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INDICATORS FOR THE CONTROL OF DIARRHOEAL DISEASES PROGRAMME IN WEST JAVA, INDONESIA

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Indicators for the Control of Diarrhoeal Diseases Programme in West Java, Indonesia

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SUMMARY

In this thesis, the health problem of diarrhoeal diseases in West Java has been discussed. The main focus is on contributing factors, intervention programmes, and indicators for monitoring and evaluation of selected programmes. These indicators were confined to programme activities and effectiveness, like behavioural changes. It was found that measuring health impact is difficult, since many factors influence and contribute to any impact. Studies on health impact are costly, time consuming, and give inconsistent results due to differences in design, location, combinations of interventions, and characteristics of the population.

Factors contributing to diarrhoea-related morbidity and mortality were: education of mothers; feeding practices of infants and children and food safety; accessibility and use of water and sanitation facilities; personal and domestic hygiene and disposal of excreta; immunization against measles; and accesibility to health facilities. The main underlying factor is the socio-economic position of households, and their beliefs and practices, which influence the above-named factors.

In West Java, the main CDD intervention programme is case management of diarrhoea, at home and at health facilities, particularly aimed at prevention and treatment of dehydration. This programme is supplemented by preventive programmes, like promotion of breastfeeding and improved weaning practices, immunization against measles, use of safe water, latrines and safe disposal of stools, and promotion of handwashing. Collaboration is sought with related Directorates in the Government, responsible for these programmes. Research is in process on the most effective ways to implement preventive strategies.

Indicators for monitoring and evaluation of case management used in West Java, are those recommended by WHO. Especially, the reliability and validity of the indicator 'ORS use rate' was discussed. Knowledge of mothers is also an important indicator; it needs, however, to be studied regularly to detect changes over time, in order to adapt messages. Selection of priority preventive activities is still in process, and appropriate indicators have not yet been defined in West Java. The author selected preventive activities related to water and sanitation to discuss indicators to be used. Recent issues in monitoring and evaluation of water supply and sanitation, especially concentration on user behaviour, and involvement of the community in monitoring and evaluation, served as a basis for recommendations on possible indicators.

CHAPTER I INTRODUCTION

1.1. Background

The subject of this thesis deals with diarrhoeal disease, its multiple causes and interventions for control. Special attention is paid to indicators to monitor the effects of some of the intervention programmes, which approach this health problem from different points of view.

Interest in this health problem and its multiple approaches evolved during my work abroad. After graduation in Social Geography of Developing Countries, with a specialization in medical subjects, I started to work in a regional planning programme in the province of West Java, Indonesia. There I was involved, among other things, with the planning of the health sector for the Fifth Five Year Plan (1989/90 - 1993/94) for the district of Sukabumi. While looking at infant and child morbidity and mortality patterns it became clear from the data that diarrhoeal diseases were one of the major causes. This health problem became closer during my work in a sanitation programme in West Java and during my work for UNICEF in Pakistan in a water, sanitation and hygiene education project. One of the broad objectives in the Pakistan project was to improve the quality of life with the ultimate objective of reducing mortality and morbidity of children, particularly related to diarrhoea. I encountered the difficulty of measuring the impact of specific water, sanitation and hygiene education activities on diarrhoea-related morbidity and mortality, since many other factors contribute to the problem. My interest was raised in how to solve this difficulty.

While reviewing literature, I noticed that it was mentioned in many studies that it is difficult to measure impact on morbidity and mortality; when changes are detected, it is difficult to attribute them to specific interventions. Therefore, it is better to look at programme output (either effective programme implementation or changes in behaviour). The assumption can be made, based on scientific studies and experiences, that this output will contribute to the intended impact.

In this thesis I will look into factors which contribute to diarrhoeal diseases, and how their influence is exerted. Further, I will look at the outcome of some studies which measured the health impact of selected intervention programmes on diarrhoeal diseases. Then, I will look at indicators to monitor and evaluate programme activities and their effectiveness. The province of West Java will be the context of the study.

1.2. Study approach

In this study on diarrhoeal diseases in the West Java context, I will first describe the severity of the problem and then look into factors contributing to it. Linkages of these factors will be shown in a "problem tree". Then, intervention programmes which are undertaken in West Java and their goals and targets will be discussed. Further, I will look into the outcome of some studies which measured health impact on diarrhoeal diseases. No studies were found on West Java, therefore other examples will be given. Then, indicators will be discussed for selected intervention programmes to monitor and evaluate their programme activities and their effectiveness. In West Java, most of the indicators are defined for activities related to case management of diarrhoea, and not for interventions to prevent diarrhoea. Selection of priority preventive activities is now in process. Therefore, examples from studies found in the literature will be given. This information will serve to suggest which indicators might be used for monitoring and evaluation of selected interventions in the West Java context.

1.3. Study objectives

The main objective of this study is to identify indicators for monitoring and evaluation of activities and effectiveness of selected intervention programmes for the control of diarrhoeal diseases in West Java, and to make recommendations as to which indicators would best serve for evaluation and monitoring purposes.

Specific objectives

1) To identify and describe factors contributing to diarrhoea-related morbidity and mortality, especially for children under the age of five years.

2) To explore and describe the interventions undertaken in West Java for control of diarrhoeal diseases and their goals and targets.

3) To identify indicators for selected intervention programmes to monitor and evaluate programme activities and effectiveness.

1.4. Methods of gathering data

For this study, primary and secondary data were used which were gathered in West Java in 1988 while preparing a five year plan for the health sector. Interviews were held with staff of the provincial Health Office and the provincial Health Department and with staff from the Diarrhoea Disease Control Working Group in Bandung. Also documents from the West Java regional plan for the period 1989/90 - 1993/94 were reviewed. Information and documents on population, their socio-economic situation and health provided background. Also data were used from a study on sanitation behaviour in two towns in West Java in 1988, which was carried out to prepare a hygiene education programme for small towns in this province. Documents on the Control of Diarrhoeal Diseases (CDD) programme in Indonesia and West Java were also reviewed. Data gathered in West Java, is from the period 1980-1988. In as far as possible more recent information was included.

Further, a literature survey was done to find factors contributing to this health problem, and indicators used to monitor and evaluate programme activities and effectiveness. Literature on these topics was not confined to that on West Java, but examples from several countries were selected for comparison.

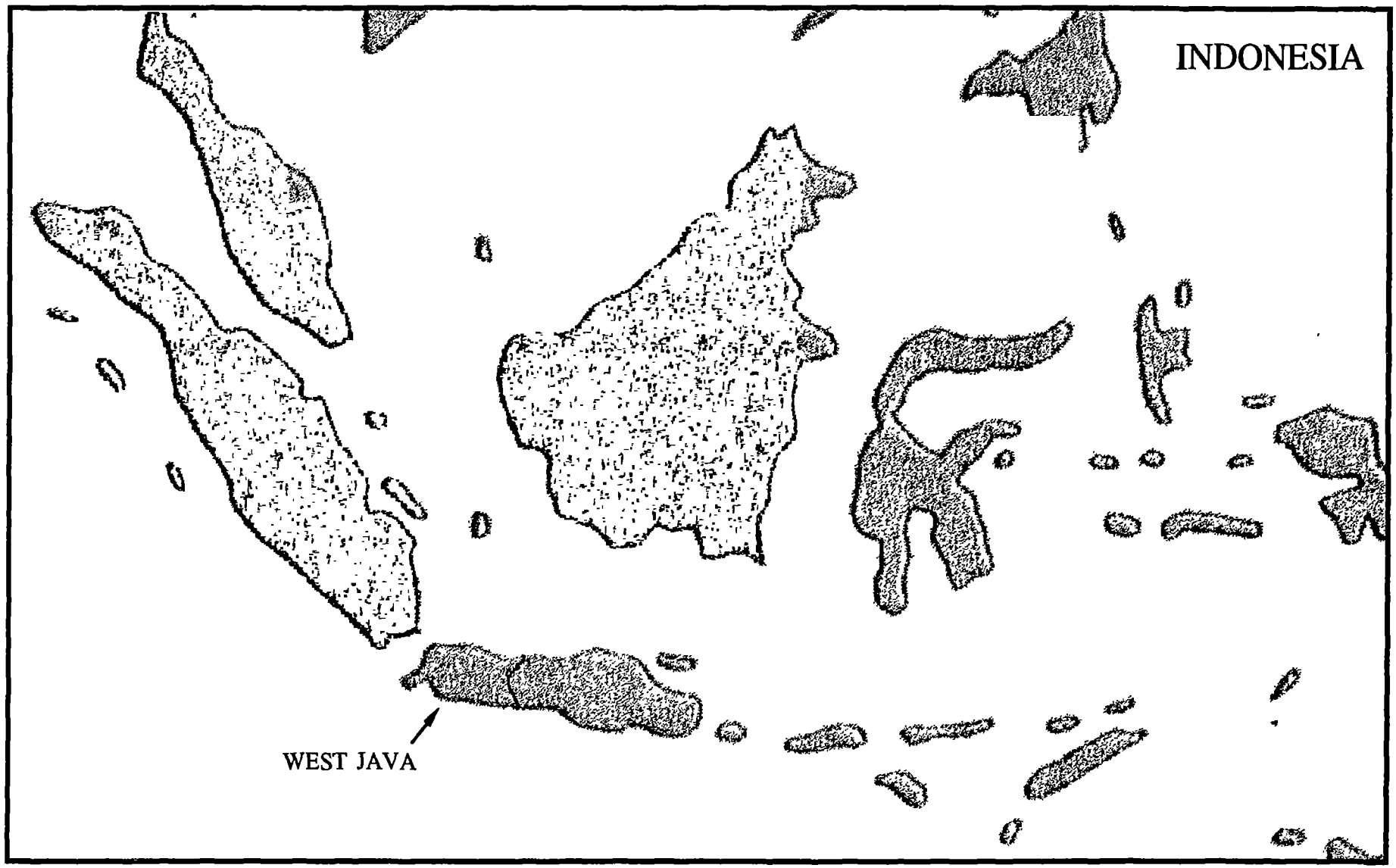
In the next chapter, some general background information on West Java and a brief overview of its health situation will be presented.

In Chapter III, the problem of diarrhoeal diseases and factors contributing to this problem will be discussed.

Then, in Chapter IV, intervention programmes for the control of diarrhoeal diseases and their goals and targets will be described.

The impact of a few selected intervention programmes and the indicators to monitor and evaluate programme activities and effectiveness will be discussed in Chapter V.

Finally, in Chapter VI, I will present conclusions and recommendations about the indicators which might be used in West Java for monitoring and evaluation of intervention programmes in CDD.


INDONESIA
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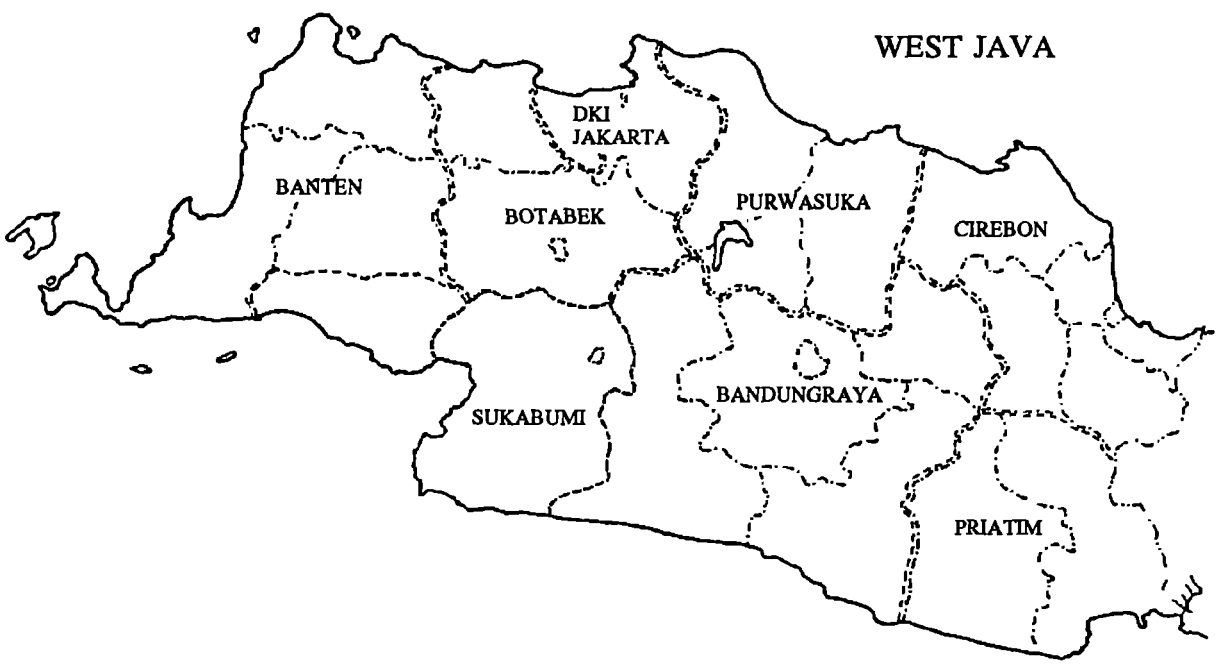
CHAPTER II SOME GENERAL CHARACTERISTICS OF WEST JAVA PROVINCE AND ITS HEALTH SITUATION

2.1. Some general characteristics of West Java province

West Java is one of the twenty-seven provinces of Indonesia. It is divided into seven development regions, which again are sub-divided into districts, municipalities, sub-districts and villages.



2.1.1. Population structure

The estimated number of inhabitants was 30,830,365 in 1985 (49,8% male and 50,2% female). The estimated number of children under the age of five years was 4,227,026 or 13.7%. About 80% of the population lives in the countryside. The average population density was 714. In the period 1980 - 1985, annual population growth was estimated at 2,35%, mainly caused by natural increase and partly by the net migration rate. The estimated crude birth rate (CBR) was 3.9% and the crude death rate (CDR) was 1.4% in 1980, resulting in a rate of natural increase (RNI) of 2.5% (1).

2.1.2. Education

The government of Indonesia has given a high priority to education. Since 1987, primary education is compulsory. In 1980 about 75% of the population of 10 years and older was literate (able to read and write) (1). Enrollment ratios for all age groups are higher in urban than in rural areas. More women than men have no schooling. In West Java the literacy rate in towns was 96.1% for males and 89.1% for females, while in the countryside the rates were 88.1% and 75.5% (1985) respectively (2). This might be due to an uneven spatial distribution of primary schools in the countryside, a reluctance of teachers to work in remote areas, or reluctance of parents to send children, especially girls, to school.

2.1.3. Economic activities and income

The main employment in West Java is in the agricultural sector (64.9%), followed by trade (18.6%), public services (14.5%) and manufacturing industry (10.7%) (estimated figures for 1985). Reliable information on income and wages is scarce. The minimum regional wage in West Java in 1987 was Rp. 750,- a day (approximately US$ 0.50,-, 1987); usually additional meals or rice are provided. In general, minimum wages are too low to make a living, especially for families with children attending school. Therefore additional work has to be sought, by the men, women or children, making an extra burden for female-headed households, which comprise 13-20% of all households (2).

The Central Bureau of Statistics in Indonesia bases the definition of poverty on the money value of a diet providing 2100 calories per person per day (the Indonesian minimum standard) plus an amount representing the value of non-food necessities such as housing, clothing, school and medical expenses. In 1984, about 22% of the Indonesian population lived below the poverty line. The incidence of poverty varies for educational levels, occupational groups and types of households. Especially female-headed households have a high incidence of poverty, as well as farmer households. In West Java, the income share of the lowest 40% of the population was 23% of the total income (3).

2.2. Health situation in West Java

In Table 1, an overview is given of health indicators related to targets for the Fourth National Five Year Plan (*Repelita IV*) in Indonesia (1984/1985 - 1988/1989). The health situation is measured by indicators 1 - 4 and further by morbidity data. Indicators 4 - 11 give an idea of the effort of the government to make health facilities available, but say very little about the use and the quality of the health services.

Most of the indicators will be discussed in Chapter III; below, some remarks are made on a few of the indicators.

Data on the infant mortality rate (IMR) cannot be considered very reliable, since only the reported cases are known, and reports from health institutions are sometimes incomplete. UNICEF classifies high infant mortality countries as those with an IMR of 60 - 100 (1984). The West Java figure scores within this range. In 1986/87, it had not yet reached the national target of 70 per 1000, although the rate had declined since 1983/84.

Lowering of the IMR is an important factor in raising the life expectancy at birth. The target set by health officials in West Java is 52.4 years for men and 55.5 years for women (average 54). In 1985, West Java had already reached this target.

In 1986/87 the under-five mortality rate (U5MR) was 72 per 1000, which was an improvement since 1983/84. In the Fourth Five Year Plan no targets were indicated to use as a reference. UNICEF classifies high U5MR countries as those with an U5MR of 71 - 140 (1991).

With regard to morbidity (not presented in the table), it is important to note that many illnesses are under-reported. Therefore, only a ranking can be given in order of frequency of reported illnesses. In West Java flu is most often reported, followed by skin diseases, disorders of respiratory tract, and diarrhoea (4). According to the Provincial Health Department in West Java, the major illnesses of infants and children under the age of five years, reported by 79% of the health centres in 1986, were: flu, diarrhoea, skin diseases and disorders of respiratory tract. These illnesses are comparable to overall morbidity figures reported for West Java.

Table 1: Health indicators for West Java province related to national targets

Health indicator	target *Repelita* IV a)	West Java data 1983/1984	West Java data 1986/1987
1. Infant Mortality Rate	70 per 1000	113	94 1)
2. Life Expectancy at Birth	59 years 54 years b)	51.5	57 1)
3. Under 5 Mortality Rate (per 1000)	n.a.	170	72
4. Incidence of bad nutritional status for children under the age of five	3,1% b)	4.4%	2.4% 2)
5. Inhabitants per *puskesmas*	30,000	52,000	46,200
6. *Puskesmas pembantu per puskesmas*	2 - 5	1,04	1,4
7. Children under the age of five years per *posyandu*	100	n.a.	134
8. Inhabitants per doctor (including specialists)	30,000	19,500	17,300
9. Accessibility to clean water	55% for rural areas 65% for urban areas	35%	39.7%
10. Accessibility to family latrines	42% for rural areas	6.0%	7.0%
11. Immunization rate of			
BCG	80% b)	66 4% 1)	71.9%
DPT	60% b)	40.4% 1)	59.3%
Polio	50% b)	48.7% 1)	55.3%
Measles	60% b)	34.5% 1)	49.1%

a) National target for 1989 (source: 5)
b) West Java target for 1989 (source: 6)

1) 1985
2) 1985/86

Source: (4), (5), (6)

CHAPTER III THE HEALTH PROBLEM OF DIARRHOEAL DISEASES IN WEST JAVA AND FACTORS CONTRIBUTING TO THIS PROBLEM

3.1. Health problem of diarrhoeal diseases in West Java

As indicated in Table 1, in West Java the reported U5MR was 72 (1985), and the reported IMR was 94 (1986).

According to the Health Office in the province of West Java, the most important factors causing infant mortality in 1986 in West Java were: diarrhoea, disorders of respiratory tract, neonatal tetanus, and other neonatal illnesses.

In 1982, an investigation was carried out in Sukabumi (a district in West Java) to identify factors causing mortality of infants. The main reported cause for infants from 0-1 months was neonatal tetanus (41,1%). For infants from 1-11 months, the main reported causes were infectious diseases, in particular diarrhoea (39,5%), and respiratory infections like bronchitis and asthma (30,2%) (4). The same pattern of mortality factors was reported from a survey in seven provinces in Indonesia (including West Java) in 1986, indicating that diarrhoea and respiratory infections are of major importance later in infancy. They accounted, together with measles, for almost 60% of post-neonatal mortality (3). In the same survey, it was found that the two major cause categories of death in the 1-4 age group were diarrhoea and the immunizable diseases, measles, diphteria, whooping cough and tetanus. These causes were responsible for more than half of the total mortality (respectively 26,4% and 27,6%). Also in a report of the Diarrhoea Disease Control Working Group, West Java Province Health Department, it was mentioned that about 25% of all deaths among under-fives were related to diarrhoea and that the proportion for weanlings may be much higher (7).

As was mentioned in Chapter 2.2., diarrhoea is one of the most reported illnesses in West Java. In the above mentioned survey, it was mentioned that diarrhoea was the second most important cause of illness among infants and children aged 1-4, contributing respectively 15% and 11% to the total morbidity (estimated figures for 1986).

From the above it is clear that the health problem of diarrhoeal diseases makes a major contribution to the existing pattern of infant and child morbidity and mortality in West Java (and other provinces in Indonesia).

In Table 2, more details about incidence and case fatality rate (CFR) of diarrhoeal diseases in West Java are shown for the years 1983/1984 and 1986/1987.

Table 2: Incidence rate of diarrhoeal diseases per 1000 inhabitants and Case Fatality Rate per 100 cases of diarrhoea for 1983/84 and for 1986/87 in West Java province

Year	Total cases	Number of persons died	Incidence Rate	Case Fatality Rate
1983/84	225,671	93	7,7 per 1000	0,04
1986/87	889,206	75	27,9 per 1000	0,008

Source (4)

The number of reported cases (all population) increased between 1983/84 and 1986/87, as did the incidence rate. This might be due to an improved reporting system. The case fatality rate decreased, which might be due to the activities of health centers in diarrhoeal control, like providing oral rehydration solutions. The number of health centers participating in the diarrhoeal control programme, which started in 1981, increased from 70 in 1983/84 to 315 in 1987 (4). According to Sutoto, the data still show only 8%-12% of the estimated incidence of diarrhoeal diseases, and 5% of CFR in the community (8).

In 1990, WHO carried out a diarrhoea morbidity survey in West Java, using a 30-cluster sample (9). This survey among 12,756 children under the age of five years provided the following data:

Prevalence in the last 24 hours	1.0%
Prevalence in the last 2 weeks	6.2%
Incidence (started in last 2 weeks)	4.7%
Episodes of diarrhoea per year	1.032

The incidence rate of 4.7% is already much higher than the rate shown for the whole population in 1986/87, Table 2.

With regard to episodes of diarrhoea, the West Java Diarrhoea Disease Working Group, reported an average annual diarrhoea attack rate of 2.8 or more, noting that the variation was broad. Among poorer children and among weanlings (age 4-24 months), the rate may be 6-8 episodes per year, or higher (7).

3.2. Factors contributing to diarrhoeal diseases

Several factors contribute to the health problem of diarrhoeal diseases. The main underlying factor is the socio-economic position of households. Income levels influence expenditure patterns. A survey in 1984 revealed that lowest income groups spend about 70% of their income on food, while at the upper income levels food accounted for only 33%-43% of per capita expenditure (3). Income will also influence, among other things, expenditure on education and therefore knowledge (like knowledge of breastfeeding, weaning foods, use of oral rehydration therapy in case children have diarrhoea and the

importance of immunization). Also accessibility to water and sanitation facilities and health facilities will be influenced. As will be discussed below, these are important factors influencing prevention and treatment of diarrhoeal diseases. Also culture plays a role, the beliefs and practices of the population influence the effects of the other factors. An overview of these factors and the relationships among them is depicted in a "problem tree", in Annex I. Examples from other studies will be discussed to clarify some of the contributing factors that may be important in West Java.

3.2.1. Education of mothers

In West Java, about 93% of the age group 7-12 years attended school in 1985. More boys than girls attend primary school. In lower and higher secondary education, participation of women is even lower. This might be attributed to availability and costs of secondary education facilities and the view in society that women's primary task is to take care of their families (1, 2). A World Bank report stated: "When educational facilities are available and accessible (proximity and costs), daughters are likely to be given equal opportunity with sons. When resources are limited, however, preference is given to boys who can attend school longer or to older ages than girls." The same report mentioned that infant mortality is strongly related to the education level of the mother. Children of mothers with no education have almost a 50% higher probability of dying during infancy than children of mothers with six or more years of schooling. Lack of education and basic skills are attributed to low productivity, poor health and poor family welfare (10).

In a study carried out in Sukabumi, mention was made of factors contributing to treatment of diarrhoeal diseases. The majority of the people came late for treatment. This was attributed to the fact that the education of the population was low. It was also pointed out that being unable to read decreases the accessibility to written health messages (4).

Education influences the mothers' knowledge and treatment of diarrhoeal diseases. The Manager of the Programme for Control of Diarrhoal Diseases, Ministry of Health, Indonesia, also mentioned the education of women: "Improved living standards, increased Gross National Product (GNP), better access to safe water and the good personal and domestic hygiene that results from higher education, especially among women, have reduced diarrhoeal morbidity as well" (8). Literacy among women is however still low, especially in rural areas.

3.2.2. Feeding practices of infants and children under the age of five years and food safety

In a review of 35 studies by Feachem and Koblinsky, it was found in most of the studies that infants receiving exclusive breastfeeding were better protected against diarrhoea compared to infants receiving partial or no breastfeeding. Exclusive breastfeeding for infants beyond six months of age was not recommended and considered as a possible risk factor, rather than a protective factor for diarrhoea. Above 1 year of age, no protective

effect of breastfeeding was evident (11, 17).

De Zoysa et al. also concluded from more recent studies, in Peru, the Philippines and Brazil, that exclusive breastfeeding to infants younger than six months, is clearly associated with the lowest risk of diarrhoea. Breastfeeding appears to be particularly protective against persistent or severe diarrhoea (12).

Breast milk gives protection because:
- it has anti-infective properties;
- it is associated with improved growth, at least during the first months of life, thereby reducing the risk of severe and persistent diarrhoea, and death from diarrhoea which is associated with poor nutritional status;
- it has a role in the prevention and management of diarrhoea-related dehydration; and
- breastfed children have reduced exposure to contaminated foods and fluids (like contaminated bottle teats and feeding bottles). (12)

In a review of studies on weaning foods, from several countries, it was found that the incidence of diarrhoeal diseases was especially high after weaning food was initiated. Weaning foods prepared under unhygienic conditions are frequently heavily contaminated with pathogenic agents. The level of contamination was related to time between preparing food and consumption, storage, and insufficient cooking or reheating of stored food. Also, food was often contaminated with faecal matter (related to lack of sanitation and contaminated water, or touching food with contaminated hands) (see also 3.2.4.). Further, other conditions like food habits and beliefs, taboos, ignorance, and poverty have implications for food safety. Possibly up to 70% of diarrhoeal episodes could be due to pathogens transmitted through food, prepared under unhygienic conditions. In the same review, it was noted that especially diarrhoea has a significant negative effect on growth: a high frequency of diarrhoeal infection reduced weight gain (13).

The National Manager of the Control of Diarrhoeal Disease Programme in Indonesia stated that the problem of under-nutrition is clearly recognized as one of the most important single factors affecting child survival and development in Indonesia. It consists of a vicious circle of low birth rate, under-nutrition, illness (including diarrhoea) and death. Of all infectious diseases, the diarrhoeal diseases (along with measles) have the greatest adverse effect on growth of children in Indonesia. Poor nutritional practices and poor consumption pattern, breast-feeding withdrawal and improper weaning practices, and inadequate production techniques together with limited food availability at household level were mentioned as underlying causes of these nutritional problems. Malnourished children have more severe diarrhoea and its vicious circle leads to persistent forms of diarrhoea with a high case fatality rate and long lasting effects on the quality of life (8).

A study in Sukabumi (West Java) revealed that many mothers throw away colostrum because it is considered dirty or spoiled so it could cause stomach pain. In general, infants already receive additional food before the age of four months. There is also a belief that young children should not eat fish (4). Other data on breast-feeding and weaning practices in West Java are not known as yet.

West Java data on the nutritional status of children under the age of five years for 1985/86 show that 64.9% had a good nutritional status, for 32.7% of the children the status was insufficient, while 2.4% of the children had a bad nutritional status. The latter is shown in Table 1 on page 8, indicating an improvement since 1983/84 and the national target already reached (4).

From the above data it can be seen that feeding practices and food safety can contribute to the health problem of diarrhoeal diseases.

3.2.3. Accessibility and use of water and sanitation facilities

The data in Table 1 reveal that access to clean water in rural areas increased from 35% in 1984 to 40% in 1986. This indicates a low accessibility and slow growth. Accessibility to latrines is even much lower (7%), and far below the target of 42%. It is assumed that the accessibility to latrines in towns is higher than in the countryside (5, 6). These figures do not indicate whether the facilities work properly and, especially with regard to latrines, whether they are used. Drinking water, for which water quality is important, is mostly obtained from wells, often not covered, with a risk of contamination. This low accessibility (or use) of these facilities, and the use of contaminated water contribute to the high incidence of diarrhoeal diseases.

3.2.4. Personal and domestic hygiene and disposal of excreta

Feachem stated that: "Most of the pathogenic organisms that cause diarrhoea, and all the pathogens that are known to be major causes of diarrhoea in many countries, are transmitted primarily or exclusively by the faecal-oral route....Faecal-oral transmission may be water-borne, food-borne, or direct. Water-borne transmission may occur when water contaminated by faeces is drunk. Food-borne transmission may occur when food contaminated by faeces is eaten. Direct transmission is used here to describe an array of other faecal-oral routes such as fingers, or objects such as eating utensils, or bed linen, or dirt which may be ingested by young children." (14)

Therefore, to prevent diarrhoeal diseases, it is very important to implement good personal and domestic hygiene practices as well as a safe disposal of excreta.
Personal hygiene refers to water used for cleaning the body, including bathing and washing the eyes, face, or hands. Domestic hygiene refers to the use of water in keeping the home clean, as well as cleansing those components of the home environment that are related to pathogen transmission, like food, clothes, utensils, floors, counter tops, or towels. (15) In this respect, the quantity of water available is important.

There have been some studies on hygiene practices in West Java. In 1986/1987, a study on hand-washing behaviour in Indonesia was carried out via interviews with housewives. In comparison with other parts of Indonesia, West Javanese respondents reported less hand-washing before preparing food (7%), before feeding young children (3%), and

coming from work (6%) (all-Indonesia data were respectively 31%, 12%, and 11%). Hand-washing after meals and coming from the field were reported more often than in other parts of Indonesia, respectively 61% and 12%, (35% and 6% in Indonesia as a whole). 93% of the respondents in West Java reported washing their hands before eating a meal (16).

In another study on sanitation behaviour in two towns in West Java, using observations and interviews, it was found that people hardly used soap when washing hands, unless hands looked very dirty. Also after going to the toilet it is not common to wash hands with soap. With regard to disposal of excreta, people reported using private and public toilets, but also used irrigation channels, drains or fishponds, contaminating the water. Babies usually defecate onto napkins or cloth which are cleaned in the river or other water places. Until the age of about three years, children are accompanied to (public) toilets or defecate in the garden (when available) or a drain. In the study area, women consider children's faeces as harmful and therefore have to clean it up well (16).

For household activities, water is obtained from wells, but also from rivers, irrigation channels and fishponds which contain contaminated water. Bathing is done in the home or a public place, but also in contaminated rivers and irrigation channels (personal observation).

All of the above-mentioned practices will contribute to a risk of obtaining diarrhoeal diseases, as well as other illnesses, like skin diseases.

3.2.5. Immunization against measles

According to Feachem, two types of measles-associated diarrhoea can be distinguished: with-measles diarrhoea, which starts between 1 week pre-rash-onset and 4 weeks post-rash-onset, and post-measles diarrhoea which starts 4-26 weeks post-rash-onset. A measles vaccination programme that achieves a 60% coverage of children at 9-11 months of age with a vaccine having 85% efficacy, might reduce the diarrhoea morbidity rate by 1.8% and the diarrhoea mortality rate by 13% among children under five years of age (17). In West Java, the immunization rate for measles was only 49.1% in 1986/87 (see Table 1). In 1990/91, this rate had increased considerably to 89.8% (18).

3.2.6. Accessibility to health facilities

Accessibility to health facilities is important to treat patients with diarrhoea and to give health education to prevent diarrhoea. Tanahashi, who discussed the measurement of health service coverage, defines accessibility coverage as: the ratio of service within reasonable reach of the target population (19). In 1986, West Java was still below the target of 30,000 inhabitants per health centre (*puskesmas*), as well as below the target of the number of assistant-health centres (*puskesmas pembantu*) per health centre (see Table 1). A health centre gives a fairly wide range of promotive, preventive and curative health services, and is usually situated in the capital of a sub-district. The assistant-health centres

are situated in villages or towns to improve the accessibility of health services. Their medical services are however limited. The number of health centres in West Java, with programme activities in diarrhoeal control, was 315 out of 701 in 1986 (4).

In 1984, a start was made with establishing integrated health posts (*posyandu*) at village level. These health post are run by village health volunteers (*kader*), usually women from the Family Welfare Movement. The *posyandu* is especially directed to health programmes for mother and child, like health education on nutritious food, weighing of children below the age of five years, case management of diarrhoeal diseases, and immunization programmes. Village health volunteers carry out their tasks through home visits and monthly meetings at the health post. Many mothers make use of this service (personal observation). The health post is under supervision of a health centre and staff from the health centre visit these posts regularly for assistance and for immunization of mothers and children. The average number of children per health post in West Java is above the norm (see Table 1). With the establishment of integrated health posts, accessibility of services has improved. The quality of the services provided will depend on the training and performance of health workers.

In this chapter, an insight was given into several factors contributing to diarrhoeal diseases in West Java. The main underlying factor is the socio-economic position of households, and beliefs and practices of the population, influencing above-mentioned factors.

In the next chapter, intervention programmes for the control of diarrhoeal diseases will be discussed.

CHAPTER IV INTERVENTION PROGRAMMES FOR THE CONTROL OF DIARRHOEAL DISEASES

4.1. Introduction

In 1980, WHO initiated programmes for the Control of Diarrhoeal Diseases (CDD) with the specific objective to reduce diarrhoea- associated mortality, morbidity and malnutrition among infants and young children in developing countries. National CDD programmes are planned and implemented as part of primary health care services, using the existing health staff, facilities and logistics system. The Indonesian national CDD programme started in 1981 under the Ministry of Health in the Sub-Directorate of Cholera Control. Later the programme came under the Directorate of Communicable Diseases Control and Environmental Health, Sub-Directorate of Diarrhoea Control. Since 1988, provincial planning of CDD was started in three provinces: West Java, South Sumatra and South Sulawesi. Special attention is given to training, communications and supplies of oral rehydration solutions (ORS).

A major goal of the national CDD policy is to prevent and treat dehydration among young children and thus to reduce mortality. Case management is the primary intervention to reach this goal (7). For activities related to the prevention of diarrhoea, collaboration with other programmes is sought. These are programmes to promote breastfeeding and improved weaning practices, immunization against measles, promotion of the use of safe water and latrines, and safe disposal of stools, and programmes to promote handwashing (8). The latter programme was part of the West Java CDD plan in 1988, using a social marketing approach (7). Collaboration is sought with related Directorates in the Government, responsible for these programmes. The above mentioned programmes will be discussed below. The importance of these programmes has already been discussed in Chapter III. With regard to case management, certain aspects will be illustrated by other studies found in the literature.

An overview of intervention programmes undertaken and their goals and targets is presented in Annex II.

4.2. West Java CDD programme: case management of diarrhoea

In the CDD programme in Indonesia, high priority is given to reduction of diarrhoea-associated mortality and morbidity among infants and children below the age of five years. Targets to be met by the end of the Fifth Five Year Plan (1994) are for Indonesia as a whole. Usually targets set at provincial level follow the national targets. Therefore, targets mentioned below will be interpreted as targets for West Java. Sutoto lists the following targets: (8)

- To reduce diarrhoeal mortality by 25%:
    a) diarrhoea infant mortality rate to 9 per 1000
    b) diarrhoea U5MR to 3.8 per 1000
    c) reduce case fatality in hospitals to less than 1% and in unusual events to less than 2%
- To reduce the diarrhoeal incidence by 20%
    a) in infants and children to less than 1 episode
    b) in all ages to less than 0.3 episodes
    c) admission rate to less than 20%
- To increase access to oral rehydration solutions to about 100%
- To increase proper treatment practices:
    a) the use of oral rehydration therapy (ORS or recommended home fluid) to 50%

The primary strategy to decrease diarrhoeal mortality in children below the age of five years is effective case management of diarrhoea at home and at all levels of the health system (8).

Case management to treat infants and children with diarrhoea includes:
a) oral rehydration therapy (ORT) to reduce dehydration by promoting oral rehydration solutions (ORS), or home fluids, like sugar-salt solutions or food-based fluids;
b) promoting continuing feeding, especially breastfeeding, during a diarrhoeal episode and increased food intake after diarrhoea has stopped;
c) rational use of drugs; and
d) referral of severe diarrhoeal cases.

To improve case management at home, village health volunteers (*kader*) receive a two days' training in diarrhoea management. This includes diagnosis and treatment of diarrhoea and dehydration, and advising mothers on when to give breastfeeding, fluids, and soft foods, and when to go to the health centre or hospital. The volunteers also learn how to teach mothers the proper use of oral rehydration solutions. In 1989, West Java's CDD programme trained more than 25,000 *kader* in oral rehydration therapy, and the use of counselling cards for advising mothers whose children have diarrhoea. These cards were designed to provide the health volunteers with a better tool to diagnose and treat diarrhoea and teach the proper use of ORS. The set consists of a diagnostic card and four treatment cards. The use of these counselling cards was found to be very effective for the performance of villlage health volunteers, as well as for the mother's ability to prepare ORS correctly (20).

To supplement activities of village health volunteers, the West Java health department initiated a social marketing approach in 1986 to promote the use of oral rehydration solutions, via the commercial sector. Social marketing is the use of marketing techniques to combat social problems, including health problems (7). "Marketers use information gathered from samples of customers to help design an acceptable product, sell it at an affordable price, distribute it through customary channels close to home, while educating and persuading mothers with understandable messages via the most popular media."(21) In West Java, use was made of television, radio, cinema, and press to promote ORS.

To improve effective case management, ORT corners have been established in some health centres for treatment of infants and children with dehydration, and to give mothers health education on treatment of diarrhoea.

In a hospital in Bandung, a diarrhoea training unit has been established. This unit serves as a diarrhoea treatment centre, and functions as a training centre for health personnel and medical students.

In addition to in-service training, a pre-service activity has been initiated which is called the Medical Education for Diarrhoeal Diseases Control (MEDIAC). This activity is aimed at integrating training materials on CDD into the curricula of medical schools and paramedical schools (8).

Rational use of drugs is an important item since in many local shops and drugstores, antibiotics and antidiarrhoeal drugs are available without a prescription. They are often used for treatment of diarrhoea, even when mothers know about ORS (Oralit is the Indonesian brand name). "Perhaps because of the lack of correct information, many mothers appear to equate Oralit with the drugs they believe will stop diarrhoea. These mothers may become dissapointed and stop using it when the diarrhoea continues." (21). Antibiotics are only effective in cases of suspected cholera, in acute dysentery and in laboratory proven cases of amoebiasis or giardiasis. Antidiarrhoeal drugs are not indicated for the treatment of acute diarrhoea in children (8).
Also the cost aspect is important with regard to rational use of drugs. From a study in Indonesia (1985), it was found that an average of US$ 2.27 was spent per year on diarrhoeal illness for each child aged less than five years. Medication accounted for 44% of the total treatment expenditure. Most of the medication costs were for antimicrobial agents, while ORS expenditure accounted for only 8%. (22)

To stop misuse of antidiarrhoeal drugs, attempts are made to influence pharmacists' and drug vendors' prescription patterns through educational intervention. Also health personnel is educated in efficacy, safety and use of antidiarrhoeal drugs, through bulletins and by incorporating this topic in medical education and all training on case management.

The importance of oral rehydration therapy and breastfeeding as part of the case management strategy is illustrated by some studies and remarks from authors.
With regard to ORT, it is mentioned by Feachem that ORT has shown to be an effective and relatively inexpensive method for reducing the mortality caused by acute watery diarrhoea. The effectiveness in reducing mortality from chronic or dysenteric types of diarrhoea is believed to be limited (this is also mentioned by Larson and Mitra) (23). Further, it is expected that ORT has little or no impact on the morbidity rates of any type of diarrhoea, although by limiting the nutritional damage during an acute watery episode, it might reduce the severity and duration of subsequent episodes (17).

In studies from Peru, Nigeria and Bangladesh, reviewed by De Zoysa et al, it was found that the promotion of breastfeeding during a diarrhoea episode is important since it can protect against the adverse nutritional effects of diarrhoea. The energy intake derived from breast milk does not usually decline during episodes of diarrhoea and other illnesses, whereas that from other food sources is often reduced. Since breast milk provides a

substantial proportion of dietary energy intake in infancy, breastfeeding offers greater protection against the nutritional impact of diarrhoea during this period. (12) This was also found in studies from several countries, reviewed by Motorjemi et al. (13).

4.3. Other programmes: prevention of diarrhoea

In this section, programmes will be discussed which are directed at prevention of diarrhoea and implemented in collaboration with other health programmes.

4.3.1. Promotion of breastfeeding

One of the strategies to prevent diarrhoea is the promotion of breastfeeding. The following recommendations are given:

- breastfeeding immediately after birth;
- exclusive breastfeeding in the first 4-6 months of life;
- breastfeeding should be continued until at least 12 months of age (8).

Promotion of breastfeeding is part of the Family Nutrition Improvement Programme, which is directed at improving the nutritional level of children below the age of five, and of pregnant and lactating women. Information is given via the health centres and village health volunteers.

4.3.2. Promotion of improved weaning practices

Diarrhoea can also be prevented by improved weaning practices. It is recommended that:
- weaning food should be started when a child is 4-6 months old;
- no pre-lacteal feeding should be given;
- nutritious food; and
- using hygiene practices when preparing food (8).

Improvement of weaning practices is, like promotion of breastfeeding, part of the Family Nutrition Improvement Programme.

4.3.3. Immunization against measles

Measles immunization is important as a strategy to prevent the diarrhoea that accompanies measles. The target in the Fifth Five Year Plan is to reach a coverage of 80% (24). Information on immunization is spread via health personnel and mass media.

4.3.4. Use of safe water, latrines and safe disposal of stools

Use of safe water, use of latrines and proper disposal of stools is an important strategy in prevention of diarrhoea. The following recommendations are given by Sutoto:
- keep water clean (clean sources, safe transportation, and safe storage);
- latrines should be located more than 10 metres away from water sources; and
- use boiled water for making foods or drinks.

Every family needs access to a clean, functioning latrine. If it is not available, the family should defecate in a designated place and bury the faeces immediately. Stool of young children should be collected soon after defecation and also disposed of in a latrine or buried (8).

Targets for the Fifth Five Year Plan are as follows:
- accessibility to clean water: 80% for urban areas, and 60% for rural areas.
- accessibility to latrines: 60% for urban areas, and 51% for rural areas (24).

To promote use of safe water, latrines and proper disposal of stools, collaboration is sought with relevant Directorates in the Ministry of Health, like the Directorates for Communicable Diseases Control, Water Quality and Environmental Health.

4.3.5. Promotion of handwashing

Sutoto recommends: "Handwashing, after defecation, after cleaning a child who has diarrhoea, after disposing of a child's stool, before preparing food and before eating. Wash all parts of the hands using soap and a sufficient amount of water." (8)

These messages are disseminated via mass media and via health personnel. The West Java CDD programme, used a social marketing approach to promote handwashing with soap. This intervention is especially directed to reduce ingestion of pathogens causing diarrhoea (7). The social marketing approach was described briefly in section 4.2.

Research on the most effective ways to implement the above named preventive strategies is now in process. Up to now, case management of diarrhoea was the primary intervention in West Java, followed by handwashing.

In the next chapter, health impact of selected intervention programmes will be discussed, followed by indicators to measure programme activities and effectiveness.

CHAPTER V POSSIBLE HEALTH IMPACT OF SELECTED INTERVENTION PROGRAMMES AND INDICATORS TO MONITOR AND EVALUATE PROGRAMME ACTIVITIES AND EFFECTIVENESS

5.1. Introduction

In this chapter, I will discuss the possible health impact of a few selected intervention programmes undertaken in West Java. Information on this possible impact is based on studies found in the literature. The programmes selected are: case management of diarrhoea, promotion of handwashing, and use of safe water, latrines and safe disposal of stools. The selection of these intervention programmes was based on the following considerations: case management is a major intervention in West Java in the control of diarrhoeal diseases, and promotion of handwashing was mentioned as a secondary intervention in West Java CDD plan in 1988. Also, my own interest in water, sanitation and hygiene education activities played a role in the selection.
Further, some indicators to monitor and evaluate programme activities and effectiveness are discussed. As already indicated in the study approach (Chapter 1.2.), in West Java most of the indicators are defined for activities related to case management of diarrhoea. With regard to preventive activities, the CDD programme collaborates with other programmes. In a travel report of Dr. Claeson (CDD-WHO, November 1990), it was mentioned that the Directorates for Water Quality and Environmental Health felt that increased access to clean water, together with improved personal hygiene, such as handwashing, were priorities for prevention of diarrhoeal diseases. Research is now in process about the most effective ways of implementing some of the preventive interventions (9). In documents of the Indonesian national CDD programme and West Java programme, no specific indicators were mentioned to monitor and evaluate preventive activities. In the literature, some of these indicators were found and will be discussed when looking at the intervention programmes mentioned above.

5.2. Possible health impact of selected intervention programmes

5.2.1. Case management of diarrhoea

Case management of diarrhoea at home and at all levels of the health system is aimed at prevention and treatment of dehydration among young children, to reduce diarrhoea related mortality. No impact study of case management was found for West Java or Indonesia. Evaluations of programme activities were available (8, 9, 25, 26). Fauveau et al. mention that diarrhoea is estimated to cause the death of five million children under the age of five years annually in the developing world, and that ORT programmes are based on the assumption that as much as half of these death could be averted if dehydration was prevented or treated. "Few studies, however, have examined the impact of ORT on infant

and child mortality in the community. Those that have been conducted have given inconsistent results, owing either to differences in design or to differences in location. Adequately controlled studies to measure this impact are indeed difficult to justify, as ORT is known to be effective in the treatment of dehydration due to an acute watery diarrhoea." Such a study was implemented in Matlab, Bangladesh in the period 1976-1988. It was concluded that effect of the ORT programme was limited, which might be attributed to factors like using a small amount of ORS, early discontinuation of oral dehydration, delays in referring severely ill children, and death from complications other than dehydration (25). De Zoysa et al. mention that it is believed that correct case management could prevent up to 90% of deaths from diarrhoeal diseases (12). El-Rafie et al. mention that (positive) changes in the management of acute diarrhoea in Egypt were associated with a sharp decrease in mortality from diarrhoea, while death from other causes remained nearly constant. This decrease in diarrhoeal mortality was possible because there were only moderate levels of malnutrition and immunisable disease mortality, a well-structured health system, and good access to the media. It was also noted that in countries without these characteristics, a programme similar to the Egyptian National CDD programme may not be as successful (27). As mentioned in Chapter 4.2., Feachem argues that ORT is highly effective in preventing death from dehydration caused by acute watery episodes of diarrhoea, but its effectiveness in reducing mortality from chronic or dysenteric diarrhoea is believed to be low (17).

5.2.2. Promotion of handwashing

Promotion of handwashing, especially with soap, is a preventive strategy aimed at reducing ingestion of the pathogens that cause diarrhoea, so to reduce diarrhoea associated morbidity. Its use has been associated with decreases in diarrhoea incidence of 30% to 70% (7). No data were available on the impact of this strategy in West Java; it is not known by the author whether this strategy has been evaluated as yet. Boot and Cairncross mention a study in Lombok, Indonesia, by Wilson et al. (1991), which found that the promotion of handwashing by mothers and children reduced the prevalence of diarrhoea (and also of conjunctivitis). They mention several other studies which prove handwashing to be effective in reducing the incidence of diarrhoeal diseases. Some of these studies indicate that handwashing by mothers is one of the major factors contributing to a lower incidence of childhood diarrhoea (28). Also Esrey et al. mention a few studies on handwashing. In Burma, a 30% reduction in diarrhoea was reported when mothers and children were provided with soap and encouraged to wash their hands after defecation and before preparing meals. In Bangladesh, a 35% reduction in the attack rate of diarrhoea caused by Shigella was found following an intervention to promote handwashing. In a study conducted at day-care centers in the United States, it was found that a handwashing regimen reduced the incidence of diarrhoea by 48% as compared to a control group (15). The latter study was also mentioned by Feachem (14).

5.2.3. Improvements in water supply and sanitation

Use of safe water, latrines and safe disposal of stools is a strategy in West Java aimed at prevention of diarrhoeal morbidity. No data are available on the impact of this strategy in West Java. Esrey et al. reviewed and analyzed the findings of 51 studies which looked either at impact on diarrhoea-related morbidity (incidence and prevalence) or impact on diarrhoea-related mortality of water, sanitation and hygiene interventions or a combination of these. The median reductions in diarrhoea morbidity rates were 22% for all studies (ranging from 0% - 100%: 49 studies). For the better designed studies, in terms of methodological criteria, median reductions were 26% (range of reductions was 0%- 68%: 19 studies). Median reductions in diarrhoea-related mortality were 65% (ranging from 43% - 79%: 3 studies) None of the better designed studies specifically addresssed diarrhoeal disease mortality reduction. It was mentioned that the size of reduction any particular project actually achieves depends largely on the interplay of two factors: the manner in which different combinations of interventions are installed and the characteristics of the people for whom the intervention is targeted. This was illustrated by some examples: In one study from Malaysia on the impact of sanitation it was found that sanitation was most effective in reducing mortality among non-breastfed infants. Another study in the same country found that sanitation was most effective in reducing mortality among infants of illiterate mothers. In a few studies from Lesotho, Guatemala, Brazil, and India, examining the impact of improving water quality, reductions in diarrhoea could not be detected. It was mentioned that since diarrhoea is multifactoral in origin, drinking water constitutes only one of many sources of infection. In areas where environmental fecal contamination is high, little or no health impact from water improvement can be expected. According to Esrey et al., interventions to improve excreta disposal and water quantity will have larger impacts than improvements in water quality, particularly in highly contaminated environments where diarrhoea rates are high. Because the use of more water following the installation of water supplies is not automatic, hygiene education is a necessary part of the package of intervention. If the interventions do not work, break down, remain under-utilized, or do not change behaviour sufficiently to reduce diseases, they will likely result in small impacts at best. It was also concluded that improvements in water and sanitation reduced the severity of diarrhoea more than the incidence. It is also important whether or not the population is prepared to benefit from the intervention (15). Therefore, community participation in planning, implementation and maintenance is very important, as well as their participation in monitoring and evaluation.

5.3. Indicators to measure intervention programmes

Indicators are important tools for monitoring and evaluating programme success. According to Engelkes, monitoring is the periodic gathering of data for evaluating purposes. This term can be used at the individual, communal or programme level, and the same data can often be used at all levels. Evaluation was referred to as measuring and judging aspects of activities or interventions, by collection and analysis of information, in order to improve decisions and thus results. She mentions that it is difficult to draw a clear line between monitoring and evaluation. The main distinction was that monitoring involves only the systematic and periodic collection of the data, while evaluation entails

their interpretation and judgement. Indicators are used for the selection and analysis of information. Since not every detail of programme activities can be registered and not all information is equally important for decision making, a selection has to be made in collecting data to serve as indicators: variables which are useful in measuring changes. Measurements should be as objective, systematic and reliable as possible. The indicators should be reliable and valid. Reliability refers to the extent that the application of the measure to a given situation produces the same results time after time, given that the situation in question does not change between measurements. Validity means the extent to which that which is intended and presumed to be measured has in fact been measured (29).

In a document of UNDP/World Bank on indicators for monitoring and evaluation for water supply and sanitation, the term indicator is defined as: "a proxy for measuring a condition which may not be readily quantifiable, and so monitoring the achievement of project objectives" (30). WHO, mentions in a programme report on CDD the use of indicators to measure progress in operational aspects of programme activities (31).

The selection of indicators needed for evaluation depends on the purpose of the evaluation and what is being evaluated. This will also influence the definition of programme input, process, output and outcome. For instance, in CDD programmes, one can evaluate the effect of health education to mothers by village health volunteers. Training of village health volunteers can be the input of the programme, and the educating activity of health workers can be regarded as a process, which should lead to improved health behaviour (effectiveness or output of the programme, sometimes also referred to as intermediate outcome). This again should lead to a reduction of diarrhoea-related mortality, or outcome, which is sometimes referred to as impact. On the other hand, the training itself can be evaluated by looking at money, manpower and materials as inputs, and the training itself as a process, which should lead to well trained village health volunteers (effectiveness or output). Changes in knowledge of mothers can also be referred to as a process which should lead to improved health behaviour: effectiveness or output.

With regard to outcome, or impact, which would be seen as a reduction in mortality, case fatality or morbidity, it is pointed out in several documents that this is difficult to measure since many other factors affect this outcome or impact (as is the case with diarrhoeal diseases). Chowdhury noted that the complexity of measurement increases when evaluations proceed from process to impact studies (26). Outcome (impact) studies are also costly and time consuming. Therefore, it is more practical to look at programme output (either effective programme implementation or changes in behaviour). The assumption is then made, based on scientific studies and experiences, that this output will contribute to the outcome or impact (26, 28, 29, 30, 31, 32, 34, 35).

Indicators to monitor and evaluate activities and effectiveness for case management of diarrhoea, and for selected preventive intervention programmes, will be discussed in the next sections.

5.4. Indicators for case management of diarrhoea

WHO uses thirteen indicators for monitoring operational aspects of diarrhoea case management in health facilities and at household level for national programmes. These indicators are also used in the Indonesian CDD programme. It is mentioned by WHO that programmes need to be effectively implemented before they can be expected to have any impact on diarrhoeal mortality, and that it is in any case difficult to measure this diarrhoeal mortality (31). Chowdhury distinguishes two broad categories of indicators for evaluating community ORT programmes, which are part of case management. First, there are the intermediate process indicators measuring perceptions of the types, causes and treatment of diarrhoeas, knowledge about ORT, use and effective use of ORT, availability of ingredients for home-made solutions, and safety of solutions. Second, there are impact indicators, measuring mortality and case fatility and cost effectiveness. He suggested to concentrate first on process indicators. If encouraging results are found, impact can be evaluated. He also pointed out that the measurement of changes in mortality is extremely difficult, requiring a huge sample, a large expenditure, enough time and a sound methodology (26).

Recently, WHO has redefined its key indicators into four core CDD indicators which serve as a minimal reporting requirement at national level. These indicators incorporate many of the WHO programme's established 13 key indicators. These core indicators are: use of ORT plus feeding; maternal knowledge; access to ORS; and access to case management through health facilities (33). Indicators mentioned below will consider data needed at provincial level (West Java), for which data of hospitals, health centres and health posts at district, sub-district and village level are necessary. These indicators consist of the 13 WHO indicators (marked as WHO), and are complemented by other indicators which were found in the literature, or thought of by the author of this thesis.

An overview of activities of the case management programme, as described in Chapter 4.2., together with expected effectiveness and indicators for their measurement, is presented in Table 3. As mentioned in section 5.3., the definition of input, process, output and outcome will depend on the purpose of the evaluation. In Table 3, resources, like money, manpower and materials, are called input. Activities will be listed under process, and expected effectiveness is listed under output. Outcome or impact of the programme will not be considered, since, as is described above, the assumption can be made that output will contribute to the outcome or impact, which is very difficult to measure directly in the case of CDD.

In the table, knowledge of mothers, and correct practices of mothers in case management of diarrhoea, are regarded as an output of the activities of village health volunteers, and health personnel. It should be noted that if mothers know of correct case management, it does not necessarily mean that they practice what they know. The health worker might have done a good job, but it may be that mothers still stick to old practices because of other factors, like beliefs or influences from other people in the direct environment.
No indicators were available on training and performance of village health volunteers, which is very important for case management at home. Some suggestions are: knowledge of subjects taught, number of meetings held, and number of health visits per month, which are indicated in Table 3.

Table 3: Input, process, output, and indicators for case management of diarrhoea

Input (resources)	**Process (activities)**	**Output (effectiveness)**	**Indicators**
A) Case management at home:			
money manpower materials	1) training of village health volunteers	well trained village health volunteers	knowledge of village health volunteers on subjects taught
	2) performance trained health volunteers	monthly meetings home visits	number of meetings held number of home visits per month
	3) diagnosis of types of diarrhoea	proper diagnosis	knowledge on types of diarrhoea
	4) health education to mothers about ORT	knowledge of mothers about ORT practising ORT (behavioural change)	knowledge of mothers about ORT*) ORT use rate (WHO)
	4a) teaching about ORS	knowledge of mothers about ORS practicing ORS (behavioural change) correct practises (behavioural change)	knowledge of mothers about ORS*) ORS use rate (WHO) rate of correct preparation of ORS (WHO) (correct mixture (safety), correct amount given, correct time)
	4b) teaching about other home fluids	knowledge of mothers practises of mothers (behavioural change)	knowledge of mothers about home fluids*) rate of correct preparation of recommended home fluid (WHO) increased fluid intake (WHO) availability of ingredients
	4c) teaching about additional fluids and food	knowledge of mothers about additional fluids and food practises of mothers (behavioural change)	knowledge of mothers about additional fluids and food*) continued feeding rate (WHO)
	4d) teaching about continued breastfeeding	knowledge of mothers about continued breastfeeding practices of mothers (behavioural change)	knowledge of mothers about continued breastfeeding*) continued feeding rate (WHO)
	4e) teaching when to seek treatment outside the home	knowledge on when to seek treatment outside the home practises of caretakers	proportion of caretakers with correct knowledge of when to seek treatment outside the home (WHO)

*) maternal knowledge (about home case management) is one of the four core indicators recently defined by WHO

Continuation Table 3

Input	Process	Output	Indicators
	5) referral to a health centre or hospital when appropriate	correct referral	number of cases which have been referred correctly
	6) providing ORS packages	availability of ORS packages in the home of village health volunteers	ORS access rate (WHO)
	7) promotion of ORS via the commercial sector	availability of ORS in villlage shops and drugstores advising ORS instead of antidiarrhoeal drugs	ORS access rate (WHO)
	8) communications through mass media	broadcasting of messages via radio, press, cinema and television	number of messages broadcasted in one month via radio, press, cinema and television
B) Case management at health facilities			
	9) case management of diarrhoeal diseases in ORT corners in health centres	correct case management in health centres	proportion of cases correctly assessed (WHO) proportion of cases correctly rehydrated (WHO) proportion of cases correctly advised on treatment at home (WHO)
	10) providing antibiotics in case of dysentery, amoebiasis, giardiasis, and cholera in health centres and hospitals	correct case management in health centres and hospitals	proportion of dysentery cases given appropriate antibiotics (WHO)
	11) training of health personnel in Diarrhoea Training Unit in a hospital in Bandung	well trained health personnel in supervision and case management	Supervisory skills training coverage, and case management training coverage (WHO)

Source: based on (26, 31, 33), and suggestions by the author

Some remarks can be made on a few indicators which are discussed in the literature. When looking at ORS use rate (Table 3, 4a), some caution is advised. Larson and Mitra, who reviewed the use of ORS in Bangladesh, found that use rates measured by several surveys varied considerably within the country and were unreliable. This was due to methodological issues. First, the terms used to describe a diarrhoeal episode differed from survey to survey. Therefore, it is important to know local concepts for several types of diarrhoea. Second, the reference period of the episode for which treatment information was

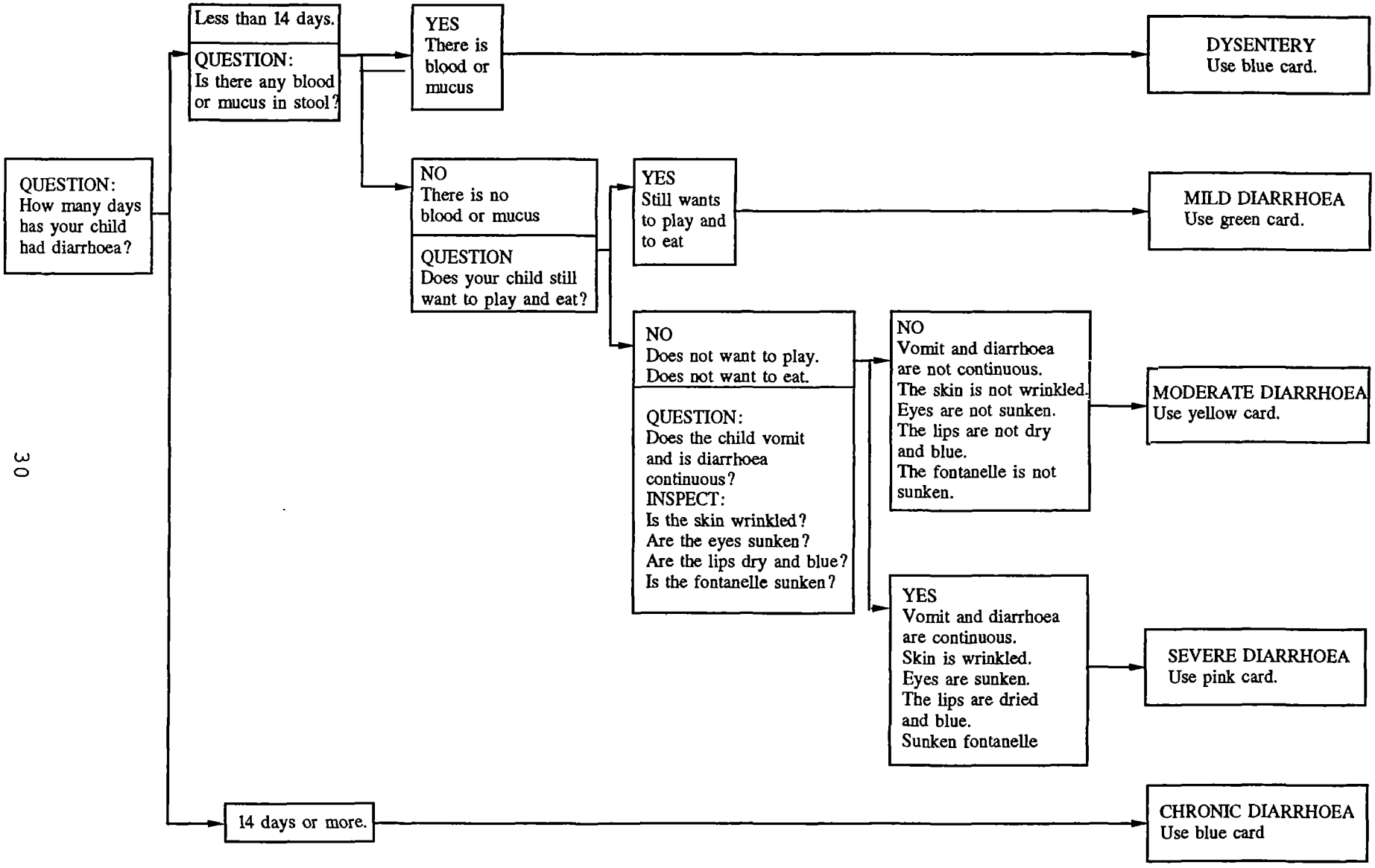


Figure 1. Diagnostic counselling card.
Source (20)

collected, differed. It was mentioned that use rates must be based on the same reference period to be comparable, and that long reference periods may produce very unreliable results. Two weeks may be too long a period for mothers to recall their children's diarrhoeal episodes accurately; data from questions about the last 24 or 48 hours undoubtedly gives a more accurate cross-sectional sample of all diarrhoeal episodes. (see also 26). A third issue was how questions about treatment were ordered and phrased. Too leading interview questions, like "Was (method) used during the illness?" can give an unreliable answer. (see also 26)
Also the validity of this indicator was questioned; it may be that ORS rates are inappropriate definitions of both the numerator and the denominator. The denominator of use rates should be restricted to the acute watery diarrhoea episodes for which this health intervention is effective. The numerator of the use rates, the number of treated cases, also presents a conceptual problem. It is questionable whether a solution that is incorrectly mixed, given at an incorrect time, or given in an incorrect amount, should be counted as a treated episode and a credit to the programme. There was no consensus of what is a 'high' use rate or a 'low' rate. It was concluded that data on use rates can serve as a feed-back on the magnitude of ORS use, and as a by-product of more in-depth studies on reasons for non-use and treatment effectiveness. (23)

ORS use rate is defined by WHO as the proportion of all cases of diarrhoea in children less than 5 years old treated with ORS (31). USAID also defines the reference period: the proportion of all under-five-years-olds experiencing a diarrhoeal episode in the previous two weeks who were treated with ORS (23). In West Java, one diarrhoea morbidity survey in 1990 used a reference period of 24 hours, while in some other provinces in Indonesia both 24 hours and two weeks were taken as reference periods (9). The use of local concepts for several types of diarrhoea was taken care of in the West Java programme by identifying concepts of Sunda-speaking mothers. As mentioned in Chapter 4.2., village health volunteers use a set of counselling cards, a diagnostic card and four treatment cards, for advising mothers whose children have diarrhoea. The diagnostic card relies on a series of yes-no questions in simple language that leads to a diagnosis of one of five categories of diarrhoea. These categories are colour-coded and numbered to match the four treatment cards. The categories of diarrhoea which are used are: mild diarrhoea (beginning diarrhoea); moderate diarrhoea (diarrhoea with weakness); severe diarrhoea (diarrhoea with vomiting); chronic diarrhoea (lasting 14 days or more); and dysentery (blood in the stool). The latter two categories are on a single treatment card (20). An overview is presented in Figure 1.

Chowdhury notes, with regard to knowledge of ORT as an indicator, that it is important to study changes of knowledge over time, since reinforcement of knowledge may be necessary. Studies on the safety of prepared solutions need to be done on a continuing basis; an excessive amount of sodium in the solution may cause hypernatraemia which can lead to death. An over-diluted solution, on the other hand, may be less effective. (26)

5.4.1. Methods of data gathering

In West Java, household surveys are used to collect data for assessing case management at home; they include treatment practice surveys and morbidity surveys. The last morbidity survey (using 30 clusters WHO method), which also considered treatment practices, was carried out in 1990. 12,756 children under the age of five years were reviewed. Prevalence (in the last 24 hours, and the last two weeks), and incidence (starting in the last two weeks) of diarrhoea was studied (see Chapter 3.1). Further, knowledge on referral and danger signs/symptoms, diarrhoea treatment practices (ORT and ORS in the last 24 hours), knowledge of ORS, preparation of ORS, clinical pictures of diarrhoea, feeding practices in diarrhoea cases, fluids therapy practices, and use of drugs in diarrhoea cases was studied (9). In addition, Knowledge, Attitudes and Practices (KAP) studies are carried out on knowledge about ORS and diarrhoea, and practices of mothers to treat infants and children with diarrhoea. The latest KAP study in West Java was done between March 1988 and February 1990; the number of people interviewed was unknown. Also, there are surveys of pharmacists and drugsellers' on their attitudes advising customers to buy ORS (sample size unknown). (8)

For case management at all levels of the health service, indicators are studied via reviews of records and health facility surveys. Also sentinel health centres are appointed which give feed back on ORS and antibiotic use (8).

5.5. Indicators for preventive activities related to water and sanitation

5.5.1. Proposed strategies in West Java

The main strategies for the prevention of diarrhoeal diseases in relation to water and sanitation, as expressed by Sutoto (see Chapters 4.3.4., and 4.3.5.) are:

1) to provide access to a clean, functioning latrine;
2) to locate latrines more than 10 metres away from water sources;
3) to ensure proper disposal of stools in case a latrine is not available;
4) to use latrines;
5) to use safe water;
6) to keep water clean (clean sources, safe transportation and safe storage);
7) to promote handwashing; and
8) to use boiled water for making foods and drinks.

Representatives from the Directorates for Water Quality and Environmental Health prioritized increased access to clean water, together with improved personal hygiene, such as handwashing (see 5.1.).

In West Java, selection of priority preventive activities is now in process and research is being done to look at feasibility, appropriateness and effectiveness (9).

With regard to the above-mentioned strategies, the following remarks can be made:
ad 1) Access to a clean functioning latrine will depend on availability of properly designed and constructed latrines (either private or public), which are located at a convenient distance. Therefore, it is very important that the community is involved in the planning of the facilities. Whether a latrine is functioning depends on proper use and maintenance, and on availability of spare parts and trained people in the direct environment who can repair the facility if it is broken down. This also requires funds, and a form of community organization, like water and sanitation committees, to manage public facilities for operation and maintenance and keeping the facilities clean.
ad 2) The population, when choosing a convenient place for a latrine, needs information on its proper location with respect to distance to water sources.
ad 3) Information is also needed on proper disposal of stools, when a latrine is not available.
ad 4 and 5) Use of safe water and latrines requires availability of and accessibility to these facilities, and they should function properly. With regard to water facilities, it is important that there is enough water, of acceptable quality and at a reasonable distance. It is also important that people are willing to use the facility, and are willing to pay for it.
Even if facilities are properly designed, constructed, maintained and well functioning, it can happen that people do not use them or only part of the time. For instance, in a study on sanitation behaviour in two towns in West Java, it was found that some people did not use their private latrine during the day in the dry season, going to a public one. Then, wells are often dry and they have to fetch water from another place, which was considered too much trouble. Some people even have to buy water at such times. People without a private latrine sometimes defecate in irrigation canals or drains, even if public toilets are available (16).
ad 6) To keep water clean at the source and during transportation and storage requires health education and behavioural change.
ad 7) Health education is also needed to promote handwashing, especially with soap.
ad 8) Boiling of water for making foods and drinks requires the availability of wood or gas, and money to buy fuel.

No mention is made of improving water quantity, which according to Esrey et al., will have, together with improved excreta disposal, a larger impact on diarrhoea-related morbidity (see Chapter 5.2.3.).

Most of the proposed strategies involve a change of behaviour. In a WHO meeting in 1992, it was decided that for the control of diarrhoeal diseases it was important to focus on a limited set of behaviours, rather than to try to include all possible faecal-oral transmission routes. The selected behaviours were:

- safe disposal of human excreta of infant and small children and people with diarrhoea;
- handwashing before handling food and eating/feeding, and after going to the toilet and cleaning babies and toddlers;
- maintaining water free from faecal material both at the source and at home;
- feeding infants and small children recently cooked food (28).

The first three of the set of behaviours reflect some of the above mentioned strategies. The fourth is more directed to food hygiene or food safety, which was discussed in Chapter 3.2.2.

It will be too extensive to discuss indicators for all of the above mentioned strategies, or preventive activities. In view of the above mentioned selected set of behaviours by WHO, and proposed strategies, I will discuss some possible indicators for access to and use of clean water and latrines, and hygiene practices, especially handwashing. But first, I will discuss some recent issues in monitoring and evaluation of water supply and sanitation, which are important for selection of possible indicators.

5.5.2. Recent issues in monitoring and evaluation of water supply and sanitation

In June 1990, a workshop was organized by UNDP and World Bank in Geneva on goals and indicators for monitoring and evaluation for water supply and sanitation. In the report of this workshop (30), mention was made that for many years monitoring and evaluation was concentrated on either the number of facilities installed, or on public health impacts. From the 60s onwards, also economic and social consequences were looked at. But it was difficult to show direct causative links between water and sanitation interventions on the one hand and specific benefits, especially health benefits, on the other hand: "Evaluations which did attempt to demonstrate and quantify health and economic impacts tended to be inconclusive or methodologically flawed. Most were also very costly." In the 1980s, studies using the case-control method for measuring impacts of improved water supplies, excreta disposal and hygiene education on diarrhoeal diseases, proved to have a significant impact on diarrhoeal disease. But the diversity of results made it clear that individual health impact studies are not a dependable tool for evaluating project interventions.
In 1983, WHO published the Minimum Evaluation Procedure (MEP), which argued that measurement of health impacts was not necessary for routine planning and implementation purposes. Monitoring of the functioning and utilization of water and sanitation facilities was proposed (34). Together, these two initiatives prompted the adoption of intermediate indicators of behavioural change as surrogates for health impact indicators. By monitoring changes in user behaviour (taking water from a tap rather than the stream, washing hands after defecation, paying water bills, reporting system malfunctions to the local technician, etc), evaluators could assess whether the preconditions for health improvements were being met.
New issues for the 1990s, which should be the main elements of country sector strategies, are the three goals of sustainability (operational efficiency), effective use (giving a central place to the users, especially women, and to supportive hygiene education), and replicability, stressing technological standardization, institutional aspects like community involvement, and local decision making. Community management is seen as important for meeting the basic needs of communities, meaning that the government's role should change from that of provider of water and sanitation services to that of promotor and facilitator. This also implies that people in the communities should be involved in planning, monitoring and evaluation. Therefore, core indicators are needed, which would be appropriate at community, national and global levels, for monitoring and evaluation

purposes (30). Some of the indicators mentioned in the UNDP-World Bank report will be used while discussing indicators for the West Java programmes. Another report, providing indicators for measuring progress and results of water supply and sanitation (35), which is the result of international working group meetings, will also serve as a basis for discussing possible indicators for West Java.

5.5.3. Key indicators at the community and project/programme level

In the report from the UNDP-World Bank workshop, the following key conditions were mentioned for monitoring and evaluation:

Sustainability:
- Are facilities functioning properly?
- Is the community equipped and empowered to manage the facilities?
- Is training provided?
- Are financial arrangements sustainable?

Effective use:
- Do all potential users have convenient access to installed facilities?
- Are available facilities being used in the most effective way?

Replicability:
- Can the community initiate and manage programmes to extend the water and sanitation services (WSS) as demand grows, and convert the WSS experience into new initiatives in other forms of development?
- Can the project experience be transferred to other agency projects?

Below, especially the conditions for sustainability and effective use will be looked at. In Table 4, an overview is presented of conditions and related indicators, taken from UNDP-World Bank report, which are important for accessibility and use of faciities. Also, other indicators are given with regard to planning and design of facilities, sustained hygiene practices and handwashing, based on other literature.

Table 4: Key indicators at the community and project/programme level for monitoring and evaluation of water and sanitation programmes

Conditions	organizational indicators	technical indicators
Sustainability		
1) Functioning of facilities	availability of spare parts	percent of facilities in working order
	no. of trained mechanics/ caretakers, by gender	average downtime types of breakdown
2) Community capabilities and decision-making	definition of operation and maintenance roles (community M/F, agency, private sector, NGO's)	
	no. served by systems managed by government, private sector, NGO's, community	
	communication channels available for technical support	
	are skills and knowledge shared within the community? How?	
	existence/membership (M/F) of water and/or sanitation committee	
3) Training provision	frequency of training covering technical, financial, management topics?	
	no. of trainees by gender	
4) Cost sharing/willingness to pay	collection and management system for operation and maintenace funds	total investment (capital and recurrent costs)
	community choice of technology/ service levels	community contribution (capital and operation and maintenace)
	benefits perceived by users (M/F)	
Effective use		
1) Access	protection of water source	no. of users/design population characteristcs (gender) of users average distance to water source water quantity (seasonal) water quality at source and in homes time taken to use facilities

Continuation Table 4

Conditions	organizational indicator	technical indicator
Hygienic use	home hygiene practises availability of cleansing materials cleanliness of facilities community views (M/F) of facilities	form of wastewater disposal provision for latrine emptying household water protection/ treatment proportion of water used for personal hygiene

Source: UNDP-World Bank report (30)

Other indicators

Before the conditions of sustainability and effective use can be met, it is very important that the local community is involved in the planning and design of facilities. Some proposed indicators are:
- identification of different user groups;
- consideration of the needs of the user groups;
- received information on technical options, and options for local management, maintenance and financing;
- involvement of user groups in the design and location of facilities; and
- involvement in planning of local hygiene programmes. (35)

With regard to hygiene programmes, it is important to identify risky health conditions and practices, and to set priorities for problem solving. Some indicators for sustained hygiene practices are:
- use of more water for hygiene (which is more important than the quality of the water, see section 5.2.3.);
- safe storage of drinking water; and
- handwashing with soap or a soap-substitute. (35)

Some proposed indicators for handwashing are:
- availability of soap for handwashing;
- presence of water for handwashing in or near latrines; and
- presence of soap near latrine and in the kitchen (32).

The kind of indicators chosen, and their operationalization, will depend on local circumstances, and should be in consultation with the local community. It will also depend if monitoring and evaluation is focussed on how well a programme is being planned and implemented, or on their effectiveness, like behavioural changes.

CHAPTER VI CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

In West Java, diarrhoeal disease is one of the major health problems, contributing to the existing pattern of infant and child morbidity and mortality.

Several factors contribute to diarrhoeal diseases. The main underlying factor is the socio-economic position of households, influencing expenditure patterns, among other things, on food, education, water and sanitation facilities and health care. Also, beliefs and practices influence factors contributing to diarrhoea. These factors are: education of mothers; feeding practices of infants and children and food safety; accessibility and use of water and sanitation facilities; personal and domestic hygiene and disposal of excreta; immunization against measles; and accessibility to health facilities.

The main interventions undertaken in West Java for the control of diarrhoeal diseases are case management of diarrhoea at home and in health facilities, and other preventive programmes for which collaboration is sought with related Directorates in the Government. Case management is particularly aimed at prevention and treatment of dehydration and includes: oral rehydration therapy (ORT), promotion of continued feeding, rational use of drugs, and referral of severe diarrhoeal cases. Training of village health volunteers and health personnel is an important part of the programme, as well as influencing pharmacists' and drug vendor's prescription patterns. ORT, is mainly effective for reducing mortality caused by acute watery diarrhoea. Programmes to prevent diarrhoea include: promotion of breastfeeding and improved weaning practices, immunization against measles, accessibility and safe use of water and latrines, and promotion of handwashing. Research on the most effective ways to implement preventive strategies is now in process.

Studies from outside West Java have shown that case management, handwashing, and improvements in water supply and sanitation have health impacts. However, measurement of these possible health impacts has proved to be difficult when many other factors inluence any impact (as is the case with diarrhoeal diseases). Impact studies are costly, time consuming, and give inconsistent results due to differences in design, location, combinations of interventions, and characteristics of the population. Before any impact can be expected, the programmes with interventions must be in place and running properly. Therefore, it is better first to concentrate on programme output, like effective implementation of the programme or behavioural changes.

6.2. Recommendations

Below, some recommendations are given with regard to indicators for monitoring and evaluation of programme activities and effectiveness, related to the control of diarrhoeal diseases.

Indicators used in West Java for monitoring and evaluation of case management, are those recommended by WHO. The following recommendations are given with respect to:

A) ORS use rate

- In view of reliability of this indicator, it is important to give attention to interview questions about use of ORS. Too leading questions can give an unreliable answer.
- The reference period should be standardized for Indonesia as a whole, facilitating comparison.

B) Knowledge of mothers about ORT and ORS

- It will be important to study changes over time, to adapt messages given.

For case management at home, training and performance of village health volunteers is important. Possible indicators, which are not given by WHO, could be:

- Knowledge of subjects taught;
- Number of meetings held; and
- Number of health visits per month.

Indicators for other preventive activities in West Java were not available, since the most effective ways to implement these activities are still being studied. The following recommendations are given:

- With regard to proposed strategies by people involved in the CDD programme, it is advisable to concentrate on a selected set of behaviours. The set of behaviours recommended by WHO, which focus on safe disposal of human excreta, handwashing, maintaining water free from faecal matter, and feeding infants and children recently cooked foods, can serve as a guide.
- With regard to preventive activities related to water and sanitation, recent issues in monitoring and evaluation of this sector should be considered. The indicator of accessibility to water supply and latrines, used in West Java, is not sufficient in measuring actual use of these facilities. User behaviour is important to be monitored as a precondition for health improvements. The conditions of sustainability, effective use and replicability, are important to consider. Some key indicators appropriate at community, national and global levels, which are indicated in Chapter 5.5, might serve as a basis for further thoughts.

LIST OF ABBREVIATIONS

CBR	Crude birth rate: Annual number of births per 1,000 population.
CDD	Control of Diarrhoeal Diseases
CDR	Crude death rate: Annual number of deaths per 1,000 population.
CFR	The proportion of cases of a specified condition which are fatal within a specified time; or, number of deaths from a disease (in a given period), divided by the number of diagnosed cases of that disease (in the same period) x 100
GNP	Gross National Product: annual GNP's per capita as expressed in current United States dollars
IMR	Infant mortality rate: annual number of deaths of infants under one year of age per 1,000 live births. More specifically this is the probability of dying between birth and exactly one year of age.
ORS	Oral rehydration solutions.
ORT	Oral rehydration therapy: a therapy to reduce dehydration by promoting ORS, or home fluids, like sugar-salt solutions or food-based fluids.
RNI	Rate of natural increase: crude birth rate minus crude birth rate.
U5MR	Under five mortality rate: annual number of deaths of children under five years of age per 1,000 live births. More specifically this is the probability of dying between birth and exactly five years of age.
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

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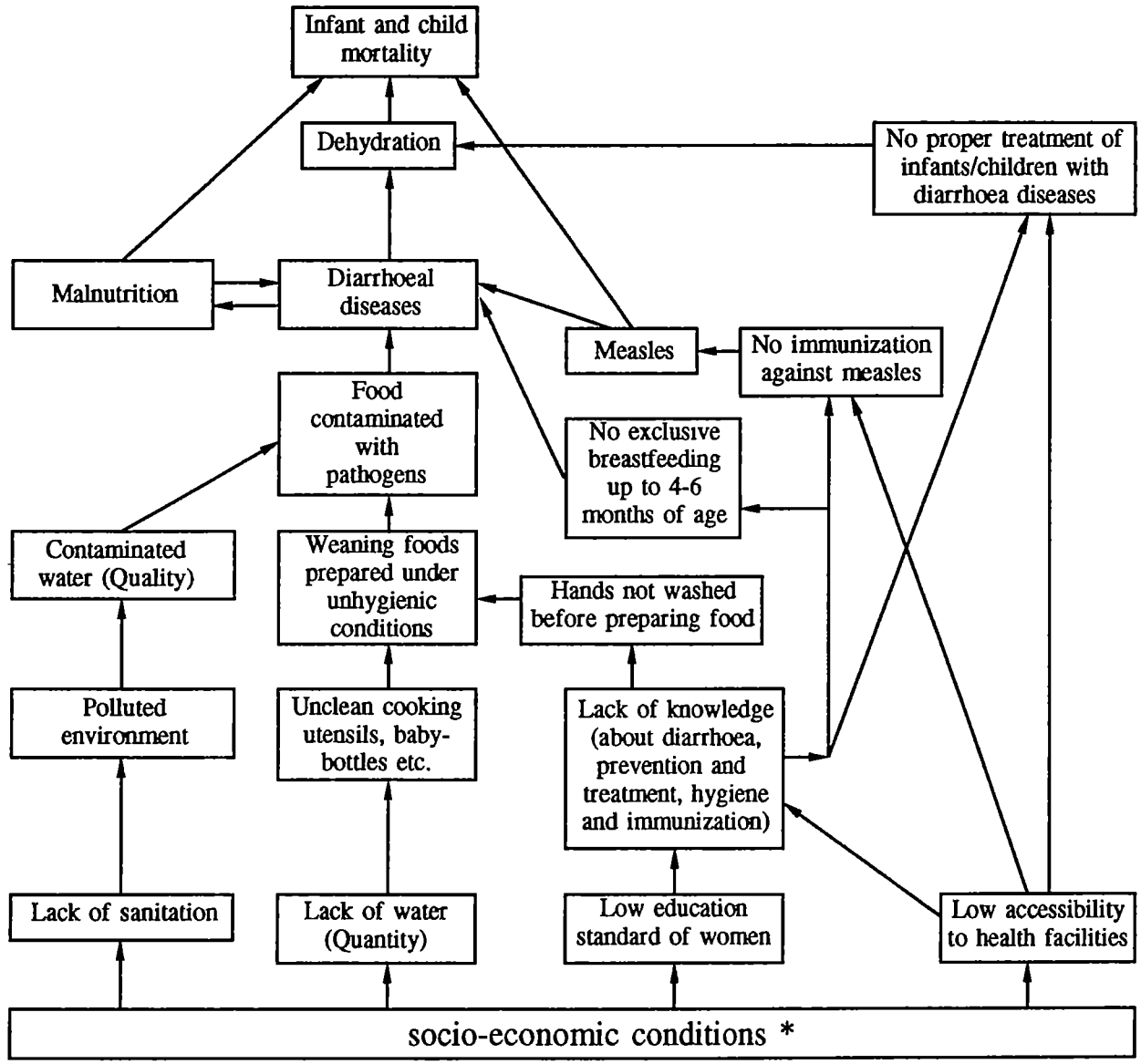
Annexes

Annex 1: Factors contributing to the health problem of diarrhoeal diseases in West Java



* Socio-economic conditions include all factors in the social, economical, cultural, and political environment

Annex 2: Intervention programmes and their goals and targets.

Programme	Goals	Targets (1994)
A. Case management of diarrhoea	**To prevent and treat dehydration, to reduce diarrhoea-related mortality**	9 per 1000 (Infants). 3.8 per 1000 (Under 5's)
1. Oral Rehydration Therapy	→ To promote ORS and home fluids to prevent diarrhoea-related dehydration.	50% use
2. Continuous feeding	→ Prevention of diarrhoea-related dehydration.	
3. Rational use of drugs	→ Proper use of drugs and to prevent use of anti-diarrhoeal drugs.	
4. Referral of severe cases	→ Further medical attention for cases which cannot be treated at home.	
B. Prevention of diarrhoea	**To reduce diarrhoea-related morbidity.**	
1. Promotion of breastfeeding	→ Prevention of diarrhoea, especially persistent or severe diarrhoea. → Prevention of weight loss.	
2. Promotion of improved weaning foods and food safety	→ Improved nutritional status. → Prevention of weight loss. → Reduced exposure to contaminated foods and fluids.	
3. Immunization against measles	→ To prevent measles. → To prevent measles-associated diarrhoea.	80% coverage of measles immunization
4. Improving water supply and sanitation facilities	→ Accessibility and use of safe water and latrines.	Accessibility to Water: rural: 60% urban: 80% Sanitation: rural: 51% urban: 60%
5. Promotion of handwashing	→ Reduced transmission of partogens causing diarrhoea.