods while she is using this method of contraception. In some cases ovulation may continue to be delayed for as much as one year *after* the injections have been stopped. For this reason this method should not be used for child spacing in mothers who want to have children at regular intervals.

The contraindications listed under oral contraceptives apply also to the injection, so any woman with one of these conditions should be evaluated by a doctor before starting on the injection. In Tanzania the injection is now used only for selected women, depending on a doctor's decision.

Effectiveness—like the pill, this is essentially 100 per cent effective.

Acceptability—very acceptable because it allows completely normal intercourse without any prior preparation. The only relative disadvantage is the need to visit the clinic every 3 months for another injection.

Availability—because a doctor's decision is required before starting the injections, this can be done only in larger MCH clinics or in hospitals. Repeat injections are becoming more widely available at smaller MCH clinics.

Side effects—one side effect is the lack of menstrual periods. This worries some women who think it is unhealthy, but others like not having periods. Other undesirable side effects may include spotting for some days during the first few months and, occasionally, heavy bleeding. A weight gain and increase in blood pressure may also occur.

Reversibility—ovulation and the possibility of getting pregnant may sometimes be delayed for as long as 12–14 months after stopping the injections. This should be kept in mind when discussing and promoting this method.

Special comments—Depo-Provera is now being widely accepted in many countries as a valuable contraceptive method. Because of its many advantages and minimal side effects it is also popular in Tanzania, and its use should be encouraged in those women who are suitable for it.

Spermicides

These include creams, jellies, foams, and tablets of various kinds that contain special chemicals to kill sperm. They are inserted into the vagina before intercourse and prevent fertilization both by killing the sperm that are ejaculated and by providing a partial barrier at the cervix. Each method must be used according to its own directions, particularly regarding the length of time to wait after insertion before intercourse takes place.

Effectiveness—only partially effective because they are often poorly dispersed throughout the vagina and round the cervix.

Acceptability—not widely accepted because they are sometimes messy to use and interfere with the normal sexual pattern.

Availability—the larger MCH clinics have supplies available.

Side effects—none except possible allergic vaginal rash to some types.

Reversibility—complete.

Special comments—possible second-choice method if more effective methods are contraindicated.

Surgical methods

Both men and women may be surgically sterilized by simple techniques that provide permanent contraception.

Tubal ligation

A woman is sterilized by cutting both her fallopian tubes and tying them off so no eggs can pass from the ovaries into the uterus.

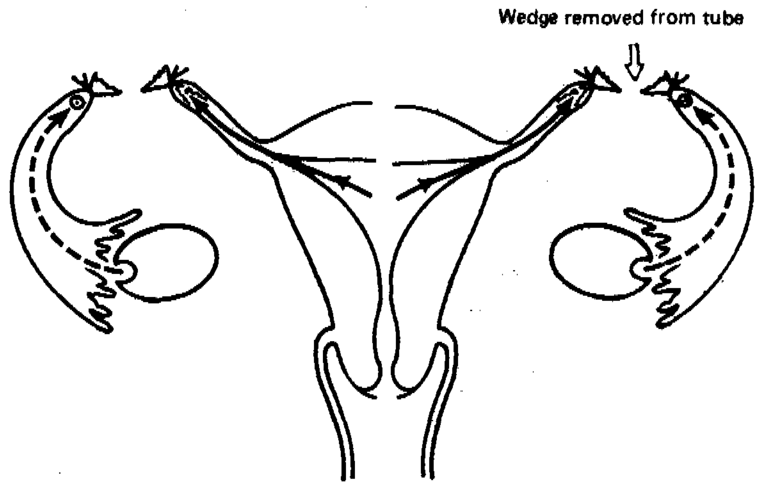


Fig. 10.3 Tubal ligation.

This procedure requires only a few minutes, and is done under general anaesthesia in Tanzania. Newer equipment and techniques now being introduced will soon make it possible to do it under local anaesthesia. Because the ovaries are not affected, they continue to produce eggs and hormones so the woman will have regular menstrual periods. This is a permanent procedure, so it is necessary to select women carefully and make sure they understand and agree. Because younger women may later change their mind or marital situation and desire more children, it is not recommended for them.

Effectiveness—with good technique it is 100 per cent effective.

Acceptability—when a couple understands and accepts that the procedure is permanent, this can be an excellent method with no further action, supplies, or clinic visits needed.

Availability—the procedure can be done at most hospitals.

Side effects—none, except possibly psychological if the woman later wants to become pregnant.

Reversibility—irreversible.

Special comments—ideal for women who have health or social conditions that contraindicate any further pregnancies.

Vasectomy

This is a very simple procedure in which the vas deferens from each testis is cut and tied off so sperm cannot pass to the urethra and mix with the semen. It requires only a small slit in the skin and is done under local anaesthesia. The testis and hormone production are not affected so the man continues to have completely normal sexual desires and performance. The prostate continues to produce semen, which is ejaculated in the normal manner but contains no sperm. The procedure is irreversible, so care must be taken in explaining it and selecting candidates.

Effectiveness—with good technique it is 100 per cent effective.

Acceptability—the procedure can be done at most hospitals.

Side effects—none except possibly psychological if the man later changes his mind.

Reversibility—irreversible.

Special comments—this method should be promoted more for those couples who have completed their families and want no more children.

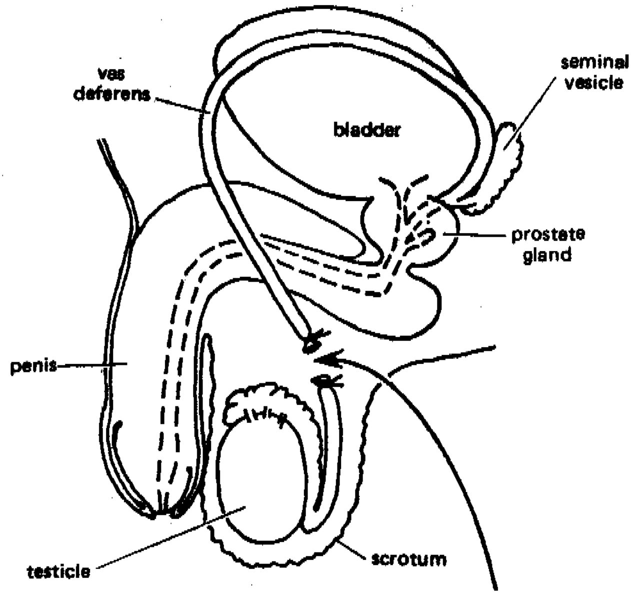


Fig. 10.4 Vasectomy.

Summary of contraceptive methods.

	Effectiveness	*Acceptability*	*Availability*	*Side effects*	*Reversibility*
Rhythm	fair	fair	nothing required	none	complete
Withdrawal	good	fair	nothing required	none	complete
Traditional abstinence	very good	fair	nothing required	none	complete

IUCD	very good	good	hospital, health centre	moderate local only	complete
Condom	good	good	hospital, health centre, dispensary, shops	none	complete
Diaphragm	fair	fair	hospitals	none	complete
Pills	very good	very good	hospital, health centre, dispensary, chemists	minimal	complete after 1–3 months
Injections	very good	good	hospital, health centre	minimal	complete 3–14 months
Spermicides	fair	fair	hospital, health centre	minimal and local	complete
Tubal ligation	very good	fair	hospital	during procedure only	irreversible
Vasectomy	very good	fair	hospital	during procedure only	irreversible

10.6 NATIONAL AND WORLD POPULATION GROWTH

The importance of child spacing in the health and development of all members of the family has been discussed. It is also helpful to have an understanding of some of the numbers and statistics that are used when people talk about populations. The population growth of the world has only fairly recently been considered to be a problem. This is because the population is increasing so much faster now than it ever has done before. Figure 10.5 (opposite) shows the population growth in the world since the year 1650. You can see that even in the last 25 years the *rate of growth* has increased tremendously.

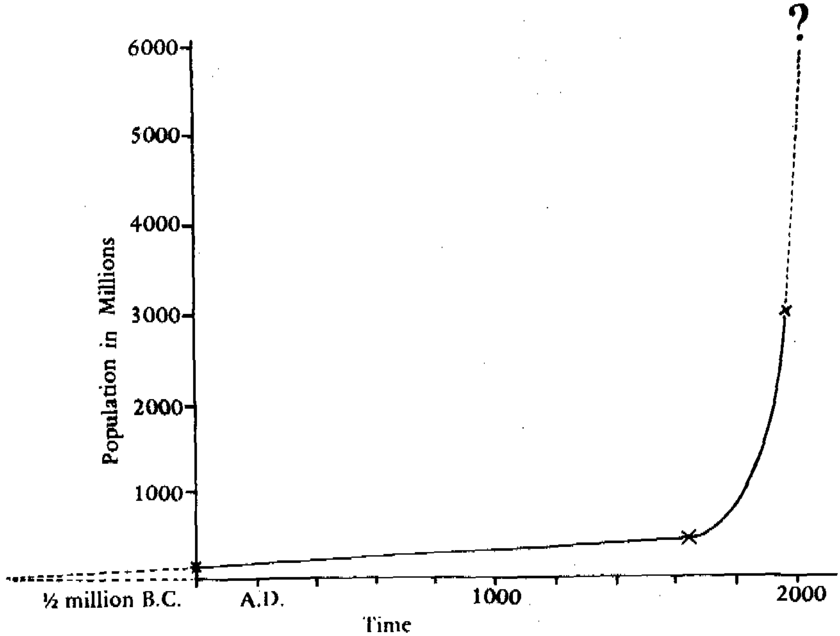


Fig. 10.5 The estimated rate of world population growth AD 1650–2000.

Tanzania's growth rate, which is the total number of babies born every year less the number of people who die, is now estimated to be about 2.7 per cent per year. This means that at present the country's population of around 15 000 000 increases each year by approximately 405 000 people, or the equivalent of nine towns the size of Arusha. Because the population is getting larger each year, the same growth rate of 2.7 per cent means the increase will be getting bigger each year. In a few more years, when the population reaches 20 000 000 the annual increase will be 540000 per year. This rate means the country will have to double its number of schools, double its number of hospitals, double its amount of food, etc., every 26 years *just to keep up with the population increase.*

To actually improve all of these things for the people, and provide more and better food, a greater chance of education, and better health care, these services and facilities must grow at an even *faster* rate than the population is increasing.

This gives an idea of the enormous task ahead of a country like Tanzania as it seeks to develop. The strong and bright children coming from homes where child spacing is practised will play a vital part in this development.

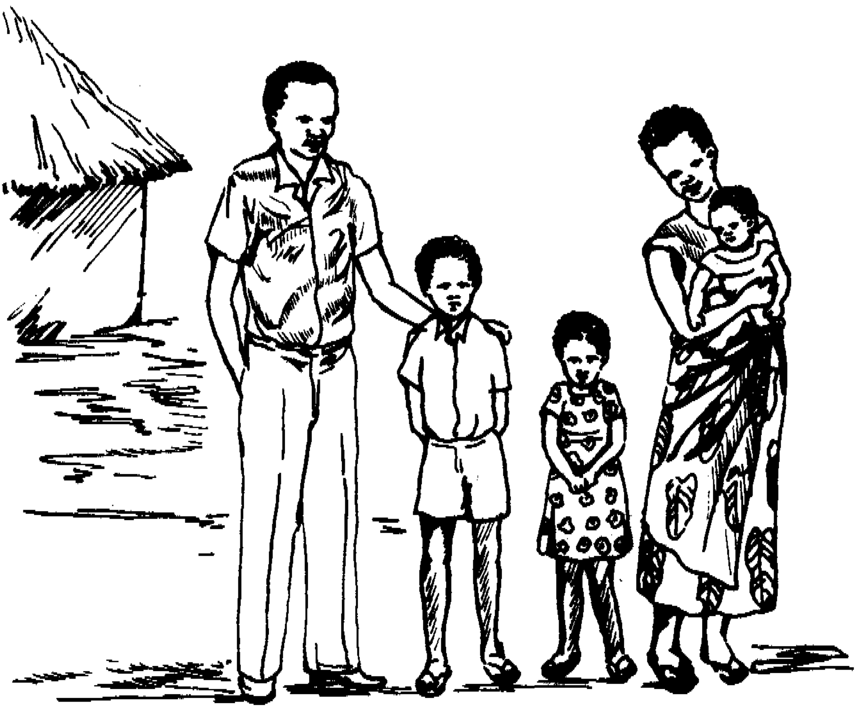


Fig. 10.6 A healthy family with well spaced children.

The above figures do not mean much to the village person, but what he does understand is the size of plots of land. Having many sons means smaller plots for each person, and even smaller plots for grandchildren to inherit. A good question is:

Can your plot of land support the number of children you have? If not, what are you going to do?

We hope that child spacing will be part of the answer to the problem.

Chapter Eleven

NUTRITION AND HEALTH

11.1 INTRODUCTION

Good nutrition is basic to good health. It is particularly important for:

- the ability of adults to work well
- the body's resistance to infectious diseases
- healthy pregnancies and deliveries

- the physical and mental development of children and adolescents
- the prevention of iron deficiency anaemia and energy protein deficiency.

Undernutrition means a lack of sufficient amounts of food or inadequate quality of food. Undernutrition of all types is a major health problem in East Africa.

In addition to the health problems caused by nutritional deficiency, researchers within the past 30 years have shown that overnutrition with certain foods (fats, sugars, and refined carbohydrates), as well as causing obesity (general overnutrition), may be a predisposing factor in a number of degenerative diseases. These diseases are common in the overfed nations of the western world, but are now beginning to appear among the urban elite in poorer countries.

11.2 HISTORY OF THE NUTRITION SERVICES

Malnutrition has been present in parts of East Africa for a long time. In the early part of the century malnutrition received little attention from the health services because the connection between nutrition and health was not well recognized, and doctors' ignorance about nutrition has been a major factor in the slow development of nutrition health services.

The Human Nutrition Unit started in Dar es Salaam in 1947 with the appointment of a full-time nutrition officer. Since then a number of surveys on nutritional status and diet have been undertaken, but there has been little effective co-operative action on recommendations of the various reports. During the 1960s some nutrition rehabilitation centres were established and a nutrition school was started.

At present there are two organizations co-ordinating nutrition activities. The Human Nutrition Unit has now become the MCH Nutrition Unit under the Ministry of Health. This is promoting nutrition education and advice in all MCH clinics throughout

Tanzania and supporting nutrition rehabilitation units in several centres (for example, Kibaha, Lushoto, Dodoma, and KCMC). The other is a parastatal organization called the Tanzania Food and Nutrition Centre (TFNC) started in 1974 at Moshi. It is concerned with such problems as food storage and preservation, distribution, economics, nutrition education, and legislation against food contamination.

11.3 FACTORS IN COMMUNITY NUTRITION

Undernutrition is a socioeconomic and political problem, and it can seriously affect the level of health and disease in a community, particularly that of growing children. *Undernutrition* mainly affects the *poorer people*, as they often have poor soils and little money, and do not get a fair share of the local resources. These poorer people also tend to grow cash crops (e.g. tobacco) instead of growing foods (e.g. beans and maize) which are necessary for everyday life.

UNDERNUTRITION MAINLY AFFECTS POORER PEOPLE

The poor quality of local land and the local climate often determine what food crops can be successfully grown. Other factors which contribute to undernutrition include agricultural practices, economic and educational levels, social beliefs and customs, disease patterns, and family life.

When undernutrition is a common problem in an area it is important to find out locally what the causes are.

Factors promoting good nutrition

The immediate cause of malnutrition is that people, especially children, are not getting enough good food for their body's requirements. But it is very important to find out WHY they are not getting enough. There may be many reasons, and some of them depend on others. Health workers dealing with malnutrition must find out which factors in their area are most important and what can be done to improve the situation. Here are a few generally accepted factors on which good nutrition depends:

Good agriculture

- clearing of land at the right time
- planting of sufficient good crops
- use of irrigation and fertilizer, if necessary, and advice from instructors
- harvesting at the right time, and safe storage of the food to avoid losses through pests or through having to sell at a bad time
- a good transport and distribution system to get enough good food to all regions.

Fig. 11.1 Plant sufficient food for the family.

Good economy

- sufficient money and resources, wisely allocated, for priorities like agricultural improvement, food and fuel, education, health, etc.
- enough cultivable land to grow sufficient food crops, and cash crops for income
- communal production, and fair distribution, marketing and pricing (i.e. villagization, co-operative societies)
- enough productive jobs and hard work.

Healthy environment

- safe and sufficient water—essential water supplies for drinking, cooking, cleaning, etc. should be both safe and not too far away from homes
- enough fuel for adequate cooking
- improved housing
- use of latrines and raising of the general standard of sanitation
- vector and disease control—important for nutrition and general health.

Good education

- spreading of knowledge about good nutrition and child health in schools, families, communities, etc.
- showing ways of improving present attitudes and practices. Special emphasis should be laid on good nutrition of the most vulnerable group —poor mothers and children. (Remember to advise only foods and practices that are possible for mothers locally.)

Healthy social and family life

- family size. All the children are more likely to receive enough good food and attention if the family is small. The younger children usually need more care
- if the mother or father, or both, are away from the home at work it is important to ensure that the children are looked after properly and that they get enough food; this may mean having day-care centres

- appropriate distribution of money, work, and food within the community and within the family. Support for the mothers is important in keeping the children healthy. Priorities within the family include seeing that children get their share of high quality energy and protein foods. Children need smaller portions of food given often; they cannot digest large quantities at one time.
- care for children from broken or incomplete families. Social integration and communal care for these children and for underprivileged families is an important factor.

Prevention and control of disease

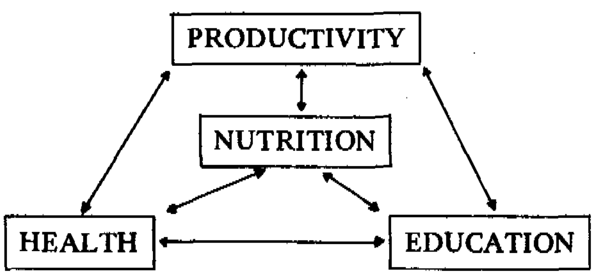
- infectious diseases, e.g. measles, can cause malnutrition in children. Many infections are preventable by immunization. Comprehensive vaccination for children, and good maternal care are important factors in good nutrition.
- early detection and effective treatment of acute diseases like the diarrhoeal diseases and respiratory tract infections are further important factors
- good management of chronic diseases in adults is important because illnesses like tuberculosis, leprosy, and mental diseases reduce productivity and manpower and diminish the ability of affected adults to take proper care of their families
- control of alcoholism to avoid waste of money and manpower.

Many of the factors listed above go together, and some lead to others. Alcoholism, for example, may cause bad agricultural work, which leads to less income, increasing poverty, and neglect of the family.

POVERTY AND DISEASE GO TOGETHER

Fig. 11.2 Alcoholism has many effects on the family.

Improvement of undernutrition and prevention of malnutrition require energetic and co-operative efforts. Good preventive work in child health is one essential weapon in fighting malnutrition, and reduced malnutrition leads to lower morbidity and mortality in children, who then become healthier adults. Some of the major factors influencing nutrition in the individual and the community can be summarized in the following diagram.



The cornerstones are Productivity, Health, and Education, with Nutrition in the centre. All of these depend on each other and influence each other. When we want to achieve the goal of good nutrition, poor productivity has to be converted into high productivity, diseases have to be prevented or treated efficiently to improve the health of the people, and poor education must be replaced by awareness and knowledge. The improvement of nutritional status by these means will in turn improve people's health, productivity, and ability to develop further. This possible solution to the malnutrition problem must also take into account socioeconomic, political, and cultural factors that are not illustrated in the diagram.

The aim of nutrition programmes is to promote good nutrition and to eradicate malnutrition, but an effective nutrition programme has to make use of other fields of activity, such as education, agriculture, marketing, and economics. Action is needed nationally, locally, and within families.

Although health workers are not the main organizers of such programmes, they may have a great deal to do in improving nutrition within the local population. They can help people to help themselves to be self-reliant through development committee activities, and they can also work through the health centre services and village health workers.

11.4 NUTRITION AND SEASONAL CHANGES

In rural areas farmers grow most of their own food, and some cash crops to enable them to buy goods, food, or extras like beer. Different foods become available at different times of the year, but usually the *staple* food is planted and harvested at a particular season. The staple food is then stored and gradually used over the remainder of the year. Farmers are therefore dependent on growing their own food and on the seasonal changes throughout the year. Food shortages are likely to occur at particular seasons.

The most important work on the shamba is digging and planting. This is usually done during the first 6 to 8 weeks of the rainy season. Both men and women, however, need to work as hard as possible in order to plant as large an area as possible. But this is also the time when food supplies are low, money is usually short, and credit at shops difficult to get. People have to work and yet they may be short of food, and the rains bring new mosquito breeding, and hence an increase in malaria.

What is the effect of all this on the most vulnerable age group, the young children? Food may be in short supply, there may be only a small variety of foods, and because mothers are busy in the shamba they cannot prepare four meals a day. Undernutrition and malnutrition therefore become common at this time of the year, and children often suffer from attacks of malaria as well.

REMEMBER THE SEASONS

The next most important season is the harvest, when the staple foods are gathered in and stored. These foods are usually the basis of life for the next year and a good harvest is therefore essential. Any accidents or illness during harvesting can lead to the family having less food for the year. Storage of food is obviously important and so is preventing food from going bad; improper storage or spoiled food will mean a food shortage before the next harvest.

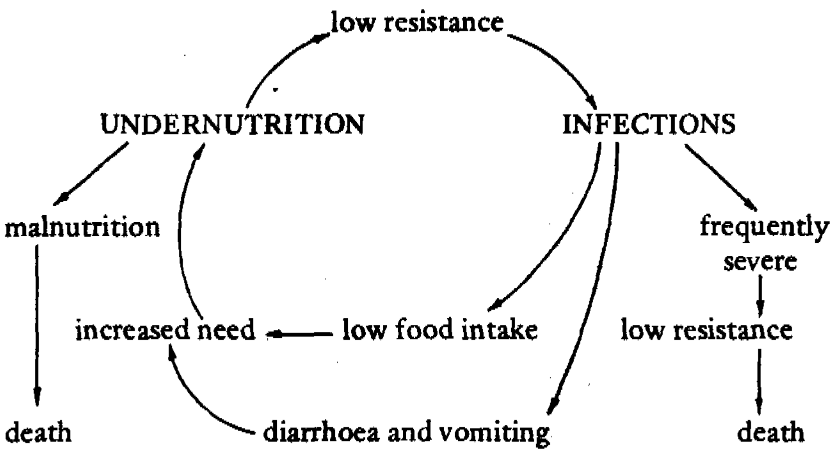
11.5 INFECTIONS AND NUTRITION

There is a very important relationship between nutrition and infection, which particularly affects children. Poor nutrition lowers the resistance of the whole body to infections.

Undernourished children more frequently become infected, recover more slowly, and more often die from infections.

But infections lead to undernutrition, and undernutrition, in turn, leads to malnutrition. This happens because infections lead to diarrhoea, vomiting, or loss of appetite, which interfere with the intake and absorption of food. At the same time, fever and the repair of damaged cells lead to an increased need for food. Therefore, with less intake and greater need, the infected child with poor reserves is easily tipped into a state of malnutrition.

INFECTIONS CAN LEAD TO MALNUTRITION



Nutrition-infection cycle

11.6 NUTRITION IN PREGNANCY AND CHILDHOOD

During pregnancy all the food the fetus needs to grow must come from the mother, and the poorly nourished mother will probably have a low-birthweight baby. Such babies have a greater chance of dying in the first few months of life. Mothers can also easily develop anaemia during pregnancy, which can result in complications during delivery, so they need extra food for energy and extra protein for body-building during pregnancy. The same applies while the mother is still breast-feeding the child.

As well as needing extra food for pregnancy and breast-feeding, mothers often have much heavy work to do in looking after the house, preparing and cooking food, caring for the young children, fetching water and firewood, and looking after the shamba. The newborn and young child grow very quickly and are very energetic, and they require a lot of food.

Although women are involved in so many activities to do with producing food, local customs and beliefs often mean that they and the children get less food than the men. This is why mothers and children, particularly the poorest, should be given a lot of attention.

MOTHERS AND CHILDREN NEED EXTRA FOOD

11.7 CUSTOMS AND BELIEFS

Most people, particularly those in rural areas, have fixed customs and beliefs about different foods and cooking practices. These traditions have arisen from the experiences of previous generations who often lived through times of hardship and danger. Many of these traditions have enabled people to survive in their different environments. It is always important to respect these customs and beliefs even though the health worker may think them foolish or without any basis.

There are also very strongly held customs and beliefs about sexual relations, pregnancy, delivery, child rearing and weaning. These traditions provide guidelines by which the whole community lives—they know what is expected of them and what to expect of each other. It is the health worker's ideas that are new to the community and as tradition is always strong, any change of ideas will take a long time.

11.8 SOME NUTRITIONAL THEORY

This section explains briefly some elementary nutrition theory on which to base nutrition advice. To simplify nutrition education for schoolchildren and the public, foods have been classified into three main groups according to their function in the body. These are:

- energy foods, e.g. cereals
- body-building foods, e.g. meat or legumes
- protective foods, e.g. fruit and vegetables

Most foods, however, combine several of these functions. For instance, red beans contain carbohydrates, fat, protein, minerals, and vitamins. Therefore, they are an energy food, a body-building food, and a protective food.

It is useful to understand the composition of different foods (i.e. which nutrients they contain), because their functions can then be understood. For example, both maize and cassava contain a large amount of carbohydrate and therefore give energy. But maize contains 8 per cent of protein and cassava 1 per cent. This means that maize has *both a body-building function and an energy function.*

Nutrients

Nutrients are classified into the six groups listed on the following page.

- carbohydrates
- proteins
- fats
- minerals
- vitamins, and
- water.

Each *group* (except water) contains a large number of different nutrients with a similar but not identical chemical structure. They are all broken down, however, into simple substances which can be used by the body. For example, all carbohydrates are broken down, digested, and used as glycogen or glucose.

Whatever food is eaten—maize, cabbage, tomatoes, or beans—it is converted into a *pool of mixed nutrients* and from this pool the body draws its requirements. Some is used immediately and some is stored in the body until needed (e.g. iron, fat, vitamin A). Most nutritional problems in East Africa are deficiencies.

Food tables

The health worker who wants to give nutritional advice may find the nutritional content of common foods in a food table. A simple food table showing the main nutrients of some common foods eaten in East Africa is shown in Appendix 11.1. Detailed food tables can be found in a small book called *Tanzanian Food Tables* by A. Marealle. For example, iron deficiency anaemia is a very common nutritional disease in East Africa. You might, therefore, want to find out which foods contain useful amounts of iron? Referring to a food table we find that cabbage has only 0.5mg Fe/100g compared to:

	Fe/100g of food
Nsansa (dried leaves of cowpeas)	22.5mg
Mchicha mwitu (wild spinach)	11.0mg
Mbegu za maboga (pumpkin seeds)	8.0mg

The best source of local protein or energy foods can also be identified from food tables. Very often a number of traditional foods have better nutrients than foods that have recently been introduced.

A food table gives the amount of different nutrients present in a given weight of food. A standard weight is chosen, usually 100g, to allow comparison between one food and another. For example, we can compare the amount of protein in 100g of meat and 100g of red beans.

The figures from a food table may be drawn in the form of a diagram or *histogram*. The main nutrients in nine common foods are shown in Figure 11.3 (page 294).

Several things should be noticed in studying a food table:

1. Many foods contain a high proportion of water. If the measurements are made on dried food (water removed), the proportion (weight) of nutrients is much higher. For example, compare the protein contents of dried fish and powdered milk with those for fresh fish and cow's milk in Figure 11.3.
2. Most food tables give the calorie (or joule) value of the food, as well the nutrient content.
3. The contents do not add up to 100g. This is because many foods contain a non-digestible residue of fibre which is not used by the body.
4. The quantities of minerals and vitamins are very small compared with those of carbohydrates, fats and proteins.

It is not useful of memorise the details of a food table, but it is very useful to be able to look up the nutrient values of different foods.

Summary

Most foods are composed of a mixture of nutrients.
There are six main groups of nutrients.
Foods are digested in the body to form a pool of mixed nutrients.
The quantities of different nutrients present in 100g of raw food are given in a food table.
To give good advice on use of traditional foods in different localities it is essential to be able to interpret a food table.

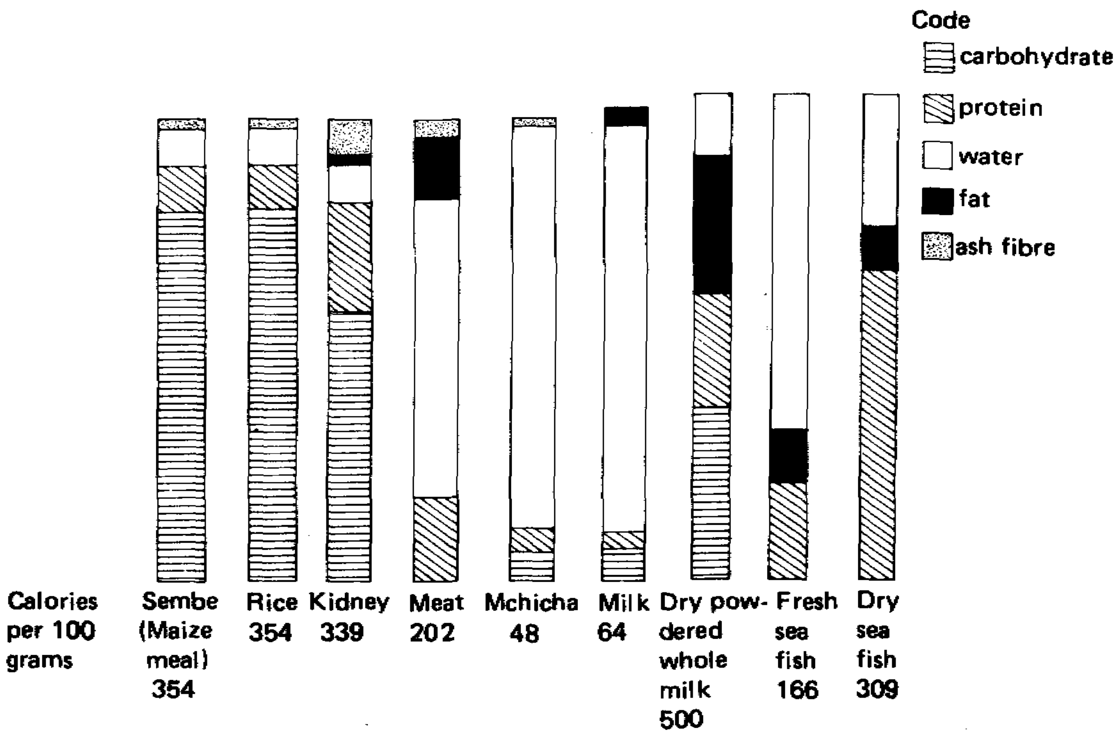


Fig. 11.3 The main nutrients in nine common foods.

Energy requirements

Energy is needed for all living activities like walking and working, for vital functions like heart beat and respiration, for growth, and for maintenance and repair of the tissues and organs.

Large people, growing children, pregnant and lactating women, ill people, those doing heavy work, and those living in cold places need comparatively more energy than the rest of us. The amount of energy required per 24 hours varies from one individual to another and from day to day (see Appendix 11.2).

Energy is released in the body by the burning (metabolism) of food. The amount of energy is measured in units. The old type of unit is called a *Calorie* and the new type is a *joule*. One food Calorie (or Cal) is equal to 4.12 kilojoules. In this chapter we will use the Calorie for simplicity. (A food Calorie is usually spelt with a big C, because it is actually 1000 scientific calories.)

Some approximate energy requirements are as follows:

- The *average male office worker* needs 2500 Cal/24hours.
- The *average non-pregnant woman* needs 2000 Cal/24 hours.
- A *lactating woman* needs an *extra* 500 or 600 Cal/24 hours.
- A man or woman doing *heavy work* all day needs an *extra* 1000 Cal/24 hours.
- A woman who is *pregnant* and who is *also breast-feeding* needs nearly 3000 Cal/24 hours, and if she is doing heavy manual work on the shamba, her total needs will be much higher still.

Energy and staple foods

The energy value (calories released in the body) of some common foods may be obtained from a food table (see Appendix 11.1).

Example: 100g of maize flour give 350 Cal
100g of potatoes give only 90 Cal

This is because there is so much water in potatoes. This illustrates that if you buy 1kg of maize and 1kg of potatoes at the market, they do not have equal energy value even though they both are mainly energy foods.

The main food from which a community gets its energy requirements is known as the *staple food*; it is usually a cereal or a root. Examples of cereal staples are maize, millet, sorghum, wheat. Root staples include cassava, potatoes, sweet potatoes, yams. Some people in East Africa eat a staple diet of plaintain (a type of banana) which is cooked when unripe and called matoke.

Although fats yield very manv calories for their weight, they are not suitable as staple foods. This is because they are nauseating to eat in large quantities, they are scarce and expensive, and a lot of fat is difficult to digest. They are useful as energy supplements.

Alcohol (beer, wine, spirits) also supplies energy, but there are very few other nutrients in alcoholic drinks. If a person drinks alcohol *in addition* to his normal intake of food, he gets too many calories and the excess is deposited as fat. On the other hand, if he takes alcohol *instead* of other food, he will become deficient in some nutrients over a period of time. Substances like alcohol and sugar which supply only calories and have little other food value, are sometimes called empty calories.

Energy balance and energy deficiency

There is a relationship between the amount of food eaten, the energy spent, and the bodyweight. If a person eats more food than he uses, the extra carbohydrate and fat is converted and deposited as fat in the tissues. If he eats less food than he needs for energy, he becomes thin.

The commonest and most important cause of undernutrition in children in East Africa is the *energy-deficient diet*.

Presented in a simplified way, there are three stages of energy deficiency:

1. Body-building (growth) requires protein (for new tissue) and energy. If the energy foods in the food only provide enough energy for daily activities, there will be none left for growth. In this case some of the protein in the food will be used to provide energy. This means less

protein for new tissue and leads to *poor growth*.

2. If the energy from food is still insufficient, the body uses its own fat stores, the fatty deposits in the subcutaneous tissues. As these are metabolized the individual becomes *thin*.
3. In severe chronic hunger when no further fatty deposits remain, the body metabolizes the cellular protein within the muscles. This results in *muscle wasting* found in severe malnutrition.

It must be understood from this that energy deficiency usually comes before protein deficiency. Giving extra protein does not help much unless the diet contains adequate energy food because the protein will only be used for energy instead of body building.

Other nutritional needs

For details of clinical syndromes the reader should refer to books such as *Child Health* in the AMREF Rural Health Series.

It is almost impossible to suffer a shortage of vitamins and minerals on a mixed diet. Any mixture of fruit and vegetables will ensure enough of all of them.

The important mineral and vitamin deficiencies in East Africa are:

- iron deficiency anaemia
- folic acid deficiency during pregnancy
- vitamin A deficiency in measles and kwashiorkor; this causes xerophthalmia, keratomalacia, and blindness. Vitamin A is made from carotene which is present in a large number of green and yellow vegetables (see Appendix 11.3).

Summary

Energy is measured in calories or joules.
Energy needs vary according to age, activity, climate and stress.
The energy value of foods can be found in food tables.
The weight of the body is a balance between food intake and energy output.

Energy-deficient diets are the main nutrition problem in East African children.
Protein deficiency is rare in energy-adequate diets.

11.9 PROTEIN FOODS

Protein is an essential part of all living cells and it is needed for all growth and repair of tissues. Extra protein is needed for pregnancy, lactation, growing children, and during sickness.

There are thousands of different proteins in the foods we eat from plant and animal tissues, but all these different proteins are formed from about 26 different amino-acids. The body can make amino-acids itself from other amino-acids, but there are 8 amino-acids it cannot make, and these are therefore called *essential* because we must get them from the protein in our diet.

All the protein that we eat is broken down into a pool of amino-acids, and from this pool all the types of protein needed for human cells are then built up. All amino-acids are good, wherever they come from.

If the amino-acid *proportions* in the protein eaten are similar to those in human cells, then all amino-acids are used, none are wasted and we say the protein is utilized 100 per cent. We call this *net protein utilization* or NPU. Only two proteins have a 100 per cent NPU (i.e. are fully used) and these are human milk protein and egg protein. We call these two proteins *reference* proteins because we can compare all other proteins with them.

The protein quality of a food refers to the proportion of amino-acids in the food which can be used. It does *not* mean the protein is an inferior or superior substance. For example only 80 per cent of the amino-acids of meat may be used (NPU 80%) but those that are used are just as good as those from egg. We may use 55 per cent of amino-acids in maize and 44 per cent of those in beans, but all those used are equally good for building up suitable proteins for human cells.

When different foods are *mixed* we can use more of the protein in them. If we mix the amino-acids from maize (55% NPU) with those from red beans (44% NPU) we can then use 70 per cent of the combination of both of them. This means the protein value of the meal goes up (the NPU becomes 70%), and this mixture is then nearly as good as meat and better than liver.

This is the reason why nutritionists advise *mixed food diets* and, particularly, mixtures of protein-containing foods. Mixing cereals (e.g. maize, rice, or millet) with any kind of legume (e.g. beans, groundnuts, kunde, lentils) gives a good-quality protein mixture. Traditional diets commonly contain such mixtures.

EAT MIXED PROTEIN FOODS

A list of protein foods and their NPU is found in Appendix 11.4.

Protein requirements

The most important factor affecting the need for protein is growth. Pregnant and lactating women need extra protein for the baby, and sick people for body tissue repair.

When studying protein figures it is important to distinguish *food* protein and *reference* protein. *Food* protein is the total weight of protein in the food. *Reference* protein is the amount usable by the body. For example, 100g of maize flour (sembe) contains 8g of food protein and of this 4.4g is reference protein (i.e. NPU = 55%).

Some books give the need for protein as total food protein to be eaten, and other books as the amount of reference protein required. This causes confusion among people who are not nutritionists.

A simplified table of protein needs is shown on the following page.

Age	*Average requirements/ 24 hours for* reference *protein*
Under 1 year	12g
1–5 years	15g
6–16 years	20g
Adult	30g
Breast-feeding woman	45g

Since families eat together it is useful to know the average daily requirement of a family.

Example: Lactating mother 45g (infant on breast), one 3-year-old child 15g, one 7-year-old child 20g, and husband 30g; total 110g. Each additional child will need 20g more protein. Therefore, the average *family* need for reference protein is between 100g and 150g/day.

AN AVERAGE FAMILY NEEDS
100 to 150g OF REFERENCE PROTEIN PER DAY

Main sources of protein
Protein supply in the diet is from two main sources:

- protein from the main staple or energy food (e.g. ugali or bread)
- protein supplement from the relish (e.g. soup, stew, sauce, vegetable)

How does the average family get its daily needs of protein? In people whose staple food is maize, rice, millet, or wheat (most of the people of East Africa), *most of the protein also comes from the staple* (i.e. the energy food). This is the most important single fact about protein supply. People who live on cassava or bananas have a problem, however, because their staple contains very little protein. These are good foods for energy but poor for protein. It is just not possible to eat enough cassava or banana to get the amount of protein that the body requires daily, therefore people living on these staples need some protein supplements from other foods.

MOST PROTEIN COMES FROM THE STAPLE FOOD

Protein supplements
These are the protein in the extra food or relish eaten with the main staple food. Sometimes the supplement may be mixed and cooked with the staple (e.g. pounded groundnuts or kunde flour cooked with the maize meal).

Protein supplements come from:

- legumes (beans, red beans, white beans, peas, cowpeas, chickpeas, lentils, grams, groundnuts, bambara nuts)
- fresh fish and dried fish, fresh milk and dried milk, red meat, liver, chicken, insects (locusts, termites), eggs

The amount of protein in staple food and supplements
Here are some examples of how much protein would come from eating a staple only and from the addition of a small amount of supplement.

Protein from maize or other cereal:

An average non-pregnant woman needs about 2000 Cal.
Eating 600g sembe (just over ½kg) gives 2100 Cal (100g gives 350 Cal).
Since 100g of sembe contains 4.4g reference protein, 600g of sembe contains 4.4 x 6g = 26.4g.

So when the average woman gets 2000 Cal from maize, she also gets 26.4g of reference protein. Her daily need for protein is 30g of reference protein, however, so she will require a small amount more of reference protein to make up the total day's requirement. This small amount of extra protein which is required by adults varies between 5g and 20g of reference protein per person per day. The following are some ways in which this supplement can be supplied:

Approximately ½ teacupful (one palmful) of most legumes will give about 10g reference protein.

One egg (50g) gives about 6g reference protein.

Under ½ cup of minced red meat (100g) gives about 12g reference protein.

About 1½ cups of dried dagaa (100g) give about 50g reference protein.

Dried fish is the most concentrated form of supplementary protein and usually the cheapest source as well.

DAGAA IS VERY GOOD AND CHEAP

The amounts of food protein and reference protein obtained from various foods are found in Appendix 11.4.

Protein deficiency

Protein deficiency is nearly always associated with energy-deficient diets. This results in the energy-protein deficiency diseases discussed in Section 11.14.

Energy-protein deficiency occurs mainly in growing children and pregnant or lactating women, i.e. in those who need extra energy and protein. In people living on mainly cereal foods protein deficiency occurs only when the calorie intake is very low. It is commoner amongst people who live on cassava or plaintain and particularly when these are eaten without supplements. At the coast cassava diets are frequently supplemented with fish, and inland with kunde or mbaazi.

Fig. 11.4 Buying dagaa at the market.

Summary

Human body proteins are made of a variety of amino-acids best obtained from a mixed diet.
The average *family* needs between 100g and 150g reference protein daily.
Most protein (about 70%) is obtained from a cereal staple food.
The remaining protein of about 5 to 10g *per person* daily comes from the relish or supplementary protein foods.
Protein deficiency rarely occurs without energy deficiency.
Sufficient energy food, and small protein supplements will prevent energy-protein deficiency.

11.10 FOOD VALUES

By a food value we mean its function or use in the body. We may refer to its energy value, or to its protein, vitamin, and mineral content; or to combinations of these. Since the main nutritional problem is energy-protein deficiency, the special food values of interest are the *energy concentration* and the *protein-calorie percentage*.

The energy concentration refers to the amount of energy in a given *volume* of food. Some foods are very bulky and contain a lot of water. For example, when we cook rice and cassava they absorb water and swell up and this means we have to eat much more of the cooked food to get the amount of calories that are contained in the dry weight. In other foods, for example fats and oils, the energy is very concentrated. One tablespoonful of oil (20g) gives about 180 Calories.

BULKY FOODS CAN BE LOW IN CALORIES

By putting foods with a high energy concentration (oil or sugar) into bulky foods (e.g. ugali or uji), we can increase the energy in a small volume. This is very important in weaning foods.

If the meal has a large amount of protein compared to the amount of calories, it has a high nutrition density or a high protein-calorie percentage.

If the meal has a small amount of protein compared to the amount of calories, it has a low nutrition density or low protein-calorie percentage.

A good mixture aims to fulfil protein requirements within energy requirements. For example, we could fill our energy requirements by eating a mixture of oil and sugar. But as there is no protein in either, the nutrition density or protein-calorie percentage is zero (0%). On the other hand if we received all our calories from eating nothing but meat (like a lion), the protein-calorie percentage would be very high. It is 60g for every 1000 Cal or 120g for 2000 Cal—which is four times our protein requirement. This is too high. So much protein cannot be used and becomes wasted.

We know that human milk has a net protein-calorie percentage of 8 per cent. This is the ideal for young infants. Older children need 7 per cent and adults 5 per cent.

BREAST MILK IS BEST

The net protein-calorie percentage of staple foods is always lower than 8 per cent. This is why it is necessary to add protein supplements to staple porridge (uji) given to young children. Adding a protein food can bring the percentage of the mixture up to about 7 or 8 per cent.

11.11 WEANING AND UNDERNUTRITION

The main undernutrition problem in East Africa occurs among children of weaning age (6 months to 3 years) and to a lesser extent among pregnant women. To prevent undernutrition, the most important single measure, besides continuing breast-feeding, is to *improve weaning foods*. This is why it is necessary to understand food values.

Problems with weaning foods

There are three main problems related to the preparation of good weaning foods for young children.

1. *To provide enough energy within the small bulk (quantity) that can be eaten by a young child.*

There are two main ways of overcoming this problem. The first is to feed young children frequently (4 to 5 times a day), or if this is not possible then give snacks like a banana, a hard-boiled egg, or a piece of fruit between meals.

FEED YOUNG CHILDREN FOUR TIMES EVERY DAY

The second way is to mix foods with high energy concentration into the basic staple food. For example, one teaspoon (5g) of oil gives 45 Calories or 2 teaspoons (10g) of sugar give 40 Calories.

2. *To provide enough protein in the food that is providing most of the calories, i.e. the staple porridge given to the child.*
   Most good cereals have a protein concentration of about 4 or 5 per cent of reference protein. But a growing child needs 7 per cent or even 8 per cent. This ideal value can be obtained by adding small amounts of food containing plant or animal protein. Suitable foods are cowpeas, beans, groundnuts, fish powder, dried milk powder, flaked fish, minced meat, or beaten egg.

CONTINUE BREAST-FEEDING DURING WEANING

3. *To provide food in a form which is easily swallowed and digested.*
   This is mainly achieved by mashing the food or grinding it into fine particles and adding liquid until it is soft. It is

also important to cook it well. Teaching mothers how to enrich weaning foods is a most important function of children's clinics. For examples see Appendix 11.5.

USE WEANING MIXTURES

Summary

Nutrition educators in East Africa should encourage:

1. children to get sufficient calories and 3 or 4 meals a day
2. people to eat mixed protein-containing vegetables as often as possible, and meat occasionally
3. people and governments to study and encourage traditional foods and diets and avoid the errors of the Western diet.

11.12 NUTRITIONAL ASSESSMENT

Health workers must ask two questions:

Is this individual or child well nourished or undernourished?
How many members of this community are undernourished or malnourished?

Nutritional assessment of the individual will answer the first question and a nutritional survey of a community will answer the second. Surveys can give an indication of the importance of nutritional problems in the population served by the health centre. The state of nutrition (called *nutritional status*) may be determined in three main ways: by anthropometric measurements of the body; by clinical examination; and by biochemical and other laboratory tests.

Anthropometric measurements

These methods are mainly useful in the case of growing children, particularly the under-fives, *and are used to detect growth failure.*

The methods of measuring are divided into two groups according to whether the age of the child is known or not.

Age known	–	weight and height for age
Age unknown	–	mid-arm circumference and head-chest circumference ratio.

Weight

When the month of birth is exactly known, we can guess the growth of a child by *weight.* This is done by the *weight-age graph.*

The weight is marked on a graph chart each month. The slope of the growth line is then compared with the normal average growth curve already printed on the card. For details, see the Road-to-Health chart in Chapter 14.

- Weights between 80 and 100 per cent of the standard are normal.
- Weights between 60 and 80 per cent are regarded as underweight. The child is said to be at *high* risk of malnutrition.
- Weights below 60 per cent of normal usually mean clinical malnutrition (marasmus or kwashiorkor) and these children need hospital admission.

Weighing children when the month of birth is unknown is almost a waste of time. The weight of a child alone, when it cannot be compared with the normal for that age, gives no information. The *best* information is obtained from a *series* of weights showing whether the child is gaining, not gaining, or losing weight.

RECORD WEIGHT-FOR-AGE
WHEN AGE IS KNOWN

Fig. 11.5 A marasmic child.

Height

Height is not a very useful measurement, since it is more determined by heredity than weight is. Height remains stationary when a child becomes malnourished and does not reduce like weight, so growth failure may not be detected for several months. Height-for-weight ratios are sometimes useful in nutrition surveys, however, particularly for older age groups like schoolchildren.

Mid-arm circumference

This is a very simple method and it is used:

- when the age is not known (but the child must be over 1 year and under 5 years)
- when weighing scales are not available
- as a screening method in outpatient work
- in community nutrition surveys

- when weight graphs (Road-to-Health charts) are out of stock
- when visiting homes and villages.

USE MID-ARM CIRCUMFERENCE WHEN AGE IS UNKNOWN

Method: The circumference of the upper arm is measured half way between the point of the shoulder and the elbow. The measurement is done with a non-stretchable strip, such as a tape or a strip of marked Xray film. The strip is measured and marked as shown in the diagram (see Figure 11.6 below).

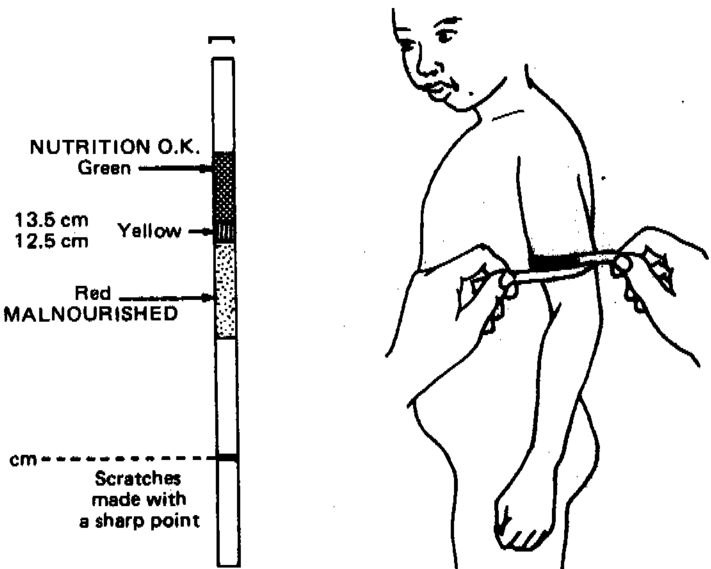


Fig. 11.6 The measuring strip and a child's arm being measured.

How does this measurement detect growth failure? Normally there is very little change in arm circumference between 1 year and 5 years of age. During this time the arm grows in *length* but does not get fatter.

- at birth the mid-arm circumference averages 11cm
- by 1 year it is 16cm (gains 5cm) (average)
- by 5 years it is 17cm (gains 1cm) (average)

This is shown clearly in the following graph (see Figure 11.7):

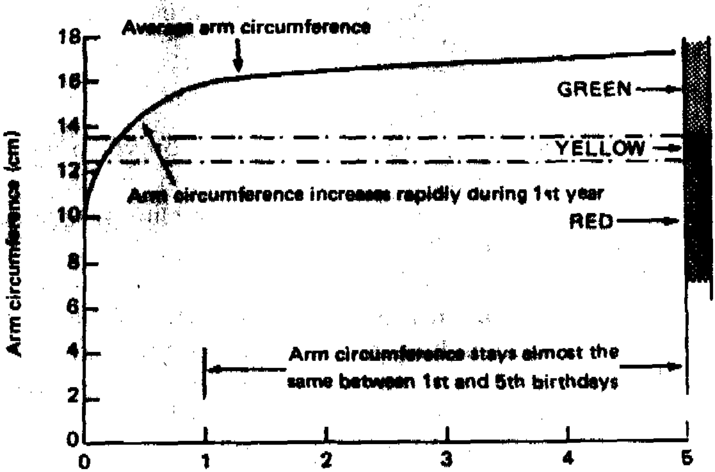


Fig. 11.7 An arm-circumference-for-age graph (after Morley).

Therefore *healthy* children over 1 year normally have a mid-arm circumference of 16cm. Any child over 1 year with an arm circumference below 13.5cm is considered *undernourished* and at high risk. Any child over 1 year with a mid-arm circumference below 12.5cm is considered *malnourished*.

The great advantages of this method are that the tape or measuring strip required for this measurement can be made anywhere, by anyone, at any time (no shortage of equipment); that the measurement can be done by anyone with minimal training; that the method can be used in all those circumstances where weight-age graphs are not possible; and that the method is very quick to do and easy to interpret.

Head-chest circumference ratio

The bones of the skull continue to grow even when a child is malnourished, but the chest and chest muscles do not develop well in malnourished children.

Over 6 months of age the chest circumference is normally larger than the head circumference. If the chest circumference is the same as or smaller than the head circumference then the child is undernourished.

Clinical examination for malnutrition

Body measurements can detect undernutrition when no other signs are present except growth failure. When *clinical* signs are present the malnutrition is more severe. For clinical signs see the *Child Health* manual.

Biochemical and other investigations for nutrition assessment

They may be useful in hospital inpatients, but they are not useful in clinics, in outpatients, or on most surveys, because they are expensive and take time and skilled personnel.

Some examples are: haemoglobin estimations, blood counts, urine ascorbic acid excretion, iodine estimations, Xray for rickets.

Summary

The main methods of assessing nutrition are anthropometry, clinical examination, and laboratory tests.

The two *most useful* methods for early detection are:

1. Weight-for-age graphs in well-equipped clinics, when the child's age is known.
2. Mid-arm circumference in other circumstances, when age is unknown but thought to be between 1 and 5 years.

Clinical examination is only useful in severe malnutrition.

11.13 NUTRITION SURVEYS

Studying the epidemiology of nutrition (distribution and causes) on a large scale requires specialists and research teams. Health workers in health centres may be requested to assist in such surveys but do not usually have to organize them.

The purposes of nutrition surveys are:

- to determine the extent of undernutrition in a community
- to assess the influence of socioeconomic and agricultural and climatic factors on the nutrition status, e.g. rainfall fluctuations, subsistence or cash economy, food taboos, family size, types of diet, alcoholism, levels of education, soil fertility, etc.
- to gain sufficient information to plan a sound nutrition programme within a community.

Health workers will need to carry out small-scale surveys to measure how important undernutrition and malnutrition are in the local community. It is possible to make a rough estimate of the nutrition status of children in the community from a health centre by the following simple surveys (see section 7.6 on organizing surveys):

1. Plotting the weights of children attending a clinic, or several clinics, on *one* weight-age graph. If 100 children are plotted then the number of marks plotted *below* the green line (below 80%) gives the percentage of undernourished children within the clinics. (Of course, this does not tell you about the community as a whole, unless most of the children are attending the clinic, as the children may be a biased sample.)
2. All the under-five children living in a community, or a random sample, can also be plotted on *one graph*. The sample must be random and include not less than 10 per cent of the total of the under-five population.

3. Measure the mid-arm circumference of all children, or a *random* sample of as many village children as possible, between 1 and 5 years. Then:

$$\frac{\text{Number with mid-arm circumference below 13.5cm} \times 100}{\text{Total number of children measured (1–5 years)}} = \text{percentage of undernourished children}$$

These simple measures can give an idea of whether or not undernutrition is a serious problem in a community.

MAKE A COMMUNITY DIAGNOSIS OF NUTRITION STATUS

Predisposing factors

If undernutrition is present, it is then necessary to identify some of the main predisposing or 'risk' factors. One way is to have a check list which is used on every undernourished child, so that the commonest factors will soon be clear.

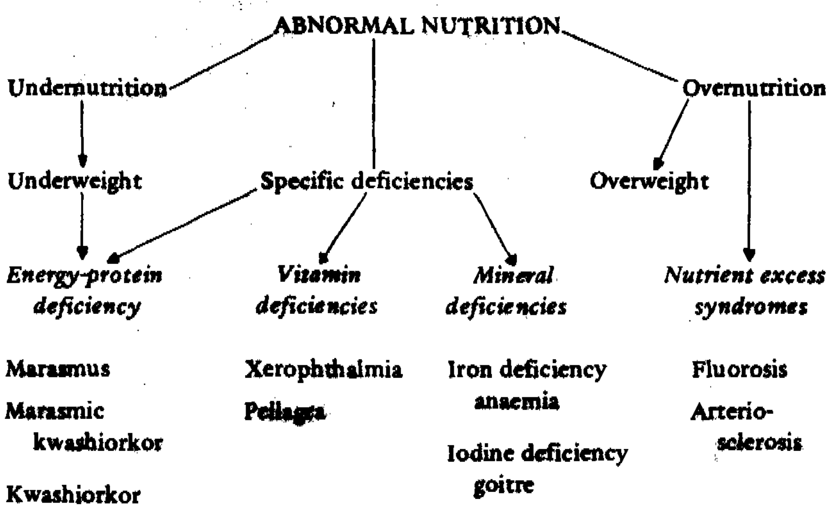
The following factors may be studied:

- broken home; mother without support; father away
- alcohol excess in one or both parents
- weaning diet inadequate
- particular food beliefs and customs
- many children in family, with short birth interval
- insufficient fuel for cooking in home
- child is not immunized; has many infections
- poor agricultural methods
- nutritious foods sold for cash

WHAT ARE THE COMMON FACTORS IN UNDERNUTRITION? SOLVE THEM THROUGH COMMUNITY ACTION

11.14 ABNORMAL NUTRITION AND CLINICAL MALNUTRITION

The main results of abnormal nutrition are shown in the diagram below. In East Africa, undernutrition rather than over-nutrition is the important problem.



The three main undernutrition problems are:

- underweight
- energy-protein malnutrition syndromes
- iron deficiency anaemia.

Underweight is detected by measurement. The other conditions are well-recognized clinical syndromes with their own symptoms and signs.

Underweight

Underweight is the first stage of energy-protein deficiency and is by far the most important nutrition problem as it affects up to 30 per cent of all children between 1 and 3 years old. It is about ten times more common than all other forms of malnutrition except anaemia. It is only detected as a growth failure when we measure weight-for-age or arm circumference. Curing underweight prevents the children going on to develop clinical malnutrition.

The effects of underweight are numerous: underweight children grow more slowly; they are more likely to get infections as they have weak body defences and do not develop antibodies easily; they die more frequently when infected by serious diseases such as measles, gastroenteritis, whooping cough, or tuberculosis; they develop clinical forms of energy-protein deficiency very rapidly during episodes of infectious diseases.

LOW WEIGHT = HIGH RISK

Diagnosis

Underweight cannot be recognized by clinical examination in the early stages. Early underweight is *only* diagnosed by measurements. Underweight is uncommon in breast-fed babies under 9 months. To detect the at-risk underweight child is the main function of children's clinics for children over 1 year old.

(a) Where the birth month is known: follow the growth curve on a weight chart at regular intervals and particularly between the ages of 1 and 3 years and at the weaning period. The high-risk underweight children are those whose weight is between 60 and 80 per cent of normal; those whose weight is not rising but which is steady; or worse still, those whose weight is falling.

(b) Where the age is unknown, use the mid-arm circumference and chest-head ratio to assess children over 1 year old.

EVERY CHILD SHOULD HAVE A WEIGHT CHART

Management

(a) The aim of management is to *increase the calories* in the diet by increasing the amount of *energy* foods. If this is not done the limited amount of protein in the diet will be used for energy and therefore be wasted. More calories mean all available protein can be used for body building. The best way to increase the calorie intake of a young child is to increase the frequency of meals. Children under 2 years old should eat at least 3 times and preferably 4 or 5 times a day.

(b) The next important measure is to *protect the child from infection*, which is done by immunization, prophylaxis against malaria, treatment of intestinal parasites, and advice to the mother on hygienic food preparation.

(c) *Weigh* the child regularly and encourage the mother by showing the growth curve moving upwards towards the normal (green) band on the chart.

(d) Give a *mixed diet*. Find out which additional foods the mother can easily obtain and encourage her to mix any of these with the main staple. *Do not* tell the mother to use protein foods that she cannot get. This is unnecessary and discourages her. The important thing is to increase the amount of staple or energy foods eaten. The addition of powdered groundnuts, kunde (cowpeas), red beans, or any local legume in small quantities will be quite sufficient. Dark green leaves (any type) and other vegetables and fruit should be encouraged when available (see Section 11.11 on weaning and undernutrition).

It cannot be overemphasized that the most important single measure in underweight is to increase the energy foods.

GIVE ENERGY FOODS FOR UNDERWEIGHT

Prevention

Treatment of underweight children prevents:

- the development of clinical malnutrition (marasmus and kwashiorkor)
- a high mortality from infectious diseases, especially measles, tuberculosis, and gastroenteritis.

This means a reduction in morbidity, mortality, and hospital admissions. It means healthy children able to play and learn.

DETECT AND TREAT UNDERWEIGHT

Energy-protein deficiency diseases

There are three main energy-protein deficiency syndromes all with a similar underlying cause. They are *not* separate diseases but related syndromes, which result from differences in the severity and duration of the deficiencies, the age of the child, and the relative importance of the protein deficiency compared with the energy deficiency.

The three main syndromes of energy-protein deficiency are:

- marasmus
- kwashiorkor, and
- marasmic kwashiorkor.

These syndromes are also known by several other names, such as: protein-calorie malnutrition (PCM), protein-joule malnutrition (PJM), protein-energy malnutrition (PEM), and protein-energy deficiency (PED). These three conditions are rarely seen in more than 5 per cent of children under 5 years old. They are the clinical presentation of the undernutrition problem in the community.

Underweight and these conditions are differentiated by means of weight-for-age and the presence or absence of peripheral oedema as follows:

	Weight	
	80–60% of normal (between green and red on weight chart)	*Below 60% of normal (in red on weight chart)*
No oedema	underweight	marasmus
Oedema present	kwashiorkor	marasmic kwashiokor

Full clinical and management details are given in the *Child Health* manual, Chapter 5, so these conditions will not be considered further here.

Iron-deficiency anaemia

This is a common nutritional problem. It may be the result of pure iron lack, or made worse by blood loss from hookworm, excess menstruation, abortions, postpartum haemorrhage, or injuries.

To make red blood cells the bone marrow needs iron, protein, and a few other minerals. There are iron stores in the body (e.g. in the liver) where iron is kept ready for use when needed. People with good iron stores recover rapidly from, for instance, haemorrhage, and their iron stores are kept replenished by eating iron-containing foods in their diet. Acute iron-deficiency can be treated with blood transfusions, Imferon injections, or iron tablets (ferrous sulphate). *But the most important treatment is to educate the patient about iron-containing foods*, so that he and his family can keep up the iron stores of the body after the treatment is finished.

TREAT ANAEMIA WITH IRON-RICH FOODS

Iron-containing foods are plentiful and cheap, e.g. pumpkin seed, spinach, and most dark green leaves such as leaves of cassava and kunde. When these leaves are dried and preserved (e.g. kisamvu or nsansa) the iron content is very high. The main animal sources of iron are red meat and liver. The cereal staple with the highest iron content is millet. Iron is present in most legumes but it is highest in red beans and dengu. (See Appendix 11.6 for food sources of iron.)

Not all iron eaten in food or tablets is absorbed. Vitamin C in the diet helps the absorption of iron.

Any mixed diet which contains daily either legumes or dark green leaves will maintain sufficient iron reserves in the body. Supplementing this occasionally with liver and red meat will help. (For clinical details of anaemia see the *Child Health* manual.)

PREVENT ANAEMIA WITH A MIXED DIET

11.15 NUTRITION ACTION BY HEALTH WORKERS

Health workers who understand nutrition theory can do the following:

1. Encourage breast-feeding until after weaning.
2. Emphasize the nutritional value of many local and traditional foods, especially in mixtures.
3. Identify the food values of locally grown foods and encourage their production and use.
4. Advise on the storage and preservation of local foods.
5. Calculate the cheapest sources of energy and protein at local market prices.
6. Organize nutrition education with a correct emphasis on what is feasible, in schools, clinics, and committees.
7. Prepare a set of weaning recipes made up from local foods.
8. Start a demonstration shamba at the health centre.
9. Advise on foods to be given at day-care centres in villages.
10. Work to improve nutrition through ward development committees.

The aim of a nutrition programme is to promote good nutrition and to eradicate malnutrition. To be effective, a nutrition programme should involve many fields of activity like education, agriculture, marketing, and economics. Action is needed nationally, locally, and within families.

Although health workers are not the main organizers of such programmes, they may do a great deal to improve the nutrition within the area.

Breast-feeding
Human breast milk is by far the best food for a baby and all mothers must be encouraged to continue breast-feeding for as long as possible.

Breast milk is *best for the baby* because it is meant for babies, is always fresh, safe from infections, easy to digest, at the right temperature, protects against diarrhoea and other infections, and gives the opportunity for mother and baby to be close.

Breast milk is *best for the mother* because it costs nothing, is always ready, helps the postpartum uterus to contract, and gives her the opportunity to show care and love for her baby.

BREAST IS BEST

For further details see the *Child Health* manual, Section 5.4.

Locally grown foods
In recent years there has been a marked lowering in the production and use of local traditional foods. Groundnuts, cowpeas, red beans, dengu, and other legumes which used to be very cheap and plentiful are now becoming rare and expensive. (For Swahili names see Appendix 11.7.) Dark green leaves, pumpkin seeds, and insects are much less commonly used. There are many reasons for this, such as increased emphasis on cash crops, reliance on shops and markets, urbanization, false nutrition education, and changes in traditional ways of living.

Whatever the reason, the loss of traditional legumes in the average family diet is a serious loss and a backward step. It is a major factor in the increase and persistence of undernutrition in the nation.

By consulting a food table a health worker can identify foods with high protein or high iron value. Wherever these can be grown locally, he can encourage their production and use.

Traditional protein-rich foods

- 8-20% protein: maize, millet, sorghum, rice
- 20-25% protein: all legumes
- 25-30% protein: pumpkin seeds, sesame seeds, dried cowpea leaves.

Other traditional foods rich in protein are locusts, termites, dried fish (dagaa), and sour milk curds (see Appendix 11.8).

Groundnuts (njugu karanga) and cowpeas (kunde)
These can be easily grown in most places in East Africa. Kunde is particularly important as it grows easily in poor soil and in areas with low rainfall. It grows in cassava areas and makes an excellent protein supplement to a cassava diet. It should be noted that both groundnuts and cowpeas contain *all* the essential amino-acids. Both can be ground into small pieces or into flour and added to either maize meal (sembe) or cassava flour before cooking.

The following table is a comparison of the value of 50g of groundnut or cowpea flour with one 50g egg.

	1 egg (50g)	*groundnut (50g)*	*cowpea (50g)*
Calories	79	289	170
Protein	6.5g	13.0g	11.0g
Essential amino-acids	All present	All present	All present

It is clear that it may be better and cheaper to add groundnuts or cowpeas to uji rather than egg.

Traditional iron-rich foods
All the legumes mentioned above (except groundnuts) contain over 5mg of iron in 100g of the food.

In addition, very many varieties of dark green leaves, both wild and cultivated, are traditionally eaten; many of these have iron contents of between 7 and 10mg/100g. These are particularly valuable sources of iron when dried. Drying is also a useful preservation measure.

ENCOURAGE PEOPLE TO EAT LEGUMES AND DARK GREEN LEAVES FOR IRON

The storage and preservation of foods

It is said that about 25 per cent (one-quarter) of the food produced in Africa is wasted due to post-harvest spoilage. It is, therefore, as important to *prevent food loss* as it is to increase production. The most common form of storage is by sun drying, e.g. maize, fish, beans, etc. The health worker should encourage the use of simple, effective storage containers which can be made of local materials in the villages.

Calculation of the cheapest source of energy and protein at local market prices

Prices of food vary from place to place, from season to season, and from year to year. No list can show the cheapest sources of protein for every place in East Africa, or at all seasons and also next year.

This is why it is very useful for a health worker to be able to calculate the 'best buy'. He can then give sound advice to patients on how to get the best value for their money at the local market. These calculations are very simple and some examples are given in Appendix 11.9.

When most protein is coming from the cereal staple then the amount of protein *supplement* needed is small and it can be cheap. When mothers understand this they will be really encouraged. The average amount of protein supplement required is between 5 and 20g (reference protein) per day, per person, or about 40g supplement for a family. Usually dried fish, legumes, and cereals are cheap protein sources. Milk, powdered milk, and egg are expensive protein sources.

Nutrition education

Rapid advances in nutrition science in the last 20 years have shown that we were wrong about several important things we used to believe. As a result, nutrition educators learnt wrongly and some nutrition programmes were wrongly based. Several mistaken ideas have been taught to the public and are still believed by many people throughout the developing world. There are three important errors:

Error No. 1 That the main food deficiency in the developing world is protein deficiency

This is now known to be incorrect. Many surveys have shown that in areas where malnutrition is common the major deficiency causing underweight and energy-protein deficiency is *inadequacy of energy foods*. This arises either from shortage of supply or not giving enough meals. Protein deficiency is nearly always *secondary* to energy deficiency.

This error led to expensive efforts to try and increase protein in the diet, which was then only wasted because there was insufficient energy in the diet. Health workers must make sure that children get enough calories *before* trying to increase protein in the diet.

Error No. 2 That animal proteins are better than vegetable proteins

This is a wrong idea which should be corrected. The amino-acids of vegetable protein and animal protein are the same. Vegetable proteins are both good and useful.

- Legumes contain more protein by weight than animal foods (e.g. beans contain 27%, meat 16%, milk 3%).
- All types of non-essential amino-acids can be resynthesized in the body, so the proportions of amino-acids in vegetable proteins make little difference.
- All the essential amino-acids are present in vegetables of different kinds and as long as they are *mixed* they have the same protein value as meat.
- There are large numbers of people in the world who live on an entirely vegetarian diet and yet remain healthy.

Animal proteins are expensive throughout the world. In many areas they are only rarely obtainable and most people cannot afford to buy them very often. If nutrition educators encouraged people to eat legumes (red beans, white beans, cowpeas, gram, chickpeas, lentils, groundnuts, and others) most nutrition problems would be solved.

One world authority on nutrition in tropical Africa has said 'The simple expedient of adding a handful of groundnuts per day to the diet of everyone over six months of age in Africa would solve a large proportion of the nutritional deficiency conditions which exist' (M. Latham).

Error No. 3 That Western diets are superior to traditional diets
This again is not true. Before the colonization of East Africa a number of tribal groups were outstandingly healthy and their

Fig. 11.8 Some traditional diets are more healthy than a Western diet.

traditional diets were highly nutritious. For example, before cassava was introduced, millet and sorghum were grown in dry areas. These have an even higher protein content than maize (10%) and are rich in iron (5mg/100g). Most of the legumes mentioned previously were grown traditionally and eaten regularly. It is not possible to return to traditional diets entirely, but their good features need to be respected.

There are many reasons for the present change from traditional diets. One of them is urbanization, where food is bought and not grown. Also growing or collecting, preparing, and preserving traditional foods is hard work.

Modern nutritionists regard the Western diet as very unhealthy. It has too high a content of refined carbohydrates like white flour and white sugar (as used in cakes and pastry for example); it has too high a content of fats, particularly cholesterol; it has too high a content of meat protein; and it leads to overweight in a high proportion of the population.

Weaning recipes

The main problem with weaning foods is to prepare the protein food so that it is soft and easily digested, and to reduce the bulk (volume) of the staple energy food. Weaning recipes are different ways of mixing protein foods with thin porridge so as to give young children protein-enriched food.

Examples are:

- cowpeas (kunde)—boil and then mash
- groundnuts (karanga)—roast and then grind to powder
- red beans—soak overnight, remove skins, then cook and mash
- fish—cook, remove bones, and mash
- meat—scrape with a knife to obtain small particles
- powdered milk—mix to a paste with water and cook with uji

If the porridge (uji) is maize or millet, only small amounts of additional food need be added. Larger amounts are needed with cassava.

Weaning recipes are to be found in the *Child Health* manual.

A demonstration shamba

To encourage mothers and others to grow a wide variety of foods for their children, a demonstration shamba at the health centre is useful. Ask the advice of the local agricultural extension officer.

Day-care centres

Many *large* villages now have day-care centres to look after young children while the mothers work on the village shamba. Health workers can advise the village committee on suitable foods to give the children while at the centre to supplement the home diet. Such things as fruits that are in season and grown in the village may be added to the main meal. If the village has cows, the committee can be advised to set aside some milk for the children. Older children may eat snacks of roasted groundnuts or roasted corn cobs.

Ward development committee

Since undernutrition is basically a socioeconomic and political problem, improvements in nutritional status must be attempted through the activities of CCM and the local ward development committee.

A combined approach must also involve such workers as teachers and agricultural advisers. Explain the problems, discuss them with the people and attempt a community action plan. Remember that undernutrition mainly affects poor families, children, and mothers, whereas it is those who are better off who usually have control of the local political power, and these are most often the men. A useful start can be made through the villages. Do not tell people what to do, but encourage help through community participation. Do not expect much help from elsewhere but encourage self-reliance and determination within the community.

GOOD NUTRITION PRODUCES A HEALTHY NATION: DO YOUR BEST

Chapter Twelve

HEALTH EDUCATION

12.1 SOME MISUNDERSTANDINGS

From the beginning people working in health services have known that more co-operation by patients and the public could make possible rapid progress in health and the reduction of sickness. Many health workers have tried to explain the causes of health and disease to patients in the hope of securing this co-operation. Others have wanted specially trained staff to act as teachers or health educators because they found their explanations did not produce much result. Others have thought that posters, pamphlets, and films would help. Experience in developing countries, however, has shown more and more clearly that there is no quick and easy way of giving health education, and that the most effective method is still careful explanation by one person to another, even though this takes a lot of time.

In the past 'health education' usually meant gathering together a group of people and giving them a health talk. These methods copied from school teachers have not been helpful. Now it is realized that unless the people in the group all have the same problem, and the same difficulties and the same way of life, it is not possible to persuade them as a group to take the same steps to solve their problems. It is essential to listen and encourage people to ask questions and discuss their points of view.

Fig. 12.1 Giving a health talk.

For success in health services we want people to work *with* us. We must then persuade them to act in appropriate ways, such as:

- recognizing the symptoms of disease quickly and coming for treatment —or giving family members simple treatment at home

- listening to our advice and following it carefully
- coming forward for preventive services like immunization
- choosing more nutritious foods and preparing them well
- seeking safe water, and disease-free foods
- carefully disposing of wastes—especially human wastes—that can lead to the spread of disease
- attacking and controlling the vectors of disease including flies, mosquitoes, rats, ticks, etc.
- caring for their children in a sound, hygienic way
- living in a healthful way, not misusing their bodies with excessive drinking, drugs, or careless behaviour.

We can persuade people to make these changes if we understand why they live as they do now, and how they can be led to see the benefits they will obtain from making the needed changes. Then we can talk to them—whenever we meet them—with confidence. If we help them understand their problems, then we may succeed in encouraging them to healthier living.

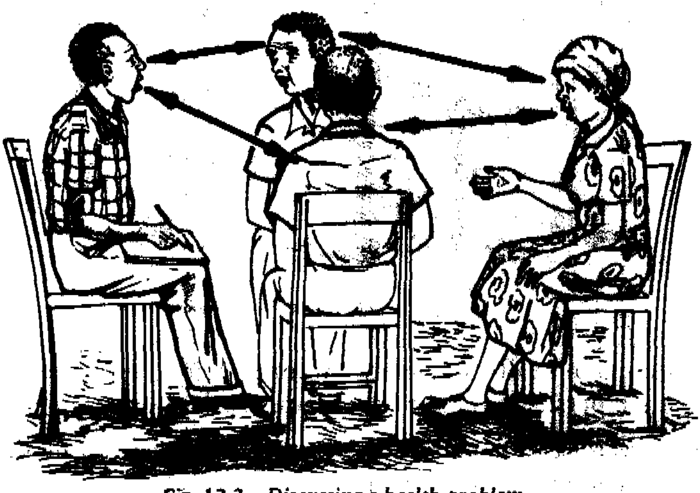


Fig. 12.2 Discussing a health problem.

12.2 THE DEFINITION OF HEALTH EDUCATION

To escape the misunderstandings of the past, a definition of the purpose of health education may be helpful:

- **The aim of health education is, by planned efforts, to secure beneficial —that is, health-promoting—changes in people's behaviour.**

12.3 HEALTH EDUCATION AND HEALTH SERVICES

A bottle of medicine without a label can be dangerous. It is just as likely to produce sickness as health. To be satisfactory, *any* service given to a patient must include an explanation. The value of the service depends on how well and clearly the explanation and advice are given.

People expect us to know what we are doing. Their dignity as human beings entitles them to an explanation of what we are doing and why. We hope they believe we want to help them to live in a healthier way, and to be more self-reliant. If they have confidence in us both as health workers and as fellow human beings, they will feel free to ask our advice.

If we seem too busy, or seem to be interested only in getting through the work of diagnosing and prescribing as quickly as possible, they will not like to take our time with questions, and will go home without their real needs being met.

They may ask someone else these questions, e.g. the nursing assistant, the microscopist, the driver, or even the sweeper—it is easier to ask someone who seems more friendly to you. They may get clear explanations and sound advice from these staff if it is a good health centre and all staff are trained and practised in health education, but if the staff are untrained the patients may go home with misunderstandings in their minds.

The health centre itself can encourage better styles of living and clearer understanding of health matters by its cleanliness and hygienic procedures, as well as by what its staff say to patients. Everyone working in health services, from the sweeper to the DMO, has a part to play in encouraging healthy living. All of them are involved in health education every day, and all need training and help to understand health education methods thoroughly.

12.4 IMPROVING HEALTH EDUCATION

Time spent in helping people to understand, and in advising them, is not wasted. If you help and persuade a patient, he or she may spread your message in a way you could never spread it yourself. Health education is like planting seeds.

To succeed in health education:

- know the people who need your advice
- know their thinking
- know their beliefs
- know their customs and daily habits
- know the way they live
- know what they can, and also what they cannot do.

The better you know them the more you will enter into their problems and anxieties, the more carefully they will listen to you, and the more you will be able sincerely to help them. To get to know them *listen* carefully to them. In time they will talk about their real, deepest problems. Get to know them by visiting them in their homes. Then the advice you give will be *feasible*—they will be able to follow it; it will be *relevant*—they will see it meets their needs; it will be *appropriate*—they will see it can immediately help them.

To change people's behaviour we must understand the roots of that behaviour. Though your personal efforts in the health education of patients may lead only to slow progress, the success of the *team* will lead to more rapid and widespread progress. As the leader you must help and train and encourage everyone in your team. If all the staff, including the driver and sweeper, speak with one clear voice together, then it is possible to begin to change the habits of the district. If you can get community support for the changes you propose, then through self-help efforts progress can be made.

12.5 STEPS TO CHANGE BEHAVIOUR

To secure behaviour change in a community and a 'breakthrough' in a particular community health problem—like scabies, or diarrhoeas, or malaria, or relapsing fever—a programme must be planned. One way to do this is to follow the 'five-step method' (see Chapter 3 of the AMREF Rural Health Series manual, *Health Education*).

Step 1 Describe the behaviour problem
What is it that people do, or do not do, that we want to change? Do we want them to wash more often, use only safe water...and so on?

Step 2 Analyse the behaviour problem—diagnosis
Why do they do, or not do, that? What is it in their thinking, their beliefs, customs, or way of living, that leads to this behaviour? Is their water too far away, too cold? Do they need bath houses? etc.

Step 3 Plan the programme—educational prescription
Draw up the messages to be discussed with mothers, fathers, school teachers, Ten-cell leaders, etc., on the need for repairing wells, protecting streams, getting a borehole, building bath houses, etc.

Step 4 Organize the programme—education treatment
Ensure that staff know exactly what they have to do through

meetings and training. Visit people and talk about good wells, easily constructed bath houses, etc. Assist in community meetings, talk with patients, etc.

Step 5 Assessing programme success–measuring response
Do this by counting the results obtained, e.g. the number of wells improved, boreholes working, people not now using unsafe water, bath houses built, etc., at a preselected time after the programme started.

12.6 MEASURING RESULTS IN HEALTH EDUCATION

A serious weakness of health education in the past was failure to measure results, that is, to evaluate. Our aim is to secure changes in people's behaviour. It is not very difficult, if we work systematically, to measure our results. Suppose we are trying by talking with mothers to get more infants vaccinated with the second and third doses of triple vaccine. We can visit people at home to see if they have changed the behaviour that has been discussed. At the end of the month we can simply count the cards, or count the doses given, compare the results with previous months, and judge our success.

SUCCESS IN HEALTH EDUCATION IS MEASURED BY CHANGES IN BEHAVIOUR

The 'five-step method' is a plan for a specific campaign and it includes a simple evaluation scheme. Most of our health education, though, will be more general and go on all the time, but it should not be allowed to become just a routine. New ideas should be discussed at staff meetings. As these ideas are tried out each should include some plan for measuring results. For example, at the weighing table we can have a sheet to write down the card number of each child and whether its face has been washed, whether it is wearing clean clothes, or whether it has been immunized at the right times, etc. Then after 2 or 3 months we can check to see if there has been an improvement following the new health education advice given to mothers.

A good idea is to have a small rubber stamp made up and to stamp patient's cards with a health education 'treatment' section like this:

Health Education	Date given
Reasons for triple	....
Diarrhoeas..........	....
Cuts, bites and stings..........	....
Fire dangers..........	....
Cleaning ears..........	....
etc.	

12.7 ACTION SUMMARY

1. Every month, as you make up your records, consider what changes in people's customs, habits, way of life, or improved co-operation with health services would lead to a decline in particular sickness problems.

2. Next, consider which of these changes can be made by people quite quickly and without costing them too much.

3. How could you and your staff plan, by improving contact with patients or by special campaigns, to persuade people to make the changes in behaviour they need to in order to improve their health?

4. Are there some activities which the staff think of as 'health education' which are doing no good and which could be replanned, or dropped altogether?
5. Plan to visit some patients in their homes, especially those who have sickness that may be connected with bad water, poor ventilation, smoky fires, or other home conditions.
6. Get staff to do more home visits and to report their findings at staff meetings.

Fig. 12.3 A lot of information can be gathered by visiting people at home.

7. Discuss community health problems with community leaders.
8. Plan a community health education programme on an important disease problem using the five-step method.
9. Visit any neighbouring health centres or district hospitals

where you think they may be being successful in their health education efforts.

10. Write down, in Swahili, some educational messages that may help staff to encourage changes in behaviour and discuss these with staff and with a few people in the community.
11. Observe the behaviour of people in the health centre. Do they spit? Do they misuse toilets? Are they kept waiting unnecessarily? What can be done to improve these things?
12. Observe the behaviour of staff. Do they encourage people to thoughtful health-promoting behaviour by what they *do*, as well as what they say?

(This chapter includes some of the important points made in more detail in the Rural Health Series *Health Education* manual by Norman Scotney. For more information refer to the manual.)

Chapter Thirteen

CONTROL OF COMMUNICABLE DISEASES

13.1 INTRODUCTION

This chapter will concentrate mainly on those aspects of communicable diseases that are important for understanding how they can be controlled in a community. Clinical aspects of these diseases are described in *Communicable Diseases* (AMREF, Rural Health Series.) and are not given in any detail here.

The importance of this group of diseases hardly needs emphasizing. They are by far the leading cause of outpatient attendances, admissions, and deaths, and they are widely distributed throughout Tanzania. The local frequency, distribution, and importance of the individual communicable diseases varies considerably from district to district and every MA must have figures on the pattern of communicable diseases in his own area.

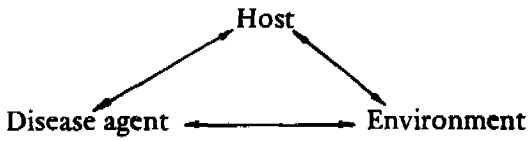
Most of these important diseases also have a high priority because they can be prevented and thus brought under control in the community. Many of the control measures are also practical, simple, and cheap, and health centres and dispensaries should spend much of their time and efforts on controlling these diseases.

MOST COMMUNICABLE DISEASES ARE PREVENTABLE

They are called communicable because they are able to spread from one living animal to another, such as man to man, animal to man, or animal to animal. In this situation the man or animal is called a *host.* These communicable diseases are all caused by some living organism or agent, such as a virus, rickettsia, mycoplasma, bacterium, protozoon, helminth, or insect.

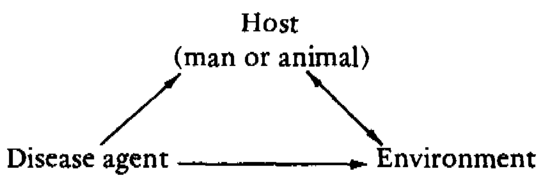
13.2 AGENT, HOST, AND ENVIRONMENT

With these diseases we need to consider the living *agent*, the *host* it infects, and the *environment* that both live in. These agents need to grow, multiply, and spread in order to infect new hosts, since they would die out if they did not do this. There is a balance between the people or animals (hosts), the agents, and the environment which can be shown diagramatically as on the following page.



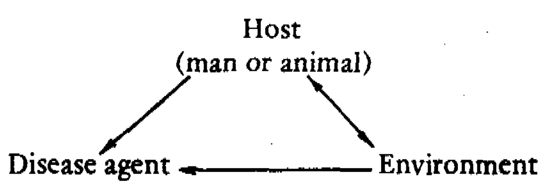
The arrows show that each of the three can have an effect on the other two. People are affected by their environment and they can also change it. People can become ill and die because of the agents, but people can also control or kill the agents. Similarly the environment can affect the agents and vice versa.

When a disease is *endemic*, that is, there are a fairly constant number of new cases, there is a balance between these three. When the balance becomes upset and favours disease agents, then the disease incidence rises and the disease becomes commoner. If the incidence rises rapidly then an epidemic will occur. This can be drawn as:



The object of disease control is to turn the balance against the agent and thus lower the incidence. This situation is maintained over a period of time until (a) the epidemic is under control, or (b) the disease is no longer a major problem, or (c) it disappears altogether. Situation (a) is known as *control of an epidemic*, (b) as *disease control*, and (c) as *eradication*.

This can be expressed like this:



To practise the control of epidemics or diseases effectively it is necessary to understand this balance between host, agent, and environment, and what practical, simple, and cheap methods can be undertaken to alter the balance against the agent.

13.3 HOST AND INFECTION

Most of the communicable diseases in Tanzania have people as their *main host*. There are, however, a few that are mainly animal infections which can spread to humans, such as rabies, plague, and trypanosomiasis. These mainly animal diseases are called *zoonoses*.

Before a person can possibly become infected with an organism they first must come into contact with it. This is called being *exposed* to the organism, and for example might be drinking infected water containing typhoid bacilli, or visiting a house where a child is ill with measles. Not all people (or hosts) exposed to an organism will become infected. This depends on how infectious the organism is, how strong the exposure was, i.e. how large a 'dose' of germs was received, the route of transmission, and whether the person is susceptible or resistant to the organism.

When an organism does infect a person there are several stages to consider. The time taken from infection to the appearance of symptoms and signs of the illness is called the *incubation period*. The incubation period is fairly fixed for each disease in Man and is usually expressed as a range (e.g. typhoid 10–20 days, measles 10–14 days). The shorter the incubation period the more rapidly the incidence of a disease can rise or fall in the community. Some organisms nearly always produce symptoms and signs—which is called *clinical infection*. Other organisms are able to infect people without always producing symptoms or signs and this is called *subclinical infection*. This is important because those people with symptoms and signs are ill and their illness causes them to seek help from the medical services. People with subclinical infections on the other hand do not know they are infected, they do not go for help, and they can therefore be a danger to other people by spreading the infection. People with subclinical infection are called *carriers* because they are spreading organisms which are dangerous for other people without knowing it. This spread can occur during the incubation period (e.g. measles), during convalescence (e.g. gonorrhoea), and even after recovery from clinical illness (e.g. typhoid).

People may be *susceptible* to many diseases but they may have developed a resistance to others. The resistance of the human body is made up of its defence mechanisms such as skin, secretions, white blood cells, and immunity. Immunity is due to special body cells and to antibodies circulating in the blood. The way that immunity can raise the body's resistance is more fully explained in Chapter 9 on immunization. Immunization procedures are an artificial way of raising people's resistance to certain infections by giving them vaccines.

The *source* of the infection is the person, animal, or place from which the particular organism spreads to its new host. The *reservoir* of the infection is the animal or place where the particular organisms are usually living and multiplying. For most of the important communicable diseases in Tanzania, Man himself is the main reservoir. For brucellosis it is cattle, for rabies wild carnivores, and for a few diseases it is the soil.

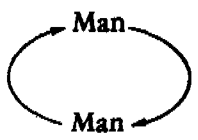
The way in which an organism leaves the infected host, the source, and travels to a new susceptible is called the *route of transmission*. Each disease organism has particular routes and these therefore play a large part in how these organisms spread in the community. For example, some are spread in water and food and others by *vectors* like mosquitoes and snails. (A vector is a living organism which acts as a link in transmission from one host to another.)

REMEMBER ROUTES OF TRANSMISSION

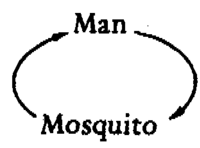
13.4 THE TRANSMISSION CYCLE

The *transmission cycle* illustrates the main stages by which the organism maintains its numbers, that is how it grows, multiplies, and spreads. Man may be the only host and infections spread from man to man, e.g. measles. Or Man may be only the final host from which the organism has no chance to pass further, e.g. tetanus. Man is more usually an integral part of the transmission cycle and he then is also the main reservoir, e.g. malaria or schistosomiasis.

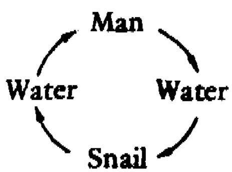
Measles



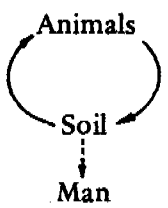
Malaria



Schistosomiasis



Tetanus



The three main parts of the transmission cycle for the agent or organism can be illustrated thus:

		Source	*Transmission*	*Susceptible host*
e.g.	Measles	child	airborne droplets	child
	Malaria	person	mosquito (vector)	person
	Schistosomiasis	person	snail (vector)	person
	Tetanus	animal	faecal contamination of soil	person

Source

This can be an infected person, animal, or the soil. People and animals may be *clinical cases, subclinical cases,* or *carriers*. If there is an *animal reservoir*, it should be considered here as part of the source.

Transmission

The main routes are by:

- direct contact
- airborne droplets
- faecal contamination of soil, food, and water
- vectors
- contact with animals or their products.

Susceptible host

This is a host whose resistance is low enough for him to get the disease. This may be due to:

- not having met the organism before and therefore having no immunity to it, e.g. measles
- certain infections only give a weak immunity, e.g. malaria
- intercurrent debilitating illness like tuberculosis
- malnutrition, which can make infections worse.

13.5 PRINCIPLES FOR CONTROLLING COMMUNICABLE DISEASES

The aim is to lower the incidence of the disease to a level that is no longer a problem to the community. When a disease is under control, the control measures normally have to be continued indefinitely, since the incidence may start to rise again if they are stopped. Ideally, we would like to eradicate all communicable diseases, but in practice this is only occasionally possible, e.g. smallpox.

The methods used to turn the ecological 'balance' against the agent by attempting to break the transmission cycle operate at one of the three points by:

- attacking the source
- interrupting the route of transmission
- protecting the susceptible host.

Main control methods

Attacking source	*Interrupting transmission*	*Protecting susceptible host*
Treatment of cases and carriers	Environmental hygiene	Immunization
Isolation	Personal hygiene	Chemoprophylaxis
Surveillance of suspects	Vector control	Personal protection
Reservoir control	Disinfection and sterilization	Better nutrition
Notification	Population movements	

Primary prevention is achieved by all the methods listed under 'interrupting transmission' and under 'protecting the susceptible host', together with control of animal reservoirs. If all these are properly carried out the number of new cases could be greatly reduced, e.g. clean water supplies and the correct disposal of faeces could stop a lot of gastroenteritis, anopheline mosquito control could stop malaria transmission, and immunization with BCG and measles vaccines could protect most young children.

Secondary prevention can be achieved by finding subclinical cases and carriers and by tracing and surveillance of contacts. Tertiary prevention is by the treatment of cases so that they do not spread the infection any further.

Attacking the source

Treatment of cases
If sufficient clinical cases can be treated with chemotherapeutic drugs that are effective against the organism, then these organisms cannot spread to new hosts, e.g. in tuberculosis and leprosy. This is called mass treatment and its effectiveness depends on the coverage that can be obtained over all the infective cases in the community.

Subclinical cases and carriers
The same applies to subclinical cases and carriers as to the treatment of clinical cases. But with these patients special efforts have to be made to find them first, as they do not usually present with any apparent illness, e.g. subclinical infectious hepatitis, or ankylostomiasis. The most important method for finding subclinical cases is through *contact tracing*. This means *going* to each clinical case, *getting* from him the names of all his contacts, *finding* these people and *doing* something about their exposure (testing, surveillance, prophylaxis, etc.). In addition to contact tracing, screening methods and surveys may have to be used.

CONTACT TRACING IS AN IMPORTANT PART OF SECONDARY PREVENTION

Isolation of cases
Isolation means that the patient is not allowed to come into close contact with other people, so that the organisms cannot spread. Isolation is very difficult to enforce but was very successfully used in the eradication of smallpox.

Surveillance of contacts
If a susceptible host has been exposed to a case or sources of infection it may be necessary to keep him under close watch and

out of contact with other people for the time of the maximum incubation period. This particularly applies to contagious diseases like plague. This form of control used to be called quarantine.

CASES ARE USUALLY THE MAIN SOURCES OF INFECTION. CHOLERA IS A NOTABLE EXCEPTION

Reservoir control

In those diseases that have their main reservoir in animals, mass treatment, chemoprophylaxis, or immunization can be used, e.g. trypanosomiasis and brucellosis. Other ways include separating man from animals or killing the animals and so destroying the reservoir, e.g. plague and rabies.

Fig. 13.1 Keep rats out of the house. Protect all food.

Notifications and reports

Although these do not directly affect the source, notifications are an essential means of keeping a watch (surveillance) on the number of new cases and thereby monitoring the effectiveness of the control programme. Notifiable diseases and epidemics should be reported to the Ministry of Health via the DMO. A good notification system provides early warning of epidemics before they become serious.

Interrupting transmission

Environmental hygiene

Many organisms are able to spread through contaminated food and water, particularly those that are dependant on the faecal-oral route. Other diseases are spread through refuse and dirty living conditions. The airborne diseases are more likely to spread when housing is inadequate and people live and sleep in crowded rooms. The methods involved in environmental hygiene are given in more detail in Chapter 8.

PEOPLE CAN CONTROL THEIR ENVIRONMENT

Fig. 13.2 Diseases spread in dirty surroundings. Bury or burn refuse.

Personal hygiene

A great many person habits make some diseases more likely, particularly the contact and venereal diseases and those that may spread due to faecal contamination of hands, food, and water. This is why it is so important to teach children to wash their hands after using the latrine and before meals, until this becomes an automatic habit.

Vector control

Any organism that requires a vector, like a mosquito or snail, for its transmission cycle may be controlled if the vectors can be killed off or reduced. Methods of vector control can be through altering the environment so that it is unfavourable to the vector (e.g. draining swamps), by using toxic substances (e.g. larvicides or molluscicides, see Figure 13.3 on page 352), or by using other living organisms that attack the vector (biological methods).

Disinfection and sterilization

These measures aim at destroying the organism when it is in the environment, e.g. sterilization of surgical instruments to prevent clostridial and other infections, the chlorinating of water supplies to prevent typhoid and cholera.

Population movements

Communicable diseases can be spread by people who are incubating the illness, by carriers or by actual cases travelling around. During an epidemic it may be necessary to stop people moving around or going on safari, and even to forbid gatherings like markets or festivals whilst the epidemic lasts. Migration of people and refugees can spread diseases from one area to another.

Protecting the host

Immunization

By giving vaccines (made of toxoids, or living or dead organisms) the level of active immunity can be raised, e.g. DPT, BCG, polio, and measles. All these offer personal protection. If immunization is to be effective in community control the population coverage of susceptibles has to be high. For measles over 80 per cent of infants have to be immunized. The protective effect that is obtained when a high proportion of the population have been immunized is called *herd immunity*. Passive immunity produced by immune globulins may give personal protection, e.g. in rabies, but it is not helpful in mass control.

IMMUNIZATION GIVES PRIMARY PROTECTION

Fig. 13.3 Spraying a molluscicide on standing water.

Chemoprophylaxis

Drugs that protect the host may be used for suppressing malaria, and for preventing infection with such diseases as plague and cerebrospinal meningitis.

Personal protection

This means using some barrier, e.g. shoes against ankylostomiasis, nets and insect repellants against mosquitoes.

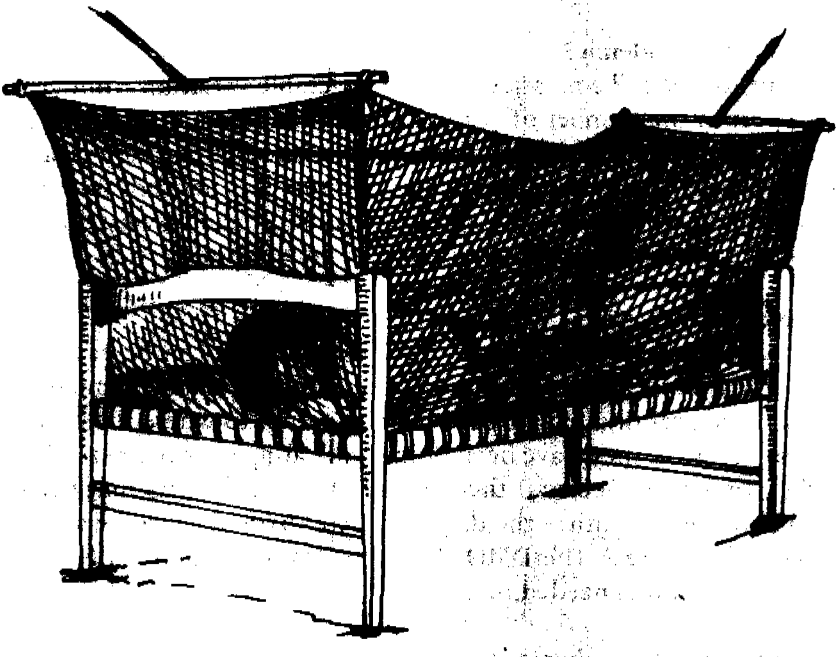


Fig. 13.4 Mosquito net protecting a sleeping child.

Better nutrition

When famine is present then epidemics are more likely to occur. Malnourished children also appear more prone to get infections and to suffer more from complications, e.g. measles and malnutrition. Therefore the promotion of better nutrition will help to control the spread of communicable diseases.

13.6 INVESTIGATION AND CONTROL OF EPIDEMICS

Epidemic illness may be due to infectious diseases like measles or gastroenteritis, or to toxic substances like agricultural sprays and poisons in food. The medical staff will probably first suspect there may be an epidemic by hearing about, or seeing and treating, an unusual number of cases. The following approach is useful in such situations.

Is it a real epidemic?
Some diseases like measles show considerable variation from year to year in the number of cases that occur and you must decide if there really is an excessive number. Unless something very clear, like deaths or paralyses, are being reported, it is best not to rely on what people say, but to go and have a look. It can be very difficult sometimes to decide if there is an epidemic or not.

Defining the cases
Often the disease the people are suffering from can be easily diagnosed but, if not, take good clinical histories and examine the patients carefully, paying particular attention to where the patients live and what they have been doing and eating over the past few days or weeks. Decide if there are any laboratory tests that need to be done to confirm the diagnosis. Are there likely to be any subclinical cases? The DMO should be informed and his help requested if it is needed.

Describing the epidemic
Use the technique of 'Who, Where, and When' to describe the epidemic (see Section 7.4). Mark on a map where the patients live and construct a chart showing the number of new cases which started on each day of the epidemic. Analyse the known cases to see how many are males or females, and then see how many there are in each main age group, i.e. 0–4, 5–14, 15–44 and 45 years and over. Work out the percentage of cases in each group. Are the

percentages similar to what might be expected for the whole population or is there an excess in one particular age group or in one sex? (See Section 3.4 for figures.) See who did *not* get the disease. This information may give a useful clue.

A special effort should also be made to find other people with the same illness who have not attended clinics. Ask Ten-cell leaders for their help.

WHY DID THE EPIDEMIC OCCUR?

How can the epidemic be explained?

When there is sufficient information about the clinical cases and about who was affected, where, and when, try to answer the following questions:

What is the diagnosis?
What is the organism or agent?
What is the source of the epidemic?
How is the organism or agent being transmitted?
Why did the epidemic occur?

It may be necessary to carry out small surveys or checks or laboratory tests to see if you can confirm your ideas on what is happening. Remember to collect and save samples that may be analysed in laboratories in order to confirm your ideas.

How can the epidemic be controlled?

Often you cannot wait until the epidemic is fully understood to start control measures, some control has to start right away. It may be necessary to start an immunization campaign straight away, or to isolate cases, or to close a water supply. The district medical officer and health inspector are both people who should be called in to help.

Look and see what can be done by attacking the source, interrupting transmission, or by protecting susceptibles—see Section 13.5.

When a contaminated food or water source, or a toxic or poisonous substance is suspected, attempts should be made to obtain samples for further analysis and bacteriology. Try to find out where it is coming from and how it was getting into people, in the same way as we do for a live organism.

DIAGNOSE DEFINE DESCRIBE EXPLAIN CONTROL

13.7 CONTROL AND ERADICATION

The purpose of a control programme for an important communicable disease is to reduce its incidence to a low level so that it is no longer a public health problem. This obviously differs from eradication where it is hoped to get rid of the disease altogether from a particular region or country. These two different objectives need different kinds of programmes and these are outlined below:

	Control programme	*Eradication programme*
1. Objective	low incidence	no cases at all
2. Duration	indefinitely	limited period
3. Area covered	only where incidence is high	everywhere there are cases
4. Organization required	should be good	needs to be perfect

5. Costs	moderate but for longer time	high but for a limited time
6. Imported cases	not very important	very important

From this table it can be seen that eradication programmes are very difficult to organize and are costly, and they are therefore usually organized by the Ministry of Health. Most programmes organized at district level are concerned only with control.

13.8 REQUIREMENTS FOR A CONTROL PROGRAMME

There are many diseases that are endemic in large areas of Tanzania and others that are more localized (see Chapter 4 on the pattern of disease). Before a communicable disease control programme is started certain requirements are necessary:

Check-list for a control programme

1. *A pre-control survey* so that the local frequency and distribution of the disease is known. This is essential for later evaluation to see if the programme is being effective in reducing the incidence of disease or not.
2. *The people must desire to improve their health*, want to co-operate, believe the programme is important, and believe it is possible to achieve.
3. *Certain knowledge and skills* are needed by the medical staff for the control methods.
4. *The technical requirements* in money, staff, and supplies must be available.
5. *The organization and a plan of action* must be worked out at the beginning.

6. *The evaluation* needs to be carried out both during the programme and after it is finished. Only in this way will it be known if the number of new cases has been reduced.

Before starting a control programme ask yourself whether the local community and the medical staff fulfil all the requirements of the check-list above. Is there any extra help required? Are any funds needed? Are the ward development committees involved?

13.9 APPLICATION OF CONTROL METHODS

The actual application of control methods can be undertaken by different groups of people and the responsibility for them is best thought of as resting with three different levels: individuals and villages, dispensaries and health centres, and other higher levels.

Each group of people and their organizations have a part to play in disease control. Sometimes the technical aspects are relatively simple and it is the human behaviour and habits that are difficult to change and control. For instance, vaccines are effective and fairly easy to administer, but will the community accept them and come forward to be vaccinated? Latrines and water supplies can be fairly easy to build, but often the community does not use them very effectively.

It is this 'human side' of disease control programmes that medical staff tend to ignore and yet it is of vital importance for success. This is why it is so important to know about the local people, their beliefs, habits, and customs (see Chapters 2 and 12), as well as their local environment.

HUMAN BEHAVIOUR MAY CAUSE DISEASES HEALTHY HABITS CAN PREVENT DISEASES

Responsibilities of individuals, villages, and the ward development committee

Co-operation and organization of community efforts in all the following:

- siting of villages and construction of houses
- personal and household hygiene

Fig. 13.5 Boil water and wash vegetables.

- protective barriers—shoes, mosquito nets
- chemoprophylaxis—malaria
- avoiding infected venereal contacts and bilharzial waters
- improving growing, storing, and distribution of food supplies
- protection of water supplies

- building and use of latrines
- rubbish collection and disposal, village hygiene
- vector control—drainage, clearance
- attendance and use of clinics and other health facilities, especially for immunizations
- feedback to medical staff on successes and failures, with suggestions.

Responsibilities of dispensaries and health centres

Support and encouragement with all of the above, including help from the district medical officer or health officer:

- health education, motivation, and example
- immunization
- nutrition programmes
- reservoir control
- larviciding, molluscicidimg
- water protection and purification
- inspection of food supplies, markets, and shops
- sanitary control of public toilets and water supplies
- epidemic control.

Responsibilities at other higher levels (district, region, and Ministry of Health)

- mass health education
- mass immunization campaigns
- mass chemotherapy
- vector control schemes
- health legislation
- research into control methods

- famine relief
- epidemic control.

Fig. 13.6 A public health assistant inspecting a kiosk.

13.10 COMMUNITY PARTICIPATION

People must be responsible for their own health. There is, however, a great danger of health staff trying to assume this responsibility for them. The staff *tell* people what they should do and then are surprised, and often angry, when they do not do it. Many of the control methods are basically quite simple but to be effective they depend on most of the villagers understanding them and *agreeing* to do the right things. This is most likely to come about if the whole village or ward agree on what is to be done. The role of the health staff should be that of 'technical advisers' helping the local people to carry out the methods for disease control. The staff should be there to help stimulate interest and understanding in health matters and then to co-operate in carrying out ideas. There is no one way that water supplies, for instance, should be organized, and different villages may decide on different ways. The important thing is not that they build a well a certain way, but that they construct and use a safe supply of wholesome water.

The meetings of village Ten-cell leaders and the ward development committee are excellent places to explain ideas about health and disease, and to decide what should be done. Communities should be allowed to participate in their own disease control programmes and to share in important decisions which, after all, do affect them more than the health staff.

Health education is essential and must precede and accompany such programmes (see Chapter 12). Health education is necessary whether the programmes are organized by the villagers themselves, by the dispensaries and health centres, or by the district, region, or Ministry of Health.

Chapter Fourteen

MATERNAL AND CHILD HEALTH

14.1 MATERNAL AND CHILD HEALTH (MCH) CLINICS

The concept

Children make up one-half of the population and usually more than one-half of the patients needing medical care. Because many of their diseases are preventable, most countries in the world have special clinics to help children stay healthy. These children's clinics have many different names, such as 'under-five clinics', 'well-baby clinics', and 'child welfare clinics' and are run by many kinds of health workers. They certainly should be part of every programme that is taking care of people's health. The usual services provided for children at these clinics are vaccinations, nutrition assessment and advice, treatment of minor illnesses, and referral for more difficult problems.

The main aim of these clinics is to keep children healthy. We know a child's health is very much influenced by his mother and her health practices, both before and after the child's birth. For this reason, these clinics have also become concerned with the mother's health, as well as how she takes care of her children. This care of the mother is fairly easy to do, because she is coming to the clinic to bring her children anyway. It means including activities like antenatal care, child-spacing advice, and education on general health and nutrition. When a clinic programme promotes the health of *both* mothers and children together, we call it a maternal (mother) and child health clinic or 'MCH clinic'. An *integrated MCH clinic* should include vaccinations for the children, nutrition advice to the mothers, antenatal care of pregnant mothers, child-spacing services, simple treatments, health education about sanitation, water, home environment, etc., and any other local mother or child health problems that may need attention.

A mother needs considerable motivation and understanding to bring her children to a clinic of this type regularly. It is difficult for her to ignore a crying child who is sick, but it is easy to forget about vaccinations, or antenatal care, or child spacing when both she and her children seem to be healthy. For this reason it is very necessary for health workers continually to educate mothers—and fathers—about the importance of regular attendance at these clinics, both for infants and also older children, even though they have received all their vaccinations. To be successful these clinics must be as easy as possible for women and children to attend.

MCH CLINICS PROVIDE PRIMARY HEALTH CARE FOR MOTHERS AND CHILDREN

Activities

Many different things need to be considered when making plans for an MCH clinic, but probably most important of all is this matter of making it as easy as possible for mothers and children to come to it. Because the great majority of the population lives in rural areas where regular transport is not available, mothers must walk with their children to attend a clinic. While most mothers are willing to walk five or maybe even ten kilometres for something they believe is important, they will not do this very often. They usually have too much work to do at home and other children to care for.

This means two things. When a mother does come, it is important to help her as quickly as possible. A well organized clinic, without long delays to be seen, to collect medicine, or for anything else, is very important. Secondly, it means that the health staff should try to use this visit to care for as many of the mothers' and children's health needs as possible. These needs are often not recognized or understood by the mothers but will probably include vaccinations for one or more of the children, assessment of each child's health and growth, including weight change since the last visit, antenatal care of the mother if she is pregnant again, and perhaps treatment of some minor illness. By offering all of these services on the same day health staff are providing the complete care that makes an MCH clinic so valuable. Mothers who would not come again another day for a separate antenatal or child-spacing clinic can be taken care of with their children. To offer this kind of comprehensive care requires careful organization of the health staff. Let us summarize the kinds of activities that need to be carried out at an MCH clinic.

Specific activities or stations at MCH clinics

Care of children	*Care of mothers*	
	Antenatal	*Child-spacing*
registration	registration	registration
weighing	weighing	
examination and advice*	examination and advice*	examination and advice*
immunization	immunization	
dispensing	dispensing	dispensing
health and nutrition education	health and nutrition education	health and nutrition education

* Treatment for minor illnesses must be available at this station or elsewhere in the clinic.

12.2 STAFFING OF MCH CLINICS

Later in this chapter we shall look in more detail at each of the activities in the MCH clinic. But even now we can see that many of these activities can be done by non-medical staff, such as drivers, clerks, sweepers, etc., or volunteers such as Ten-cell leaders, teachers, pastors, students, or even mothers themselves. It is especially important to think of using volunteers when there are not enough trained staff to run a clinic properly. By carefully selecting interested people and giving them some training you will be able to have extra help and increased efficiency. These non-medical assistants can do such things as registration and weighing, and even dispensing of medicines and health education in some instances.

TRAIN VOLUNTEERS FOR EXTRA CLINIC HELP

Another very important type of staff who often form the backbone of MCH clinics are the *nursing, ward, or dispensary assistants*. These people already know enough to do many of the clinic activities. The particular stations where they often work best are registration and weighing (if no non-medical helpers are being used to do these jobs), and for immunizations, dispensing of medicines, and health education.

Finally, we are left with the examination and treatment part of the MCH clinic. This should be done by a qualified medical worker, such as a *rural medical aid*, or *grade B nurse*. This person will be the clinic leader and should keep an eye on all the other clinic activities to make sure they are done correctly. He will then decide if any child or mother needs special attention or help.

There may be other categories of health workers who are available to help in MCH clinics. *Village midwives* are probably the most common of these. They can help in most of the different stations, but are particularly skilled in antenatal care and child-spacing assistance. In these areas they can usually examine and even treat the mothers as well.

Health auxiliaries are another important kind of staff who will gradually become more available at the dispensary level. These workers have special skills in immunization programmes and in providing health education about water, sanitation, home construction, etc. They should certainly be used in MCH clinics whenever possible.

Another new type of staff now being trained is the *MCH aid*. As their name suggests, these people are specifically trained to work in MCH clinics. They know all the clinic activities and greatly strengthen the MCH services.

In general, medical assistants do not need to work in MCH clinics as a routine. Since they are often finally responsible, however, they must have a clear idea of the organization and staffing needs for each of the different activities of the clinic. Only by knowing this can they correctly supervise the clinic. They will also provide back-up consultation services for more difficult cases, either children or mothers, that may be detected in the clinic.

The following table shows which personnel are usually qualified for the normal activities of an MCH clinic. There are often special cases of people who have learnt to carry out additional jobs besides those in the table. They should be allowed to do these, as it is wrong for higher trained staff to spend time doing things that others could do.

Personnel and their duties in an MCH clinic.

Type of staff	*Registration*	*Weighing*	*Exam/advice for children*	*Exam/advice for antenatal*	*Exam/advice for child spacing*	*Referral of problem cases.*	*Immunization*	*Dispensing*	*Health/nutrition education*
Non-medical workers	X	X						X	X
Nurse or dispensary assistant	X	X	X			X	X	X	X
Health auxiliaries	X	X					X	X	X
Village midwives	X	X		X	X	X	X	X	X
MCH aids	X	X	X	X	X	X	X	X	X
Trained nurses	X	X	X	X	X	X	X	X	X
Rural medical aids	X	X	X	X	X	X	X	X	X

14.3 ORGANIZATION OF MCH CLINICS

We have seen the different kinds of activities and staff that make up an MCH clinic. Now we must plan to organize the clinic in order to accomplish our stated goal of providing integrated MCH care as efficiently as possible. In some places it may not be possible to change at once from the old clinic pattern to an integrated MCH clinic. Plans should start to be made, however, for reassigning and perhaps training of staff and volunteers, organization of the clinic rooms to avoid overcrowding, and arranging for good supplies of vaccines, medicines, and equipment.

We also have to decide how often each dispensary, health centre, and hospital should hold their MCH clinics. This will depend on the staff available to help in the clinic and the size and arrangement of the clinic buildings. A very important consideration is when is the easiest time for most mothers to attend. A quick check at the outpatient clinic almost always shows that many mothers and children are coming every day for treatment. Ask how many of these children have attended an MCH clinic, or look for the BCG scars on their arms and you discover that many of them, often the majority, have never been to an MCH clinic for weighing, immunizations, or assessment. Obviously one of the first aims of an MCH clinic should be to provide MCH services to these mothers and children who are already coming to the outpatient clinic for treatment. This is often the only chance to reach these children because many mothers will not come back on another special day for the MCH clinic.

To provide MCH services for all mothers and children attending outpatient clinics means that MCH clinics need to be held each day outpatients are working, usually Monday to Friday. Many staff at first think it is impossible to run an integrated MCH clinic, including immunizations, antenatal care, child spacing, etc., every day because of the shortage of staff and clinic space. But the places which have started this new daily plan have found it is actually easier and more efficient than the old system. This is because the number of mothers and children attending are spread throughout the week so you have five small clinics instead of one or two very large ones. This makes a regular daily workload for the clinic staff rather than some very busy days requiring extra staff and some days when there is little to do. The clinic rooms are also usually more suited to daily small clinics than less frequent large ones.

This system of daily MCH clinics is usually best started in three separate steps. The *first* step is to provide complete integrated MCH services at each child welfare and antenatal clinic that is already being held. For example, perhaps there is a follow-up antenatal clinic on Monday, a children's clinic on Wednesday, and a new antenatal clinic on Friday. Start by making each of these clinics a complete MCH clinic by adding children's care and child spacing to the antenatal clinics and, similarly, mothers' care, including antenatal checks, to the children's clinic. Encourage mothers to bring their children with them so they can receive all services in one visit.

Once this has been done it is time for the *second* step of adding new integrated MCH clinics on the other days until you have MCH every day there are outpatient clinics. This may mean changing some staff around or perhaps reducing the number of staff going out with the mobile team. This should be possible because of the new plan for mobile teams discussed later (see page 378).

Finally, the *third* step is to route all mothers and children coming for outpatient services through the MCH clinic. Here they can be weighed, checked, and immunized. If they are well or have only a minor problem they can be taken care of completely in the MCH clinic. Those who have more serious problems are referred over to the *front* of the outpatient queue *after* they have received any MCH services needed. Some mothers will still try to go directly to the outpatient clinic because they do not understand or want MCH services. A good way to stop this is to make every mother and child have their antenatal, growth, or clinic cards stamped in the MCH clinic before the medical assistant will see them as outpatients. As discussed in Section 14.5, the new growth card has extra room for clinic notes, so both the MCH and outpatient clinics should use the same card for writing their notes about each child.

This type of clinic system will decrease the pressure and attendances at the outpatient clinic because many mothers and children will be taken care of completely, including simple treatment, in the MCH clinic. As a result, some of the staff normally working in outpatients can be moved over to MCH to help there. In some places the changeover will need to be arranged differently, but the eventual aim should always be daily comprehensive MCH services

OFFER FULL MCH SERVICES EVERY DAY

One final consideration that comes with daily MCH clinics is whether to open a vial of vaccine for just a few children. Polio, DPT, and tetanus toxoid can be kept in the refrigerator after opening or diluting, and used for several days, so there should be no hesitation to open them for even one or two children. Measles and BCG must be discarded after a few hours, but it is still better to open these and have to waste some vaccine than to miss a chance to vaccinate even a few children. If all the doses of measles vaccine are not used up in the clinic, they can often be used to vaccinate or even revaccinate children on the wards. BCG vaccine should be used both for newborns in the maternity ward and unvaccinated children who come to the clinic. Be sure to check all expiry dates regularly so the vaccines are used while still potent.

Time to start

It is important to start a clinic in the first part of the morning by 8 or 9 a.m. at the latest. Some people say that mothers do not come until 10 or 11 a.m. so do not start your clinic until then, but the usual reason mothers do not come earlier is that they have learned the clinic does not start early. If you start early and punctually, and at the *same time* each day, most mothers will be glad to come early and then return home in time to get on with their other jobs. This means that most of the preparations in the clinic should be made the day before, not the same morning.

Fig. 14.1 Hold MCH clinics every day.

Stations and flow pattern

We have now discussed the available staff, kinds of activities, and frequency of MCH clinics. Finally we should look at the actual stations at each clinic and the most efficient way of moving mothers and children through them. We must remember the rule stated earlier that it is wrong to use more highly trained staff for activities that less highly trained people can do. This is important when we start organizing our different stations.

1. *Registration*

   First we have a registration station. Here we record all attendances of both mothers and children on the attendance tally sheet (see Section 14.8). We give those who are attending the MCH clinic for the first time their own cards—a growth card for each child and an antenatal or child-spacing card for the mother. We fill out the information asked for on the card at the first visit and write the person's name, age, village, and card number in the register book.

2. *Weighing*

   Next comes the weighing station. At this point the children and/or pregnant mothers are weighed and their weights recorded on their cards in the right places. In small clinics the recording and weighing can be done by one assistant or trained volunteer. (See Fig. 14.2 on page 374.)

3. *Examination and advice*

   The examination and advice station, manned by a qualified medical worker, is next and is the centre of the clinic. Smaller clinics need only one station for both mothers and children. In large clinics it is good to have at least two stations, with an RMA or similar person caring for the children, and a trained midwife providing antenatal and child-spacing services for the mothers. In large clinics it is also helpful to have a separate station before this one to do urine and blood pressure checks on pregnant mothers.

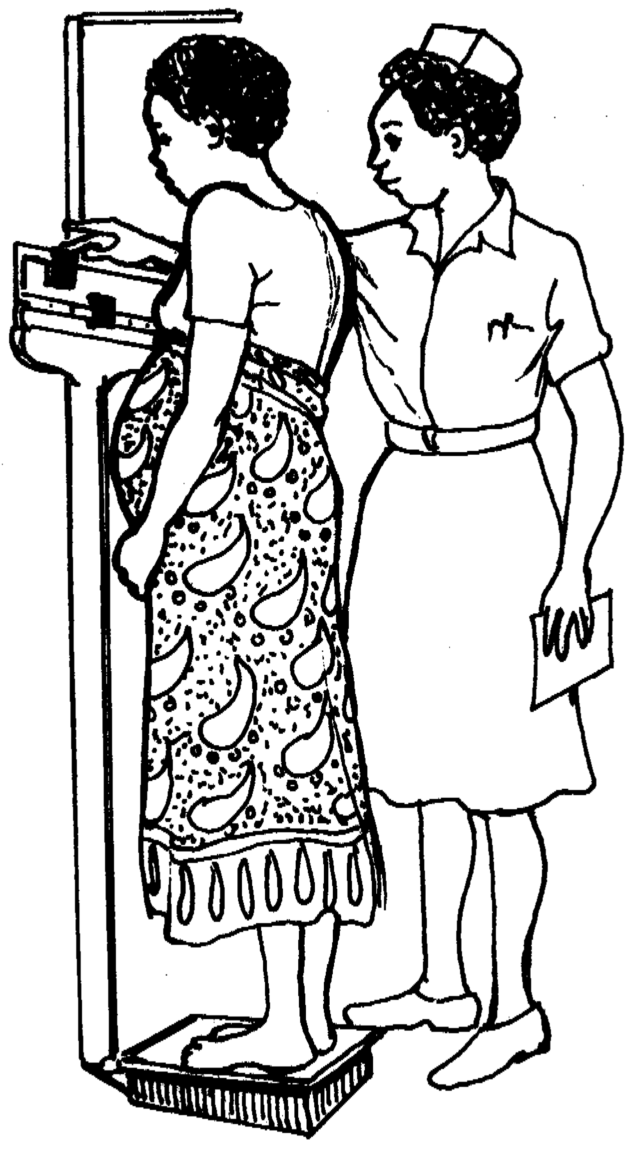


Fig. 14.2 A pregnant mother being weighed and measured.

4. *Immunization*
   Next is the immunization station. It is best for this to be near the refrigerator so vaccines can be kept cold when not in use. Both children and mothers are immunized at this one station.

5. *Dispensing*
   This is the final station where medicines, including chloroquine, and food supplements, are given to those who need them, as prescribed at the examination station. It helps considerably to have the medicines prepacked in small envelopes. In smaller clinics the immunization and dispensing stations can be combined.

6. *Health and nutrition education*
   This is best given at *all* the clinic stations, by every person working in the clinic.

Below (Figs. 14.3 (a) and (b)) are two flow patterns for MCH clinics. The first is a small clinic with only one qualified medical worker, one assistant, and one volunteer.

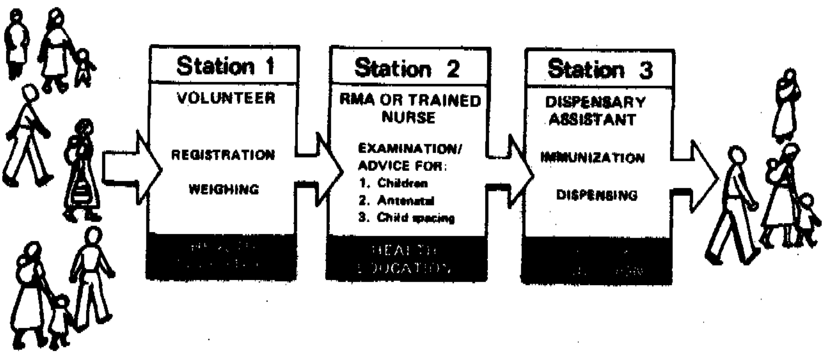


Fig. 14.3(a) Stations in a small clinic.

The second illustrates the flow pattern for a large clinic with six staff, including two qualified workers, two volunteers, and two assistants.

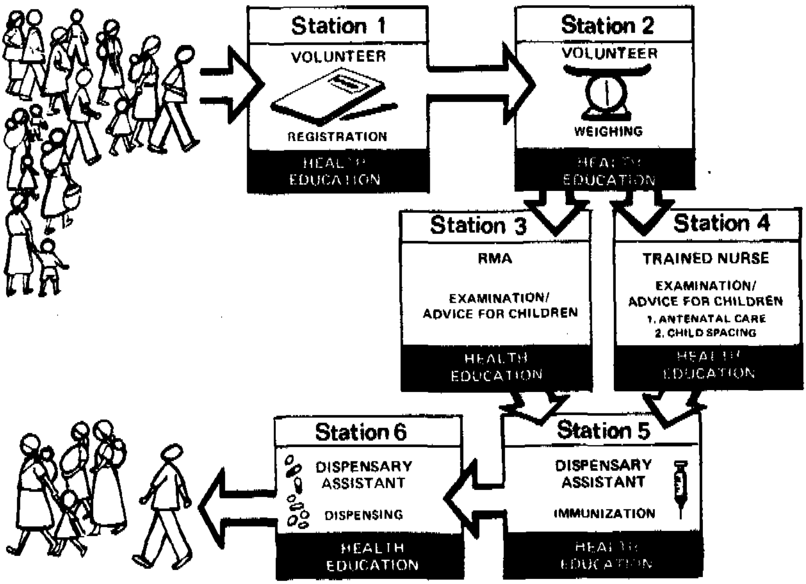


Fig. 14.3(b) Stations in a large clinic.

There can, of course, be many variations of these flow patterns. If still more trained medical staff are available, it is best to add even more examination and advice stations, so each mother and child gets more time at this point, and can ask more questions and get more advice.

GIVE HEALTH AND NUTRITION EDUCATION AT EACH CLINIC STATION

Queues

It is important for each of these different stations to have adequate room to work comfortably without having too many mothers crowding closely around. This can only be achieved if the mothers and children are organized into queues for each of the different stations. This is often difficult at first because the mothers may be afraid they will not be seen unless they crowd to the front. But if you are persistent, and insist that they queue, they will soon realize they will be seen most quickly if they wait their turn in line, and that the staff will not let others crowd in front of them. When the queues are well organized, it is important to arrange that the first five or six mothers in the line are close enough to be able to hear what is being talked about. As the staff member is advising one mother about a particular problem, or answering a question, the other mothers can be 'learning by overhearing'. This multiplies the effect of the health education advice that is given to each mother.

Fig. 14.4 Learning by overhearing.

Mobile teams
In many areas mobile nutrition teams are now providing all or part of the services we have described for MCH clinics. In some instances these teams go out for a week or longer on each safari, holding clinics in different places. There are several important points to mention about mobile teams in general.

Firstly, obviously a mobile team cannot provide the *daily* comprehensive MCH care that should be the aim for each area. Mobile teams usually cannot visit each place more than once a week and often only once a month. So we should always work towards developing full MCH services at dispensaries and health centres and then gradually phasing out the mobile teams. This is also economically sound because the same services usually cost more when provided by a mobile team than by a fixed institution.

Secondly, any time a mobile team holds a clinic at an existing dispensary or health centre, they must be very sure to co-operate with and support the local staff who are there. Because the mobile team often comes from a regional or district hospital, they may have better equipment and more medicine than the local unit has. When the mothers discover this, they may decide only to come when the mobile team is there and start to criticize the local staff and facilities. This is very bad for the whole health care system. It is therefore best for the local staff to remain in charge of the MCH clinic even when the mobile team is there, and for the mobile staff always to be seen to be supporting them, and not taking over.

INTEGRATE MOBILE SERVICES
WITH LOCAL STAFF AND INSTITUTIONS

Thirdly, the mobile team should function as a mobile teaching and supervisory unit. Whenever a team is holding a clinic, especially at a health unit of some kind, they should teach the local staff and volunteers how to do each of the activities. This not only provides extra help but gradually prepares the local staff to take over the clinic themselves. As soon as there are enough trained staff and equipment to operate an MCH clinic, they should be encouraged to start their own programme. The mobile team will continue to visit there, preferably on a monthly basis, but will now include only one or two trained medical workers who will bring supplies and provide advice and consultation only. It is very important for the mobile unit to continue indefinitely in this supervisory and supporting role to maintain the quality of service in each of the rural units.

14.4 EQUIPMENT

Scales

The weighing, examination, and immunization stations of an MCH clinic have main activities requiring special equipment. Many different kinds of scales can and are being used to measure children's weight. For effective work, the scale should be easy to use and carry, strong, and able to measure weights up to 25kg by ¼kg steps. The two types of scales used in East Africa that meet these requirements best are the spring scale and the beam scale. The spring scale has the additional advantage of being small, relatively cheap, and fairly easy to read, even with a crying or bouncing child. Currently the best kind of spring scale is the Salter Scale No. 235*, measuring up to 25kg by 100g steps. It is necessary to buy or make weighing trousers to be used with these scales. These can easily be made by a local tailor out of jinja cotton or other sturdy material. The general design is shown in Fig. 14.5(a) and it is recommended that you have 10 pairs of these trousers for each scale you are using.

* Available at Agricultural & Industrial Supplies Co. Ltd., P.O. Box 4797, Dar es Salaam, or at Avery Kenya Ltd., P.O. Box 30417, Nairobi.

There should also be an adult scale for weighing pregnant mothers. These can be of many different types. Scales supplied by UNICEF often have a scale to measure height as well (see Fig. 14.2, page 374). This is useful for detecting mothers who are shorter than 150cm and are at risk of complications in delivery. All scales must be checked regularly for accuracy (once a day in large clinics, once a week in smaller ones) and adjusted if necessary.

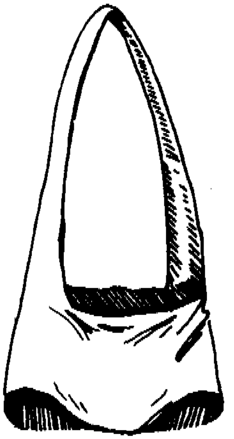


Fig. 14.5(a) Weighing trousers.

Fig. 14.5(b) Child being weighed on hanging scale.

Examination

The usual examination of a child in an MCH clinic is brief and simple, and depends more on observation of the mother and child than special equipment. The person doing the examination should have a strong light and a tongue depressor for examining the mouth and throat. A stethoscope for examination of the chest and an otoscope for ear examinations are also useful.

Additional equipment is necessary for examination of pregnant mothers. This includes a sphygmomanometer for checking blood pressure and a fetal stethoscope for listening to the fetal heart. Routine checks are also made for haemoglobin and albuminuria during pregnancy. A number of simple methods are available for these examinations and the best to use will depend on the particular equipment and staff that are available.

A vaginal speculum is sometimes necessary in an MCH clinic, particularly when a woman wants an IUCD inserted or checked. A speculum should always be available. Clean it well between each use.

Vaccinations

We must consider immunizations at mobile clinics in more detail. A separate sterile needle must be used for each injection. A fresh syringe should also be used if possible but this is not quite as important as using a fresh needle and in practice there are usually not enough syringes. In this case one syringe can be used for up to 10 patients before it is resterilized. This means there must either be enough sterile needles to allow one for each injection to be given in a day's clinic, and at least one syringe for every 10 needles, or there must be sterilizing arrangements of some sort to resterilize needles and syringes during the day.

The 26-gauge needle for BCG intradermal injections can be sterilized between each use by passing it through the flame of a spirit lamp (be sure to allow them to cool thoroughly before using again). All the clean syringes and needles should be carried and stored in a suitable container, preferably metal, so they keep safely sterile until needed.

During the past few years different kinds of 'guns' and 'injectors' have been developed with which immunizations can be given rapidly and easily without using syringes and needles. This would certainly solve the problem of dirty and blunt needles and broken or leaking syringes. So far such 'guns' are not being used widely in East Africa, but they did look likely to be very useful once the earlier difficulties of blocking and breaking down had been overcome.

Refrigeration

As the immunization chapter shows, most vaccines need to be kept in a refrigerator if they are to remain active. Unfortunately most rural dispensaries and even some health centres do not yet have refrigerators. This means other arrangements must be made for delivering and/or storing the vaccines. The best alternative is to find some other nearby refrigerator—in a shop, a mission or somewhere else—where you can store the vaccines temporarily. A vaccine supply usually does not take up much room and most people with refrigerators are happy to help in this way.

If no refrigerator is available, the fresh vaccines must be brought every 1–2 days, except in the case of freeze-dried BCG which can remain at room temperature for one month (see Chapter 9). These vaccines should all be transported in a vacuum (Thermos) flask with ice, or cold box of some kind, and kept in a cool part of the vehicle or building. When a mobile team is carrying vaccines like this, it is very important that only a few vials be taken out of the cold box at one time, so the rest will remain cold until needed. If a refrigerator stops working or vaccines are left at room temperature for too long a period of time, it is important to get them cold again as quickly as possible and then discuss with the DMO whether they should be used or discarded. (See Appendix 9.1 for how to maintain paraffin refrigerators.)

Equipment list for MCH clinics

- 25kg spring or beam scale
- weighing trousers

- adult scale for weight and height (a separate scale and height measure)
- light and tongue depressor
- stethoscope
- sphygmomanometer
- fetal stethoscope
- equipment for haemoglobin and urine albumin
- 5ml syringe } for DPT, measles, tetanus toxoid, and medicines
- 21- or 23-gauge needles }
- 1ml tuberculin syringe } for BCG
- 26-gauge needles }
- storage container—for syringes and needles
- refrigerator and/or cold box
- otoscope
- vaginal speculum

14.5 THE GROWTH CARD (ROAD-TO-HEALTH CHART)

The growth card is rapidly becoming a central part of the care of children in developing countries. It has been developed from the basic idea that it is better to check that growth is satisfactory rather than just to try generally to prevent malnutrition. By measuring and recording a child's weight regularly, on one card, a 'growth curve' for that particular child is made. This curve can quickly reveal any significant changes in the child's pattern of growth, so help can be given in time. We use weight on these cards rather than height or some other measurement, because it is the easiest and most accurate way of catching any growth failure early.

Plan of the card

Though there are many different kinds of growth cards, they all follow the same basic design. The card that is described here is the one produced by the Ministry of Health for use throughout Tanzania. It is reproduced at the back of this book.

Whenever possible these cards should be issued to each newborn on the day of birth. At this time the actual birthweight and date of birth can be written on the card. The section VIDOKEZO VYA AWALI (risk factors from birth) described later should be asked about at this time so any child with risk factors present can be asked to return after 1 to 2 weeks for a close follow-up. The BCG immunization is also given and recorded, and every child should have a definite date written on the card for his first clinic visit.

The recorded growth part of each card is divided into 60 sections *across* the card, with each section representing one month in a child's life. These 60 sections are grouped into twenty 3-month blocks. The card is thus capable of showing a child's growth throughout the first 60 months or 5 years of his life.

The card is also divided into 40 sections *up and down*. Each of these sections represents ½kg weight, so the card can record weights up to 20kg, which is usually adequate for children under five years of age. On this kind of graph, you find the correct month representing the child's age across the bottom of the card and his correct weight on either side of the card. You can then put a dot where these two lines cross each other somewhere in the middle of the card. By measuring his weight and recording it with a dot on several different occasions, and then joining each of the dots by a line, you form a *growth curve* showing that child's growth in weight. To assist in interpreting this growth curve, three additional curves have been drawn across the middle of the card. The top curve starts at 3.5kg on the left side of the card and gradually increases to 18.5kg on the right side. This represents the '100% median' or standard weight line, which is the ideal growth curve that a child should achieve during his first 5 years. The next lower curve represents the '80% median', or 80 per cent of the top standard line. Any child whose growth curve stays between these two top lines, and rises steadily is growing satisfactorily and is on the 'road-to-health'. This area between 80 per cent and 100 per cent has been coloured green to show satisfactory progress. Finally, the lowest of the three lines starts at 2kg at birth and the area between it and the 80 per cent line is coloured grey, and the area below it is coloured red. This line is drawn at 60 per cent of the top standard line, and the red colour signifies danger. Any child in the grey area between the green 'road-to-health' and the red danger area is underweight and should receive special attention. Those dropping below 60 per cent into the red are usually in great danger and should receive immediate attention.

At the bottom right-hand side of the card is a section telling what action to take (HATUA ZA KUCHUKULIWA) for children whose weight falls into either the grey or red areas. Those children in the grey area are defined as *underweight* and are considered at increased risk of developing infections and worsening malnutrition. The instructions next to the grey box are to give special attention to these children, including individual health education to the mother and more frequent clinic visits and weight checks.

A child whose weight falls into the red is usually very sick and by definition either has *marasmus*, or *marasmic kwashiorkor* if he also has oedema. As the instructions next to the red box say, this child should be referred immediately to the health centre or hospital for further evaluation and treatment.

There are two additional sections of the card which use this colour system telling the action to take. They are the risk factors which are present (VIDOKEZO VYA HATARI ZILIZOPO) across the top and the risk factors from birth (VIDOKEZO VYA AWALI) on the left-hand side of the card. There are four risk factors from birth listed:

- birthweight under 2 kilos
- birth order of 5 or more

- 3 or more sibling deaths, and
- twins

which are each followed by a grey box. Each of these things should be asked about at birth when the card is issued, or at the first visit if the card is not issued until then, and a tick put in the box after any one that is present. If some other risk factor is present this should be written in the space by the last box. The action to take for each of these is the same as for a weight in the grey area—special attention and more frequent clinic visits.

There are nine risk factors listed at the top of the card under VIDOKEZO VYA HATARI ZILIZOPO. As the instructions say, you should ask about these at *each* visit and a tick put after each factor that is present at that visit. The blank line on the bottom should be used to write in any other risk that may be present. It is important to line up with the current month on the bottom of the card to make sure the tick is put in the right box each time.

The first risk factor listed is:

- kwashiorkor or oedema.

The boxes after it are coloured red and the same action should be taken as for a child whose weight is in the red area below 60 per cent—immediate referral to a health centre or hospital.

The next two risk factors are:

- severe anaemia and
- other difficult diseases.

The instructions given there are to refer any child with one of these to the person in charge of the outpatient clinic. He will then decide whether he can treat it or whether to refer it to a larger centre.

The next six factors:

- absent parent
- malnourished sibling

- recent measles
- no weight gain for 3 months
- weight loss, and
- weaning period

are less serious and the boxes following them are coloured grey. If any of these are present you should put a tick in the right box for that factor and month. The action to be taken for a tick in the grey is the same as for a weight dot in the grey—special attention and more frequent clinic visits to detect early if there are any complications or worsening of the condition.

There are two additional rows just below the red area at the bottom of the card which are for *malaria chemosuppression* (KUZUIA MALARIA) and *child spacing* (UZAZI WA MAJIRA). The boxes in the kuzuia malaria row go all across the card for 5 years and should be ticked when chloroquine or any other medicine is given to prevent malaria. If only a one-month supply is given, the box for that month should be ticked. If a 3-month or 4-month supply is given, the boxes for those months should be ticked so anyone seeing the card will know how much medicine was given to that child.

Just below this row is a child-spacing row that goes across the first two years only. A tick should be put in the box above the current month each time child spacing is discussed with the mother and/or father. This does not mean she has actually started a child-spacing method, but only that it has been discussed and questions answered. This should be done frequently during the first 2 years, especially after the first 6 months when the mother is more likely to conceive again. When she decides to start using a particular method this should be written in the child-spacing row and then a child-spacing card filled out and given to the mother.

On the back of the card are two sections for writing in notes about the child (MAELEZO). This section should be used for every clinic visit and *all* notes about the child's health or illness, medicines given, laboratory tests, etc., should be written *briefly* on the card. It is also used to put down the date when the child should next come to the clinic.

The other section of the back is for writing the child's name, date of birth, birthweight, father's name, etc. Below this is the immunization record.

Appendix 14.1 (page 455) gives details of how to use the card in practice.

Interpretation of growth curves

Now that we have discussed how a growth curve is made, it is important to understand how to use that curve to improve a child's health. First, it is important to remember that it is always possible that the birth date is not accurate, and also that there may be great differences in the sizes of different children. This means that a small child who has small parents may be in the bottom of the green section, or even below the 80 per cent line, and still be completely healthy and growing well. Likewise, a large child may be over the top of the green.

Because of these normal variations, it is always more important to note *changes* in a particular child's curve, rather than just noting its relation to the 80 per cent or 60 per cent lines. For example, a large child may normally be in the upper part of the green 'road-to-health'. Then his mother weans him, but does not provide adequate energy and protein foods. His weight starts to drop one or more kilos as he begins to get kwashiorkor, but since he started out so high on the card, he may develop severe kwashiorkor while his weight is still in the green section. *Loss of weight* is a danger signal, even if it is taking place in the green zone.

With these cautions in mind, let us look at three possible types of growth curves. First is the curve in which the child's weight continues to *increase* gradually. His curve may not be at the 100 per cent line, but if it remains parallel to the standard 80 per cent and 100 per cent curves with a gradual but steady weight gain, we know the child is growing well.

A second type of curve starts in a normal way, but then remains flat with no increase for several months. This type of thing frequently happens when a child is weaned from the breast. It is a signal for special attention, as it means the child is not getting enough food to gain weight and it is the first step towards a weakened condition, increased chance of getting infections, and possible marasmus or kwashiorkor. The real value of the growth card is in detecting these children early. The opportunity to advise the mother and correct the problem at this stage should not be missed. A child who does not gain weight for three successive months or more is in serious danger and should receive extra help.

FAILURE TO GROW SHOULD BE DETECTED EARLY

The third type of curve is where the child is actually losing weight and the curve is falling. This may be due simply to inadequate food but often it is the result of severe infection, such as measles. This child must obviously be helped immediately, through whatever means are available. Chapter 11 on nutrition gives more details on the steps to take.

Another word of caution should be mentioned about weight of children with kwashiorkor or marasmus. As explained in the nutrition chapter, kwashiorkor is caused primarily by a lack of energy and protein. This lack of protein in the body results in increased oedema fluid collecting in the tissues. The weight of this oedema fluid can hide the weight loss in a malnourished child. For this reason, a child with oedema is always at special risk even if his actual weight is not very far below the 80 per cent line. The table on page 390 shows the relationship between the 80 per cent and 60 per cent lines, oedema, and the various kinds of malnutrition.

In general, if a child is just a bit underweight (between 80 per cent and 60 per cent with no odema) he should receive special attention with specific diet instructions given to his mother, and more frequent clinic visits as written by the grey box under HATUA ZA KUCHUKULIWA. If a child stays in this category for over three months without any weight gain, or shows any tendency either to lose weight or develop odema, he should receive urgent priority. This may mean referral to a nutrition rehabilitation centre if there is one nearby, admission into a nutrtition ward, or home visiting and extra food supplements While indefinite malnutrition tends to develop gradually over some months, once a child has reached this point he is at great danger from even minor illnesses, and must receive special care if he is to survive (see Chapter 11). Those children with actual kwashiorkor obviously need immediate help.

	Weight	
	80–60% of normal (between green and red on weight chart)	*Below 60% of normal (in red on weight chart)*
No oedema	underweight	marasmus
Oedema present	kwashiorkor	marasmic kwashiorkor

OEDEMA IS ALWAYS A DANGER SIGNAL

The 'at-risk' concept

The various effects of malnutrition on a child's growth have now been discussed. It is important to realize, however, that malnutrition does not stand alone, but is closely related to other factors, especially infections and socioeconomic factors. Children who are already malnourished, or who run a special risk of becoming malnourished, should be identified and given special care and attention.

Some of these 'at-risk' children are:

1. children with a recent history of infections like measles, whooping cough, severe respiratory tract infection or diarrhoeal diseases. These diseases interfere with the food intake and utilization because they decrease appetite, decrease absorption of nutrients, and increase susceptibility to infections because antibody production is impaired;

2. children who are recently weaned. If the weaning food is not adequate and suitable, the child is very likely to develop malnutrition;

3. children with no weight gain for 3 months at any time during their first 3 years, or weight loss (to be confirmed after one week's interval), also require special attention;

4. children with unfavourable conditions at home:
   - absent parents
   - large families—especially when the children are born closely together
   - twins
   - when more than three siblings have died
   - contact with persons who have open tuberculosis
   - children who come from very poor homes with uneducated or sick parents.

5. children with acute diseases, including severe anaemia and oedema; these require immediate treatment.

Identifying those children who have one or more of these risk factors is a very important part of the MCH clinic. Any child at risk, and of course any child with frank malnutrition, needs special attention. A careful history and obvious interest in the family helps to identify these at-risk children and often shows the underlying problem as well.

LOOK FOR 'AT RISK' CHILDREN IN ALL CLINICS

When identified, any risk factors should be noted on the child's growth card with indications for special concern. Each time he visits the clinic, which should be more frequently than normal while he remains at risk, special attention and assistance should be given to the risk factors. This extra help and care may include such things as advice on weaning, food supplements, malaria prophylaxis, specific immunization, child spacing, or any other particular problem a child or mother has. Referral or asking for a special consultation may be necessary for some problems.

8 child risk factors

4 by history	1. twins
	2. birthweight under 2kg
	3. 3 or more sibling deaths
	4. 5th pregnancy or more
4 to be watched for	5. oedema, kwashiorkor, or anaemia
	6. weight steady or dropping; weaning
	7. difficult diseases (measles, respiratory, diarrhoea, Tb)
	8. family situation (malnutrition, poverty, ignorance).

Distribution of cards

You can now see the vital part that the growth card can play in keeping a watch on a child's health. For this reason every child should have one. Whenever possible, it is best to give one of these cards to the mother right after the birth of the child. Then the *actual* birthweight and date can be filled in and the date for the baby's first clinic visit written on the card. Each card is given with a plastic bag to protect it, and the mother soon learns the value of this card in caring for her child. Once their importance has been adequately explained, these cards are kept safely by mothers. This greatly simplifies the work of filing at a clinic and provides the mother with a 'ticket' to the clinic, as well as a good record of the child's health and vaccinations if she travels elsewhere.

EVERY NEWBORN SHOULD RECEIVE A GROWTH CARD

14.6 THE ANTENATAL CARD

Many different kinds of antenatal card are being used in East Africa. The card that will be described here is one that has been developed by the Ministry of Health in Tanzania for use in MCH clinics. The card contains four main sections:

1. Background information such as identification, history, and risk factors.
2. On-going information such as risk factors, physical findings, and treatment.
3. Labour and delivery.
4. Summary of current pregnancy.

Like the children's growth card, the antenatal card includes a number of risk factors with instructions on what to do when they are present. These risk factors are summarized on page 394.

20 maternal risks

10 by history	1. age less than 16 years or more than 35
	2. height less than 150cm
	3. parity less than 1 or more than 8
	4. birth interval 10 years or more
	5. abortions—3 or more
	6. delivery—by vacuum extractor or forceps
	7. Caesarean section
	8. stillbirth or neonatal death
	9. postpartum haemorrhage
	10. postpartum difficulty with walking
10 to be watched for	1. blood pressure more than 140/90
	2. haemoglobin less than 8.5g
	3. albuminurea present
	4. oedema present
	5. vaginal bleeding
	6. fetal death
	7. any severe illness
	8. twin pregnancy
	9. fetal lie poor
	10. possible tubal ligation candidate

Detailed explanation and instructions on the use of the card are given in Appendix 14.2, page 461.

14.7 HEALTH EDUCATION

The need to educate mothers, fathers, and children about the factors that contribute to good health is accepted by everyone. But how to do this successfully is still a matter of considerable discussion. Anyone who has tried to teach a mother and has failed time after time to get her to adopt a new habit or way of doing something, knows how difficult this is. But it is very important for us to realize that this failure is usually not because the mother is uninterested or does not care about her children, but because the old habit patterns in us are very strong. An honest health worker will realize that even he himself is bound by his old practices, usually learned from childhood, and he would find it very difficult to change.

There are two main types of health education that are well suited to MCH clinics, but of course any method that works well may also be used.

Individual discussion

Despite all the posters, pictures, demonstrations, etc., which are used in health education, personal counselling and advice to one mother at a time continues to be the most effective method. In individual discussion you can answer specific questions and give advice in a way that each particular mother can understand. Because this is the best way to teach mothers (and children) it should be done at *every station* in an MCH clinic. Anyone, including non-medical volunteers, should teach her what they know. This counselling must include praise and congratulations when she has learned something and her child is growing well, just as much as it includes advice and warnings when her child is sick or malnourished.

In a busy clinic there will not be a lot of time to teach the mothers at each station. But a few words can always be said and when added together they will have a significant effect. By always allowing the first five or six mothers in the queue to stand close and listen, they can also learn by hearing what you are telling another mother.

It is very important that everyone counselling mothers also learns how to listen. Many times a mother will have a specific question or belief that you will be able to help her with only if you first listen carefully to her opinion and comments.

Group demonstration and discussion

The other common type of health education in MCH clinics is a discussion or demonstration with a group of mothers. You can have this before the actual clinic starts, although then you will probably get only the most interested and eager mothers who come early, and not the ones who need to learn the most. Group discussions can also take place at different times during the clinic or when a group of mothers have completed all the stations. It is very important not to have too large a group, usually not more than 10 or 15, or the mothers will not listen well and cannot ask their own questions. Getting all the mothers interested in a specific subject or problem together to discuss possible solutions among themselves, with the guidance and advice of a health worker, is particularly effective.

Another health education principle is that everyone learns faster by seeing something than by just hearing about it—what we see we usually remember. Because of this it is always good to use a demonstration or other aids whenever possible, and particularly when teaching mothers about nutrition. A nutrition demonstration, using local cooking pots and locally available foods, will interest the mothers. Involve them in preparing particular foods or combinations of foods, and then encourage the mothers and children to taste them. This will help to convince them of their usefulness and encourage them to start using them at home.

Additional methods and general guidelines for health education are given in Chapter 12.

EVERY CLINIC WORKER HAS
TO BE A HEALTH EDUCATOR

14.8 RECORDS

The main clinic record for each child is his own growth card and for the mother either an antenatal or child spacing card. On these cards is recorded all the important information about weight, laboratory tests, examinations, immunizations, and any illnesses.

Since these are the only complete clinic records, it is very important that mothers understand their value and take good care of them. When this has been carefully explained and they have been given a plastic bag to carry and store the cards in, it is best to let them keep the cards at home. This has proved to be safe, as only a very few mothers will lose a card or not take care of it. If a card is lost, a new one should be issued and filled out as accurately as possible. This system greatly simplifies the record-keeping at the clinic, as there is no need for a box or file full of cards which usually get mixed up and take time to sort out. It also allows the mother to have a record of her child's growth and immunizations to show her husband, relatives, and friends. She will take the card with her if she goes away or attends a different clinic.

Frequently a mother or father may take a very sick child directly to the hospital, or a pregnant mother will go directly to the hospital when labour starts. Parents should be aware of how important it is that the child's or mother's clinic card is also taken at this time to help the hospital staff evaluate the problem and make the right decisions. The immunization record, nutritional history, use of chloroquine, history of previous illness, etc., are all important pieces of information to help the doctor or midwife at the time of delivery or of a serious illness.

Clinic-based records

In addition to the home-based cards, some kind of records must also be kept at the clinic for statistical purposes and monthly reports. The usual outpatient register contains such things as name, age, diagnosis, and treatment, but all this information takes considerable time to record, is not very accurate, and is almost never looked at again! It is much better to change the clinic records to something simpler, easier, and more useful.

The first principle to consider when developing a new record system is to collect only the kind of information which is reasonably accurate and useful. This will include such things as the number of new and repeat attendances, vaccinations given, and a count of a few specific kinds of diseases. The diseases that are important to know about are communicable diseases, nutritional diseases, and perhaps a few other indications of the home environment, such as roundworms, anaemia (hookworm), and diarrhoea.

The details about what is done or recommended for each person are recorded on his or her own growth, antenatal, or child spacing card. Therefore the clinic record only needs to keep track of the total numbers in each of the different categories. This can best be done by the use of a *tally system* which simply has 0's to tick for each activity. The tally system used for keeping records in Tanzanian MCH clinics is explained in Appendix 14.3 (page 466) and examples of the record sheets are reproduced inside the back cover.

When this kind of record system is used, it is no longer necessary to write the name, age, diagnosis, and treatment of each mother and child in a register. Instead, the register is used to record the name of the child or mother at the *first attendance only*, when a growth, antenatal, or child spacing card is issued. This register should be divided into separate sections for each of the different villages or areas of town that the clinic serves. Each mother and child is then registered on the page for his or her village. In this way it is easy to know how many are attending the clinic from each village. This number can then be compared to the total population of that village to see the percentage of those attending the clinic. It also makes it easier to do home visiting in different areas. The only other information that should be recorded in this register are the ages of the mothers and children, and the names of their Ten-cell leaders. For children it is also useful to have a final column to tick when each one receives his last immunization. Then you can know the percentage of protected children among all those who initially registered for the clinic.

USE A SIMPLE TALLY SYSTEM FOR CLINIC RECORDS

Details of the tally system are given in Appendix 14.3.

14.9 WEIGHING

Measuring the weight of each mother and child is one of the main activities of an MCH clinic. As previously explained, the growth curve showing a child's changes in weight is one of the easiest and most effective indicators of his health status. It is also easy for the mother to understand and take pride as she sees her child gain weight and the curve go up. Abnormal changes in a woman's weight during pregnancy similarly help to detect excessive oedema and other complications, and a pregnant mother's weight chart is a very important part of antenatal care.

It is important to be as accurate as possible when measuring and recording the weights, but this must be done without requiring extra staff or slowing down the rest of the clinic. The best system for children, providing both speed and sufficient accuracy, is the use of a hanging spring scale and weighing trousers as detailed in Section 14.4. Remember to check the scale using a 5kg weight approximately once a week. Each child's weight should be read to the closest ¼kg and recorded on the growth chart as explained in Section 14.5. Pregnant mothers are weighed on an adult scale and their weights recorded on their antenatal card.

The actual weighing and recording can be done by a dispensary or ward assistant, or non-medical volunteer, but be sure they understand clearly each step of the procedure. It is recommended to have about 10 pairs of weighing trousers for each hanging scale being used. After the child is weighed, the trousers can be passed down the waiting queue so each mother can put the trousers on her own child. This will need some demonstration at first, but once understood it is quicker and makes the children happier.

By the time a mother gets to the front of the line, the trousers are already on her child and he just needs to be hung on the scale and weighed.

As soon as her child is weighed, the mother pulls the trousers off and passes them to the next mother in the line who has not got a pair. Children around 3 years or older do not need the trousers, they can simply hang from the scale by their hands.

Be sure to keep this queue well organized.

Because the child's weight is an important indicator of his health, and change in a mother's weight helps to detect potential problems, the weighing station should come early in the clinic, before the examination and advice station. The medical worker who is examining the mother and child needs to see both the change in weight and the current weight. This information is used together with the history and examination in assessing progress and deciding on recommendations.

USE TWO SCALES FOR A LARGE CLINIC

14.10 EXAMINATION AND ADVICE

The examination and advice station is the central 'control' station of an MCH clinic. In small clinics there is only one station, whereas large clinics have separate stations for children and mothers. A qualified medical worker sits at each of these and from here she should keep an eye on all the other stations, both before and after them. By seeing on the card whether each mother and child was registered correctly and how their weight was measured and recorded she can tell about the first two stations in the clinic. She should also occasionally visit each of the stations and change the staffing arrangement if one station is working too slowly or too fast for the rest of the clinic. As team leader, she has a continual responsibility to educate the other clinic workers, so they can understand and do their work better and also be more effective in teaching the mothers.

Her own work at the examination and advice station is to assess the health status of each mother and child and advise accordingly. Since most mothers and children who attend an MCH clinic will be healthy, this evaluation can be brief, but it should include several important things. The first is to listen to any complaints or questions the mother may have. This is an important part of both clinical and social assessment. It also gives an excellent opportunity to observe the child and the mother, both individually and in their relationship together. This observation is one of the most important ways of assessing a child's health.

> **SCREEN ALL MOTHERS AND CHILDREN FOR RISK FACTORS**

If the child appears healthy and the mother has no complaints, there is no need to undress the child. A quick examination of each child should still be made, however, by checking the conjunctivae for anaemia, looking for any skin disease or evidence of infection, and quickly palpating the abdomen for an enlarged liver or spleen, and perhaps roundworms. During this quick examination, you should look for any sign of malnutrition such as oedema and abnormal hair, and also check for fever or dehydration. These few items and a general observation only take a minute or so, but enable the medical worker to make a fairly complete assessment of each child and advise the mother accordingly. The routine antenatal examination is more methodical and each step has been outlined on the card. These should be followed carefully.

If the mother or child is sick, or the mother thinks her child is sick, a more complete history and examination may be necessary. In this case the questions and examination should be about the problem. Since the mother is greatly concerned about the trouble and has come to the clinic for help, this is the best time for health education. Explain simply to her about the cause of the illness and how she can prevent it. Make sure she has understood completely by asking her questions about what she has been told.

After you have made a diagnosis—either that the mother or child is healthy or has a particular problem—you must decide about treatment. Because medicine is usually very popular and wanted by most mothers, they will exert considerable pressure to be given some kind of medicine. They often attach great importance to this medicine and it may be the only reason they have come to the clinic. If this is the case, the mother may not pay attention to the health education or even the weighing of her child, as she considers these just things she must do to get the medicine. This attitude is often difficult to change, but all health workers must work together to teach the mother that medicine only helps in some specific diseases, and that the most important way of improving her family's health is what she does at home. If she understands this, a mother can be proud when she brings her children to the clinic and finds they do not need any medicine because they are healthy. Only the unfortunate mother with sick children needs to get medicine. For these reasons, try *not* to make a habit of giving multivitamins, iron, other medicine, or even food supplements like dried skimmed milk, to all children attending; give them only when they are really needed.

GIVE FOOD SUPPLEMENTS TO AT-RISK CHILDREN ONLY

If there is a specific indication for medicine of some kind, this should be written on the advice section of the growth card, along with the other advice that was given, or in the medicine section of the antenatal card. One kind of medicine that is indicated for most children and mothers in Tanzania is chloroquine or Daraprim for malaria chemosuppression. It is now government policy that this should be given routinely to all pregnant women and all children under 5 in malarious areas of the country. Even in areas with a low malaria incidence it is good to give prophylactic chloroquine to at-risk children and mothers, such as those with malnutrition or an infection. In all cases, this chemosuppression should be recorded in the Kuzuia malaria section of the growth card, or in the chloroquine section of the antenatal card.

The actual medicine is given out at the dispensing station or, in small clinics, at the examination and advice station. The instructions to the mother on how to use the medicine must be very clear and simple; ask her to repeat them to be sure she understands. The instructions should also be written down on the package of medicine, or a piece of paper, to help her remember when she gets home.

One final thing that must be checked at this station is whether there are any contraindications to vaccinations. By looking at the vaccination record on the cards, one can tell whether the vaccinations have been completed or one or more are due at the present visit. Chapter 9 gives the contraindications for each of the different vaccines. If any contraindication is present, this should be noted on the advice section of the card so the person working at the immunization station will read it and act accordingly.

14.11 IMMUNIZATION

The immunization station is a very important part of an MCH clinic, because here the children, and some of their mothers, receive all their immunizations. In smaller clinics, this station can be combined with the dispensing station where medicine is distributed and other treatments or injections are given. The person at the immunization station must be capable of giving all the vaccines, including BCG intradermally. This can usually be a nursing or dispensary assistant who has received special instructions in these techniques.

All the specific information about the vaccines, including the basic concepts of how they work, how to administer and store them, an immunization schedule, and the contraindications, are detailed in Chapter 9. This information should be readily available to whoever is responsible for the vaccines and their administration.

It is best to give all subcutaneous and intramuscular injections for children in the lateral aspect of the thigh. This is the safest place to avoid major vessels and nerves in small children. It is usually easiest to have the mother hold the child for the injection. She is the best person to control and comfort her own child.

The date for the child to return to the clinic must be decided at the immunization station, if it has not already been entered at the examination and advice station. There are various things to consider when giving a return appointment and Section 14.5 gives these details. Always be sure to write the next appointment date in the advice section of the card so the mother does not lose contact with the clinic and think her clinic visits are completed.

When filling out the immunization record on the card, write the actual date when the vaccine was given in the box. By always keeping this record accurate and up to date it is easy to decide which vaccine to give next by referring to the immunization schedule. Be sure also to check the advice section of the card to see if there is any contraindication to giving an immunization at the present visit.

KEEP IMMUNIZATION RECORDS ACCURATE
AND COMPLETE

Because of possible anaphylactic shock, which may occasionally occur after an immunization, it is good to have adrenaline nearby and ready. The dose of adrenaline 1:1000 in such a case is 0.2ml i m for a small child. Hydrocortisone 100mg i v or i m is also useful in aiding recovery from anaphylactic shock but adrenaline is the primary and essential treatment. The indications for these drugs are a sudden collapse, sweating, difficulty in breathing, or loss of blood pressure, within a few seconds or minutes after an injection.

14.12 DISPENSING

The final station in an MCH clinic is where medicines and other supplies and advice are given out. In most clinics it is easiest to have basic medicines already packed in small paper or plastic bags with simple instructions on how to take the medicine written on the bag or on a separate piece of paper in the bag. This pre-packing can be done after clinic hours or at other times when the work load is light. By having the right amount of medicine for a full course of treatment already counted out, considerable time is saved in a busy clinic. The worker at the examination and advice station will write on the card what medicine he wants the child or mother to have. Then the worker at the dispensing station reads these instructions and gives the appropriate packet of medicine to the mother and tells her how it is to be taken. With this system it is easy for a trained volunteer or assistant to run the dispensing station. For greater flexibility, it is good to make up several different-sized packs of medicine for children of different weights (ages).

PREPACK MEDICINES TO SAVE CLINIC TIME

It is very important that mothers understand clearly how they are to use the medicines. This should be explained at the examination and advice station and again at the dispensing station, as well as being written down for the mother. It is often helpful to have the mother repeat the instructions to be sure she has understood. In smaller clinics, when the medicine has been prepacked, the dispensing station can be combined with the immunization station or with the examination and advice station.

Since this is usually the last station, it is a good place to answer any final questions a mother may have. Further information on the same subject as the diagnosis and recommendations written on the card at the examination and advice station can be given to the mother. Another useful technique is to gather 5-10 mothers together who are concerned about the same question or problem and have a short discussion with them.

DRUGS GIVEN WITHOUT EXPLANATION ARE WASTED

Small group discussions like this can be very effective in guiding the mothers to search for solutions to their problems together. It is helpful to write down lists of the important points about different health subjects and have these posted at the station for easy reference.

At this final station it is also useful to check the cards and make sure everything has been filled in correctly. This will include glancing at the weight chart, the immunization records, and place for the return appointment. If any of these are missing, the mother should be referred back to the appropriate station.

14.13 MCH AND THE COMMUNITY

This chapter has so far dealt with the need to provide integrated MCH clinics for the primary health care of mothers and children, how to organize such clinics, and how to keep useful records of what has been seen and done. To provide such integrated clinics where they do not exist will indeed be a first priority.

Once the clinic is running, however, the records should be examined to see what information they provide about such things as: How much do the mothers and children in the community use the clinics? Are the clinics making any changes in the community's health state? Are there any health problems which have not been recognized yet by the MCH staff?

Coverage

The health worker in charge of the clinics should know the approximate total number of men, women, and children in the community served by the health centre or dispensary, or the number who are living in a well defined place like a village. (For details on how this can be done see Section 3:10 on the health centre population.) By using the crude birth rate of 47 per 1000, we can expect 47 new pregnant mothers each year in 1000 population. (For ease of doing calculations we can say 50 per 1000.)

How many *new* antenatal mothers are in fact being seen each year at the MCH clinics? Compare this figure with the total number of expected newly pregnant mothers. What percentage of all pregnant mothers are attending?

The same can be done for young newborn children. There should also be 47 newborns each year per 1000 population. How many of these are being registered at the MCH clinics?

From these two calculations it should become clearer whether the MCH services provided are being well used, or only by a few mothers and children, who probably live nearby.

THOSE MOTHERS AND CHILDREN
WHO DO NOT COME
ARE JUST AS IMPORTANT
AS THOSE WHO DO (PERHAPS MORE)

If the coverage is low, health workers should ask themselves why this is so. What problems do the mothers face in getting to the MCH clinics? Is the help and advice appropriate for the local people? Are the health workers enthusiastic and do the community like and trust them?

Improvements in health

Similarly, as time goes on, the figures should show an improvement in major health problems like underweight, maternal mortality in childbirth, infant mortality, infants' illnesses like gastroenteritis and malaria, poor child spacing, and low immunization rates.

If good records are kept and the total numbers of newly pregnant mothers and newborn children per year are known, then good estimates can be made of such improvements.

IMPROVEMENTS IN HEALTH OF THE COMMUNITY DEPEND ON A HIGH COVERAGE

Unrecognized problems

From the records, and from experience, the MCH staff should be able to build up a picture of the health problems and disease pattern in their area. It may become clear that some problems and diseases that were thought to be common are less so than was expected, and the opposite may occur too. Also the seriousness of some problems will differ from area to area, for instance underweight and malnutrition. Do not rely, however, only on what the figures say—listen to the mothers as well.

LET MOTHERS TELL YOU THEIR PROBLEMS

Chapter Fifteen

HEALTH SERVICES FOR SPECIAL GROUPS

15.1 INTRODUCTION

The overall aim of the health services is to provide health care for all people. To achieve this aim there should be co-ordination between all health activities so that no person or group of any age or sex, wherever they may live, is without access to some basic health services. We have seen, however, that there are special groups of people, such as pregnant women, small children, and schoolchildren, who for various reasons need some special services. This chapter considers briefly the reasons for some other special services and describes those for schoolchildren, workers, and the handicapped.

Some reasons for having health services for special groups

The reasons for establishing special health services can be considered under three main headings:

- Large groups of people collected at one place
- Special at-risk groups
- People requiring specialized care.

Large groups collected at one place

When there are a large number of people in one place it may be more efficient and economical for health workers to go to them, rather than for the people to go to the dispensary or health centre. This is particularly important when the group of people are all exposed to the same health risk or have similar health problems, such as those in *villages, schools, estates, factories, and prisons.*

Special at-risk groups

Where a group of people are known to be subject to increased risk of diseases, particularly if these are preventable, it may be desirable to provide additional services for them. The best examples of such groups are pregnant women and small children, for whom MCH services are provided, and schoolchildren for whom a school health service should be provided.

Another at-risk group is those most exposed to infection from tuberculosis and leprosy. These are the families and other contacts of known cases, and as part of the tuberculosis and leprosy service provision is made for staff to trace and look after these people.

Some workers may also be exposed to particular risks at their work, for example those exposed to dust in textile factories, or dust in mines, to chemicals such as insecticides, or to dangerous machinery such as wood-working machines. This is a further reason for providing occupational health services.

Groups requiring specialized care

There are a number of defects or diseases such as *deafness, blindness,* *mental retardation*, and *physical handicap* (e.g. after polio or accidents) which require special facilities and staff to look after them. These are not usually available in general hospitals.

15.2 SCHOOL HEALTH SERVICES

By the time that children reach school age they have already passed some of the worst dangers to health, which should have been looked after by MCH services, but they are still in a stage of rapid physical, mental, and social development and still more likely than adults to suffer from health problems. Now that primary education is free and is extending to cover all children, the development of a health service in each school is the best way to reach these children. They are a large group, a quarter of the whole population.

The beginning of school life is an important event in the life of a child. He is separated from the security of his home and exposed to a new environment. He will meet many other children and so be more exposed to the childhood infections, he cannot have food just when he wants it and may have to go long periods without it, and he will be required to undertake new learning tasks and be exposed to new rules of behaviour and discipline.

> A HEALTH SERVICE SHOULD BE PROVIDED FOR ALL SCHOOLS

Organization

The staff of the health centre, dispensary, and school should work together with the village health worker and teachers to provide a school health service. Children are growing up in the school and can learn good health practices from the teachers there. Teachers should also be encouraged to run as much as possible of the services themselves. *The school can be helped to organize the following:*

1. A small clinic to treat minor ailments like skin sores, fever, and diarrhoea.

2. School staff can encourage good environmental health by supervising and maintaining:
   - a good wholeseome supply of fresh water
   - pit latrines (seeing that they are used properly and maintained)
   - clean buildings
   - rubbish disposal
   - good classroom lighting and ventilation.

3. Reporting of communicable disease outbreaks to health workers. With a good relationship between headmaster and medical assistant, there should be early reporting of any disease outbreaks and co-operation in establishing prophylaxis and community education through students.

4. Health education on the importance of (a) different foods in nutrition, together with good methods of storage and cooking, and (b) of personal hygiene.

5. The keeping of a central record on health activities of the clinic and on the school in general, i.e. sanitation, epidemics, buildings, etc. This can be done in a plain exercise book.

6. Where there are possibilities of getting help by referring a child to special centres, screening can be carried out for poor eyesight and poor hearing, deformities, and anaemia.

HOW MANY SCHOOLS SET A GOOD EXAMPLE?

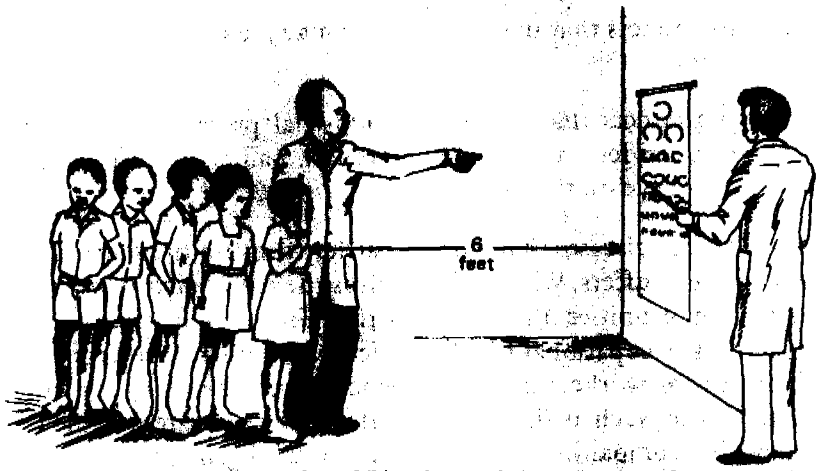


Fig. 15.1 Schoolchildren having their eyesight tested.

15.3 OCCUPATIONAL HEALTH SERVICES

By the time men and women start work they have passed through the ages at which the most serious illnesses of infants and children occur and they are generally at their peak of physical fitness. Why then are special health services sometimes provided for workers?

The principal reason for occupational health services is an economic one. When many people are gathered in one place it is more economical for a health worker to visit them and deal with most of the health problems on the spot, rather than let each individual worker visit the health centre or dispensary. This cuts down on sickness absence and increases productivity. Also where workers are exposed to special risks of injury or disease at their place of work, due to dangerous machinery, chemicals, or dusts, some of them may rightly be considered another at-risk group.

Occupational health is concerned with:

1. the effects that work may have on health in causing injury or disease;

2. the effects that injury or disease may have on the ability to work;

3. the effects that dangerous industrial products such as insecticides, inflammable materials, paints, and cleaners may have on the public.

Most of the diseases that workers suffer from are the same as everyone else suffers. What is different is the *work environment* and the opportunities it provides for the prevention of disease.

The first occupational health services were started in large companies for workers in dangerous jobs such as mining, or in isolated places such as sisal or tea estates. Now they are provided by most big companies, such as the parastatal organizations, and by some small companies, either through a group occupational health service such as is used by many small companies in Dar es Salaam, Moshi, and Arusha, or by part-time visiting staff.

For a more detailed account of occupational health services refer to the *Occupational Health* manual in the Rural Health Series.

Fig. 15.2 Workers on agricultural estates need medical care.

Objectives of an occupational health service

Primary prevention
Primary prevention anticipates and thus avoids:

1. wounds from machines or other injurious objects
2. people falling over things or things falling on people
3. toxic effects (on eyes, skin, lungs, etc.) of substances contacted or inhaled
4. increased risk of any of the above because of employee's own poor personal habits, attitudes, or physical condition.

Secondary prevention
Secondary prevention concentrates on three types of screening:

1. screening of all those employees at risk to a particular hazard
2. general screening for non-occupational illness. (This type of screening works best when there are good relationships between employees and health workers.)
3. screening of the working environment to check that recommended preventive measures are being used.

Tertiary prevention
Tertiary prevention includes the whole spectrum of health care from first aid to treatment and rehabilitation, but with the main emphasis upon first aid in the sense of its being 'early aid'—early enough to minimize any complications and disabilities.

Almost all occupational diseases can be prevented because they have specific known causes. In order to do so it is important to:

- *Be on the look-out*. The first indication that a hazard exists may be an individual worker presenting with symptoms and signs of a disease which can be related to a specific occupation or exposure, e.g. bilharzia in a worker on a sugar plantation.

- *Make a simple epidemiological study.* When an occupational disease occurs, check other people working at the same job and, vice versa, watch for unusual disease occurrences in people in the same job. Look at records.

- *Study the environment.* Knowledge about dangerous chemicals or dusts may help to identify an occupational risk before effects have occurred in the exposed workers. This is especially necessary for irreversible diseases which take a long time to develop such as byssinosis in the cotton industry.

> FOR PREVENTION– BE ON THE LOOKOUT
> STUDY THE WORKERS
> STUDY THE ENVIRONMENT

How to deal with a hazard or harmful substance

The type of preventive measures to be adopted depend on the nature of the hazard or harmful substance and its routes of absorption into the body. The *main general methods* can be dealt with under the following headings:

1. *Getting rid of the hazard or toxic substance*

   The best preventive measure is to get rid of the substance or chemical or machine altogether and replace it with another less dangerous one. This is often done in the chemical industry but is not so easy with machinery.

2. *Reducing exposure*

   This can be done by a variety of methods:

   (a) carrying out a process entirely in a closed system of tanks and pipes, or in a closed room or space;

   (b) sucking or blowing away the dust or fumes from the place where they are produced;

(c) wetting a substance that gives rise to dust when dry, e.g. soaking asbestos in water before it is cut so that none of the dangerous dust is inhaled.

3. *General ventilation*
By improving the ventilation of work rooms so that atmospheric contaminants and heat are removed.

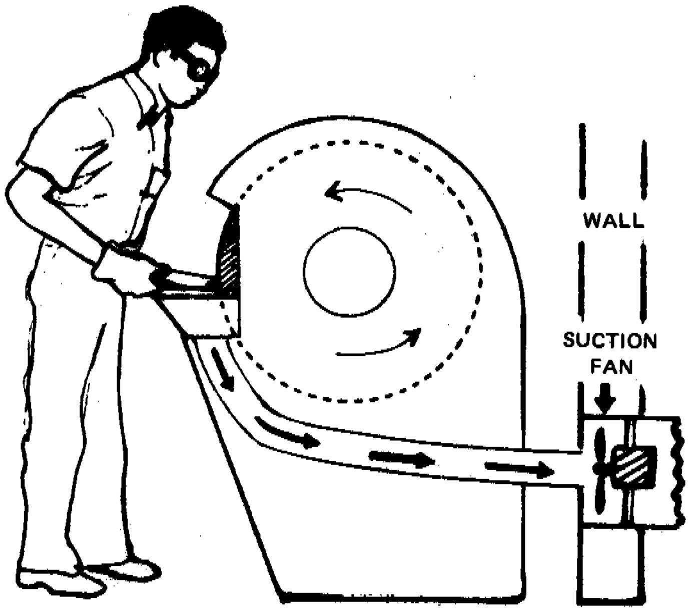


Fig. 15.3 Local exhaust ventilation.

4. *General cleanliness*
Good factory cleanliness reduces exposure and encourages tidiness and safer methods of working.

5. *Personal hygiene*
Good facilities for washing should be available so that

workers may wash dirt and chemicals off their hands before eating. Where the work is very dirty, or irritant chemicals are used, showers should be provided in changing rooms.

6. *Protective and safety equipment*
It is possible to protect against some hazards by wearing special clothing or equipment, e.g. rubber gloves when handling irritant chemicals, goggles when using a grinding machine, a respirator when exposed to dust, etc. In practice it is very difficult to get workers to use these devices regularly and it is therefore better to try to eliminate hazards by other means.

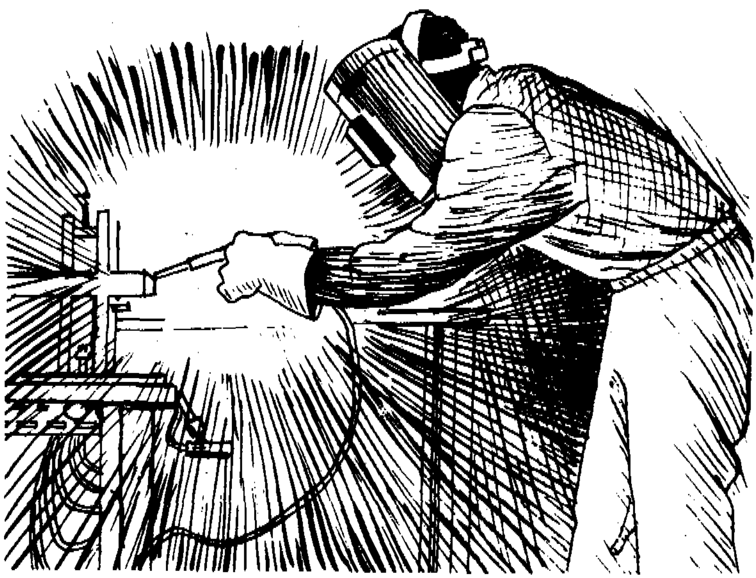


Fig. 15.4 Protective face shield and gloves.

Accident prevention and promotion of safety in working places
Although an accident is defined as an unexpected and unplanned

occurrence which may lead to bodily injury, situations in which accidents are likely to occur may be foreseen. By identifying these situations many accidents can be prevented. The preventive measures that should be taken include:

1. Pre-employment and pre-placement medical examinations for all employees. This is a very important aspect of accident prevention because those with poor sight, epilepsy, or any other disability should be given jobs in which they cannot hurt themselves or others.

2. Industrial workers and farmers should be trained in the proper ways and techniques of using machines and agricultural chemicals *before* they start to use them.

Fig. 15.5 Pesticides are dangerous wherever used.

3. Regular inspection of machines and work places by someone who is responsible for safety. This will detect any mechanical faults, and ensure that safety guards are in

place (workers often remove safety devices if they can).

4. The occupational health personnel should make regular inspections of the working environment including the equipment and chemicals used. Managements of factories, or self-employed individuals, e.g. farmers using insecticides, should be advised about the use of any safety equipment such as boots, gloves, glasses, masks, helmets, etc.

The above measures can best be carried out through discussions with workers' committees and management staff.

What can general health staff do for workers?
In villages and rural areas there are small-scale industries using machinery and toxic substances such as insecticides. Health workers must be aware of any hazards or harmful substances and should be prepared to advise workers, managers, and development committees on health matters, particularly as there is often no local occupational health service. In general, the duties of a health worker serving an industry or working group are:

1. Pre-employment and routine medical examination of workers and matching of workers to the job.

2. Keeping a continuous watch on working conditions, equipment, and materials for safety precautions and possible dangers.

3. Obtaining the confidence of workers. If they trust the health worker, they will accept his health advice.

4. Co-operating with management in application, enforcement, and training with regard to protective measures.

5. Maintaining a first-aid clinic to be run by the workers and himself.

6. Maintaining simple records on which to base surveillance, prevention, and control of occupational illnesses or accidents.

7. Reporting to the DMO any serious hazard, injury, or accident for his advice and further action.

15.4 SERVICES FOR GROUPS WITH SPECIAL HANDICAPS

A handicapped person is someone suffering from any continuing disability of body or behaviour which is likely to interfere with normal growth, development, or the ability to learn or work in the usual manner. Most handicaps start at birth or in childhood.

It used to be thought that handicapped children were rare in Africa. This was due to the fact that they were often hidden, out of a feeling of shame. Often such children are also weak and less able to stand up to the common killing diseases of childhood like malaria, measles, pneumonia, or malnutrition. With better control of these diseases and more children going to school it is now appreciated that some types of handicap are not as rare as they were once thought to be. Also many people have now moved to towns and live in crowded houses and flats, separated from their families, and they find themselves less able to cope with the burden of a handicapped child and therefore seek help.

No precise data exist about the prevalence of these conditions in Africa but in some other countries about 5 out of every 1000 children are affected. These rates would suggest that there are tens of thousands of children in East Africa with these handicaps and the numbers surviving into adulthood are likely to increase.

The common types of handicap may be classified as follows:

Physical

Motor defects —congenital causes such as missing limbs
—poliomyelitis

—trauma, amputees
—cerebral palsy (spastics)
Sensory defects—blindness
—deafness

Mental deficiency—mental deficiency
—mongolism
—birth injuries
—meningitis

Chronic illness e.g. epilepsy

REMEMBER THE DEAF, THE BLIND, AND THE DISABLED

Sometimes a child may have more than one problem, a typical example being cerebral palsy. Apart from motor defects, such a child may be mentally retarded or have epilepsy. A high proportion of cerebral palsy children also suffer from visual defects such as poor visual acuity.

Children with some physical handicap commonly suffer from emotional disorders and temper tantrums as well. They become over anxious about failure and give up so quickly that their learning and social ability develop only slowly.

Deaf children are often thought to be mentally defective, and because they do not hear, their learning is retarded. Lame children are not likely to discover and learn from their surroundings as fast as their normal friends.

Need for early detection

Most of these children are survivors of antenatal, birth, and perinatal injuries. They are affected from early childhood and consequently their early development is delayed and distorted.

It is known that the development of *speech* reaches its peak during the first 3 or 4 years and the optimum period for learning to *hear* is during the first year. In order to give a child with a hearing loss a chance of learning words and language, it is necessary to train him from very early on.

In cerebral palsy and other limb deformities the deviations in development must be detected early so that appropriate physiotherapy can be instituted before secondary disabilities such as contractures and shortening of limbs develop.

Parents may have detected something wrong with a child and may have wasted time and money going to local healers who usually promise to cure the incurable. Early referral to a doctor is necessary.

Part of the problem of identifying handicapped babies is to inform all who have to deal with pregnant mothers and new-born babies. The following list summarizes the important factors which should alert health workers to the risk of subsequent handicap.

Family history (parents)	Congenital deafness or deformity in the family, visual handicap, cerebral palsy, mental subnormalities
Antenatal (mother)	Virus infection, particularly rubella, during pregnancy, severe illness necessitating chemotherapy or major surgery, toxaemia of pregnancy and twins, maternal diabetes mellitus and hydramnios
Perinatal (mother and child)	Presence of other congenital abnormalities in child (particularly those involving eyes, heart, or nervous system), premature birth, prolonged or difficult labour, anoxia, neonatal jaundice
Postnatal (child)	Convulsions, cerebral palsy, mumps, measles, meningitis or encephalitis, cerebral malaria, severe malnutrition

Management of the handicapped child

Effective management is based on early detection. Adequate comprehensive care can be planned only if it is recognized that one is dealing with a handicapped family. The parents may have a sense of guilt and failure and this is further intensified by the difficulty they experience in finding adequate help and guidance.

By far the best form of management here is through an integration of the family and child into the community. This of course calls for a lot of support for the family in the form of information, equipment, training and, above all, encouragement to overcome inevitable disappointments.

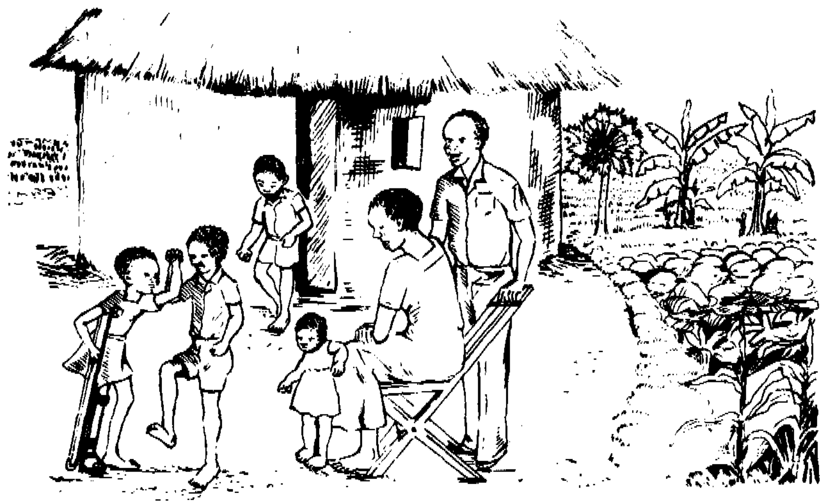


Fig. 5.6 A handicapped child playing with her brothers and sisters.

LOOK AFTER THE HANDICAPPED
IN THE COMMUNITY

Only the *grossly handicapped* can be best cared for in an institution, especially if the child is in his middle years and is violent, mentally defective, or abandoned. But these are the exceptions which should underline the rule that home is best.

Special schools

These may be required for slow learners, the deaf, blind, or disabled. There are a few schools for each of these categories and advice should be sought about the suitability of candidates for them.

Institutions

As opposed to special schools where the handicapped go to learn special skills, institutions are a form of permanent home where the grossly handicapped are taken care of. Though the present trend is against such institutions, they still have a part to play for the very severely retarded and severely spastic children who cannot be cared for by their parents and cannot be integrated into the community.

What can health workers do?

1. Emphasize the part that good antenatal and obstetric care can play in preventing birth injuries producing spastics.

2. Be on the look-out in the very young child for any developmental abnormality, particularly delay in speaking, hearing, crawling, or walking.

3. Encourage the family to care for the child in their local community. If possible *do not* refer to an institution.

4. Give good emotional and medical support to such families.

5. Give polio vaccine to prevent paralytic poliomyelitis.

6. Attempt to control epileptics with drugs and advise

parents on care of unconscious children, and especially of the danger of open fires.

7. If in any doubt refer patients to a doctor for a further opinion, particularly those with poor eyesight, poor speech, poor hearing, or deformed limbs. There are special societies formed to look after the interests of the deaf, blind, and physically disabled. Hearing aids and artificial limbs can be obtained at several regional centres.

APPENDICES

Chapter Eight

8.1 How to make a concrete latrine slab

A good slab for a pit latrine makes the latrine much better. It is easy to keep clean, therefore people are more likely to use it. Hookworm ova cannot live on it like they do on a soiled earth floor. A lid fits better and prevents flies from breeding.

Making a slab is *not* expensive. The only material that you must buy is ¼ of a bag of cement—12k. The other materials—sand and small stones—can generally be collected locally. Any old wire (plain or barbed), chicken wire, or metal bars that can be found can be used as reinforcement. If no reinforcement is available make the slab 1 inch thicker.

Making a slab is not difficult. The best way to learn is to watch a fundi do it and then do it yourself. After you have made two or three you will learn many little ways to make the work easier and better.

There are four stages in making a latrine slab:

1. Collecting the materials and tools
2. Making the frames
3. Mixing the concrete
4. Making the slab.

1. Collecting the materials and tools

You will require:

Materials

- Cement
  ¼ bag, approximately 12k
  this should be fresh and powdery.
- Sand
  you will need approximately ½ a wheelbarrow
  the sand should be clean, without earth or grass in it.
- Gravel (small stones)
  you will need approximately 1 barrow-full
  the stones should be clean, without earth, and ¼–¾ inch in size.
- Reinforcing wire or bars
  the best is a sheet of expanded metal, or weld mesh, or chicken wire. Lengths of plain or barbed wire can also be used, or metal bars if they are available.
- Water
  you will require about 2 bucket-fulls.

Tools

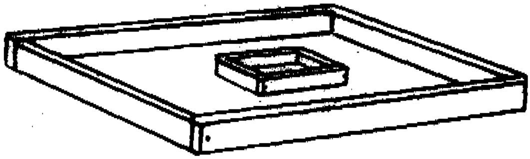
- shovel
- karai (or bucket) for measuring quantities of materials
- bucket or other container for water
- builder's metal trowel

or

a homemade wooden trowel.

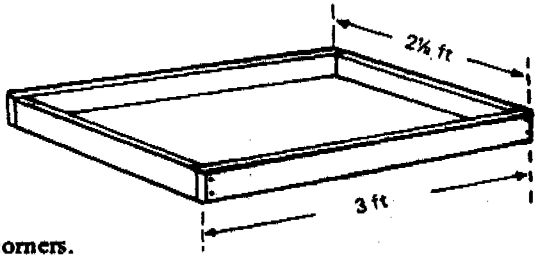
2. Making the frames

Two frames, to hold the runny concrete until it dries, must be made first. The same frames can be used to make other slabs afterwards. (See top of page 429.)



Outside frame

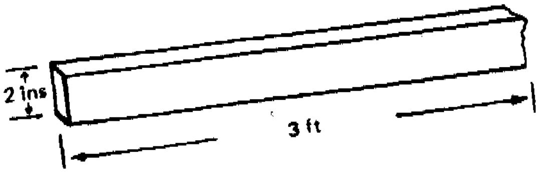
Cut four pieces of wood 2½ inches wide (the thickness does not matter)
- —two 2½ feet long
- —two 3 feet long



Nail them together at the corners.

Inside frame for the slab hole

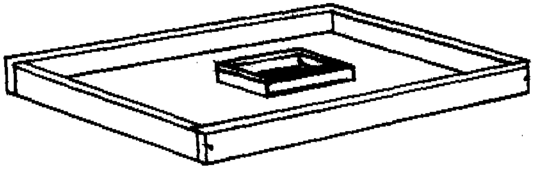
Get 3 feet of wood 2 inches wide (the thickness does not matter)



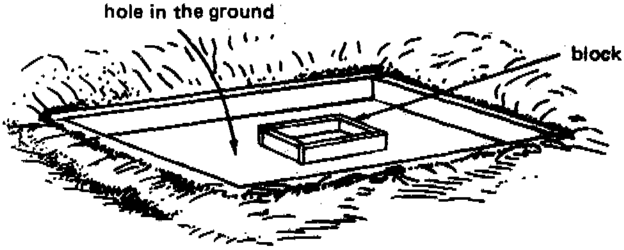
Cut four pieces
- —two 11 inches long
- —two 6 inches long

Nail them together at the corners.

Place the frames on flat hard ground near where you will mix the concrete, the small frame inside the large one.



N.B. If no wood is available for making frames, a shallow hole can be dug in the ground instead, and a block or box put in the middle.



3. **Mixing the concrete**

Mixing cement, sand and gravel with water makes concrete. Using clean sand and stones, mixing thoroughly, packing the frame tightly and drying slowly makes good concrete and a strong slab.

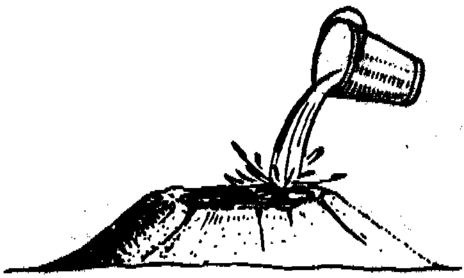
Choose a place for mixing

- this should be a hard flat area, without grass or loose earth.

Mix the dry materials in the right proportions

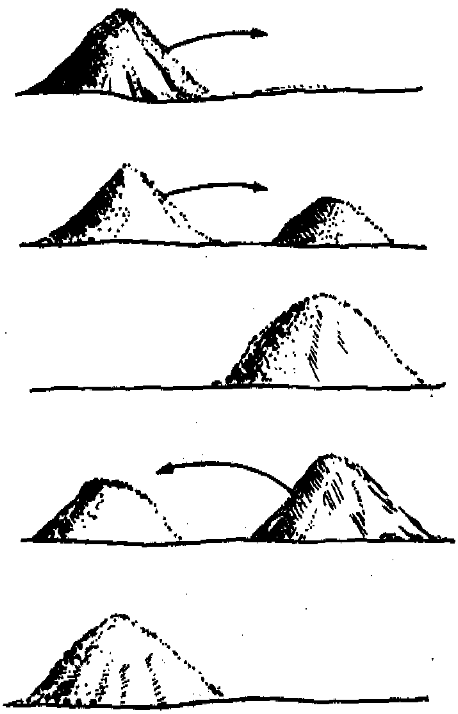
- 1 karai of cement
- 2 karais of sand
- 4 karais of gravel

Mix these dry materials thoroughly.
Make a hole in the top of the heap and add a little water.



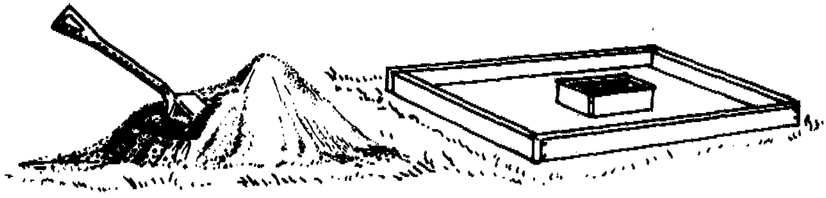
Continue adding a little water at a time and mixing until the whole heap is a sticky, sloppy (but not runny) mixture. Thorough mixing of the whole heap is *very important*. This can be done by gradually walking around the heap as you turn the cement.

When nearly ready turn the whole heap over to one side and then turn it back again. Too much water weakens the concrete; too little water makes it difficult to pack tightly into the frame.



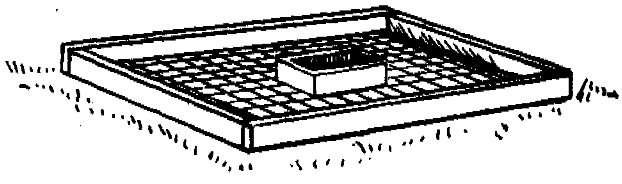
4. Making the slab

When the frames are in position and the concrete is mixed, you can make the slab.



Start filling the frame

Shovel in enough concrete to cover the ground between the frames (i.e. about ½ inch thick).
Put in the reinforcement.
Lay the wire or bars on the first layer of concrete.



Finish filling the frame

Shovel in more concrete to fill in the space between the frames.
Beat the mixture to pack it tightly—use the back of the shovel, or a jembe, or a pole, and thump the mixture to get rid of all air holes.
If required mix more concrete using the same proportions.

Flatten the top of the concrete

Use the trowel to rub the surface level with the top of the frames. Pay particular attention to the sides of the hole. Use the edge of the trowel to make sure that it is filled tightly.

Make a smooth surface

Mix another half karai of sand (approximately 4 trowel-fulls) with 2 trowel-fulls of cement and a little water in the karai.
Spread this mixture evenly over the surface and smooth with the trowel.

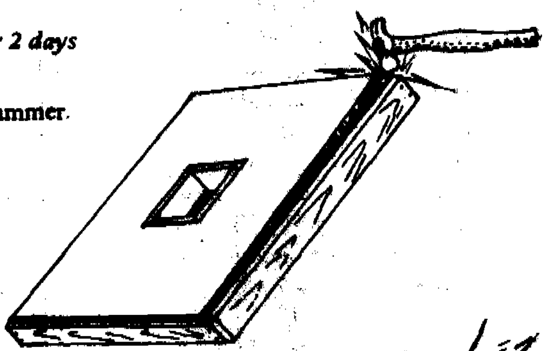
N.B. Time spent making a very smooth surface, with no stones sticking up or holes, will make the slab much easier to keep clean.

Dry the slab

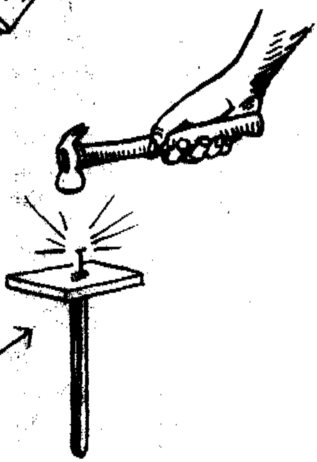
The concrete will become stronger and not crack if it dries slowly. Therefore cover the slab with paper or banana leaves and then grass or more leaves. Pour water on the leaves 3 times a day to keep them moist. Leave for 2 days.

Removing the frames—after 2 days

Lift the slab onto its edge.
Tap off the frame with a hammer.



The slab is now ready to be lifted onto the poles put across the pit.



N.B. Every latrine should have a cover. Cut a piece of wood larger than the hole and nail a handle onto it.

Chapter Nine

9.1 Use and maintenance of paraffin refrigerators

The most common refrigerator now being used is the Electrolux RAK 36 so the following instructions are primarily about this model. Since all paraffin refrigerators are rather similar, however, the principles apply to others as well.

Assembly of a new fridge

There are detailed instructions inside each new fridge on how to assemble and use it. It is important to read and understand these before beginning to put the fridge together. There are also usually several spare parts, including extra lamp glasses and wicks, which should be stored in a safe place for future use.
Several additional points about the Electrolux model RAK 36 are:

1. Open the lamp glass wrapped in red paper first as this one contains the metal sealing ring that fits on top of the lamp glass.
2. Make sure the lamp glass slides all the way down to the base of the burner. The three metal tabs around the sides of the burner may need to be flattened slightly to make this possible without breaking the glass.
3. A new wick has already been put in the burner at the factory. Make sure it adjusts easily up and down.
4. Additional parts include a long wire brush for cleaning the boiler tube above the lamp glass.

Where to put the fridge

For any paraffin fridge to function well it must be level both ways, and have enough, but not too much, air ventilation around it. To provide this there must be 3–4 cm of free space on all sides of the cabinet and 40 cm or more above the cabinet. It must also be kept out of direct sunlight and away from any heater, sterilizer, or other hot things.

Lighting the fridge

When you have a suitable place for putting the fridge and you know how to fit the burner, lamp glass, and sealing ring tightly against the boiler tube, and the wick adjusts freely up and down, you are ready to start the fridge.

1. First remove the tank from the fridge by depressing the burner and lamp glass away from the boiler tube and sliding the entire tank out to the right.

2. Fill the tank with good quality paraffin through the funnel and filter. Wipe off any spilled paraffin.
3. Wait for 2-3 hours until the wick is completely soaked in paraffin. This first wick has already been burned, cleaned, and adjusted at the factory.
4. Lift off the metal sealing ring and lamp glass, turn the wick up so it just shows above the burner, and light it.
5. Replace the lamp glass and sealing ring, depress the entire burner and glass, and slide it back into place beneath the boiler tube.
6. Make sure the sealing ring fits tight against the boiler tube, the lamp glass is straight, and no air can leak in around the top of it.
7. Adjust the wick and flame to give the desired temperature. It should be kept cold enough to make ice in the freezing section.

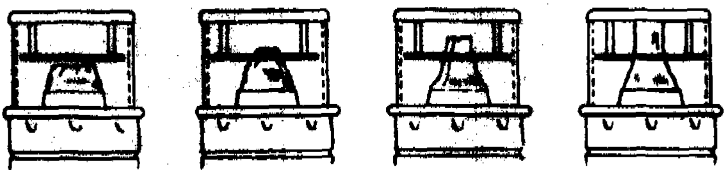


Fig. 1 How high to adjust the flame.

8. The flame may need to be readjusted frequently during the first few hours and days to keep the right temperature without producing smoke and smell from too high a flame.

Cleaning the fridge

It is extremely important to take care of a paraffin fridge on a regular schedule if it is going to provide good service. One person should be given full responsibility for the fridge, and that person only should adjust it, clean it, fill it with paraffin, etc.

ASSIGN ONE PERSON ONLY TO CARE FOR THE FRIDGE

The tanks on most fridges hold enough paraffin to last a week. As the fridge should also be cleaned once a week it is best to refill it and to clean at the same time on a regular schedule, say every Saturday morning. (During the first month of use a new fridge should be cleaned even more often, usually every 4-5 days.)

The following steps should be followed each time the tank is filled and the burner cleaned:

1. Turn down the wick, push down the burner, and slide the tank out to the right; then blow out the flame and let it cool for a few minutes.
2. Remove the lamp glass after it is cool and turn the wick down below the edge of the burner. Using a knife or piece of metal, scrape the soot off from the wick tube. Then turn the wick up so it just shows above the tube and carefully clean the soot from the top of it so it is even all around. Be careful not to fray the edges of the wick.
3. Blow the soot off. If any of the air holes in the base of the burner are blocked, clean them. The outer part of the burner may be unscrewed from its base to make it easier to clean.
4. Remove the burner and wick from the tank to see if the tail of the wick is dirty. If it is, it must be washed off with clean paraffin, and the tank also washed out.
5. Soot must be cleaned out of the boiler tube once a week at first, and then less often if it remains clean. This is done by sliding up the top piece of the flue pipe and removing the baffle hanging inside the boiler tube. Place a piece of paper below the boiler tube to catch the soot, then slide the long wire brush up and down in the tube to clean it. Be sure the baffle is also cleaned and then replaced carefully.
6. Reassemble the burner, fill the tank with clean paraffin, light the wick, replace the lamp glass, and slide the tank back into place.
7. To prevent rust and mould from growing on the cabinet, it is important to keep all parts clean and dry by wiping off once a week.

Changing the wick

If it is not possible, after a time, to get a good flame in spite of cleaning and adjusting the wick, it is best to change the wick.

1. Remove the burner as described above and screw the old wick completely out.
2. Insert the red end of the new wick into the hole in the bottom of the

burner. Push it in with your finger until it catches in the cog wheels and can be turned up by the knob.

3. Turn it up and down several times to make sure that it adjusts easily. It is very important that the top edge is level, so pull it at the top if one side is lower (see Fig. 2) until it is even all round.

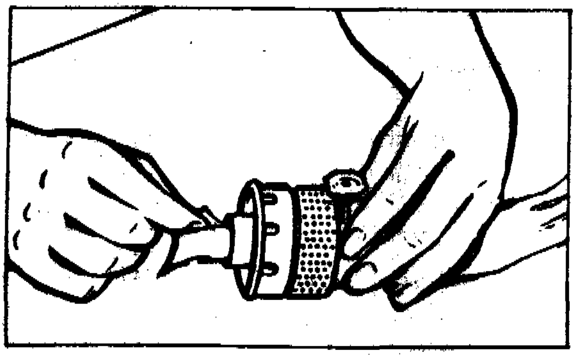


Fig. 2 Make the wick level.

4. Turn the wick so it is about 1 cm above the top of the burner, then dip this top part in paraffin (Fig. 3).

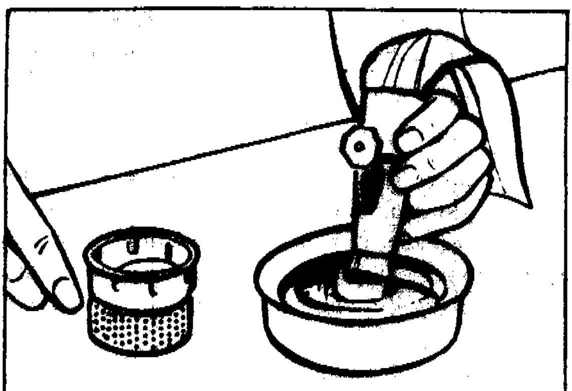


Fig. 3 Dip the end of the new wick in paraffin.

5. Turn it back down just barely above the burner (2–3 mm), light it, and let it burn until it goes out by itself. When it goes out, blow the ash away and it should be even all around.
6. Replace the burner in the tank, let the tail of the new wick soak in the paraffin for 2–3 hours, and then it is ready for use.

Additional maintenance hints

1. *Paraffin supply*

If the fridge stops being cold even for a few days the whole stock of vaccine will be spoilt. It is most important not to run out of paraffin for any reason.

ENSURE REGULAR PARAFFIN SUPPLY

It is wise to keep a reserve supply in case of emergency.

2. *Spare parts*

Some spare wicks, lamp glasses, and other parts usually come with the fridge. These must be kept in a safe place where they won't get lost or broken. Remember to order ahead and keep at least two spare glasses and wicks on hand so the fridge can be immediately repaired if something goes wrong.

3. *Yellow flame*

Never operate the burner with a flame having yellow tips or streaks in the bright blue portion. Such a flame will result in soot forming rapidly on the wick and in the boiler tube. This soon plugs the tube and the flame goes out. If you are unable to get a blue flame you should search for the problem, e.g. poor adjustment, air gap, dirty burner, poor paraffin, etc., and correct it.

4. *Wick doesn't adjust up or down*

Occasionally the wick becomes worn and frayed so it slips on the cog wheel and doesn't move. If you cannot adjust is properly, a new wick should be put in.

5. *Broken lamp glass*

On some occasions when there is no spare lamp glass, a metal lamp glass has been made by bending mabati, or some other metal, into a tube. This method can serve in an emergency, but it is not recommended for more than a short time because of the difficulty of making it air-tight and of adjusting the flame when you cannot see it.

Fault tracing

If there is no cooling at all:

1. Burner has gone out
2. Paraffin tank empty
3. Wick or burner needs cleaning.

If the refrigerator does not get cold enough:

1. Incorrectly adjusted flame
2. Uneven or too short wick--clean or replace it
3. Burner needs cleaning
4. Poor quality paraffin
5. Soot needing removal from the boiler tube and flue pipe
6. Poor seal between the sealing ring and the boiler tube
7. Flue baffle missing or incorrectly located
8. Freezing compartment needing to have ice melted and cleaned out ('defrosting')
9. Door not making a good seal against the cabinet
10. Poor ventilation around the fridge
11. The cabinet not being level.

Smell of paraffin:

1. Wick turned down too far
2. Wick or burner needs cleaning
3. Poor quality paraffin.

Fridge not in use

If the fridge is not going to be used for a while, it is important to take all vaccines and other things out of it. Clean and dry off the inside, and leave the door open so that it will not become mouldy.

9.2 WHO rabies treatment schedule

A. Local treatment of wounds involving possible exposure to rabies

1. Recommended in all exposures

(a) First aid treatment

Since elimination of rabies virus at the site of infection by chemical or physical means is the most effective mechanism of protection, immediate washing and flushing with soap and water, detergent or water alone is imperative (recommended procedure in all bite wounds including those unrelated to possible exposure to rabies). Then apply either 40–70% alcohol, tincture or aqueous solutions of iodine, or 0.1% quarternary ammonium compounds.[1]

(b) Treatment by or under direction of a physician

(1) Treat as above *(a)* and then:
(2) apply antirabies serum by careful instillation in the depth of the wound and by infiltration around the wound;
(3) postpone suturing of wound; if suturing is necessary use antiserum locally as stated above;
(4) where indicated, institute antitetanus procedures and administer antibiotics and drugs to control infections other than rabies.

1 Where soap has been used to clean wounds, all traces of it should be removed before the application of quarternary ammonium compounds because soap neutralizes the activity of such compounds.

B. Specific systemic treatment

	Nature of exposure	Status of biting animal irrespective of previous vaccination: At the time of exposure	During 10 days[2]	Recommended treatment
I.	Contact, but no lesions indirect contact; no contact	Rabid	—	None
II.	Licks of the skin; scratches or abrasions: minor bites (covered areas of arms, trunk and legs)	(a) Suspected rabid[3]	Healthy	Start vaccine. Stop treatment if animal remains healthy for 5 days[2, 4]
			Rabid	Start vaccine; administer serum upon positive diagnosis and complete the course of vaccine
		(b) Rabid; wild animal,[5] or animal unavailable for observation		Serum + vaccine
III.	Licks of mucosa; major bites (multiple or on face, head, finger, or neck)	Suspect[3] or rabid domestic or wild[5] animal or animal unavailable for observation		Serum + vaccine. Stop treatment if animal remains healthy for 5 days[2, 4]

2 Observation period in this chart applies only to dogs and cats.
3 All unprovoked bites in endemic areas should be considered suspect unless proved negative by laboratory examination (brain FA).
4 Or if its brain is found negative by FA examination.
5 In general, exposure to rodents and rabbits seldom, if ever, requires specific antirabies treatment.

Chapter Eleven

11.1 Food composition table (per 100 grams edible portion)

English	*Swahili*	*Calories*	*Protein* g	*Fat* g
Cereals				
maize	mahindi	350–360	7–10	2–3
millet, sorghum	wimbi, mtama	350–360	8–10	2–4
rice	mchele	350–360	6–8	2–3
wheat flour	unga wa ngano	350–360	10–12	1–2
Starchy roots and tubers				
Fresh roots and tubers				
cassava, plantain	muhogo, ndizi mbichi, matoke	120–150	1	2–3
Irish potato, yam sweet potato	kiazi kizungu kiazi kitamu	80–100	2	2–3
yam flour	unga wa magimbi	300	3.5	4
cassava flour	unga wa muhogo	350	1.5	6
Grain legumes and legume products				
groundnuts - fresh	njugu karanga mbichi	330	15	28
groundnuts - dried	njugu karanga kavu	580	27	44
chick peas, cow peas	dengu, kunde	340–360	20–22	2–3
kidney beans, lentils, peas	maharage, dengu, njegere	340	22–25	1.5
pigeon peas	mbaazi	350	20	1.5
soya bean seeds		380	35	18
Oil seeds and fats				
cashew nuts, sesame seeds	korosho, ufuta	590	20	45
pumpkin seeds	mbegu za maboga	610	28	37
coconut, mature fresh	nazi mbichi	370	4	39
sunflower seeds		500	15	27
Fruits and vegetables including leaves	***Mboga na matunda yote pamoja na majani yake***	20–50	1–2	0.5
Exceptions:	***Isipokuwa:***			
beans and peas, fresh	maharage na njegere mbichi	100	7	1
maize, immature on cob	mahindi mbichi	80	4	1.5

Food composition table (cont.)

English	*Swahili*	*Calories*	*Protein* g	*Fat* g
Fats and oils				
butter	siagi	720	0.5	81
margarine, ghee, pork fat, and others	margarine, samli, mafuta ya nguruwe, na mengineyo	850–900	0	80–100
Fish				
fresh	samaki	100–170	10–20	5–18
dried (average)	samaki waliokaushwa	310	60	5–20
Insects and larvae				
lake fly (cake)		380	49	10
caterpillars dried	viwavi (vilivyokaushwa)	370	55	15
locusts mature	nzige, nsenene	230	20	20
termites, white ants (raw)	kumbikumbi	340	15	28
Meat and eggs				
meat - depending upon proportion of fat	nyama - kulingana na kiasi cha mafuta yaliyoko	150–250	14–20	7–30
eggs	mayai	150	13	12
one egg 50 grams	yai moja 50 grams	75	7	6
Milk and milk products				
milk - human	maziwa ya mama	75	1.3	3.5
cow - whole fresh	maziwa ya ng'ombe	65	3.3	
dried skimmed powder	maziwa yaliyotolewa mafuta na kukaushwa	250	35	1
dried whole powder	maziwa yaliyokaushwa	500	25	30
cheese	jibini	300	25	5–20
sugar	sukari	400	0	0
honey	asali	100	0.4	0.2

11.2 Energy requirements

(a) *Relation of activity to energy needs*

Resting and sleeping in bed	1 Calorie/minute	4 KJ
Sitting and minor activities	2 Calorie/minute	8 KJ
Walking and light work	2½ Calorie/minute	10 KJ
Heavy work (wood cutting)	4 Calorie/minute	16 KJ

(b) *Average energy and protein requirements per 24 hours based on age and weight*

Age	*Body weight (average)*	*Calories*	*Cal/kg weight*	*Protein*	*Protein/kg*
Children					
6 months – 1 year	7.5	800	110	14	2
1 – 3 years	13.5	1360	100	16	1.2
4 – 6 years	20	1830	90	20	1
7 – 9 years	28	2200	80	25	0.9
Adolescent males					
10 – 12 years	37	2600	70	30	0.8
13 – 15 years	51	2900	57	37	0.7
16 – 19 years	63	3100	50	38	0.6
Adolescent females					
10 – 12 years	38	2350	62	29	0.8
13 – 15 years	50	2500	50	31	0.6
16 – 19 years	54	2300	42	30	0.4
Adults					
males	65	3000	46	37	0.6
females	55	2200	40	29	0.5
pregnancy, later half		+350		+1.5	
lactation		+550		+2.5	

11.3 Foods containing vitamin A or carotene

English	*Swahili*
	Foods with very high vitamin A content
Oil palm (red)	mafuta ya nazi nyekundu
Liver	maini
Milk (whole)	maziwa
Butter	siagi
Cheese	jibini
Eggs	mayai
Carrots	karati
Dark green leaves	boga zenye rangi ya kijanikibichi
	Foods with high vitamin A content
Light green leaves	mboga zenye rangi kidogo
Mangoes	maembe
Other yellow fruits (except pineapples)	matunda zenye rangi ya manjano (isipokuwa nanasi)
Yellow sweet potatoes	viazi vitamu vyenye rangi ya manjano
Yellow maize	mahindi yenye rangi ya manjano
	Foods with a lower vitamin A content
Pawpaw	papai
Pumpkin (yellow)	maboga (ya manjano)
Melon (yellow)	malenge mbichi
Tomatoes	nyanya

11.4 Table of protein sources

Type of Food	*English*	*Swahili*	*Protein in 100g*	*NPU %*	*Reference protein per 100g*	*Calories*
Staples						
Cereals	rice	mchele	8	57	4.5	350
	maize	mahindi, sembe	8	35	4.4	350
	millet	ulezi	10	56	5.6	350
	sorghum	mtama	10	56	5.6	350
	wheat	ngano	11	52	5.7	350
Roots and plantains	cassava whole	muhogo mbichi	0.7			150
	cassava flour	unga wa muhogo	1.5	unknown		342
	potato (Irish)	viazi	2	71	1.4	75
	sweet potato	viazi vitamu	1.5	72	1	114
	taro (yam)	magimbi	2	unknown		113
	plantain	matoke	1	unknown		128
Vegetables						
Legumes	cow peas	kunde	22	44	9.6	340
	lentils	adesi	24			339
	kidney beans	maharage	24	47	11.2	339
	soya beans	soya	35			382
	pigeon peas	mbaazi	20	44	8.8	328
	chick peas	dengu	20			368
	black and green grams	choroko	24			329
	green peas	njegere	25	44		337
Nuts and seeds						
	bambara nuts	njugu	18			367
	dry groundnuts	karanga kavu	27	48	12.9	580
	raw groundnuts	karanga mbichi	15	48	7.2	330
	coconut (dry)	nazi kavu	4			375
	pumpkin seeds	mbegu za maboga	30			610
	sesame seeds	mbegu za ufuta	20	56	13.2	590

Table of protein sources (cont.)

Type of Food	*English*	*Swahili*	*Protein in 100g*	*NPU %*	*Reference protein per 100g*	*Calories*
Insects						
	caterpillars (dry)	viwavi	55		40	
	locusts	nzige	20	? 70	14	134
	termites	kumbikumbi	15		10	
Animals						
	beef	nyama ya ng'ombe	16	80	12.8	262
	chicken	nyama ya kuku	19	65	12.3	139
	fresh fish	samaki	18	83	14.9	95
	dried fish	samaki wakavu	63	83	56.4	309
	liver	maini	16	65	10.4	145
Animal products						
	milk, fresh cow	maziwa ya ng'ombe	3.3	75	2.4	75
	milk, dried skim		35	75	26.2	250
	milk, dried whole		25	75	18.7	500
	eggs (100g)	mayai	13	100	13	150
	1 egg (50g)	yai	6.5	100	6.5	75

11.5 Weaning recipes

(a) *Proportions of food mixtures which give NDP Cal % of 7 – 8%*

To:			Add:		
Cereal	*Amount*	*Household measure*	*Protein food*	*Amount*	*Household measure*
maize	100g	¾ cup	DSM +	15g	dessert spoon
			OR DWM +	30g	heaped tablespoon
			OR legume	25g	¼ cup
			OR mince meat or fish	25g	tablespoon
rice	100g	½ cup	DWM	25g	tablespoon
			OR legume	25g	¼ cup
			OR mince meat or fish	25g	tablespoon
cassava	100g	¾ cup	DSM	30g	tablespoon
			OR fresh fish	45g	¼ cup

(b) *Mixtures of cereal, protein food and energy food*
These amounts give total calorie value 350 and NDP Cal % of 7%

Take:			Add	and	Add:		
Cereal		*Amount*	*Protein*	*Amount*	*Energy*	*Amount*	*Household measure*
maize		60g	DSM	15g	sugar	20g	4 teaspoons
	or	50g	legume	50g (½ cup)	oil	10g	2 teaspoons
	or	70g	meat	30g	oil	10g	2 teaspoons
rice		40g	DSM	30g	sugar	20g	4 teaspoons
	or	65g	legume	35g	oil	10g	2 teaspoons
cassava		55g	DSM	25g	sugar	20g	4 teaspoons
	or	75g	meat	50g	oil	10g	2 teaspoons

+ DSM – dried skimmed milk

+ DWM – dried whole milk

11.6 Foods containing iron over 5mg/100g

Cereals	Millet	Ulezi or Mtama	5.0
	Maize	Sembe	5.5
Legumes and nuts	Chick peas	Dengu	9.0
	Red beans	Maharagwe	8.0
	Gram	Choroko	9.0
	Bambara nuts	Njugu	6.0
	Cow peas	Kunde	5.0
	Peas	Njegere	5.0
	Pigeon peas	Mbaazi	5.0
	Cashew nuts	Korosho	5.0
Dark leaves and seeds	Dried cassava leaves	Kisamvu	?
	Dried cow pea leaves	Nsansa	22.5
	Wild spinach	Mchicha mwitu	11.0
	Sesame seeds	Mbegu za ufuta	10.0
	Pumpkin seeds	Mbegu za maboga	10.0
Spices	Coriander seeds		18.0
	Sweet pepper	Pilipili	9.0
Animal products	Liver	Maini	10.0

Note:

Absorption of iron is irregular. Not all the iron that is eaten is absorbed, but every little bit helps because iron is stored in the body. Vitamin C helps the absorption of iron.

11.7 Names of some legumes and nuts

English	*Swahili*	*International*
Groundnut	Njugu karanga	Orachis hypogaea
Bambara groundnut	Njugu mawe	Voandzeia subterranea
Chick pea	Dengu	Cicer arientinum
Cow pea	Kunde	Vigna spp.
Pigeon pea	Mbaazi	Cajanus cajan
Pea (green)	Njegere	Pisum sativum
Black gram	Choroko (nyeusi)	Phaseolus mungo
Green gram	Choroko (kijani)	Phaseolus aureus
Lentil	Adesi	Lens esculenta
Kidney bean	Maharagwe	Phaseolus vulgaris
Cashew nut	Korosho	Anacardium occidentale

11.8 Some protein-rich foods

(Daily needs of protein by weight and age)

	Reference protein
Child 0 – 5 months	2g/kg/day
6 months – 1 year	1.5g/kg/day
Older children	1g/kg/day
Adults	0.5g/kg/day
Pregnancy	0.5g/kg/day add 6g/day
Lactation	0.5g/kg/day add 16g/day

Simplified protein table | *Approximate value*

	English	*Swahili*	*Protein 100g*	*NPU %*	*Utilized protein/ 100g*	*Calories/ 100g*	*NDP Cal %*
Staples	Maize	Sembe	8–10g	55%	4–5g	350	5–6%
	Millet	Ulezi					
	Sorghum	Mtama					
	Rice	Mchele					
	Wheat	Ngano					
	Cassava	Muhogo	1–2g	10%	0.7–1.5g	120	1–3%
	Potato	Viazi					
	Plantain	Ndizi					
Legumes	Red beans	Maharage	20–25g	45%	9–11g	330	8–12%
	Cow peas	Kunde					
	Chick peas	Mbaazi					
	Lentils	Adesi					
	Grams	Dengu					
	Groundnuts	Karanga					
	Bambara nuts	Njugu					
Animal products	Dried fish	Samaki wakavu	45–65g	80%	50g	300	
	Fresh fish	Samaki	18g		14.4g	80	
	Dried whole milk	Maziwa ya unga	25g	75%	18g	500	
	Fresh milk	Maziwa	3g		2.2g	60	
	Meat (beef)	Nyama ya ng'ombe	18g	80%	14.4g	260	
	Eggs	Mayai	12g	100%	12g	150	

*For household measures of 100g see Appendix 11.5

11.9 Examples of some calculations

i. *Calculating the protein-calorie percentage*

Formula: $\dfrac{\text{The number of calories from protein in the food}}{\text{Total calories from the food}} \times 100$

Note: 1g of protein gives 4 calories

Example: 100g maize gives 350 calories and contains 8g protein (refer food table)

$$\frac{\text{Calories from protein}}{\text{Total calories}} = \frac{8g \times 4}{350} = \frac{32}{350} \times 100 = 9.1\%$$

ii. *Calculating the nett dietary protein calorie percentage*

Formula: $\dfrac{\text{The number of calories from reference equivalent protein}}{\text{Total calories from food}} \times 100$

Example 1: Reference protein in maize flour is 4.4g (NPU is 55%)

$$\frac{\text{Calories from reference protein in maize flour 100g}}{\text{Total calories}} \times 100$$

$$\frac{4.4g \times 4}{350} = \frac{17.6}{350} \times 100 = 5.0\%$$

Example 2: The NDP Cal % of 100g sembe + 25g kidney beans

From tables:

Reference protein from maize 100g = 4.4g
Reference protein from kidney beans 25g = 11.2 ÷ 4 = 2.8
Calories from maize 100g = 350
Calories from kidney beans 25g = 339 ÷ 4 = 85

$$\frac{\text{Calories from maize ref. protein}}{\text{Calories from maize}} + \frac{\text{Calories from beans ref. protein}}{\text{Calories from beans}}$$

$$\frac{(4.4 \times 4)}{350} + \frac{(2.8 \times 4)}{85} = \frac{(17.6 + 11.2)}{435} \times 100 = \frac{2880}{435} = 6.6\%$$

iii. *Calculating the price of protein in a market bought food*

Formula to find the price of 100g of any food protein

$$\text{Price of 100g of the food protein} = \frac{\text{Price of 1kg of the food}}{\text{Amount of protein in 1kg}} \times 100$$

Note: Amount of protein in 1kg = Amount shown in food table x 10

Example 1: Price of 100g of bean protein, when beans are Shs. 3.50 per kilo.

$$\text{100g of bean protein} = \frac{3.50}{240\text{g}} \times 100 = 145\text{c} = \text{Shs. } 1.45$$

Example 2: Price of 100g of dagaa protein, when dagaa is Shs. 8.00 per kilo.

$$\text{100g of dry fish protein} = \frac{8.00}{630\text{g}} \times 100 = 127\text{c} = \text{Shs. } 1.27$$

These two examples show that although dried fish is more than twice the price of beans, the protein price is slightly cheaper in the case of the fish.

Example 3: Price of 100g of egg protein, when eggs are Shs. 6.00 per dozen.

Note: One egg contains 6.5g protein and weighs 50g
1 dozen eggs = 12 x 50g = 600g cost Shs. 6.00
1000g eggs cost Shs. 10.00

$$\text{Price of 100g of egg protein} = \frac{10.00}{130\text{g}} \times 100 = \text{Shs. } 7.70$$

Market-bought eggs are an expensive source of protein although one egg costs only 50 cents.

iv. *Calculating the price of the reference protein equivalent in the food*

Perform the above calculations and then divide the answer by the NPU value and multiply by 100

Example:	Bean protein	Shs. 1.45 x $\frac{100}{47}$ = Shs. 3.00
	Fish protein	Shs. 1.27 x $\frac{100}{83}$ = Shs. 1.52
	Egg protein	Shs. 2.70 = $\frac{100}{100}$ = Shs. 7.70

It is then seen that usable protein from fish is much cheaper than beans. This is because more of it is used, i.e. the NPU has a higher score.

To make sure you understand these calculations, try the following:

The price of 100g of rice protein, when rice is Shs. 5.00 per kilo
The price of 100g of groundnut protein, when groundnuts are Shs. 12.00 per kilo
The price of beef protein, when beef is Shs. 10.00 per kilo
The price of fresh milk protein, when milk is Shs. 1.50 per ½ litre
The price of dried milk protein, when milk powder is Shs. 12.00 for 500g

and then calculate the price of the reference protein equivalent in the same foods.

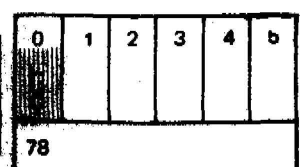
Chapter Fourteen

14.1 Using the growth chart

Filling out the Road-to-Health card (see sample inside back cover)
It is very important to fill out the card accurately. Because of the many crossing lines, the growth curves can be confusing to an untrained person and special care must be taken so that anyone writing on the card understands it completely.

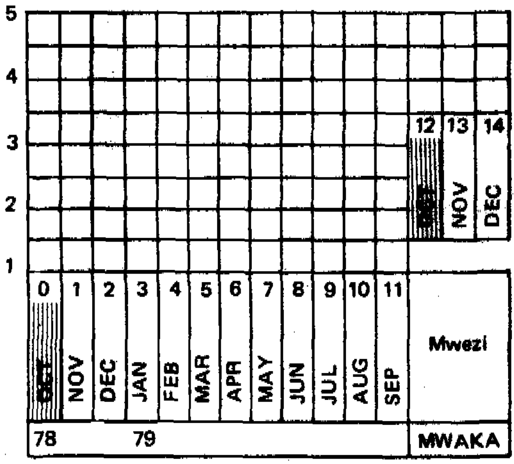
First fill in the names of the child, clinic, parents, village, etc. on the back of the card. The NAMBA YA MTOTO should be the clinic number of the child and this should also be recorded in a register for the clinic when the card is given to the child at birth or his first attendance (see Records, Section 14.8). Next, and perhaps the most important piece of information to record is the *birth month*. This must be done as accurately as possible because it will influence the position of all the rest of the growth curve. When the card is filled out at birth, of course, the exact date is known. But when children come to the clinic for the first time when they are older, it is often more difficult to know their birth month. If the mother does not remember the exact month, there are different ways of trying to calculate it. If the child is walking, he is usually 12 months or older. You can also count how many teeth he has and add six to that figure to get the approximate age in months, up to 2 years old. Or you can ask the mother additional questions about what time of year the child was born, harvest season, rainy season, etc., or whether it was before or after a particular holiday or event. When you are finally satisfied that you know the correct month, write it in the shaded box in the lower left hand corner of the card under O. You should also write the *birth year* in the box under the months. An example of this is below:

ALWAYS WRITE THE BIRTH MONTH IN EACH SHADED BOX



Once the birth month is recorded in the first shaded box, you should write the same month in each of the other *shaded boxes* at 12, 24, 36, and 48 months. This helps you to notice any later mistakes if someone leaves out a month. You can also fill in the other months between the birth months in the

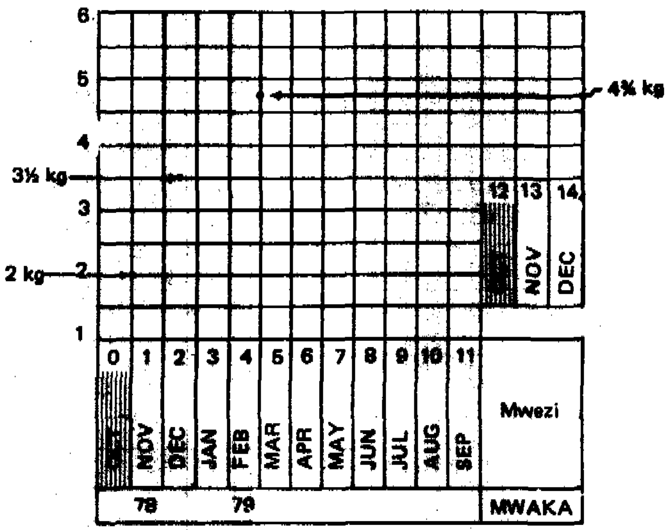
the empty boxes. It is faster to use abbreviations for each month, as the example below shows



A common mistake is for someone to write the month of the first clinic visit in the shaded box instead of the birth month. This would be correct only if the child's first clinic visit was during his birth month, within a few weeks after birth, which is often not the case. So be sure that it is always the *birth month* that is recorded in the shaded boxes.

You can see that the growth curve for each child can only start at the time of his first clinic visit. This may be at 2 or 3 months, or 6 months, or 10 months or actually any age during the first 5 years. For example, if a child first came to the clinic and had a growth card filled out at the age of 2 years, you would record his birth month in the first shaded box as usual, with the correct birth year below it. But then you would have to record the months and years in the boxes up to the present date, two years later, where you would record his weight. This would mean that the first two years on his card would be blank, and his growth curve could only start in the middle of the card at the current month.

When the correct months have been filled, at least up to the current month, you are ready to record the child's weight. The weight should be read from the scale to the closest ¼ kg. Since there are lines for every ½ kg, it is easy to record the weight to a ¼ kg accuracy by putting the dot either on the appropriate line or halfway between two lines.

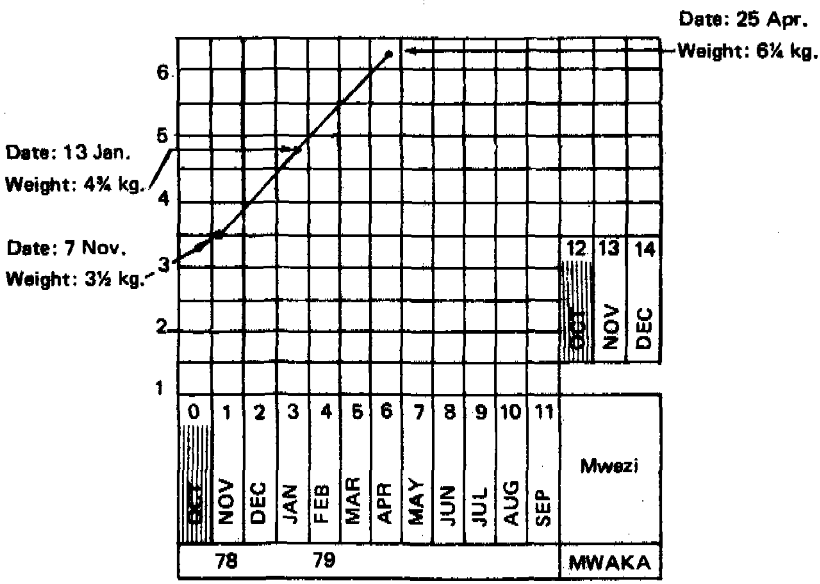


For charting the correct date of the clinic when the weight was measured, it is best to divide each month into 3 parts, days 1–10, 11–20, and 21–31. Then, depending on which of these parts of the month a particular clinic day fell in, you would put the dot in the first, middle, or last part of the box for that month. For example, see chart on next page.

Every time the child is weighed, his weight is recorded on the card above the correct part of the month in which the clinic was held. When each of these weighings is connected by a line, you have made a growth curve which shows the progress of that child. It is important to look at each weight that is recorded and see if it seems correct in relation to the previous weights. If one dot is a long way above or below the growth curve line that is being formed, you should recheck that dot. Perhaps the weight was misread from the scale or, even more commonly, it has been misplaced on the card and needs to be corrected. When you have to correct a dot, put an 'X' over it to show it was a mistake, then make a new dot in the right place.

Once the child's weight dot has been marked a line should be drawn from the last dot to the new dot to continue the growth curve. If there has been no weight gain for three months or a weight loss, a tick should be put after the correct risk factor at the top of the card. Be sure to put it above the same month as the weight dot.

Correct dot placement



There are three sections on the back of the card that must also be filled in. The first two sections (MAELEZO) are for writing in advice or notes about the child. Because these sections are not very big and must last for 5 years they must be used carefully. *All* treatment and advice from any clinic, including the outpatient clinic, should be recorded here along with the correct date. In this way the medical assistant or rural medical aid will know what has been done in the MCH clinic and the MCH clinic staff can read what has been done in the outpatient clinic. If a child has a major illness and needs to be seen often in the clinic, or admitted, other records should be kept and only a brief summary of the disease written on the growth card. In some cases a 'clinic' or 'continuation' card may need to be added to provide additional space for writing comments and advice.

The MAELEZO section of the card is also used to keep track of the exact date of each clinic visit and to give the child an appointment for his next visit. When a child is registered at the beginning of each clinic, the clerk writes the current date in the TAREHE column. Any recommendations from anyone seeing the child in the clinic on that day will be written next to this date. Then the date for the child's next appointment must be decided on. This return visit should usually be after one month if the child has not yet completed his immunizations. Do not tell healthy children to return too frequently or your clinic will become too big and mothers will get tired and stop coming. Sick children must usually return much sooner than one month for follow-up, and this will be written at the examination and advice station.

EACH CHILD SHOULD BRING HIS GROWTH CARD TO EVERY CLINIC

The following table serves as a guide for making these return appointments. When the *exact date* is decided on, it should be written in the TAREHE KURUDI column of the card, after the notes from the present visit. This will help to remind the mother when to return for the next MCH clinic visit.

Suitable reattendance intervals

			To come back after
1. Before completing vaccinations:			1 month
2. After completing vaccinations:		*Weight*	
(a)	below 3 years	In green field	3 months
		Underweight	1 month
		Falling underweight Kwashiorkor Marasmus	Refer or follow weekly
		Acute illness	1 day to 1 week
(b)	3 years and older	In green field	4 months
		Underweight	2 months
		Falling underweight Kwashiorkor Marasmus	Refer or follow weekly
		Acute illness	1 day to 1 week

ALWAYS GIVE A RETURN CLINIC APPOINTMENT TO EVERY CHILD

The final section is where the immunization record is written. There is a space to record when each dose of a vaccine is given. Do not just tick the boxes, but write in the actual date that each vaccination is given so an accurate record is kept. When successful BCG and smallpox immunization has been given and a scar forms, a tick should be put under KOVU.

14.2 Details of the antenatal card

Medical and obstetric history

This card (see inside back cover) is issued at the first clinic visit a mother makes after she knows she is pregnant. At this time the first section of the card is filled out, which includes the name of the clinic, her name, her age, her husband's name, etc. At the same time her name, age, and village are also recorded in a clinic register. It is best to have a separate page on the register for each village so you can record everyone from that village together. Then it is easy to know how many mothers from each area are attending and also to make home visits. All return antenatal visits are recorded on the tally sheet (MAHUDHURIO) only and not written in the register.

Below the area for writing in names is a summary of past pregnancies. First it asks how many deliveries a mother has had and how many children are now living. Below this are listed a number of risk factors (VIDOKEZO VYA HATARI) that come from previous pregnancies and other possible complications. These should all be asked about at the first visit when the card is issued. They are grouped in two separate boxes (see Section 14.6). The first group are not as serious and the instructions are to refer the mother to a health centre or hospital for delivery. This means she can continue to attend her regular MCH clinic during the antenatal period, but should make plans to go to a health centre or hospital for delivery because of the increased chance of complications.

The second box of risk factors are more serious and require a complete evaluation early in pregnancy. For this reason the instructions for these are to refer the mother to a health centre or hospital at the time of her first visit to the MCH clinic. Each risk factor has a box to tick so that anyone seeing the woman after that will know what factors are present.

At the bottom of this first section is a place to write in any other complications the mother may have (MAGONJWA MENGINEYO) that are a risk to pregnancy. These may include things like heart disease, a history of TB, diabetes, etc.

FILL IN SUMMARY OF PREVIOUS PREGNANCIES WHEN THE CARD IS ISSUED

Antenatal visits

The second section of the card is for routine antenatal visits with 12 common risk factors (VIDOKEZO VYA HATARI) listed at the top. Also at the top is a place to write in the date of the last menstrual period (TAREHE YA MWISHO KUINGIA MWEZINI) and the estimated date of delivery (TAREHE YA MAKISIO YA KUJIFUNGUA).

Down the left side are listed the various items that need to be checked or given at each antenatal visit. The date of the clinic is written first, then the woman's weight, and then her blood pressure. There is a box reminding that the upper limits of normal are 140/90. Next come the laboratory tests for haemoglobin and protein (albuminuria) in the urine with instructions to do these at the first visit and at 36 weeks. More frequent tests are recommended if there is any indication of abnormality. Again there are boxes showing the limits of normal—any haemoglobin below 8.5g (60%) or albuminuria of + or more are risk factors that require referral.

The next five items are part of the examination (KUPIMA). The first is oedema with a box showing that ++ or more is abnormal and should be referred. Then the age of pregnancy (UMRI WA MIMBA) and fundal height (KIMO CHA MIMBA) are asked for, both to be written as a number of weeks. It is then easy to compare these figures to see whether the fetus is of normal size, too large, or too small for its calculated age. The next items are the lie (MLALO WA MTOTO TUMBONI) and presentation (KIPI KINATANGULIA). There are three categories of lie which are recorded as longitudinal (KUNYOOKA), transverse (KUKINGAMA) and oblique (MSHAZARI). Presentation is either vertex (KICHWA) or breech (MATAKO). The final item is fetal heart rate. If there is a clock or watch in the clinic the actual rate can be recorded. Otherwise the rate is estimated as slow (POLE YA KAWAIDA, PK), normal (KIASI YA KAWAIDA, KK), fast (HARAKA YA KAWAIDA, HK), or very fast (HARAKA SANA, HS).

The last section includes the various medicines that are to be given. These are iron (tabs 2/day), folic acid (tab 1/week) and chloroquine (tabs 2/week). Note that the dose of folic acid now recommended is much less than many clinics are still using. The actual number of each kind of tablet that is given should be written in the box for that visit so it is easy to check at the next visit if the mother has used all of them or if some are remaining. Three doses of tetanus toxoid (PEPO PUNDA) are recommended which can be given at weeks 28, 32 and 36. If a mother first attends clinic before 28 weeks, it is good to start this series early so they can be spread even further than 4 weeks apart. If a mother has already had a series of three doses in a previous pregnancy, only one booster dose is necessary. The final item (MENGINEYO) is for any other medicines that may be given.

Below the medicine section is a place to record each time child spacing is discussed and the mother's reaction. The antenatal period is a good time for both mother and father to begin thinking and learning about child spacing.

Next come the places for the examiner to sign and write a specific date for a return appointment. Any additional notes or comments can be written under MAELEZO.

At the top of the card 12 risk factors are listed. These are all items that will be asked for or examined during the routine checks. It is important to know about each of these and to remember to put a tick if any one is present. The instructions are then to refer that mother to a health centre or hospital for further evaluation. All mothers with any risk factor should be referred as soon as possible except for those with the last two, which are suspected twins and abnormal lie. These two should be referred at 32 weeks or as soon afterwards as they are discovered.

Labour and delivery

On the back of the card is a large section for recording the progress of labour and its associated risk factors. At the top of this section is a place to write the name of the clinic, mother, and husband again because this section of the card may be separated from the first section and left in the clinic after delivery. Below this is a place to write the date and time of admission (KULAZWA), when labour started (UCHUNGU ULIPOANZA), and when the membranes ruptured (CHUPA ILIPOPASUKA). A vaginal examination should also be done on admission and the findings recorded.

The next main section is for recording the progress of labour (MAENDELEO YA UCHUNGU). Boxes for seven checks are shown, but lines can be drawn cutting some of these in half if more checks are made. Next comes the frequency of contractions (UCHUNGU KILA DAKIKA NGAPI). If there is a clock or watch, the actual number of minutes between contractions can be written; otherwise they should be estimated. Then strength of contractions (NGUVU ZA UCHUNGU) is written as weak (KIDOGO), medium (KIASI) or strong (KABISA). Fetal heart rate is then estimated or counted if there is a watch. Finally we record whether the liquor is clear or stained with meconium, the dilatation of the cervix, and medicines that are given, and the signature of the person who has made the examination.

Nine possible risk factors that may occur as a part of labour are listed at the bottom. If any one of these is present, the box after it should be ticked, and plans made to send the mother immediately to a health centre or hospital if at all possible. There are also four risk factors listed that may occur after delivery (BAADA YA KUZAA). These should also be ticked, and the patient referred if they are present. Other possible complications of labour and delivery may also occur. If they do they should be written on the card and the mother referred.

Summary of current pregnancy

The final section of the card is a summary of the complete pregnancy. After delivery this section can be cut from the rest of the card and given to the mother to keep. On one side is the summary of this pregnancy and on the other side is a summary of previous pregnancies. The mother should keep this part until she becomes pregnant again, and then bring the information to the clinic to use in filling out a new antenatal card for the new pregnancy.

The first section of this summary is about the antenatal period (WAKATI WA MIMBA) and if there were no complications the box is ticked. If there were complications these should be briefly explained. There is also a box to tick if the mother was immunised with tetanus toxoid, and if so how many doses she received. This will help in deciding how many doses to give in the next pregnancy.

The next section is about delivery (KUJIFUNGUA) and first asks for the place and date of delivery. The type of delivery is then recorded with a big box to tick if it was a simple vaginal delivery or four possible complications if it was not. If there was some complication not listed, this should be written in (MATATIZO MENGINE). Next is the third stage (HATUA YA TATU) with a big box for normal, two possible complications listed with boxes to tick, and a place to explain any other problem.

Next details of the child (HABARI KUHUSO MTOTO) are entered, showing his sex, weight, and whether it was a live birth, stillbirth, or neonatal death. Each child should be given a growth card at birth and there is a box to tick if this was done. He should also receive a BCG immunization which is recorded on this summary and also on his growth card, along with his birth date, birth-weight and any other important information. Finally he is given a specific date for his first clinic visit which is also written on both cards.

The final section asks which child-spacing method the mother may have decided to use so she can be given the needed supplies or referred if necessary.

Finally a decision should be made where to advise the mother to deliver her next pregnancy. This will depend on what risk factors or complications she has had and it is important to let her know now so she can make the right plans.

14.3 Use of the clinic tally sheet

The first section of the clinic tally sheet (see sample inside back cover) is for marking attendances (MAHUDHURIO) of children and mothers. One 0 is crossed for each mother or child that attends the clinic that day. Both the children's and mother's sections are divided into first attendances on the left and return attendances on the right. The children's section is also divided into those below 6 months of age and those between 6 months and 6 years. So for each child attending clinic, there are four possible sections he could be recorded under:

1st attendance/below 6 months; 1st attendance/6 months to 6 years; return attendance/below 6 months; and return attendance/6 months to 6 years. Pregnant mothers are divided into those before 32 weeks of pregnancy and those who are 32 weeks or more. This also gives four sections according to whether it is the mother's first visit or a reattendance and whether she is before or after 32 weeks of pregnancy. For any mother or child attending for the first time, a new clinic card should be filled out at the registration station and given to them.

Most daily MCH clinics will not have enough attendances to completely fill a sheet in one day. If this is the case a mark should be made in each section after the last attendance for that day, like this ØØØ|O. Then the totals for that day are counted and written on the monthly summary sheet (JUMLA YA MAHUDHURIO), MCH 3 (see example inside back cover). Attendances at the next clinic can then be marked on the same sheet, starting where the last clinic stopped. In this way, one tally sheet will probably last an entire month at a small dispensary clinic and maybe a week at a health centre.

The next section of the tally sheet is for recording diseases or complications (MAGONJWA AU MATATIZO). This is also divided into a section for children and a section for mothers. Only a few specific 'indicator' diseases or conditions are listed. These have been selected because they tell us certain things about the community, and can usually be diagnosed fairly accurately. The first three children's diseases–underweight, kwashiorkor, and marasmus–are diagnosed from the child's weight as marked on the growth card and whether he has oedema or not. The number of children in each of these categories tells us about the nutrition of the community. Next is severe anaemia, usually from hookworm, and diarrhoea, both of which tell something about sanitation in the community. Then measles (SURUA) is asked about because it is one of the most important communicable diseases, even though it is more difficult to diagnose. Since it is usually the last immunization to be given, the control of measles suggests that the other diseases that have been immunized against are probably also being controlled. Finally come other difficult diseases (MAGONJWA MENGINE MAGUMU KWAKO). These include anything that cannot be diagnosed or treated in the MCH clinic and needs to be referred.

ONE PERSON MAY HAVE SEVERAL 'INDICATOR' DISEASES: RECORD EACH ONE

The section for mothers is similar. Blood pressure over 140/90 and severe anaemia are some of the risk factors listed on the antenatal card and these are asked for on the tally sheet. The next complication asked is any mother with more than eight pregnancies, which should be recorded at the first attendance only, when the antenatal card is filled out and the obstetric history is taken. Any other complications of pregnancy (VIDOKEZO VINGINE VYA HATARI YA UZAZI) come next and these include any of the risk factors shown on the antenatal card. Next is any serious complication of a child-spacing method that a woman may have, and finally any other difficult diseases not related to pregnancy that require referral.

It must be re-emphasized that many other diseases will of course be diagnosed and treated in an MCH clinic in addition to those listed on the tally sheet. Complete details of what is done and the medicine given to each person will be written on their own cards. But on the tally sheet they will just be listed as attendances (MAHUDHURIO) unless they have one of the specific items listed under MAGONJWA AU MATATIZO. The MAGONJWA AU MATATIZO section of the tally sheet will be filled in at the examination/advice station because that is where these diagnoses are made. It is certainly possible to have two, three, or even four diagnoses made for one person and *each* of these should be recorded under the right item. At the end of the clinic a line is drawn after the last mark in each section, the totals counted up, and then written together with the totals from other sections on the summary sheet.

The first section on the back of the tally sheet is for child-spacing activities.

This may be done at a separate station in a large clinic or combined with the antenatal station in a small clinic. Education *about* child spacing should take place at other stations as well and be recorded on each mother's own antenatal card or her child's growth card. When she actually starts to use a child-spacing method, she is recorded on the clinic tally sheet as a first attendance under the method she is using, either pills (VIDONGE VYA UZAZI WA MAJIRA), the IUD (KITANZI), or other methods (NJIA ZINGINE). Each return visit for additional supplies or checks is recorded under MAHUDHURIO YA MARUDIO.

The next section is for immunizations, including the five immunizations given to children in the first part, and tetanus toxoid for pregnant mothers in the second part. These are given at the immunization station, where the actual date is written on the clinic card and then a 0 is ticked on the tally sheet for each one. BCG and smallpox revaccinations or booster doses are not listed separately but should be recorded together with primary immunizations. DPT, polio, and tetanus toxoid are divided into 1st, 2nd, and 3rd doses. Boosters of any of these should be recorded under the 3rd dose. At the bottom of the immunization section is a place to write in when other vaccines such as TAB or cholera are given.

The final section of the tally sheet—MAMBO MENGINE—includes food supplements (VYAKULA VYA NYONGEZA), malaria chemosuppression (KUZUIA MALARIA) and health education (MAFUNZO YA AFYA). Food supplements include corn soya milk (CSM), vegetable oil, or other local products. These should be given only to those children who are actually malnourished. Each child or mother that is given food is recorded on the tally sheet.

The Tanzanian national policy for malaria chemosuppression is to give chloroquine to all children under 5 and pregnant mothers living in malarious areas. In areas with only occasional malaria, chloroquine should be given only to those with other risk factors present, such as malnutrition. The tally sheet has a box to tick showing which of these two plans are being followed, or if there is no medicine or no malaria so nothing is being done.

Finally the health education topics that have been discussed in clinic are written in. On the summary sheet, the actual number of mothers and children receiving food supplements should be recorded. For malaria prevention and health education, only a tick is put on the summary sheet if they were given on that day.

There may be as many as three or four different tally sheets being used in each clinic—one at the registration station to record attendances, another at the examination station for MAGONJWA AU MATATIZO, maybe another at child-spacing, and yet another at the immunization station. At the end of each clinic the totals from each tally sheet are written on one summary sheet (JUMLA YA MAHUDHURIO), which becomes the official clinic record. At the end of the month these totals are added up and written at the bottom of the summary sheet and one copy is then sent to the district headquarters and one copy is kept at the clinic. The tally sheet is for use in the clinic only and can be thrown away when it has been all filled up and the totals transferred to the summary sheet. If only one section is full, however, such as attendances, use it in other stations for a while, such as diseases or immunization, until it is completely filled.

TRANSFER TOTALS FROM TALLY TO SUMMARY SHEET AT THE END OF EACH CLINIC

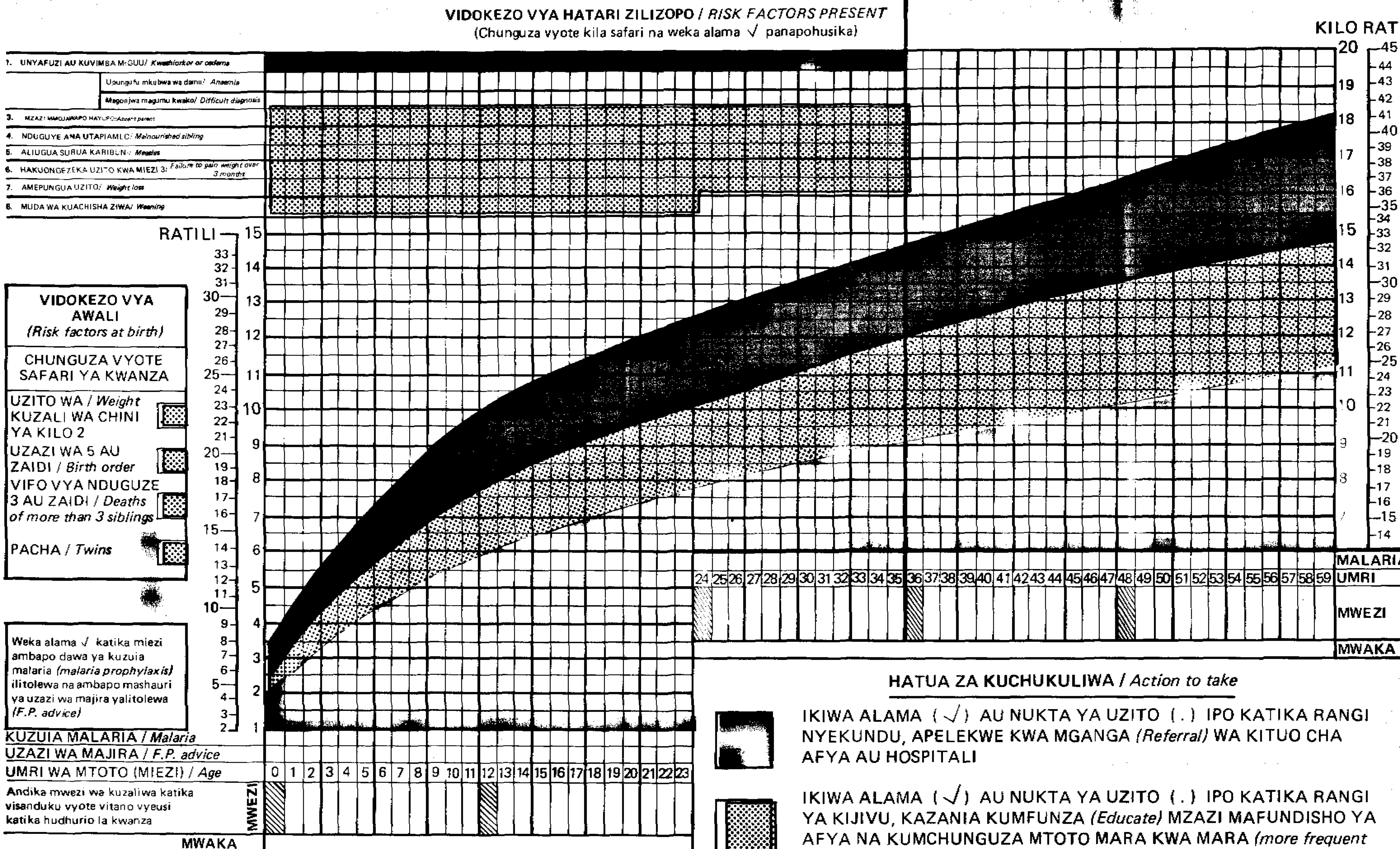
On the final section on the summary sheet is a record of all MCH supplies in stock. This includes all vaccines and other items like medicine, food supplements, cards, etc. and a space is provided to write in the amount received during the month, the amount used, and the amount of each item remaining at the end of the month. This information will help the district to know what supplies it needs to send out to each clinic for the following month.

At the district level the summary sheets from all the clinics are collected and the totals transferred over to a new district summary sheet. Instead of writing in each date on this sheet, each clinic is listed on the separate lines at the left of the sheet, with its monthly totals for each item. These are then added together to make a district total for the month. The amounts of MCH supplies received, used, and remaining at district headquarters are also entered. This supply record now is *not* a summary of the supplies reported from each clinic, but is a record of the supplies in the district headquarters store itself. Three copies of this district summary sheet are made, one to remain at the district, one to be sent to the region, and one to be sent directly to the MCH Unit in the Ministry of Health.

INDEX

I

THE ROAD-TO-HEALTH CHART (Appendix 14.1)



HATUA ZA KUCHUKULIWA / *Action to take*

IKIWA ALAMA (√) AU NUKTA YA UZITO (.) IPO KATIKA RANGI NYEKUNDU, APELEKWE KWA MGANGA *(Referral)* WA KITUO CHA AFYA AU HOSPITALI

IKIWA ALAMA (√) AU NUKTA YA UZITO (.) IPO KATIKA RANGI YA KIJIVU, KAZANIA KUMFUNZA *(Educate)* MZAZI MAFUNDISHO YA AFYA NA KUMCHUNGUZA MTOTO MARA KWA MARA *(more frequent surveillance)*

TAREHE	MAELEZO	TAREHE KURUDI

TAREHE	MAELEZO	TAREHE KURUDI

KADI YA KLINIKI YA WATOTO

Jamhuri ya Muungano wa Tanzania
Wizara ya Afya

Jina la Kliniki	Na ya mtoto
Jina la mtoto	MUME/MKE
Tarehe ya kuzaliwa	Uzito alipozaliwa KILOGRAMS/(RATILI)

Jina la baba		
Mahali mtoto anapoishi sasa	Mtaa/Kujiji	
	Jina la Balozi	

KUCHANJWA
(Andika tarehe hapa)

	1	KOVU (√)	Marudio kama kovu hakuna	MARUDIO
BCG bega la kulia				
NDUI bega la kushoto				

	1	2	3	MARUDIO
DPT				
KUPOOZA				
SURUA		X	X	

THE ANTENATAL CARD (Appendix 14.2)

KADI YA KLINIKI ZA MAMA WAJA WAZITO

Jamhuri ya Muungano wa Tanzania
Wizara ya Afya

Jina la Kliniki	Namba ya mama
Jina la mama	Umri wa mama
Jina la mume	
Jina la Balozi	Mtaa/Kijiji

HABARI KWA KIFUPI JUU YA UZAZI ULIOTANGULIA

Amezaa mara ngapi ________ Watoto wanaoishi sasa ________

VIDOKEZO VYA HATARI
CHUNGUZA VYOTE SAFARI YA KWANZA

WEKA ALAMA √ PANAPOHUSIKA NA MPELEKE KITUO CHA AFYA AU HOSPITALI KWA KUJIFUNGUA

- Umri chini ya miaka 16 ☐ Umri zaidi ya miaka 35 ☐
- Kimo chini cm 150 ☐ Kuchechemea au kupooza mguu ☐
- Zaidi ya mimba 8 .... ☐
- Matatizo ya kujifungua katika mimba za kutangulia (k.m. vakium, koleo za kunga, n.k.) ☐
- Matatizo ya hatua ya tatu katika mimba zilizotangulia ☐

WEKA ALAMA √ PANAPOHUSIKA NA MPELEKE KITUO CHA AFYA AU HOSPITALI AFIKAPO MARA YA KWANZA

- Zaidi ya miaka 10 imepita tangu mimba ya mwisho ☐
- Kupasuliwa tumboni katika mimba za kutangulia ☐
- Kuzaa mtoto mfu au kufa mtoto mchanga katika uzazi uliopita au kuzaa mtoto mfu au kufa mtoto mchanga zaidi ya mara moja katika uzazi wowote uliopita ☐
- Kuharibu mimba mara 3 au zaidi ☐

MAGONJWA MENGINEYO:

____
____
____

TAREHE YA MWISHO KUINGIA MWEZINI:

TAREHE YA MAKISIO YA KUJIFUNGUA:

VIDOKEZO VYA HATARI ZILIZOPO / *RISK FACTORS PRESENT*

(Chunguza vyote kila safari na weka alama ☑ panapohusika na mpeleke kituo cha afya au hospitali)

BP ZAIDI 140/90 ☐	KUTOKA DAMU TOKA NJIA YA UZAZI ☐	ANATAKA KUFUNGA NJIA YA UZAZI BAADA YA KUJIFUNGUA ☐
Hb CHINI YA 8.5gm (60%) ☐	KUFA MTOTO KATIKA TUMBO YA UZAZI ☐	MAGONJWA MENGINEYO MAKUBWA ☐
ALBUMIN KATIKA MKOJO ☐	MTOTO MKUBWA ZAIDI AU MDOGO ZAIDI KWA UMRI WAKE ☐	MPELEKE WAKATI WA WIKI 32 ZA MIMBA: UKIONA ANA MAPACHA ☐
KUVIMBA MIGUU ++ ☐	UMRI WA MIMBA ZAIDI YA WIKI 42 ☐	MTOTO AMELALA VIBAYA KATIKA TUMBO LA UZAZI ☐

TAREHE											
UZITO											
BLOOD PRESSURE 140/90											
PIMA KATIKA SAFARI YA KWANZA NA WIKI 36: UPUNGUFU WA DAMU (Hb) 8.5gm (60%)											
PIMA KATIKA SAFARI YA KWANZA NA WIKI 36: ALBUMIN KATIKA MKOJO											
KUPIMA: KUVIMBA MIGUU											
KUPIMA: UMRI WA MIMBA (WIKI)											
KUPIMA: KIMO CHA MIMBA (WIKI)											
KUPIMA: MLALO WA MTOTO TUMBONI											
KUPIMA: KIPI KINATANGULIA											
KUPIMA: MAPIGO YA MOYO WA MTOTO											
DAWA: IRON (Vid. 2/siku)											
DAWA: FOLIC ACID (Vid. 1/wiki)											
DAWA: CHLOROQUINE (Vid. 2/wiki)											
DAWA: PEPO PUNDA KATIKA WIKI 28, 32, NA 36											
MENGINEYO											
MASUNGUMZO JUU YA UZAZI WA MAJIRA											
SAHIHI YA MPIMAJI											
TAREHE YA KURUDI											
MAELEZO											

Jina la Kliniki	Namba	Jina la Mama	Jina la Mume

REKODI YA UCHUNGU

Kupima njia ya uzazi wa kulazwa (matokeo)

	Tarehe	Saa
Kulazwa		
Uchungu ulipoanza		
Chupa ilipopasuka		

MAENDELEO YA UCHUNGU

TAREHE / SAA								
B P	140/90							
UCHUNGU KILA DAKIKA NGAPI								
NGUVU ZA UCHUNGU								
KICHWA KIMEINGIA KIASI GANI								
MAPIGO YA MOYO WA MTOTO KWA DAKIKA								
MAJI YA CHUPA (SAFI AU MECONIUM)								
KUPIMA NJIA YA UZAZI (CM NGAPI)								
DAWA								
SAHIHI								

WEKA ALAMA √ PANAPOHUSIKA NA MPELEKE MARA MOJA KITUO CHA AFYA AU HOSPITALI IKIWA:

UCHUNGU

- CHUPA IMEPASUKA AU UCHUNGU KABLA YA WIKI 34 ☐
- MTOTO AU KICHWA CHA MTOTO KIMEKAA VIBAYA ☐
- KUTOKA DAMU WAKATI WA MIMBA ☐
- HOMA ZAIDI YA 38°C B P ZAIDI 140/90 ☐
- CHUPA IMEPASUKA ZAIDI YA MASAA 12 BILA UCHUNGU ☐
- UCHUNGU MKALI ZAIDI YA MASAA 12 BILA MAENDELEO ☐
- MAPIGO YA MOYO WA MTOTO CHINI 120 AU ZAIDI YA 160 AU MAJI YA CHUPA MACHAFU ☐
- KITOVU CHA KIZAZI KISICHOFUNGUKA VIZURI (CHINI YA 1cm/saa) ☐

BAADA YA KUZAA

- KUCHANIKA VIBAYA ☐
- KONDO LA NYUMA KUBAKIA NDANI ☐
- KUTOKA DAMU BAADA YA KUZAA ☐
- HOMA ZAIDI YA 38°C ☐

HABARI KWA KIFUPI ZA MIMBA YA SASA

WAKATI WA MIMBA

BILA MATATIZO ☐

MATATIZO YAMEGUNDULIWA ____

DAWA KUZUIA PEPO PUNDA IMETOLEWA KWA MAMA ☐

SINDANO NGAPI ____ HAIKUTOLEWA ☐

KUJIFUNGUA

MAHALI ALIPOZALIA ____ TAREHE ____

AINA YA KUJIFUNGUA

KUJIFUNGUA KAWAIDA ☐

KUVUTWA NA VAKIUM ☐ KUTANGULIZWA MATAKO ☐

KUPASULIWA TUMBONI ☐ KUZAA KWA KOLEO ZA UKUNGA ☐

MATATIZO MENGINE: ____

HATUA YA TATU

KAWAIDA ☐

KONDO LA NYUMA KUTOLEWA KWA MKONO ☐

KUMWAGIKA DAMU NYINGI BAADA YA KUZAA ☐

MATATIZO MENGINE: ____

HABARI KUHUSU MTOTO

MUME MKE UZITO ____ AMEZALIWA HAI ☐

AMEZALIWA MFU ☐ KAFA ANGALI MCHANGA ☐

KADI YA KUKUA KWA MTOTO IMETOLEWA ☐

BCG IMETOLEWA KWA MTOTO ☐

BCG HAIKUTOLEWA ☐

AMESHAURIWA KWENDA KLINIKI MARA YA KWANZA LINI

NJIA YA UZAZI WA MAJIRA ILIYOSHAURIWA

VIDONGE ☐ KITANZI ☐ MENGINE ☐ HAKUNA ☐

MAMA AJIFUNGULIE WAPI WAKATI UJAO

KLINIKI ☐ KITUO CHA AFYA ☐ HOSPITALI ☐

Jamhuri ya Muungano wa Tanzania
Wizara ya Afya

MONTHLY SUMMARY SHEET (Appendix 14.3)

KLINIKI YA AKINA MAMA NA WATOTO – JUMLA YA MAHUDHURIO

Mwezi ____________

Jina la Kiongozi ____________

Kliniki ____________

Wilaya ____________

	MAHUDHURIO								MAGONJWA AU MATATIZO													UZAZI WA MAJIRA					
	WATOTO				AKINA MAMA				WATOTO							AKINA MAMA						AKINA MAMA					
	MAHUDHURIO YA KWANZA		MAHUDHURIO YA MARUDIO		MAHUDHURIO YA KWANZA		MAHUDHURIO YA MARUDIO															MAHUDHURIO YA KWANZA			MAHUDHURIO YA MARUDIO		
Tarehe au Kliniki	CHINI YA MIEZI 6	MIEZI 6 MIA KA 6	CHINI YA MIEZI 6	MIEZI 6 MIA KA 6	KABLA YA WIKI 28	WIKI 28 NA BAADAYE	KABLA YA WIKI 28	WIKI 28 NA BAADAYE	UZITO UPUNGUFU 60-80%	UNYAFUZI (KWASHIORKOR)	UPOJAZO (MARASMUS)	UPUNGUFU MKUBWA WA DAMU	KUHARISHA	SURUA	MAGONJWA MENGINE MAGUMU KWAKO	BLOOD PRESSURE ZAIDI YA 140/90	UPUNGUFU MKUBWA WA DAMU	MIMBA 8 AU ZAIDI (Onyesha hudhurio la kwanza tu)	VIDOKEZO VINGINE VYA HATARI YA UZAZI	MATATIZO YA UZAZI YA MAJIRA	MAGONJWA MENGINE MAGUMU KWAKO	VIDONGE VYA UZAZI WA MAJIRA	I U D	NJIA ZINGINE	VIDONGE VYA UZAZI WA MAJIRA	I U D	NJIA ZINGINE
Jumla kwa mwezi																											

CHANJO ZINGINE		KUCHANJWA													MAMBO MENGINE		
NAMNA	JUMLA	WATOTO									AKINA MAMA					WEKA ALAMA √ KAMA YAMETOLEWA	
		BCG	NDUI	DPT			KUPOOZA			SURUA	PEPO PUNDA			VYAKULA VYA NYONGEZA		KUZUIA MALARIA	MAFUNZO YA AFYA
				1	2	3	1	2	3		1	2	3				
TAREHE AU KLINIKI																	
JUMLA KWA MWEZI																	

REKODI YA VIFAA NA DAWA

DAWA ZA KUCHANJA

	IDADI ILIOPOKELEWA	IDADI ILIOTUMIKA	IDADI ILIOBAKI
BCG			
NDUI			
DPT			
KUPOOZA			
SURUA			
PEPO PUNDA			
TAB			
HOMA YA MANJANO			
KIPINDU-PINDU			
KICHAA CHA MBWA			

VIFAA NA DAWA NYINGINEZO

		IDADI ILIOPOKELEWA	IDADI ILIOTUMIKA	IDADI ILIOBAKI
VIDONGE (kopo la 1000)	CHLOROQUINE			
	CHUMA			
	FOLIC ACID			
VYAKULA VYA NYONGEZA	Corn soya blend Mfuko wa kilo 25			
	MAFUTA (Videbe vya lita 4)			
UZAZI WA MAJIRA	VIDONGE VYA UZAZI WA MAJIRA			
	IUD			
KADI	WATOTO			
	ANTENATAL			
	UZAZI WA MAJIRA			
REKODI	MAHUDHURIO			
	JUMLA YA MAHUDHURIO			

MAELEZO AU MATATIZO

ATTENDANCE TALLY SHEET FOR MOTHERS AND CHILDREN (Appendix 14.3)

KLINIKI YA AKINAMAMA NA WATOTO — **MCH 2**

JAMHURI YA MUUNGANO WA TANZANIA — **REKODI YA MAHUDHURIO** — **WIZARA YA AFYA**

JINA LA KLINIKI ______________________ JINA LA KIONGOZI ______________________ TAREHE ______________

MAHUDHURIO

		MAHUDHURIO YA KWANZA				MAHUDHURIO YA MARUDIO						
WATOTO	CHINI YA MIEZI 6	00000	00000	00000	JUMLA	00000	00000	00000	00000	00000	00000	JUMLA
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000	______	00000	00000	00000	00000	00000	00000	______
	MIEZI 6 MIAKA 6	00000	00000	00000	JUMLA	00000	00000	00000	00000	00000	00000	JUMLA
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000	______	00000	00000	00000	00000	00000	00000	______

		MAHUDHURIO YA KWANZA				MAHUDHURIO YA MARUDIO						
AKINA MAMA	KABLA YA WIKI 32	00000	00000	00000	JUMLA	00000	00000	00000	00000	00000	00000	JUMLA
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000	______	00000	00000	00000	00000	00000	00000	______
	WIKI 32 NA BAADAYE	00000	00000	00000	JUMLA	00000	00000	00000	00000	00000	00000	JUMLA
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000		00000	00000	00000	00000	00000	00000	
		00000	00000	00000	______	00000	00000	00000	00000	00000	00000	______

MAGONJWA AU MATATIZO

WATOTO	UZITO UPUNGUFU 60-80%	00000	00000	00000	00000	00000	00000	00000	00000	00000	JUMLA
		00000	00000	00000	00000	00000	00000	00000	00000	00000	
		00000	00000	00000	00000	00000	00000	00000	00000	00000	______
	UNYAFUZI (KWASHIORKOR)	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	UPOJAZO (MARASMUS)	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	UPUNGUFU MKUBWA WA DAMU	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	KUHARISHA	00000	00000	00000	00000	00000	00000	00000	00000	00000	
		00000	00000	00000	00000	00000	00000	00000	00000	00000	
	SURUA	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	MAGONJWA MENGINE MAGUMU KWAKO	00000	00000	00000	00000	00000	00000	00000	00000	00000	
		00000	00000	00000	00000	00000	00000	00000	00000	00000	
AKINA MAMA	BLOOD PRESSURE ZAIDI YA 140/90	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	UPUNGUFU MKUBWA WA DAMU	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	MIMBA 8 AU ZAIDI (Onyesha hudhurio la kwanza tu)	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	VIDOKEZO VINGINE VYA HATARI YA UZAZI	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	MATATIZO YA UZAZI WA MAJIRA	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	MAGONJWA MENGINE MAGUMU KWAKO	00000	00000	00000	00000	00000	00000	00000	00000	00000	

UZAZI WA MAJIRA

AKINA MAMA

	MAHUDHURIO YA KWANZA NJIA INAYOANZA KUTUMIKA LEO				MAHUDHURIO YA MARUDIO NJIA INAYOENDELEA KUTUMIKA						
				JUMLA							JUMLA
VIDONGE VYA UZAZI WA MALARIA	00000	00000	00000		00000	00000	00000	00000	00000	00000	
IUD	00000	00000	00000		00000	00000	00000	00000	00000	00000	
NJIA ZINGINE	00000	00000	00000		00000	00000	00000	00000	00000	00000	

KUCHANJWA

WATOTO

											JUMLA
BCG	00000	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	00000	00000	00000	00000	00000	00000	00000	00000	00000	00000	
NDUI	00000	00000	00000	00000	00000	00000	00000	00000	00000	00000	
	00000	00000	00000	00000	00000	00000	00000	00000	00000	00000	

	CHANJO YA KWANZA				CHANJO YA PILI				CHANJO YA TATU			
DPT	00000	00000	00000		00000	00000	00000		00000	00000	00000	
	00000	00000	00000	JUMLA	00000	00000	00000	JUMLA	00000	00000	00000	JUMLA
	00000	00000	00000		00000	00000	00000		00000	00000	00000	
	00000	00000	00000		00000	00000	00000		00000	00000	00000	

	CHANJO YA KWANZA				CHANJO YA PILI				CHANJO YA TATU			
KUPOOZA	00000	00000	00000		00000	00000	00000		00000	00000	00000	
	00000	00000	00000	JUMLA	00000	00000	00000	JUMLA	00000	00000	00000	JUMLA
	00000	00000	00000		00000	00000	00000		00000	00000	00000	
	00000	00000	00000		00000	00000	00000		00000	00000	00000	

SURUA	00000	00000	00000	00000	00000	00000	00000	00000	00000	00000

AKINA MAMA

	CHANJO YA KWANZA				CHANJO YA PILI				CHANJO YA KWANZA AU MARUDIO			
PEPO PUNDA	00000	00000	00000		00000	00000	00000		00000	00000	00000	
	00000	00000	00000	JUMLA	00000	00000	00000	JUMLA	00000	00000	00000	JUMLA
	00000	00000	00000		00000	00000	00000		00000	00000	00000	
	00000	00000	00000		00000	00000	00000		00000	00000	00000	

CHANJO ZINGINE NAMNA ______ JUMLA ______ NAMNA ______ JUMLA ______ NAMNA ______ JUMLA ______

MAMBO MENGINE

VYAKULA VYA NYONGEZA	ITOLEWE KWA WATOTO WENYE UTAPIAMLO TU	00000	00000	00000	00000	00000	00000	JUMLA
		00000	00000	00000	00000	00000	00000	
		00000	00000	00000	00000	00000	00000	

KUZUIA MALARIA

IMETOLEWA KWA WATOTO NA AKINA MAMA WENYA MIMBA ______ ☐

IMETOLEWA KWA WENYE VIDOKEZO VYA HATARI TU ______ ☐

HAYAKUTOLEWA ☐ SABABU: HAKUNA DAWA ☐ HAKUNA MALARIA ☐

MAFUNZO YA AFYA

YAMETOLEWA ☐ SOMO: ______

HAYAKUTOLEWA ☐ SABABU: ______

MAELEZO AU MATATIZO

COMMENT SHEET

The editors would welcome any comments that you may have for improving a reprint of this manual. Suggestions for additions, deletions and corrections should be sent to:

The Editor
Community Health Manual
AMREF, P O Box 30125
Nairobi

Chap.	Page	Comment

P.T.O.

Chap.	Page	Comment

Name and address if you would like a reply:

. . . .

. . . .

. . . .

Thank you.