# COMMUNITY WATER SUPPLY AND EXCRETA DISPOSAL SITUATION IN THE DEVELOPING COUNTRIES

## A COMMENTARY

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WORLD HEALTH ORGANIZATION
GENEVA
1975

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## ACKNOWLEDGEMENT

The authors are particularly grateful to Dr B. Grab, Health Statistical Methodology, Division of Health Statistics, WHO, for the statistical analysis of the data.

## PREFACE

In 1959 the Twelfth World Health Assembly launched a "spearhead" programme to promote the provision of safe water in adequate quantities to communities lacking it, concentrating first on improving urban water supplies. It was obvious that conditions were poor, but only meagre quantitative information on the magnitude of the problem was then available.

The results of a survey carried out in 1962 on urban water supply conditions and needs in 75 developing countries, by two WHO consultants, B. H. Dieterich (now a member of the Organization's staff) and J. M. Henderson, were published in 1963 in Public Health Papers, No. 23. Since then the importance not only of sewage disposal facilities in urban areas but, more particularly of water supply and excreta disposal in the rural areas simultaneous with urban development has been recognized by the Organization.

In 1971 and 1972 a global survey was carried out of community water supply and excreta disposal conditions and needs in the developing countries in both urban and rural centres. The statistical results country by country, depicting the situation as at the end of the year 1970, were published in the World Health Statistics Report, 1973, vol. 26, No. 11, pp. 720-783.

The present publication is an analysis and commentary on some of the salient data presented in the issue of World Health Statistics Report referred to above. Progress made in the urban sector between 1962 and 1970 is reviewed and prospects for reaching the Second United Nations Development Decade targets are considered. It is hoped that this paper will be of some value to those concerned with planning and assistance for community water supply and excreta disposal programmes in the developing countries.

Some information from the two earlier publications is repeated here to make the document self-contained with respect to core data. For detailed information on specific aspects of the situation, especially at country level, the Public Health Paper and the World Health Statistics Report mentioned must be referred to.

It is proposed to carry out a mid-decade review in 1976 to ascertain the conditions and the progress made up to the end of 1975. This will be followed by an end-of-decade report in 1981.

# 1. INTRODUCTION

## 1.1 The problem

For the housewife in the industrialized part of the world, safe water is obtained from from the tap in her kitchen or bathroom at any time of the day or night. Human wastes are simply flushed away by the water closet. That such is not the case for the vast majority of people of the developing countries, constituting more than two-thirds of humanity, is well known. The extent of the problem, the underlying causes, and the methods and means by which remedial action can be taken are less well defined.

Ignorance, poverty, and disease constitute the vicious circle that hampers development. More specifically, lack of skilled manpower, inadequate capital, inappropriate technology, insufficient community participation, outmoded or nonexistent institutional infrastructures for programme planning and implementation, and shortage of managerial skill are factors that either singly or more often in combination account for the poor achievement of developing countries in the provision of basic sanitary services for their populations. Notwithstanding tremendous odds, the developing countries have made some progress in the past decade, especially in the urban sector.

Over the years the ineffectiveness of trying to find piecemeal solutions by attempting to isolate problems that are multifaceted in character (e.g., a crash latrine-construction programme in a subsistence-level community that lacks many other basic necessities of life) has been amply demonstrated. The rising tide of expectations that demand basic sanitary amenities such as safe water supply and sanitary disposal of wastes as a right rather than as "goods" (commodities that one could have if only one could pay for them), together with recent concern about the environment and quality of life throughout the world, have thrust upon governments as well as international agencies an obligation to review the problem of basic sanitation in all its aspects.

## 1.2 Information needs

A review of basic sanitation in all its aspects poses specific information needs. While data on individual installations may be available in some countries (at least for the bigger urban communities), useful information for national planning and programming is woefully inadequate at country level. Such regional and global summaries are, at best, order-of-magnitude estimates.

The purposes for which information is required and the sources from which such information can be obtained have been identified.[1] Guidelines to enable countries to set up information systems for planning, programming, and evaluation are needed. WHO has therefore embarked on the preparation of a guide on information systems for the planning and evaluation of community water supply and wastewater disposal programmes.

While the development of information systems at country level is a basic need, regional and global situation and trend reports serve the purpose of stimulating countries to set up regional and global goals (or targets), encourage collaboration, and serve as a tool for directing international assistance where it is needed.

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[1] WHO Technical Report Series, No. 490, 1972 (Report of Scientific Group on Techniques for the Collection and Reporting of Data on Community Water Supply).

## 2. REGIONAL AND GLOBAL INFORMATION

### 2.1 Sources

A number of agencies connected with international assistance in the sectors of community water supply and excreta disposal have from time to time published situational data on the countries assisted. Examples are the Housing Census of the United Nations, the International Bank for Reconstruction and Development (World Bank), and the Agency for International Development (AID) of the United States Government. However, this information is always limited. It may not cover all aspects of the problem, or it may cover only a part of the countries, or it may not be truly global in character. With all its inaccuracies and inadequacies, the information obtained through WHO's global survey is the best that is available today, while admittedly needing much refinement.

### 2.2 Regional data for Latin America

While the systematic collection, analysis and reporting of information in most developing countries is in a rudimentary stage, the assessment of status and trends in community water supply and wastewater disposal services on a regional level has been operational in Latin America and the Caribbean for more than two decades. Although assisted by the Pan American Health Organization (PAHO),[1] much of this effort has come from the countries themselves. The data are updated and published every year for review and programming purposes.

### 2.3 The 1962 WHO global survey

The aim of the 1962 survey was to outline as simply as possible the general situation with regard to urban water supply conditions in 75 selected countries. This analysis was based on information obtained from the Member States and Regional Offices of the World Health Organization, the United States Agency for International Development, the International Water Supply Association, and other sources including reports of WHO consultants.

The information generally obtained was on (i) the methods used by governments to evaluate the present status of water supply in their countries, (ii) the percentage of the urban population served by piped water in the house or through public outlets, (iii) recent developments, (iv) future planned developments, and (v) costs.

In spite of the efforts made, no data on water supply conditions could be obtained from a number of countries, chiefly in Africa. Assumptions were made on percentages of population connected and served and on general conditions by comparison with adjacent countries with similar socio-economic conditions where such information was available.

Populations served by urban water supply in 1962 in the countries surveyed are shown in Annex 2, which also shows the populations served in 1970.

### 2.4 The 1970 WHO global survey

This study contains national data, as at the end of 1970, on community water supply and excreta disposal from many of the developing countries that are Member States of WHO.

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[1] The Pan American Health Organization (PAHO) comprises the Pan American Sanitary Conference, the Directing Council, and the Pan American Sanitary Bureau (PASB). The Pan American Sanitary Conference (or the Directing Council in those years when the Conference does not meet) serves as WHO's Regional Committee for the Americas, and PASB as WHO's Regional Office for the Americas.

2.4.1 Sources of data

The main sources of information were government departments or ministries responsible for community water supply and excreta disposal. WHO country staff and Regional Offices were additional sources.

Data on per capita gross national product (GNP) used in this publication were mainly derived from estimates by the International Bank for Reconstruction and Development.[1]

2.4.2 Content

For community water supply, the following aspects were covered:

(i) population supplied with water as of 31 December 1970 (urban population supplied by house connexion, urban population without house connexions but with reasonable access to public supplies, rural population having reasonable access to safe water, and estimated percentage of urban population receiving intermittent supply);

(ii) additional population supplied with water annually, urban and rural;

(iii) water quality control (authorities, standards, surveillance procedures);

(iv) planning, construction and extension of water supplies;

(v) maintenance and operation;

(vi) reporting;

(vii) external assistance;

(viii) unit data on consumption, cost, etc.;

(ix) long-term programme (including criteria for priorities in providing new supplies);

(x) training;

(xi) research and development;

(xii) constraints to progress.

Information on excreta disposal was obtained on similar lines to that for community water supply. Figures were also obtained for the population connected to public sewerage systems, the percentage served by conventional treatment methods and oxidation ponds, and the percentage not served by sewage treatment of any kind.

2.4.3 Data collection

Questionnaire with spot checking was essentially the method used for collection of data pertaining to 1970. This operation was carried out in 1971 and 1972. Two questionnaires, one covering national data on sewage disposal were answered by government engineers and checked for completeness by WHO staff assigned to the countries. In some countries WHO engineers worked with the national staff in compiling the data required by the questionnaires.

[1] World Bank (1973) Trends in developing countries, Washington, D.C.

In others the major responsibilities fell on the WHO staff. Subsequently, consultants visited the larger countries (those of over 10 million population) to check the answers to questionnaires for completeness and comparability and to gather supplementary information. The 25 countries covered by this additional checking process comprised over 75% of the population included in the summary.

The answers to the questionnaires were based on information from many sources, including annual reports and census data, and on the experience and subjective judgement of national staff most closely connected with the community water supply and excreta disposal conditions in their own countries. Special in-depth studies were not carried out in individual countries. Hence the information contained in the World Health Statistics Report, 1973, vol. 26, No. 11, as well as the present publication should be taken as an indication of order of magnitude involved rather than as highly accurate statistics. The figures for the number of people served by house connexions from community water supply systems are undoubtedly better estimated than the number of people served by standposts or public outlets. Moreover, it is evident from the replies to the questionnaires that many of the countries are better informed about the status of their community water supply situations than they are about the excreta disposal services. As can be expected, not all questions were answered by all the countries.

In the survey depicting 1970 conditions, 91 developing countries responded to the community water supply questionnaire and 61 countries responded to the excreta disposal questionnaire.

2.4.4 Definition of terms

Developing countries. The definition of "developing countries" may vary with the purpose for which the classification is sought. In this survey of conditions in 1970, the approach was more practical than rational. In general, countries in need of substantially developing their community water supply and excreta disposal services were considered as "developing" for the purposes of this study. It is pertinent to point out that 89 out of 91 countries included in this survey appear in the list of 96 countries of the "UNCTAD Group of 77" that declared themselves as "developing" at the Second Ministerial Meeting of 7 November 1971 at Lima.

Urban and rural. The national definition of urban and rural population as determined by each country has been accepted, as it was by the United Nations Department of Economic and Social Affairs in preparing a document on urban and rural populations.[1] The 1970 and 1980 mid-year data in this document have been projected to 1970 and 1980 year-end to be comparable with the year-end information obtained through the questionnaires.

Reasonable access. In an urban area a house located not farther than 200 metres away from a public fountain or standpost may be considered as having reasonable access to that water supply.

In rural areas reasonable access would imply that the housewife or members of the household do not have to spend a disproportionate part of the day in fetching the family's water needs.

Safe water supply. The term "safe water supply" included treated surface waters or untreated but uncontaminated water such as that from protected boreholes, springs and sanitary wells. Other waters of doubtful quality are classified as unsafe.

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[1] United Nations, Department of Economic and Social Affairs, Population Division (1970) Urban and rural populations: individual countries 1950-1985 and regions and major areas 1950-2000 (Document ESA/P/WP.33/Rev.1).

Excreta disposal. Excreta disposal may include collection and disposal, with or without treatment, of human excreta and wastewater by waterborne systems or the use of pit privies and similar installations.

2.4.5 Presentation

The situation in 1970 is presented in 18 tables in the issue of World Health Statistics Report referred to previously. Some of the relevant information is repeated in this Offset Publication to make it self-contained. A list of the 18 tables shown in Annex 1 of this document will give the reader an idea of the scope of the information contained in the World Health Statistics Report. All except two of the 18 tables give country-by-country data as well as regional summaries. The regional summaries in the World Health Statistics Report pertain to the WHO Region to which any Member country belongs. In this Offset Publication, while the same regional breakdown has been used for facilitating comparison, the following descriptive titles are used to designate the regions:

1. Africa, south of the Sahara, which includes countries south of a line running across the southern borders of Algeria, Morocco, Libya, Sudan, Ethiopia, and Somalia. It includes Madagascar and Mauritius. It corresponds to the African Region of WHO.

2. Latin America and the Caribbean, which includes countries south of the USA. These constitute the developing countries of the American Region of WHO.

3. West Asia and North-East Africa, which includes countries to the east of Morocco on the African mainland that have access to the Mediterranean and the Red Sea and those lying south of Turkey and the USSR extending up to and including Pakistan in the east. It corresponds to the Eastern Mediterranean Region of WHO.

4. Algeria, Morocco, and Turkey. These countries belong to the European Region of WHO. Sewage disposal data pertain to Algeria and Morocco only.

5. South-East Asia, which includes Bangladesh, Burma, India, Indonesia, Mongolia, Nepal, Sri Lanka, and Thailand. For Mongolia only community water supply data are given. These countries belong to the South-East Asia Region of WHO.

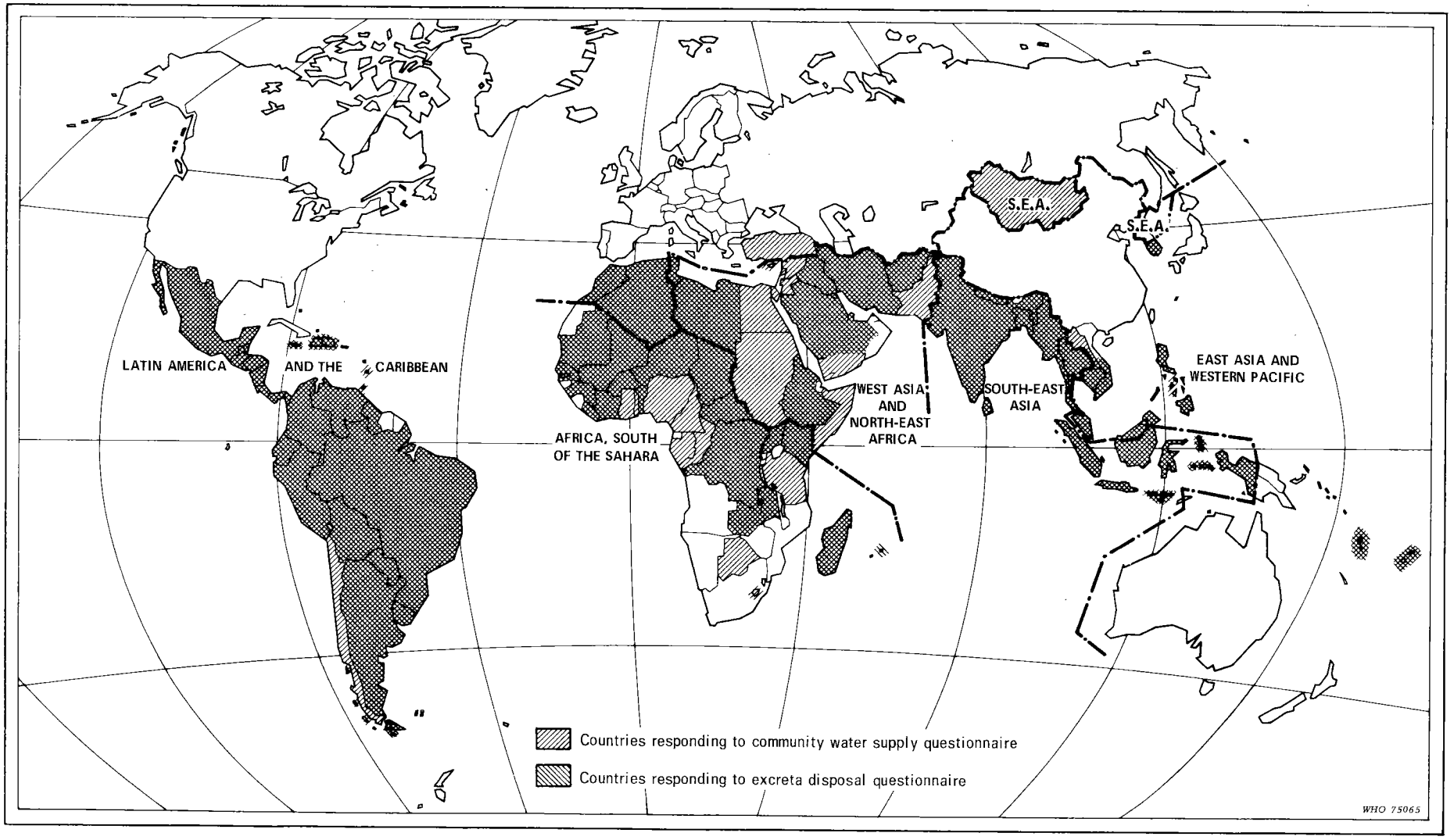
6. East Asia and Western Pacific, which includes Fiji, Khmer Republic, Laos, Malaysia, the Philippines, Singapore, Republic of Korea, Republic of Viet-Nam, and Western Samoa. These countries belong to the Western Pacific Region of WHO.

Fig. 1 shows the developing countries that participated in the WHO survey on the community water supply and excreta disposal situation in 1970. The countries responding to the water supply and excreta disposal questionnaires are marked.

Annexes 2 and 3 give the basic situation information as at 1970 with regard to community water supply and excreta disposal services in the developing countries. Annex 2 also gives comparative data from Public Health Paper No. 23 concerning the urban water supply services in 75 developing countries in 1962.

In view of the lesser reliability of the information on excreta disposal, much of those data have not been analysed in the present document. It is hoped that with the refinement of the data in future surveys, such analysis would become worthwhile. Even with the community water supply data the inaccuracies make interpretation far from easy, and the difficulties are compounded when correlations are sought with economic and health parameters, owing to deficiencies and inaccuracies in those sets of data. The interpretations made in this document must therefore be viewed with caution and considered as tentative, subject to revision as more reliable information becomes available in future years.

FIG. 1. DEVELOPING COUNTRIES PARTICIPATING IN THE WHO SURVEY OF COMMUNITY WATER SUPPLY AND EXCRETA DISPOSAL, 1970



## 3. WHAT THE 1970 SURVEY SHOWS

### 3.1 Coverage of service

The world population in 1970 was estimated to be 3672 million. Of these the developed countries that were not included in this survey (USA, Canada, countries in Europe, South Africa, Israel, Japan, Australia, and New Zealand) constituted less than 30% of the global population. The developing countries thus represented more than 70% of the world population in 1970. China was not covered in the 1970 survey. The remaining developing countries constituted very nearly half the total population of the world.

The indices that have been used to describe the community water supply and waste disposal situation in the survey are as follows:

Community water supply

urban

- percentage of urban population served by house connexions
- percentage of urban population having reasonable access to public supplies

rural

- percentage of rural population having reasonable access to safe water

Excreta disposal

urban

- percentage of urban population connected to public sewers
- percentage of urban population with household sewage disposal systems

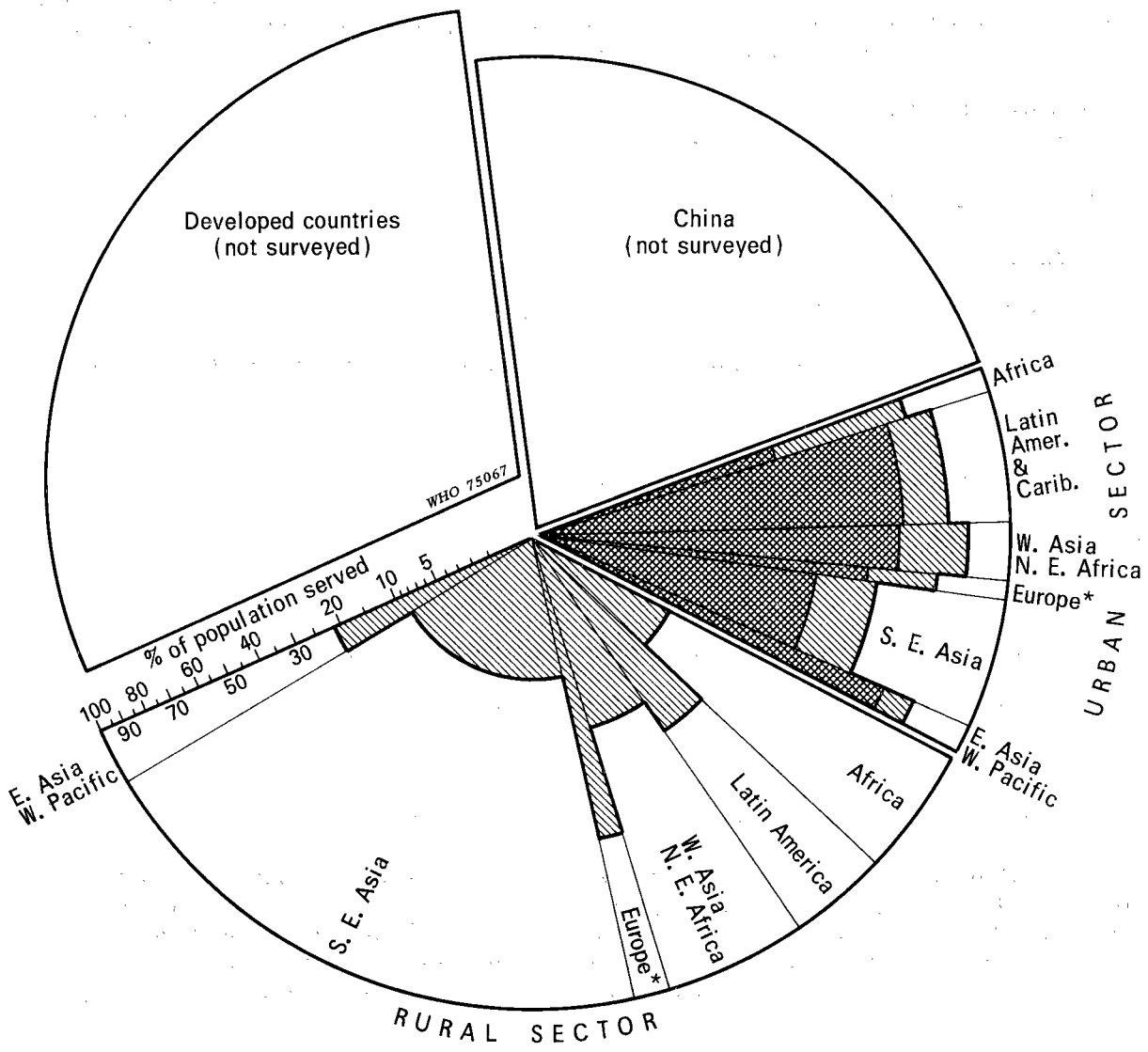
rural

- percentage of rural population with adequate excreta disposal.

The situation of community water supply and excreta disposal achievement as at the end of 1970 in the developing countries is depicted graphically (using the above indices) in Fig. 2 and 3. The two figures have been drawn taking the 1970 world population as the area of the whole circle. The areas of sectors, such as between developed and developing countries, urban and rural sectors, populations served versus not served, are in proportion to the populations involved.

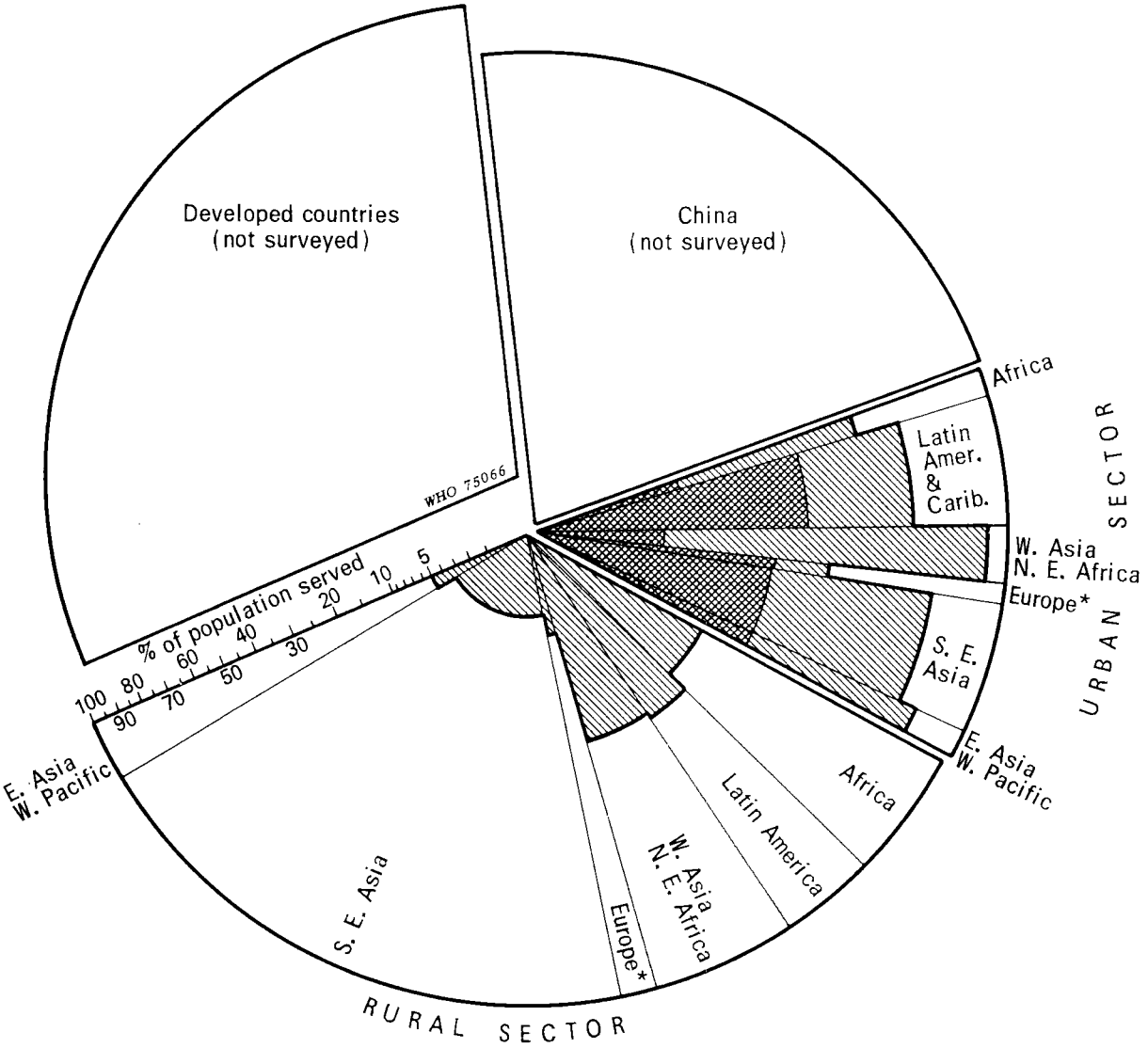
In the urban sector it will be seen that a considerable proportion of the population still have no reasonable access to public water supplies and no adequate sewage disposal facilities. Although the proportion of the population thus not served in the urban sector is much less than in the rural sector, the public health hazards of insanitary conditions are much greater in an urban than in a rural situation owing to the crowding factor. It can be seen that Africa south of the Sahara and South-East Asia are behind other regions in community water supply progress in the urban sector. With regard to sewage disposal, it is worthy of note that even Latin America has still a considerable way to go in the urban sector.

FIG. 2. COMMUNITY WATER SUPPLY SITUATION IN DEVELOPING COUNTRIES, 1970
(EXTRAPOLATED FROM SURVEY OF 91 COUNTRIES)




*Only Algeria, Morocco and Turkey of European Region of WHO.

FIG. 3. EXCRETA DISPOSAL SITUATION IN DEVELOPING COUNTRIES, 1970
(EXTRAPOLATED FROM SURVEY OF 61 COUNTRIES)




*Only Algeria and Morocco of European Region of WHO.

Fig. 2 and 3 also show that in the rural sector where nearly two-thirds of the population of developing countries live, an overwhelming majority have no reasonable access to safe water and no adequate excreta disposal facilities. The needs of the South-East Asia region stand out prominently. The comment has been made that inasmuch as the sources of information for the WHO survey consisted mainly of government departments and agencies there must be considerable under-reporting of water supply and excreta disposal facilities constructed with local initiative without government assistance. While this comment is valid, most of these unreported facilities are known to both WHO and national staff to be insanitary.

## 3.2 Health aspects

While the acute and long-term effects of chemical pollutants are no doubt important, the incidence of waterborne diseases due to faecal contamination is of greater significance.

With the availability of information on the percentage of population having access to safe community water supplies and adequate excreta disposal facilities, the obvious temptation was to plot the data against morbidity and mortality rates due to waterborne diseases to observe if any correlation existed. The plot (not published) showed no correlation. This might have been expected since the morbidity and mortality data related to hospital registration figures; registration is generally better (resulting in more cases appearing in the report) in the richer countries, which are also the ones that have better community water supply and wastes disposal services. Information on water supply and excreta disposal services is easier to obtain than morbidity and mortality rates by causes of disease or death.

A number of studies, over the past 30 years or so, have attempted to correlate the incidence of waterborne and water-related diseases with community water supply availability (quantity and accessibility), quality of water, and sanitary excreta disposal. A recent World Bank report[1] reviews a number of such studies and contains an extensive bibliography on the subject. In summary, all the studies can be said to show that better water and improved sanitation lead to better health. Many of the studies show that the incidence rates of diarrhoeal diseases are much lower when water supplies and excreta disposal facilities are available inside the house. The bacteriological quality of water plays an important role in the control of diseases in whose transmission water is a major pathway (e.g., cholera, typhoid). Other studies show that improvement of water supplies alone without concomitant provision of sanitary disposal of excreta is much less effective. It can also be stated that, for development, community water supplies and sewage disposal are essential but not sufficient in themselves. Development in the health services sector and in other sectors such as agriculture and communications is also vital.

A recent example of the correlation between water quality and the incidence of cholera would not be out of place. Fig. 4 shows the cholera cases in the Mulanje district of Malawi from the onset of an epidemic in October 1973 until March 1974. Through the community development programme, some of the villages in this district (within the areas denoted by broken lines) had been provided with piped water supply. The intakes for the water lie high up in the mountains, and the water, though untreated, is relatively uncontaminated. The rest of the villages in the district use contaminated surface water. The distribution of cases shows the effect of a piped water supply. The population density, access to health services, social and economic conditions, etc., are the same in the villages lying within the piped water supply area as in those lying outside it. It is known that some of the cholera victims within the piped water supply area used stream water because it was closer than the standposts; there were also some imported cases. The difference in the incidence of cases observed is striking.

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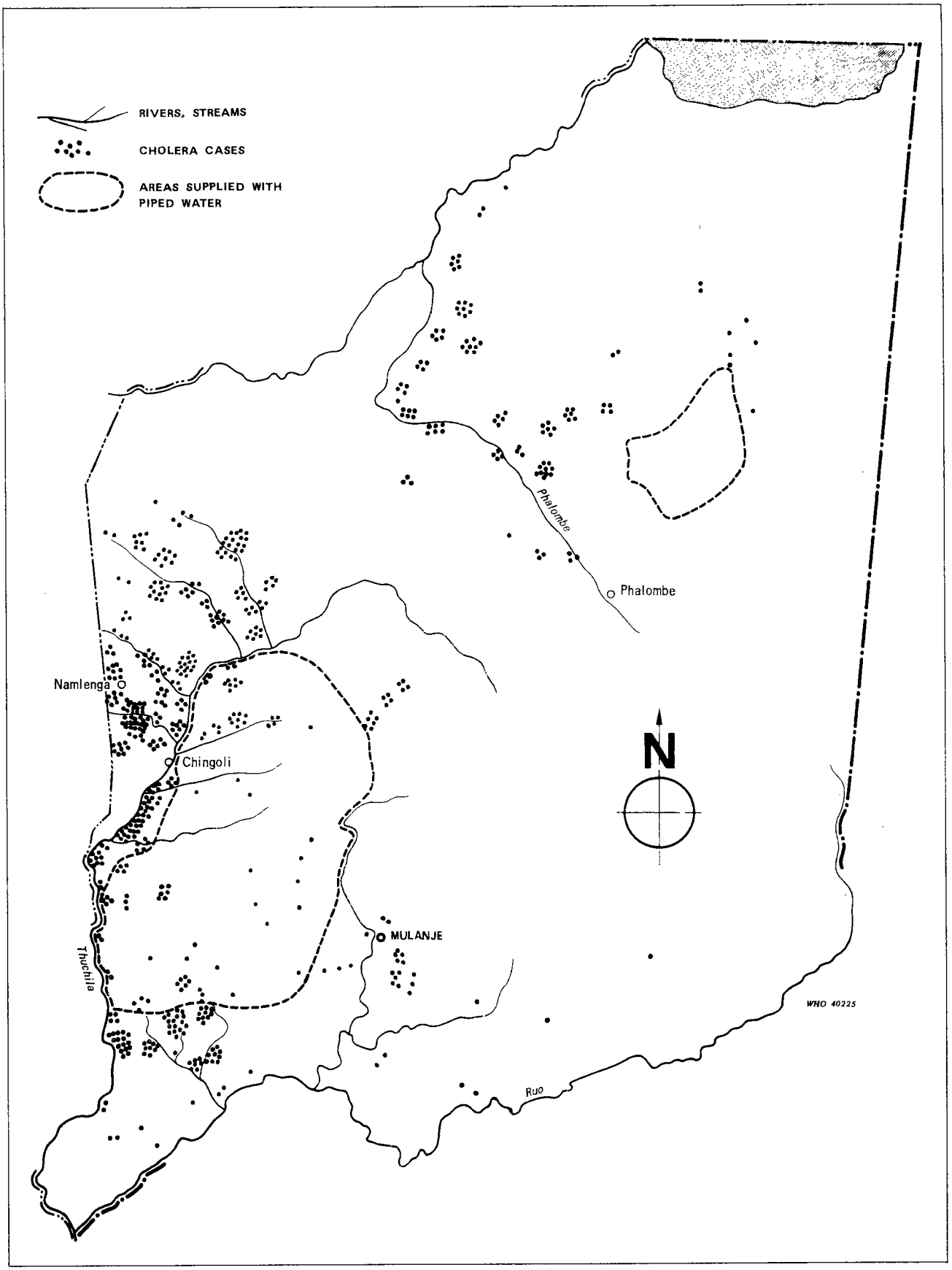
[1] Saunders, R. J. & Warford, J. J. (1974) Village water supply and sanitation in less developed countries, Washington, D.C., International Bank for Reconstruction and Development, Public Utilities Department (P.U. Report No. RES 2).

FIG. 4. INCIDENCE OF CHOLERA CASES IN RELATION TO PIPED WATER SUPPLY
MULANJE DISTRICT, MALAWI, MARCH 1974

Compiled by Dr C. Pauli and Mr L. Robertson



Access to public water supplies, whether through house connexions or through public standposts, does not necessarily mean that the population is served with biologically safe water. Many of the urban water supplies in the developing countries leave much to be desired in operational quality control. Of the many factors that affect the biological quality of the water supplied to an urban consumer, leakage and intermittence in supply are two of the most important. No water distribution system, even in the most highly developed countries, is leakproof and, where water can leak out, contamination may enter. The losses due to leakage and other causes (usually categorized as "unaccounted for" water) can be considerable. From a survey of 401 cities in the USA, Seidel and Baumann[1] found that in nearly one in ten of these cities 25% or more of the water produced was unaccounted for, while more than half the cities reported that over 10% of the total water produced was unaccounted for. The very constraints under which urban water supply authorities in developing countries labour make the collection of information exceedingly difficult. Many of these authorities simply do not know how much of the water they produce is lost. In certain cities, for which some information is available, educated guesses put the percentage of water unaccounted for as high as 50%. The economic implications of unaccounted for water are obvious, but the considerable public health hazards should also be borne in mind.

It may be seen from Table 1 that half the population that had access to public supplies in the urban communities of developing countries had access only to an intermittent supply. Such a situation is attended by a grave public health hazard because, when the pressure in the distribution system falls, there is no resistance to infiltration of pollutants from outside. Latin America, Algeria, Morocco, and Turkey are comparatively well off. The figure for intermittent supply (27%) for Africa south of the Sahara should not come as a surprise as many urban systems in Africa are not overloaded like those in South-East Asia, where intermittent supply is the rule rather than the exception.

TABLE 1. URBAN POPULATIONS THAT RECEIVED INTERMITTENT WATER SUPPLY IN 1970, AS PERCENTAGE OF URBAN POPULATIONS SERVED[a]

| | 1970 urban population (millions) | Urban population served by house connexions or public standposts (millions) | Percentage of population served that received their supply intermittently |
|---|---|---|---|
| Africa south of the Sahara | 30.9 | 20.8 | 27 |
| Latin America and the Caribbean | 155 | 122 | 23 |
| West Asia and North-East Africa | 65.0 | 54.8 | 34 |
| Algeria, Morocco, and Turkey | 24.6 | 17.8 | 22 |
| South-East Asia | 158 | 83.2 | 91 |
| East Asia and Western Pacific | 38.4 | 28.8 | 49 |
| TOTAL | 472 | 327 | 54 |

[a] Data in columns 2 and 3 are from 91 countries; data in column 4 are extrapolations from 47 countries.

[1] Seidel, H. F. & Baumann, E. R. (1957) A statistical analysis of water works data for 1955, J. Amer. Wat. Wks Ass., 49, 1537 (Table 5).

It is also known that some cities in developing countries have one distribution system for what is known as "safe water" and another for raw water, which is intended for such purposes as the washing of streets and the watering of lawns. The public health hazard from cross-connexions is well known. No statistical information on dual supplies was collected in this survey.

Supplying reasonably safe water to the burgeoning populations of urban centres in developing countries is a problem that many a mayor and city engineer have to face. It might be argued that they have no alternative to intermittent or dual supply. Is it better - indeed is it politically feasible - to supply high-quality safe water to a few people and leave the rest of the urban population to fend for themselves? Is not the supply of a water of lesser quality to larger numbers of urban populations the lesser of two evils? This question has extensive social, economic, and political implications. Provision of a high quality of life for the few and a subsistence struggle for the remaining millions would run counter to the social objectives of most developing countries. Since freedom from preventable communicable diseases is considered a basic human right in many societies (even if a broader definition of health is unattainable in the immediate future), a practical compromise may lie in at least ensuring that a community water supply is not the vehicle for the transmission of the many waterborne diseases that occupy such a high place in the morbidity and mortality statistics of the developing countries. Safety of the water as regards biological quality may therefore be considered as a minimum requirement in a public supply even if other water quality standards are not fully met. If this principle is accepted, an intermittent supply may not be the answer for meeting the social objective of serving more people. The ingenuity of engineers needs to be applied in designing systems that prevent excessive consumption without affecting the biological quality of the water. Control devices (orifices) and "waste-not" taps have been used in some countries. The whole question of design criteria for community water supply in developing countries needs more attention than it has been given hitherto.

Will the provision of biologically safe water in small quantities to an entire urban population lead to a dramatic improvement in health status? It is already known that safe community water supply alone is not enough for improvements in health and economic status. What is also known is that increasing the quantity of available water plays a part in the reduction of what White et al. have termed "water-washed" diseases (e.g., trachoma, scabies, etc.).[1] Thus the concept of a minimum requirement for quantity of water (a concept that is easily understandable from the viewpoints of amenity, convenience, and economics) also emerges from public health considerations. It is doubtful however whether public health standards for minimum quantity can be laid down, because conditions vary so widely. Should the minimum quantity entail a piped supply into the house, economic constraints would dictate the time when this goal could be reached.

### 3.3 Relationship to economic status

Are community water supply and excreta disposal facilities to be regarded as health services, as social services, or as infrastructures for economic development? They are all of these. Investments in this sector represent social overhead capital. One of the features that distinguishes the developed countries from the developing countries is the contrast in the extent and quality of the provision of basic sanitary facilities and services. It would be reasonable to expect that differences should also exist among developing countries at different economic levels.

Notwithstanding its deficiencies, GNP per capita has been used in this publication as an index of economic status. Fig. 5 and 6 are plots of countries showing the total percentage of their peoples served by community water supply and excreta disposal facilities and services, in relation to their economic level as measured by GNP per capita.

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[1] White, G. F., Bradley, D. J. & White, A. U. (1972) Drawers of water, Chicago, University of Chicago Press, p. 163 (Table 6.7).

FIG. 5. COMMUNITY WATER SUPPLY IN RELATION TO ECONOMIC LEVEL, 1970

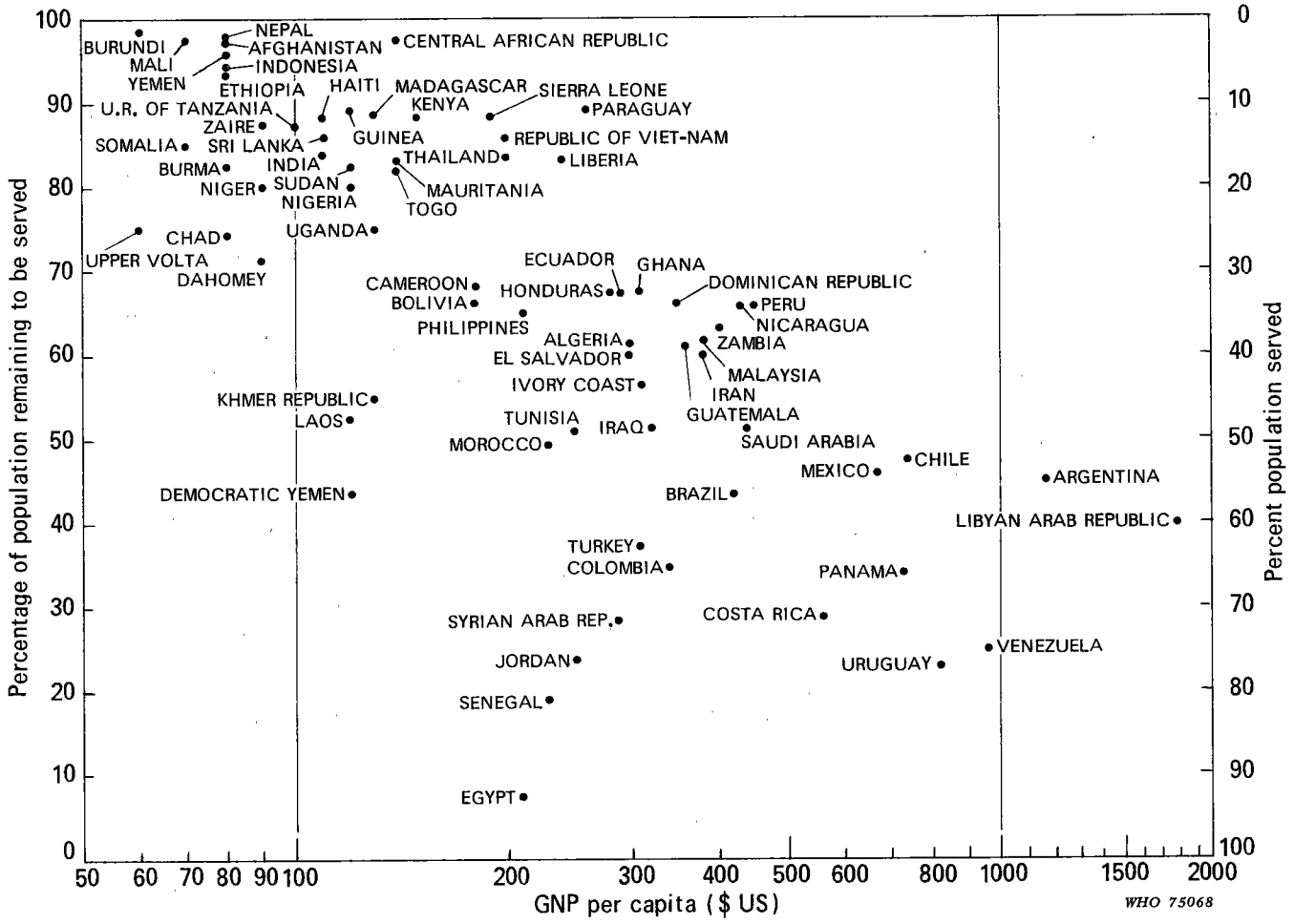
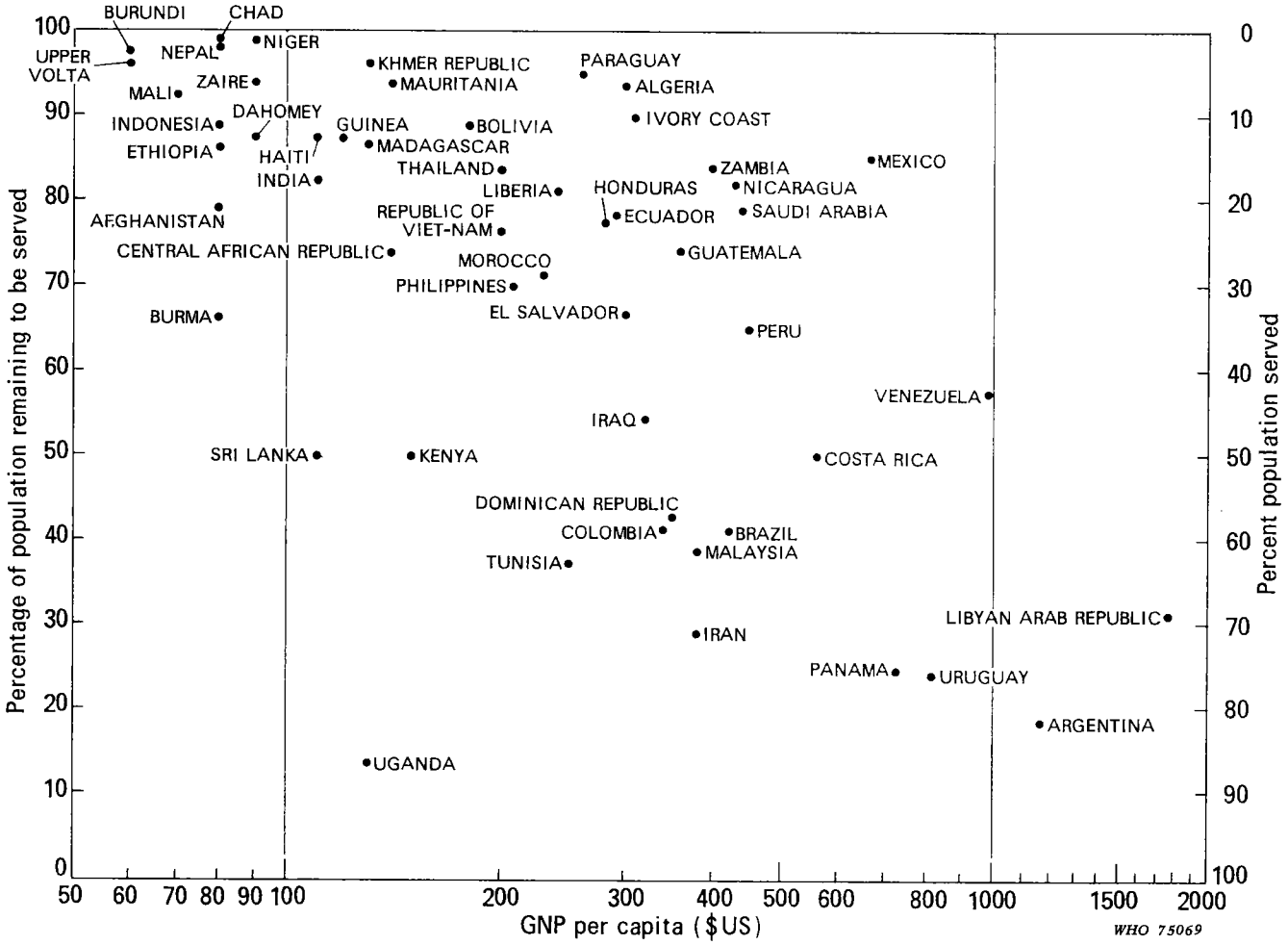


FIG. 6. EXCRETA DISPOSAL SERVICES IN RELATION TO ECONOMIC LEVEL, 1970



Although these figures show the obvious - that the poorer countries have high proportions of their populations still to be served with safe water or adequate excreta disposal - the graphical presentation of the relative positions of countries in relation to economic level and basic sanitation might be of interest. There are a few exceptions to the general trend. The scatter is high in the GNP per capita group of US$ 200 to 400. Countries with less than about $ 110 GNP per capita have uniformly high levels of their populations remaining to be served. No country with a GNP per capita of over $ 500 has less than 50% of its population served. Almost all countries with a GNP per capita of less than $ 200 have over half of their populations still remaining to be served, whereas only about 60% of the countries with a GNP per capita of more than $ 200 have over half their populations remaining to be served.

All developing countries need assistance, some more than others. The United Nations General Assembly has approved a list of 25 "hard core" least developed countries.[1] How would a list of 25 countries with least development of community water supply and excreta disposal services compare with the United Nations list? Table 2 makes such a comparison. In preparing this table, countries were ranked in order of GNP per capita but weighted according to their need for community water supply and excreta disposal services. For countries with the same GNP per capita, the ones with a smaller percentage of people served with water supply and excreta disposal services (taken together) were placed higher on the list. It may be seen that 16 out of the 25 countries listed in Table 2 also figure in the United Nations "least developed" list.

Poverty may not be considered by some as the sole criterion for assistance, and GNP per capita may not be a good index of poverty. The availability of local resources (material and manpower) and the existence of institutions, not to speak of political considerations, are among the factors that influence assistance. Table 2 could thus be modified if different criteria were adopted.

### 3.4 Manpower needs

The 1970 survey questionnaire asked for information on the additional numbers of trained staff that would be required over the next five years to undertake planning, construction, maintenance, operation, and management of existing as well as planned water supplies under the national programme. The question did not relate to the needs for meeting the Second United Nations Development Decade targets. Various categories of professional and subprofessional personnel were suggested and information was requested on the adequacy of training facilities for each category of staff.

Country-by-country information is presented in the World Health Statistics Report.[2] An abstract for the various regions is presented in Table 3. It will be seen that in Africa south of the Sahara, training facilities for professional personnel are quite inadequate. Somewhat better facilities are available for the training of subprofessionals. In Latin America and the Caribbean good training facilities are available for all classes of personnel. It is well to recollect that training of sanitation staff at all levels has been going on in that region for nearly three decades. In West Asia and North-East Africa training facilities are inadequate both for professionals and subprofessionals. The response from the South-East Asia Region shows that training facilities both for professionals and subprofessionals are adequate, except for chemists and biologists. It is clear that in this region the summaries are heavily influenced by the situation in India. The same situation cannot be said to hold good for all the countries of the region - Indonesia, for instance. In the East Asia and Western Pacific regions, training facilities are inadequate both for professionals and subprofessionals.

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[1] United Nations General Assembly (1971) Resolution 2768 (XXVI); see also Off. Rec. Wld Hlth Org., 1974, No. 217 (Resolution WHA27.34).

[2] Wld Hlth Statist. Rep., 1973, 26, 720-783.

TABLE 2. COMMUNITY WATER SUPPLY AND EXCRETA DISPOSAL (1970)
THE 25 POOREST AND LEAST DEVELOPED COUNTRIES[a]

| Country | Whether included in the United Nations list of 25 "hard core" least developed countries |
|---|---|
| 1. Burundi | Yes |
| 2. Upper Volta | Yes |
| 3. Mali | Yes |
| 4. Somalia | Yes |
| 5. Nepal | Yes |
| 6. Yemen | Yes |
| 7. Afghanistan | Yes |
| 8. Ethiopia | Yes |
| 9. Indonesia | No |
| 10. Burma | No |
| 11. Chad | Yes |
| 12. Zaire | No |
| 13. Niger | Yes |
| 14. Dahomey | Yes |
| 15. Tanzania | Yes |
| 16. Haiti | Yes |
| 17. India | No |
| 18. Sri Lanka | No |
| 19. Guinea | Yes |
| 20. Sudan | Yes |
| 21. Nigeria | No |
| 22. Laos | Yes |
| 23. Madagascar | No |
| 24. Mauritania | No |
| 25. Central African Republic | No |

[a] Only WHO Member States are included for which data are available on water supply, excreta disposal, and GNP per capita. Bhutan, Botswana, Lesotho, Malawi, Rwanda, Sikkim, Uganda, and Western Samoa figure additionally in the United Nations list.

TABLE 3. COMMUNITY WATER SUPPLY STAFF[a] REQUIRING TRAINING DURING 1972-76 AND AVAILABILITY OF ADEQUATE IN-COUNTRY TRAINING FACILITIES

| | Africa south of the Sahara | Latin America and the Caribbean | West Asia and North-East Africa | Morocco | South-East Asia | East Asia and Western Pacific | Total |
|---|---|---|---|---|---|---|---|
| No. of staff for whom training facilities are: | available/ not available | available/ not available | available/ not available | available/ not available | available/ not available | available/ not available | available/ not available |
| Professionals | | | | | | | |
| Managers | 8/45 | 406/87 | 28/220 | -/- negligible | 30/57 | -/285 | 472/694 |
| Finance personnel | 43/55 | 255/47 | 84/338 | -/6 | 1569/31 | 4/393 | 1955/870 |
| Engineers | 17/245 | 562/139 | 70/254 | -/24 | 33040/316 | 178/567 | 33867/1645 |
| Chemists/biologists | 19/51 | 130/39 | 20/156 | -/6 | 41/2525 | 7/144 | 217/2921 |
| Other professionals | 137/57 | 220/51 | 65/81 | 21/- | 680/22 | 3/151 | 1126/362 |
| Total professionals | 224/453 | 1573/363 | 267/1149 | 21/36 | 35360/2951 | 192/1540 | 37637/6492 |
| Subprofessionals | | | | | | | |
| Drillers | 71/111 | 148/38 | 22/133 | -/- | 606/240 | 3/402 | 850/924 |
| Supervisors | 332/206 | 382/191 | 273/465 | -/- | 4060/315 | 18/2000 | 5065/3177 |
| Specialized artisans | 1181/25 | 1928/7 | 4880/2470 | 208/- | 2000205/620 | 90/4004 | 2008492/7126 |
| Special clerks | 397/- | 427/250 | 2375/1170 | 96/- | 40280/140 | 25/3550 | 43600/5110 |
| Other sub-professionals | 574/117 | 1053/156 | 239/441 | 43/- | 9059/810 | 255/558 | 11223/2082 |
| Total subprofessionals | 2555/459 | 3938/642 | 7789/4679 | 347/- | 2054210/2125 | 391/10514 | 2069230/18419 |

[a] Some countries included training needs of staff required for sewage disposal.

## 3.5 Criteria for providing community water supplies

The provision of water supply to communities may be undertaken for a multitude of reasons. In the WHO survey of conditions in 1970, countries were requested to state the criteria that they adopted in assigning priorities for the provision of new water supplies. A variety of responses to this open-ended question was received, and, inasmuch as different criteria might be adopted in different regions of the same country, multiple responses were observed in many country questionnaires. Table 4 enumerates the frequency of the responses for different criteria grouped for different regions. The figures represent the number of times any particular criterion was mentioned (not the number of countries). For ease in tabulation the criteria were divided into seven broad categories as shown in the table. Three responses indicated "political" criteria. These are not specifically included in the classification of Table 4, but it is well known that in many countries political considerations often play a decisive role in the selection of communities for which new water supply systems are provided. Other criteria such as improvement of existing services, availability of sources, and promotion of tourism were mentioned occasionally. These have not been included in the grouping of Table 4.

From the global totals it will be noted that "population" is the most frequently mentioned criterion, with "scarcity", "development", "health", "social reasons", "willingness", and "cost" following in that order.

It is interesting to note that the criteria pattern in the region with the greatest achievement (Latin America and the Caribbean) shows "health" as the next to lowest priority in terms of frequency of mention, and "willingness of community to participate" as the next to highest priority. While safe community water supply has a positive impact on health, it could well be undertaken for other reasons. An important element in achievement is community participation.

## 3.6 Constraints to progress

Seven constraints were listed in the questionnaires, and countries were requested to arrange them in order of importance as they affected the progress of their community water supply programmes. Seven scores were thus possible plus an eighth score for "other" constraints.

Table 5 gives horizontally the frequency distribution of scores for each of the constraints, and vertically the frequency distribution of constraints for each score, for the 86 countries that responded to this question. All countries were given equal weight. It is seen from this table that insufficiency of internal financing is given a very high rating as a constraint by most countries, followed by lack of trained personnel.

Insufficiency of external assistance, insufficiency of local production of material, and inappropriateness of the administrative framework are constraints that appear with a fair frequency scatter.

Inappropriateness of the financial framework and inadequacy of the legal framework appear to be of lower importance as constraints in many countries.

In Table 6, the underlined scores give the order of importance for each constraint, taking the country as the unit (not rated by population). The global order of priority of the constraints shown in this table is also borne out in Table 5. In Table 6, the order of importance of the constraints is also shown region by region, as it was felt that the different regions might have special characteristics in this respect.

TABLE 4. CRITERIA ADOPTED BY COUNTRIES FOR ASSIGNING PRIORITY IN PROVIDING NEW COMMUNITY WATER SUPPLIES

| | Frequency of mention of the following priority criteria | | | | | | |
|---|---|---|---|---|---|---|---|
| | Scarcity (acute need, etc.) | Population (size of community, density of population, growth rate, etc.) | Health (poor quality of available water, high incidence of waterborne diseases, etc.) | Development (agricultural, industrial and other development in an area) | Social reasons (uplift of sections of population or area, etc.) | Cost (unit costs of new projects in one area compared with another) | Willingness (community readiness, demand, etc.) |
| Africa south of the Sahara | 9 | 10 | 4 | 9 | 6 | 3 | 2 |
| Latin America and the Caribbean | 2 | 11 | 3 | 6 | 6 | 4 | 8 |
| West Asia and North-East Africa | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Algeria and Morocco | 8 | 4 | 6 | 3 | 4 | 1 | 4 |
| South-East Asia | 2 | 1 | 5 | 2 | 0 | 1 | 3 |
| East Asia and Western Pacific | 1 | 4 | 3 | 3 | 2 | 0 | 1 |
| TOTAL | 23 | 30 | 21 | 23 | 18 | 9 | 18 |

TABLE 5. COMMUNITY WATER SUPPLY (1970):
DISTRIBUTION OF COUNTRIES BY SCORE[a] FOR EACH CONSTRAINT

| Constraint | No. of countries giving scores[a] of: | | | | | | | | Total countries |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| Internal financing insufficient | 48 | 15 | 6 | 5 | 2 | 2 | 1 | 7 | 86 |
| External assistance insufficient | 10 | 23 | 5 | 15 | 5 | 9 | 8 | 11 | 86 |
| Insufficient local production of material | 2 | 10 | 19 | 11 | 6 | 13 | 13 | 12 | 86 |
| Inappropriate administrative framework | 11 | 13 | 9 | 13 | 8 | 7 | 4 | 21 | 86 |
| Inappropriate financial framework | 2 | 7 | 10 | 10 | 24 | 10 | 1 | 22 | 86 |
| Inadequate legal framework | 2 | 7 | 8 | 8 | 10 | 9 | 19 | 23 | 86 |
| Lack of trained personnel | 19 | 10 | 17 | 13 | 8 | 7 | 5 | 7 | 86 |

[a] Constraint of high importance given low score and vice versa.

TABLE 6. COMMUNITY WATER SUPPLY (1970):
REGIONAL AND GLOBAL ORDERING OF SCORES[a] FOR EACH CONSTRAINT

| Constraint | Score[a] | | | | | | |
|---|---|---|---|---|---|---|---|
| | Africa south of the Sahara | Latin America and the Caribbean | West Asia and North-East Africa | Algeria and Morocco | South-East Asia | East Asia and Western Pacific | Global |
| Internal financing insufficient | 1 (1) | 1 (1) | 2 (1) | 1 (1) | 1 (1) | 1 (1) | 1 (1) |
| External assistance insufficient | 2 (3) | 6 (4) | 4 (5) | 2 (2) | .5 (6) | 3 (4) | 3 (6) |
| Insufficient local production of material | 4 (4) | 7 (7) | 5 (6) | 4 (3) | 2 (4) | 4 (3) | 5 (5) |
| Inappropriate administrative framework | 5 (5) | 2 (2) | 3 (2) | 4 (5) | 5 (3) | 5 (6) | 4 (3) |
| Inappropriate financial framework | 6 (6) | 3 (3) | 7 (4) | 7 (7) | 4 (2) | 7 (5) | 6 (2) |
| Inadequate legal framework | 7 (7) | 4 (6) | 6 (7) | 6 (6) | 7 (7) | 6 (7) | 7 (7) |
| Lack of trained personnel | 3 (2) | 4 (5) | 1 (3) | 3 (4) | 3 (5) | 2 (2) | 2 (4) |
| No. of countries | 28 | 22 | 19 | 2 | 7 | 8 | 86 |
| Population remaining to be served (millions) | 145 | 128 | 148 | 21 | 683 | 68 | 1 193 |

[a] Constraint of high importance given low score and vice versa.
Underlined scores: unit is country, not weighted by population.
Bracketed scores: weighted by population remaining to be served.

Globally, the first three constraints in order of importance are:

- insufficiency of internal finance

- lack of trained personnel

- insufficiency of external assistance.

Efforts to overcome some of the constraints such as inappropriate administrative framework, inappropriate financial framework, or inadequate legal framework may not be strictly proportional to the populations involved. However, other constraints such as financial and manpower resources will depend on the size of the country and the populations involved. In Table 6, the bracketed scores give the regional and global ordering of scores for each constraint rated by population remaining to be served. It will now be seen that while insufficiency of internal finance still remains as the primary constraint, inappropriateness of financial framework, and inappropriateness of administrative framework appear as the second and third most important constraints. The South-East Asia region, with more than half the total global population remaining to be served, heavily influences the ordering of scores in this table. The influence of India's order of constraints, in particular, has a considerable influence. It might perhaps be pertinent to consider India as a separate case. However, the differences in the order of scores for the other regions - when country is taken as a unit (underlined scores) and populations remaining to be served are given due weight (bracketed scores) - are worth noting.

### 3.7 Interdependence of constraints

The list of constraints suggested in the WHO questionnaire is by no means exhaustive. The listed constraints themselves are interdependent. Some of the constraints that have figured prominently, such as insufficiency of internal financing, could well be symptoms rather than the root causes. Why, for example, are more of the internal resources not being allocated to the community water supply sector? The question might well evoke different responses depending on who in the national administration is approached. An engineer might well feel that if he had more funds he could do more. A national planner at the country development planning level might have other views. There are instances where the application of inappropriate, sophisticated technology has led to high costs and poor maintenance. Insufficient consultations with the communities to be served and lack of appraisal of their needs, priorities and capacities to pay have been the cause of many failures. Lack of trained manpower has resulted in departments being unable to utilize the resources allocated, with consequent lapse of voted funds in this sector at the end of the financial year. Inappropriate institutional infrastructures and lack of sound financial policies tailored to the specific local needs have been causes of lack of progress in many countries. Good managerial skill is at a premium. It is therefore obvious that the various constraints cannot be considered in isolation; it is not even sufficient to consider all the constraints within the community water supply and excreta disposal sectors alone. As mentioned in the Introduction, what is required is an integrated analysis of all the constraints affecting the community water supply and excreta disposal sectors vis-à-vis the national health and socio-economic development objectives and plans.

While numerous examples of failures can be cited, it might be more relevant to examine why certain programmes have succeeded, at least partly, in the provision of community water supply and excreta disposal services.

## 4. FACTORS CONTRIBUTING TO SUCCESSFUL PROGRAMMES

A number of factors contributing to successful programmes have been clearly identified and are outlined below, with selected examples.

### 4.1 Community participation

It is hard to find a successful rural community water supply programme that did not involve active community participation. The literature abounds in examples of failures of systems that did not take this aspect into consideration, but in systems that are operating successfully, there has been strong and active community participation from the inception of the scheme, during its execution, and finally in the administration and operation of the system. The programmes in Argentina, Colombia, Egypt, India (Uttar Pradesh), Kenya, Malawi, Malaysia, Peru, and Thailand are only some examples. The first step in any rural water supply programme should be to determine the interest of the community in the undertaking and its willingness to participate; the second step should be to determine the capability of the community to contribute to the cost of construction in labour or cash; and the third step should be to determine the community's ability to manage the system and collect revenues for its operation and maintenance. Implicit in the above is the need for community workers, health educators, sanitarians, etc., to motivate people and develop a demand for a water supply service in the community.

### 4.2 Simple technology and standardization

The rural water supply programme in Kenya is an example of such an approach. Kenya is short of trained professional engineers. By simplifying designs and evolving standard specifications, costings, and plans for a number of situations that prevail in the country, the Government has been able, through the health inspectors of the Ministry of Health, to implement a sizable rural water supply programme. Standardization has also been an important contributing factor in the success of the rural water supply programme in north-east Thailand.

### 4.3 Government support

Where rural water supply programmes in developing countries are concerned, no success can be hoped for without a strong commitment and continued support by the government of the country at all levels. Consider the case of the Dominican Republic: in 1961, 43% of the 867 000 urban population were without water supply services, and 82% of the 2 095 000 rural population lacked these services. By setting up a national drinking-water institute the Government has achieved considerable success in its plan for providing water not only to the urban areas but also to smaller communities. No one factor can contribute to such success. The programme involved a proper institutional structure; the training of staff; the adoption of simple technology and standardized designs; built-in flexibility that enabled changes to be made on the basis of experience as the programme developed; the greatest possible decentralization of responsibility and authority for efficient administration; cooperation between ministries and coordination of resources; a dynamic programme of education, consultation, stimulation, and organization of the communities benefiting to assure the maximum extent of self-help; tight technical supervision at levels where necessary; the fullest exploitation of economies of scale wherever possible; and the development of financial and managerial procedures tailored to local needs. Underlying these factors was, of course, the full commitment and support of the Government.

Another example for urban communities is the successful programme undertaken in Brazil. Through the creation of a national sanitation plan and the delegation of financial management to the National Housing Bank, the Government proposes to attain the objective of providing running water for at least 80% of the urban population by 1980. Some of the salient features of the programme are: a realistic, dynamic, and flexible global plan at metropolitan, states, regional, and national level; national distribution of grants and loan resources; operation of an integrated complex of several municipal systems by one and the same concessionaire;

prior determination of the demand for resources and services in each state; mobilization of resources on a scale required by the size of the country and the scope of the problem; implementation of a rate policy based on the ability of the low-income sector of the population to pay and sufficient to cover the costs of maintenance, operation, and expansion of the system under the management of each sanitation enterprise; a policy of reducing operational costs as a function of economies of scale and rational programming; a training programme on a permanent basis; and a sound mixture of centralization and decentralization of selected aspects of the planning, construction, and operation processes.

### 4.4 Economics and financing

While authorities responsible for establishing new or augmenting existing water supply and/or excreta disposal facilities may themselves be aware of the need for such projects, it is usually essential that the need be first accepted by the national planning authorities. Sources of external finance must also be approached for loans to cover the foreign exchange component of the capital cost. These steps are unlikely to be successful without effective project presentation, which requires a comprehensive preinvestment survey embracing *inter alia* both economic and engineering feasibility studies. Projects so presented have found acceptance in national development plans and have attracted outside investment from national, international, or bilateral lending agencies.

Cooperatives, housing banks, lotteries, revolving funds - to name but a few means of obtaining support - have all been used successfully to implement rural water supply programmes. To inspire the confidence of a State or other public agency and so obtain loans to the community, adequate institutional arrangements are established, the economic viability of the project is worked out, and the project is tailored, in financial terms and through technological innovation, to the needs and capacity of the community. Where the economic level of the community is very low, the State may be obliged to subsidize a major part of construction as social overhead investment. This is often done, since it is important in such cases to provide the minimum service commensurate with public health protection, in order to extend service to as much of the population as possible. However, operation and maintenance must be accepted by the community as their responsibility, and the project must be designed, in its engineering and financial aspects, so as to enable the community to do so. Examples of failure due to lack of adherence to these basic principles abound.

### 4.5 Excreta disposal in congested urban and fringe areas

In most developing countries excreta disposal is still the individual householder's responsibility. However, with rapid population growth and increasing population density, there is a recognized need to introduce a public waterborne sewerage system.

While the higher-income groups have private water connexions and waste-disposal facilities discharging into septic tanks, a large proportion of the population is not so served. Studies made in several countries show that fewer than 50% of the urban population have private water connexions and, not infrequently, have no private wastewater disposal facilities, nor do the housing lots permit their erection.

In Ibadan, Nigeria, a successful approach to this problem in the heavily congested area of the old city, where a considerable part of the population has no excreta disposal facilities, has been the development of the "comfort station".[1] The "comfort station" is built to cover the needs of a family group (which may consist of anything from 100 persons to more than 10 times that number). These family groups make application to the Ibadan sewerage authority, undertake to provide the land required, and provide the necessary labour as a contribution to the construction of the "comfort station". The system comprises separate

[1] See: WHO Expert Committee on Disposal of Community Wastewater (1974) Report, Geneva (Wld Hlth Org. techn. Rep. Ser., No. 541), p. 54.

aqua privies for men and women, individual showers for women, common shower units for men, urinals, and a washing counter. One toilet and one shower per 25 persons are provided. In each toilet running water is supplied through a tap. Laundry and shower wastes are disposed of along with latrine wastes in the aqua privy. The overflow of the aqua privy is directed to a soakaway pit, which is provided with an emergency overflow in case it does not absorb the effluent wastewater. Piped water and electricity are metered and the cost is borne by the family compound, whose head undertakes responsibility for the maintenance and operation of the facility on completion of its construction and may employ an attendant for this purpose.

In some other countries similar facilities are provided by the local authority with reasonable success. It is however considered essential to provide full-time attendants to prevent misuse. No charges are levied and both capital and annual costs are met from the local authority's revenues.

Where public latrines have been constructed without any other facilities and without attendants they have proved less successful, and an instance is known where the local people demolished a latrine owing to the public nuisance it created - primarily because of misuse and lack of regular cleaning.

Realization by the family groups of the usefulness of the "comfort stations", their education in the correct use of the facilities, and their organization in groups to pay for an attendant to maintain the facilities in good condition are key elements of the success of the programme in Ibadan.

## 5. PROGRESS BETWEEN 1962 AND 1970

The survey of conditions in 1970 included in its scope community water supply and excreta disposal, in both the urban and the rural sectors. Ninty-one countries responded to the water supply questionnaire and 61 to the excreta disposal questionnaire. Only developing countries that were Member States of WHO were included.

The survey of conditions in 1962 dealt only with the urban water supply situation. It covered 75 developing countries, some of which were not Member States of WHO.

For this reason an assessment of the progress made between the years 1962 and 1970 can be made only for the urban water supply situation and for the countries for which information is available for both the years 1962 and 1970. Some countries (e.g., Angola and Mozambique) were not included in the 1970 survey because they are not Member States of WHO. Israel was included in the 1962 survey but not in the 1970 survey as it was not considered a developing country for the purposes of the 1970 study. Some others (e.g., Malawi and Rwanda) for which information is available for the year 1962, did not respond to the 1970 questionnaire. Information on the urban water supply situation in both 1962 and 1970 is therefore available for only 67 countries. The estimated urban populations country by country are given in the reports of the two surveys for the years in question.[1] For the 67 countries common to both surveys, Table 7 gives the urban populations by region. Annex 2 gives a comparison of the urban water supply services both by house connexion and by street standposts in the years 1962 and 1970, by country as well as by region. Fig. 7 represents the regional and global summaries graphically.

TABLE 7. URBAN POPULATIONS OF COUNTRIES SURVEYED IN 1962 AND 1970, BY REGION

| | Urban population (millions) | |
|---|---|---|
| | 1962 | 1970 |
| Africa south of the Sahara | 17 | 30 |
| Latin America and the Caribbean | 104 | 153 |
| West Asia and North-East Africa | 40 | 62 |
| Algeria, Morocco, and Turkey | 15 | 24 |
| South-East Asia | 106 | 153 |
| East Asia and Western Pacific | 26 | 36 |
| TOTAL | 308 | 458 |

The conclusion is inescapable that definite progress has been made by the developing countries in the provision of water supply for their urban communities between the years 1962 and 1970. Latin America is known to be ahead of the other regions in the provision of basic sanitary facilities. It is worth noting, however, that between the years 1962 and 1970 progress in the provision of urban water supply services in the countries of West Asia and North-East Africa was greater than that in Latin America.

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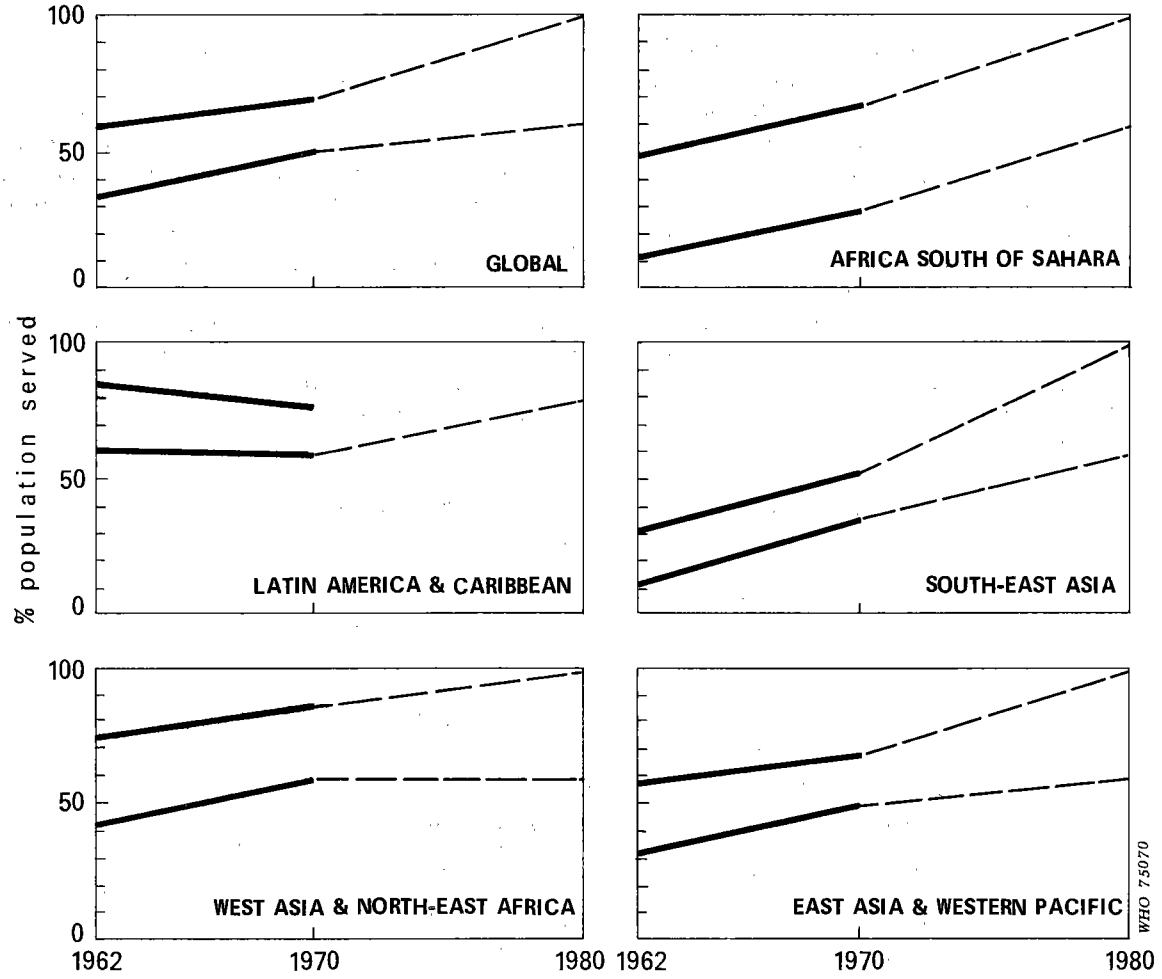
[1] Dieterich, B. H. & Henderson, J. M. (1963) Urban water supply conditions and needs in seventy-five developing countries, Geneva, World Health Organization (Publ. Hlth Pap., No. 23); Wld Hlth Statist. Rep., 1973, 26, No. 11.

FIG. 7. PERCENTAGE OF URBAN POPULATION SERVED WITH PUBLIC WATER SUPPLY, BY REGIONS, 1962 AND 1970, WITH PROJECTIONS TO SECOND UNITED NATIONS DEVELOPMENT DECADE TARGETS




In each graph, population below lower line is served by house connexions, while population between the two lines is served by street standposts.

Second United Nations Development Decade targets for urban areas: 60% of population served by house connexions; 40% of population served by standposts.

Target set by Latin American countries: 80% of population served by house connexions; no target for service by street standposts.

## 6. SECOND UNITED NATIONS DEVELOPMENT DECADE TARGETS

In 1972 the Twenty-fifth World Health Assembly in resolution WHA25.35 endorsed the revised global targets proposed by the Director-General for community water supplies in the developing countries to be attained in the Second United Nations Development Decade. These are as follows:

- in urban areas 60% of the population to be served by house connexions and the remaining 40% by public standposts

- in rural communities 25% of the population to have reasonable access to safe water.

At the III special meeting of Ministers of Health of the Americas (Santiago, Chile, 2-9 October 1972) the following targets were adopted for the Second United Nations Development Decade:

- to provide house connexions to 80% of the urban population or, as a minimum, to supply half the population at present without water services

- to supply water to 50% of the rural population or, as a minimum, to reduce by 30% the proportion of the population lacking such supply

- to install sewerage systems for 70% of the urban population or, as a minimum, to reduce by 30% the proportion of the population lacking such services

- to install sewerage systems or other sanitary means of excreta disposal for 50% of the rural population or, as a minimum, to reduce by 30% the number of inhabitants not possessing adequate facilities.

These revised targets were set taking into account the situation prevailing in 1970, and the constraints under which developing countries find themselves. They are considered as too modest by some, especially the targets for the rural population. Even by 1980, only a quarter of the rural populations are expected to have access to reasonably safe water, if the targets are met.

It is worth remembering that targets are only a means to an end. Their sole purpose is to stimulate and sustain enthusiasm, effort, and dedication. They will fail in this purpose if they are set too low or too high. By themselves, targets cannot deliver the goods. Target mania can be self-defeating. In conjunction with other measures, target setting has its role. Targets such as these need regular and periodic revision on the basis of evaluation of progress and other considerations, such as the effects of current inflation and of energy costs.

# 7. PROSPECTS

## 7.1 National effort

It is worth mentioning that both the global and Latin American percentage goals refer to percentage of population in 1980. The rate of growth of population in the developing countries is different from that in the industrialized countries. In the decade 1970-1980, the world population is expected to increase by 23%, whereas the population of the developing countries alone, taken as a group, is expected to increase by 32%.

In Fig. 7, the actual progress in the provision of water supply services to urban communities between the years 1962 and 1970 is depicted region by region and globally. Linear extrapolation to 1980 shows whether the 1962-70 rate of progress is sufficient to meet the Second United Nations Development Decade targets. Information relating to the year 1962 is however available only for urban water supply coverage. For estimation of prospects in the rural sector, the annual investment in 1970 can be taken as a guide, although admittedly a crude one. If the rate of investment in community water supply construction in the year 1970 were maintained through the Second United Nations Development Decade, would the developing countries be able to attain the targets? In Table 8, annual community water supply construction investment required to meet the targets is compared with the actual 1970 investment for each of the different regions and globally. Trends shown below give weight to the data presented in Fig. 7 for the urban sector (as it represents progress over a period of 8 years) and in Table 8 for the rural sector. The mid decade review to be presented in 1976 will no doubt throw fresh light on the situation.

## 7.2 External assistance

According to the International Bank for Reconstruction and Development[1] the total net flow of financial resources, both public and private, directly to developing countries and multilateral agencies, increased in absolute terms in the First Development Decade but remained below the United Nations target, and the total net flow as a share of the gross national product of the DAC countries (Development Assistance Committee of the Organization for Economic Co-operation and Development) actually decreased. In 1961 the total net flow (public and private) was US$ 9.2 billion compared with the United Nations target of $ 9.6 billion. The total net flow represented 0.95% of the gross national product of DAC countries. In 1971, the total net flow (public and private) was $ 17.4 billion compared with the United Nations target of $ 22.0 billion. This represented 0.79% of the gross national product of the DAC countries.

According to the WHO survey of conditions at the end of 1970, the external assistance received by the developing countries in the five-year period 1966-70 was of the order of $ 710 million for community water supply and $ 142 million for excreta disposal. Although these figures are subject to under-reporting, it is apparent that much more development assistance would be needed by the developing countries to reach even the modest Second United Nations Development Decade targets. Added to the insufficiency of external assistance is its maldistribution. From the data available in the WHO survey, Table 9 has been prepared showing the distribution of external assistance for community water supply in the five-year period 1966-1970 in different regions compared with the needs in those regions. The needs are expressed both in terms of people remaining to be served by 1980 to meet the Second United Nations Development Decade targets and in terms of the money required to meet those targets. Taking the total needs and the total external assistance as 100%, Table 9 shows the percentage of the needs falling within each region and the percentage of the total assistance given to each region.

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[1] World Bank (1973) Trends in developing countries, Washington, D.C. (Table 4.3).

| Region | Prospects based on past trends[1] | |
|---|---|---|
| | urban sector | rural sector |
| Global | 1962-70 progress, if maintained, is sufficient to meet DD II target for house connexions but not to meet DD II target for public standposts. | 1970 investment level will be insufficient to meet DD II target. |
| Africa south of the Sahara | 1962-70 progress rate is insufficient to meet DD II targets for house connexions and public standposts. | 1970 investment level will be insufficient to meet DD II target. |
| Latin America and the Caribbean | 1962-70 progress rate is insufficient to meet target established at Santiago in 1972 for house connexions in DD II. No targets were set for public standposts. | 1970 investment level will be insufficient to meet target set at Santiago for DD II. |
| West Asia and North-East Africa | 1962-70 progress rate, if maintained, will be sufficient to meet both urban DD II targets. | 1970 investment level will be insufficient to meet DD II target. |
| South-East Asia | 1962-70 progress, if maintained, is sufficient to meet DD II target for house connexions but not to meet DD II target for public standposts. | 1970 investment level will be insufficient to meet DD II target. |
| East Asia and Western Pacific | 1962-70 progress, if maintained, is sufficient to meet DD II target for house connexions but not to meet DD II target for public standposts. | 1970 investment level is slightly lower than that required to meet DD II target. |

[1] In this analysis DD II is used an an abbreviation for Second United Nations Development Decade.

TABLE 8. COMMUNITY WATER SUPPLY - COMPARISON, REGION BY REGION, OF ACTUAL CONSTRUCTION INVESTMENT IN 1970 WITH REQUIRED ANNUAL INVESTMENT TO REACH SECOND UNITED NATIONS DEVELOPMENT DECADE (DD II) TARGETS

| | | Population (millions) | | % population served in 1970 | | Construction cost per capita in 1970 (US$) | | Investment (millions of US$) | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1970 | 1980 | Urban: by house connexions | Urban: by public standposts Rural: reasonable access | Urban: for house connexions | Urban: for public standposts Rural: reasonable access | Actual 1970 investment for construction | Required annual investment to meet DD II targets |
| Africa south of the Sahara | urban | 31 | 53 | 29 | 39 | 53 | 28 | 72 | 146 |
| | rural | 152 | 188 | | 11 | | 20 | 20 | 63 |
| | total | 183 | 241 | | | | | 92 | 209 |
| Latin America and the Caribbean | urban | 155 | 235 | 60 | 17 | 40 | | 263 | 386 |
| | rural | 118 | 131 | | 25 | | 24 | 46 | 75 |
| | total | 273 | 366 | | | | | 309 | 461 |
| West Asia and North-East Africa | urban | 65 | 103 | 59 | 26 | 30 | 11 | 198 | 101 |
| | rural | 170 | 216 | | 18 | | 13 | 37 | 47 |
| | total | 235 | 319 | | | | | 235 | 148 |
| Algeria, Morocco, and Turkey | urban | 24 | 42 | 50 | 22 | 120 | 25 | 27 | 181 |
| | rural | 42 | 48 | | 44 | | 20 | 67 | 5 |
| | total | 66 | 90 | | | | | 94 | 186 |
| South-East Asia | urban | 158 | 240 | 36 | 17 | 16 | 9 | 142 | 200 |
| | rural | 693 | 874 | | 9 | | 8 | 44 | 124 |
| | total | 851 | 1 114 | | | | | 186 | 324 |
| East Asia and Western Pacific | urban | 38 | 61 | 65 | 10 | 22 | 20 | 63 | 67 |
| | rural | 75 | 89 | | 21 | | 6 | 4 | 5 |
| | total | 113 | 150 | | | | | 67 | 72 |
| Global figures | urban | 471 | 734 | 49 | 19 | | | 765 | 1 081 |
| | rural | 1 250 | 1 546 | | 14 | | | 218 | 319 |
| | total | 1 721 | 2 280 | | | | | 983 | 1 400 |

TABLE 9. DISTRIBUTION OF EXTERNAL ASSISTANCE FOR COMMUNITY WATER SUPPLY IN DIFFERENT REGIONS, COMPARED WITH NEEDS

| | Needs | | External assistance |
|---|---|---|---|
| | in terms of people: % of total study population remaining to be served by 1980 to meet DD II targets | in terms of money: % of total investment required by 1980 to meet DD II targets | Percentage of total external assistance provided in the five years 1966-70 |
| Africa south of the Sahara | 9% | 15% | 22% |
| Latin America and the Caribbean[a] | 24% | 33% | 49% |
| West Asia and North-East Africa | 14% | 11% | 15% |
| Algeria, Morocco, and Turkey | 5% | 13% | 0% |
| South-East Asia | 41% | 23% | 2% |
| East Asia and Western Pacific | 7% | 5% | 12% |
| TOTAL | 100% (1124 million people) | 100% (US$ 1400 million) | 100% (US$ 710 million) |

[a] Although achievement is highest in Latin America, need appears high because the targets for the Second United Nations Development Decade and the unit costs are much higher for that region than for the other regions.

From the table it may be seen that Latin America has received in the five-year period 1966-1970, nearly half the total external assistance for community water supply. In this region, the long history of development of manpower in environmental health with the assistance of WHO/PAHO, the action of governments in setting goals and initiating necessary changes in the managerial, institutional, and financial framework of operation, and the action of governments in securing community participation - are some of the factors that have created the climate for assistance by donor agencies, foremost among which is the Inter-American Development Bank.

The region with the greatest need in terms of people, South-East Asia, received only 2% of the total external assistance in the same period.

## 7.3 Concluding remarks

If past trends in investment and progress are a guide, a great many developing countries will be finding it difficult even to reach the modest community water supply targets of the Second United Nations Development Decade. Insufficient allocation of finances by governments for community water supply, lack of trained personnel, and inadequate external assistance appear to be three major constraints to progress. Much more progress is needed in the urban fringe and rural sectors. In many developing countries priority for allocation of scarce capital is given to development sectors that yield quick returns in cash crops or other exportable commodities. Community water supplies and excreta disposal in themselves may not assure development, but it is well to remember that very few countries have achieved prosperity and health without paying attention to these basic amenities.

Simultaneously, ways must be explored of making current investment go further and serve more people. This may be done through innovative technology appropriate to the local situation, self-help projects involving a maximum of community participation, the evolution of appropriate institutional structures, the development of financial and managerial policies suited to local circumstances, and a reorientation of training and utilization of manpower to get the job done by personnel with minimal but adequate training.

Economies of scale accrue when programmes are undertaken on a national or even a district level, especially when community water supplies and excreta disposal are planned in conjunction with health, agriculture, and other development programmes.

Increased external assistance (bilateral, multilateral, or international) by itself will not be productive unless carefully tailored to the needs of each country in well planned national programmes with clear realizable objectives. Better coordination among external assistance agencies is thus imperative. In the final analysis, most of the effort in planning, setting objectives, programming, and implementation has to come from the countries themselves.

ANNEX 1

LIST OF TABLES PRESENTED IN THE WORLD HEALTH STATISTICS REPORT, 1973, VOL. 26, No. 11, DEPICTING THE COMMUNITY WATER SUPPLY AND SEWAGE DISPOSAL CONDITIONS IN THE DEVELOPING COUNTRIES AS AT 31 DECEMBER 1970

1. List of developing countries surveyed
2. Population estimates 31 December 1970 and 1980
3. Community water supply - Comparison of services 1962 and 1970
4. Community water supply - Targets for 1980 and costs estimated to reach these targets
5. Population served by sewage disposal facilities 31 December 1970 by type of service
6. Sewage disposal - Targets for 1980 and costs estimated to reach these targets
7. Annual investment in 1970 for construction of community water supply and sewage disposal facilities (including external, national, and local capital, material and labour)
8. External assistance received for community water supply and sewage disposal projects, 1966-1970
9. Community water supply and sewage disposal - Percentage cost of imported material to total construction cost
10. Patterns of cost-participation by users
11. Constraints in construction of community water supply and sewage disposal systems
12. Types of agencies responsible for planning, construction, operation and maintenance of community water supply
13. Types of agencies responsible for planning, construction, operation and maintenance of sewage disposal systems
14. Drinking-water quality surveillance
15. River, lake and marine pollution by sewage or industrial wastewater
16. Community water supply - Daily water consumption in litres per caput
17. Community water supply staff requiring training during 1972-1976 and availability of adequate in-country training facilities
18. Research, surveys and other needs by order of priority.

ANNEX 2

COMMUNITY WATER SUPPLY - COMPARISON OF SERVICES 1962 and 1970

| | Urban population with public water supplies | | | | | | | | | | | | Rural population with reasonable access | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | By house connexions | | | | By public standposts | | | | Total urban | | | | | | | |
| | 1962 | | 1970 | | 1962 | | 1970 | | 1962 | | 1970 | | 1970 | | 1970 | |
| | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % |
| **Summary for countries that replied in both 1962 and 1970** | | | | | | | | | | | | | | | | |
| Africa south of the Sahara | 2 110 | 12 | 8 587 | 29 | 6 500 | 38 | 11 256 | 38 | 8 610 | 50 | 19 843 | 67 | 15 876 | 11 | 35 719 | 21 |
| Latin America and the Caribbean | 59 020 | 60 | 90 513 | 59 | 26 350 | 27 | 25 916 | 17 | 85 370 | 87 | 116 429 | 76 | 26 104 | 23 | 142 533 | 53 |
| West Asia and North-East Africa | 17 410 | 44 | 37 152 | 60 | 11 260 | 28 | 16 021 | 26 | 28 670 | 72 | 53 173 | 86 | 30 058 | 20 | 83 231 | 39 |
| Algeria, Morocco, and Turkey | 5 550 | 35 | 12 406 | 50 | 6 110 | 39 | 5 426 | 22 | 11 660 | 74 | 17 832 | 73 | 18 400 | 44 | 36 232 | 55 |
| South-East Asia | 13 230 | 12 | 55 543 | 36 | 20 170 | 19 | 25 516 | 17 | 33 400 | 31 | 81 059 | 53 | 31 095 | 5 | 112 154 | 15 |
| East Asia and Western Pacific | 4 075 | 16 | 23 359 | 65 | 8 865 | 34 | 3 661 | 10 | 12 940 | 49 | 27 020 | 75 | 16 017 | 22 | 43 037 | 39 |
| Total | 101 395 | 33 | 227 560 | 50 | 79 255 | 26 | 87 796 | 19 | 180 650 | 60 | 315 356 | 69 | 137 550 | 12 | 452 906 | 28 |
| **Summary for all countries that replied in 1970** | | | | | | | | | | | | | | | | |
| Africa south of the Sahara | | | 8 876 | 29 | | | 11 921 | 39 | | | 20 797 | 67 | 16 717 | 11 | 37 514 | 21 |
| Latin America and the Caribbean | | | 91 570 | 59 | | | 26 074 | 17 | | | 117 644 | 76 | 27 864 | 24 | 145 508 | 53 |
| West Asia and North-East Africa | | | 38 093 | 59 | | | 16 726 | 26 | | | 54 819 | 84 | 31 255 | 18 | 86 074 | 37 |
| Algeria, Morocco, and Turkey | | | 12 406 | 50 | | | 5 426 | 22 | | | 17 832 | 73 | 18 400 | 44 | 36 232 | 55 |
| South-East Asia | | | 56 391 | 36 | | | 26 798 | 17 | | | 83 189 | 53 | 61 095 | 9 | 144 284 | 17 |
| East Asia and Western Pacific | | | 25 107 | 65 | | | 3 668 | 10 | | | 28 775 | 75 | 16 067 | 21 | 44 842 | 40 |
| Total | | | 232 443 | 49 | | | 90 613 | 19 | | | 323 056 | 68 | 171 398 | 14 | 494 454 | 29 |
| AFRICA SOUTH OF THE SAHARA | | | | | | | | | | | | | | | | |
| Botswana | | | 16 | 46 | | | 19 | 54 | | | 35 | 100 | 149 | 25 | 184 | 29 |
| Burundi | 10 | 10 | 15 | 15 | 40 | 40 | 60 | 62 | 50 | 50 | 75 | 77 | ... | . | 75 | 2 |
| Cameroon | 20 | 10 | 150 | 13 | 50 | 24 | 750 | 64 | 70 | 33 | 900 | 77 | 1 000 | 21 | 1 900 | 32 |
| Central African Republic | 10 | 8 | 16 | 4 | 20 | 17 | 34 | 9 | 30 | 25 | 50 | 13 | ... | . | 50 | 3 |
| Chad | 30 | 13 | 30 | 11 | 20 | 13 | 170 | 65 | 40 | 25 | 200 | 76 | 780 | 22 | 980 | 26 |
| Congo | | | 80 | 28 | | | 198 | 69 | | | 278 | 98 | 46 | 7 | 324 | 34 |
| Dahomey | | | 33 | 9 | | | 313 | 85 | | | 346 | 94 | 455 | 19 | 801 | 29 |
| Gabon | | | 5 | 5 | | | 1 | 1 | | | 6 | 6 | 1 | - | 7 | 1 |
| Gambia | | | 10 | 27 | | | 26 | 70 | | | 36 | 97 | 9 | 3 | 45 | 12 |
| Ghana | 160 | 10 | 652 | 22 | 1 080 | 65 | 1 483 | 51 | 1 240 | 75 | 2 135 | 73 | 870 | 14 | 3 005 | 33 |
| Guinea | 50 | 14 | 337 | 75 | 130 | 36 | 100 | 22 | 180 | 50 | 437 | 97 | ... | . | 437 | 11 |
| Ivory Coast | 40 | 13 | 260 | 28 | 70 | 23 | 656 | 70 | 110 | 37 | 916 | 97 | 1 000 | 29 | 1 916 | 44 |
| Kenya | 180 | 25 | 1 000 | 90 | 360 | 50 | 72 | 7 | 540 | 75 | 1 072 | 97 | 240 | 2 | 1 312 | 12 |
| Lesotho | | | 5 | 19 | | | 22 | 81 | | | 27 | 100 | ... | . | 27 | 3 |
| Liberia | | | 60 | 43 | | | 80 | 57 | | | 140 | 100 | 67 | 6 | 207 | 17 |
| Madagascar | 60 | 15 | 236 | 25 | 180 | 45 | 594 | 63 | 240 | 60 | 830 | 87 | 45 | 1 | 875 | 12 |
| Mali | 30 | 10 | 160 | 26 | 100 | 33 | 20 | 3 | 130 | 43 | 180 | 29 | ... | . | 180 | 3 |
| Mauritania | | | 80 | 91 | | | 6 | 7 | | | 86 | 98 | 114 | 10 | 200 | 17 |
| Niger | 10 | 5 | 40 | 12 | 50 | 26 | 180 | 55 | 60 | 32 | 220 | 68 | 570 | 16 | 790 | 20 |
| Nigeria | 740 | 10 | 2 810 | 22 | 2 610 | 35 | 4 650 | 36 | 3 350 | 45 | 7 460 | 58 | 3 586 | 8 | 11 046 | 20 |
| Senegal | 100 | 19 | 300 | 29 | 160 | 31 | 722 | 69 | 260 | 50 | 1 022 | 98 | 2 178 | 74 | 3 200 | 81 |
| Sierra Leone | 10 | 10 | 102 | 27 | 20 | 20 | 180 | 48 | 30 | 30 | 282 | 75 | 26 | 1 | 308 | 12 |
| Togo | 10 | 10 | 34 | 13 | 20 | 20 | 214 | 84 | 30 | 30 | 248 | 97 | 86 | 5 | 334 | 18 |
| Uganda | 30 | 20 | 400 | 58 | 60 | 40 | 216 | 31 | 90 | 60 | 616 | 89 | 1 600 | 20 | 2 216 | 25 |

| | Urban population with public water supplies | | | | | | | | | | | | Rural population with reasonable access | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | By house connexions | | | | By public standposts | | | | Total urban | | | | | | | |
| | 1962 | | 1970 | | 1962 | | 1970 | | 1962 | | 1970 | | 1970 | | 1970 | |
| | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % |
| AFRICA SOUTH OF THE SAHARA (continued) | | | | | | | | | | | | | | | | |
| United Republic of Tanzania | 60 | 15 | 100 | 11 | 190 | 48 | 400 | 44 | 250 | 63 | 500 | 54 | 1 200 | 10 | 1 700 | 13 |
| Upper Volta | 20 | 8 | 40 | 20 | 60 | 24 | 100 | 49 | 80 | 32 | 140 | 68 | 1 300 | 25 | 1 440 | 26 |
| Zaire | 400 | 15 | 1 205 | 41 | 1 080 | 40 | 400 | 14 | 1 480 | 55 | 1 605 | 55 | 750 | 5 | 2 355 | 13 |
| Zambia | 150 | 15 | 700 | 71 | 200 | 20 | 255 | 26 | 350 | 36 | 955 | 97 | 645 | 19 | 1 600 | 37 |
| LATIN AMERICA AND THE CARIBBEAN | | | | | | | | | | | | | | | | |
| Argentina | 9 150 | 65 | 11 800 | 60 | 3 520 | 25 | 900 | 5 | 12 670 | 90 | 12 700 | 64 | 654 | 14 | 13 354 | 55 |
| Barbados | | | 85 | 75 | | | 15 | 13 | | | 100 | 88 | 138 | 96 | 238 | 93 |
| Bolivia | 750 | 57 | 542 | 33 | 370 | 28 | 1 009 | 62 | 1 120 | 85 | 1 551 | 95 | 53 | 2 | 1 604 | 34 |
| Brazil | 17 700 | 55 | 28 700 | 53 | 9 700 | 30 | 12 600 | 23 | 27 400 | 85 | 41 300 | 77 | 12 000 | 30 | 53 300 | 57 |
| Chile | 3 770 | 74 | 4 200 | 58 | 820 | 16 | 800 | 11 | 4 590 | 90 | 5 000 | 69 | 250 | 9 | 5 250 | 53 |
| Colombia | 5 570 | 79 | 9 493 | 73 | 780 | 11 | 2 000 | 15 | 6 350 | 90 | 11 493 | 88 | 2 680 | 31 | 14 173 | 65 |
| Costa Rica | 450 | 98 | 611 | 91 | 10 | 2 | 46 | 7 | 460 | 100 | 657 | 98 | 639 | 55 | 1 296 | 71 |
| Dominican Republic | 550 | 57 | 934 | 55 | 270 | 28 | 291 | 17 | 820 | 85 | 1 225 | 72 | 271 | 10 | 1 496 | 34 |
| Ecuador | 900 | 58 | 1 498 | 61 | 420 | 27 | 312 | 13 | 1 320 | 85 | 1 810 | 74 | 244 | 6 | 2 054 | 33 |
| El Salvador | 590 | 58 | 540 | 37 | 270 | 26 | 446 | 31 | 860 | 84 | 986 | 68 | 436 | 21 | 1 422 | 40 |
| Guatemala | 470 | 39 | 725 | 45 | 490 | 41 | 858 | 53 | 900 | 80 | 1 583 | 98 | 425 | 12 | 2 008 | 39 |
| Guyana | | | 200 | 75 | | | 60 | 23 | | | 260 | 98 | 309 | 63 | 569 | 75 |
| Haiti | 180 | 25 | 159 | 17 | 260 | 36 | 457 | 48 | 440 | 60 | 616 | 64 | ... | . | 616 | 12 |
| Honduras | 160 | 33 | 475 | 65 | 220 | 46 | 233 | 32 | 380 | 79 | 708 | 97 | 193 | 10 | 901 | 33 |
| Jamaica | | | 475 | 62 | | | 24 | 3 | | | 499 | 65 | 647 | 52 | 1 146 | 57 |
| Mexico | 10 300 | 55 | 18 840 | 64 | 5 600 | 30 | 3 290 | 11 | 15 900 | 85 | 22 130 | 75 | 5 770 | 26 | 27 900 | 54 |
| Nicaragua | 220 | 38 | 296 | 34 | 240 | 41 | 227 | 26 | 460 | 79 | 523 | 60 | 170 | 14 | 693 | 34 |
| Panama | 390 | 83 | 611 | 87 | 60 | 13 | 66 | 9 | 450 | 96 | 677 | 96 | 308 | 39 | 985 | 66 |
| Paraguay | 180 | 28 | 162 | 17 | 210 | 32 | 25 | 3 | 390 | 60 | 187 | 20 | 81 | 5 | 268 | 11 |
| Peru | 3 540 | 69 | 3 580 | 51 | 1 070 | 21 | 620 | 9 | 4 610 | 90 | 4 200 | 60 | 500 | 7 | 4 700 | 34 |
| Trinidad and Tobago | | | 297 | 54 | | | 59 | 11 | | | 356 | 65 | 666 | 100 | 1 022 | 95 |
| Uruguay | 1 780 | 74 | 1 947 | 85 | 380 | 16 | 216 | 9 | 2 160 | 90 | 2 163 | 95 | 60 | 10 | 2 223 | 77 |
| Venezuela | 2 370 | 50 | 5 400 | 72 | 1 660 | 35 | 1 520 | 20 | 4 030 | 85 | 6 920 | 92 | 1 285 | 38 | 8 205 | 75 |
| WEST ASIA AND NORTH-EAST AFRICA | | | | | | | | | | | | | | | | |
| Afghanistan | | | 125 | 10 | | | 200 | 15 | | | 325 | 25 | 110 | 1 | 435 | 3 |
| Bahrain | | | 125 | 89 | | | 13 | 9 | | | 138 | 98 | 77 | 99 | 215 | 98 |
| Cyprus | | | 275 | 99 | | | - | - | | | 275 | 99 | 300 | 87 | 575 | 92 |
| Democratic Yemen | | | 234 | 62 | | | 100 | 26 | | | 334 | 88 | 400 | 43 | 734 | 57 |
| Egypt | 7 910 | 80 | 11 170 | 75 | 1 020 | 10 | 2 830 | 19 | 8 930 | 90 | 14 000 | 94 | 18 000 | 93 | 32 000 | 93 |
| Ethiopia | 190 | 15 | 600 | 31 | 520 | 40 | 900 | 47 | 710 | 55 | 1 500 | 79 | - | - | 1 500 | 6 |
| Iran | 1 010 | 15 | 6 491 | 55 | 2 540 | 38 | 3 238 | 27 | 3 550 | 53 | 9 729 | 82 | 2 000 | 12 | 11 729 | 41 |
| Iraq | 1 480 | 50 | 3 600 | 77 | 880 | 30 | 966 | 21 | 2 360 | 80 | 4 566 | 98 | 300 | 6 | 4 866 | 49 |
| Jordan | 400 | 61 | 972 | 88 | 60 | 9 | 108 | 10 | 460 | 70 | 1 080 | 98 | 742 | 59 | 1 822 | 77 |
| Kuwait | | | 120 | 29 | | | 280 | 67 | | | 400 | 96 | - | - | 400 | 54 |
| Lebanon | 750 | 75 | 2 100 | 95 | 150 | 15 | - | - | 900 | 90 | 2 100 | 95 | 850 | 85 | 2 950 | 92 |
| Libyan Arab Republic | 130 | 25 | 650 | 54 | 220 | 42 | 200 | 17 | 350 | 66 | 850 | 71 | 300 | 42 | 1 150 | 60 |
| Pakistan | 3 120 | 30 | 5 194 | 34 | 3 120 | 30 | 6 270 | 41 | 6 240 | 60 | 11 464 | 76 | 1 720 | 3 | 13 184 | 20 |
| Qatar | | | 50 | 91 | | | 4 | 7 | | | 54 | 98 | 10 | 40 | 64 | 80 |

| | Urban population with public water supplies | | | | | | | | | | | | Rural population with reasonable access | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | By house connexions | | | | By public standposts | | | | Total urban | | | | | | | |
| | 1962 | | 1970 | | 1962 | | 1970 | | 1962 | | 1970 | | 1970 | | 1970 | |
| | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % | N'000 | % |
| WEST ASIA AND NORTH-EAST AFRICA (continued) | | | | | | | | | | | | | | | | |
| Saudi Arabia | 420 | 20 | 1 500 | 79 | 1 050 | 50 | 330 | 17 | 1 470 | 70 | 1 830 | 97 | 2 000 | 34 | 3 830 | 49 |
| Somalia | | | 12 | 2 | | | 108 | 19 | | | 120 | 21 | 300 | 13 | 420 | 15 |
| Sudan | 310 | 30 | 1 140 | 71 | 640 | 61 | 10 | 1 | 950 | 90 | 1 150 | 72 | 1 800 | 12 | 2 950 | 18 |
| Syrian Arab Republic | 840 | 60 | 2 455 | 89 | 420 | 30 | 244 | 9 | 1 260 | 90 | 2 699 | 98 | 1 746 | 50 | 4 445 | 71 |
| Tunisia | 820 | 50 | 1 200 | 53 | 580 | 35 | 850 | 38 | 1 400 | 85 | 2 050 | 91 | 500 | 17 | 2 550 | 49 |
| Yemen | 30 | 10 | 80 | 23 | 60 | 20 | 75 | 22 | 90 | 30 | 155 | 45 | 100 | 2 | 255 | 4 |
| Algeria | 680 | 25 | 4 500 | 73 | 950 | 35 | 1 000 | 16 | 1 630 | 60 | 5 500 | 89 | ... | . | 5 500 | 39 |
| Morocco | 1 110 | 30 | 2 200 | 39 | 930 | 25 | 3 000 | 53 | 2 040 | 55 | 5 200 | 91 | 2 900 | 28 | 8 100 | 51 |
| Turkey | 3 760 | 40 | 5 706 | 45 | 4 230 | 45 | 1 426 | 11 | 7 990 | 85 | 7 132 | 56 | 15 500 | 66 | 22 632 | 63 |
| SOUTH-EAST ASIA | | | | | | | | | | | | | | | | |
| Bangladesh | | | 750 | 16 | | | 1 100 | 24 | | | 1 850 | 41 | 30 000 | 43 | 31 850 | 43 |
| Burma | 260 | 10 | 369 | 7 | 380 | 15 | 1 581 | 30 | 640 | 25 | 1 950 | 37 | 2 995 | 13 | 4 945 | 18 |
| India | 9 700 | 12 | 46 400 | 39 | 14 600 | 18 | 19 900 | 17 | 24 300 | 30 | 66 300 | 56 | 25 000 | 6 | 91 300 | 16 |
| Indonesia | 2 580 | 15 | 5 000 | 23 | 3 420 | 20 | 2 500 | 12 | 6 000 | 35 | 7 500 | 35 | ... | . | 7 500 | 6 |
| Mongolia | | | 98 | 20 | | | 182 | 37 | | | 280 | 58 | ... | . | 280 | 21 |
| Nepal | 30 | 11 | 13 | 2 | 140 | 52 | 300 | 56 | 170 | 63 | 313 | 59 | 10 | - | 323 | 3 |
| Sri Lanka | 330 | 15 | 920 | 36 | 660 | 30 | 800 | 31 | 990 | 45 | 1 720 | 67 | 90 | 1 | 1 810 | 14 |
| Thailand | 330 | 10 | 2 841 | 52 | 970 | 30 | 435 | 8 | 1 300 | 40 | 3 276 | 60 | 3 000 | 10 | 6 276 | 17 |
| EAST ASIA AND WESTERN PACIFIC | | | | | | | | | | | | | | | | |
| Fiji | | | 144 | 100 | | | ... | . | | | 144 | 100 | 50 | 12 | 194 | 35 |
| Khmer Republic | 100 | 14 | 572 | 64 | 250 | 36 | 296 | 33 | 350 | 51 | 868 | 98 | 2 400 | 38 | 3 268 | 45 |
| Korea, Republic of | 1 280 | 15 | 10 430 | 84 | 3 000 | 35 | 549 | 4 | 4 280 | 50 | 10 979 | 88 | 6 857 | 34 | 17 836 | 55 |
| Laos | 45 | 16 | 300 | 65 | 105 | 36 | 148 | 32 | 150 | 52 | 448 | 97 | 1 000 | 39 | 1 448 | 48 |
| Malaysia | 520 | 20 | 3 257 | 72 | 1 040 | 40 | 881 | 19 | 1 560 | 60 | 4 138 | 91 | 55 | 1 | 4 193 | 38 |
| Philippines | 1 460 | 15 | 7 350 | 55 | 2 890 | 30 | 1 312 | 10 | 4 350 | 45 | 8 662 | 65 | 5 060 | 20 | 13 722 | 35 |
| Singapore | | | 1 586 | 74 | | | ... | . | | | 1 586 | 74 | - | - | 1 586 | 74 |
| Viet-Nam, Republic of | 670 | 15 | 1 450 | 33 | 1 580 | 35 | 475 | 11 | 2 250 | 50 | 1 925 | 44 | 645 | 5 | 2 570 | 14 |
| Western Samoa | | | 18 | 49 | | | 7 | 19 | | | 25 | 68 | ... | . | 25 | 16 |

ANNEX 3

POPULATION SERVED BY EXCRETA DISPOSAL FACILITIES 31 DECEMBER 1970 BY TYPE OF SERVICE

| | Urban excreta disposal facilities | | | | | | | | | | Rural with adequate disposal | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Connexion to public sewerage system | | | | | Household systems | | | | Total urban | | | | |
| | conventional treatment | oxidation ponds | without treatment | Total | | pit privy, septic tank | buckets | Total | | | | | | |
| | N'000 | N'000 | N'000 | N'000 | % | N'000 | N'000 | N'000 | % | N'000 | % | N'000 | % | N'000 | % |
| Africa south of the Sahara | 696 | 159 | 347 | 1 202 | 11 | 3 431 | 953 | 4 384 | 40 | 5 586 | 51 | 13 534 | 18 | 19 120 | 22 |
| Latin America and the Caribbean | 2 933 | 1 614 | 45 699 | 50 246 | 34 | 46 041 | 20 | 46 061 | 31 | 96 307 | 65 | 25 595 | 22 | 121 902 | 46 |
| West Asia and North-East Africa | 1 023 | 164 | 751 | 1 938 | 8 | 21 274 | 300 | 21 574 | 86 | 23 512 | 94 | 14 704 | 21 | 38 216 | 40 |
| Algeria, Morocco and Turkey | 267 | 20 | 2 976 | 3 263 | 27 | 1 148 | 355 | 1 503 | 13 | 4 766 | 40 | 848 | 5 | 4 614 | 19 |
| South-East Asia | 4 468 | 500 | 36 659 | 41 627 | 26 | 31 950 | 43 220 | 75 150 | 48 | 116 797 | 74 | 23 055 | 3 | 139 852 | 16 |
| East Asia and Western Pacific | 1 341 | 19 | 8 633 | 9 993 | 26 | 14 182 | 6 099 | 20 281 | 53 | 30 274 | 80 | 3 870 | 5 | 34 144 | 31 |
| Total | 10 728 | 2 476 | 95 065 | 108 269 | 27 | 118 026 | 40 947 | 168 973 | 42 | 277 242 | 69 | 81 606 | 8 | 358 848 | 25 |
| AFRICA SOUTH OF THE SAHARA | | | | | | | | | | | | | | | |
| Burundi | - | - | 14 | 14 | 14 | 80 | - | 80 | 82 | 94 | 97 | ... | . | 94 | 3 |
| Central African Republic | - | - | 1 | 1 | 0 | 397 | - | 397 | 100 | 398 | 100 | 15 | 1 | 413 | 27 |
| Chad | - | 1 | - | 1 | 0 | 28 | - | 28 | 11 | 29 | 11 | 13 | 0 | 42 | 1 |
| Dahomey | - | - | 45 | 45 | 12 | 240 | 60 | 300 | 81 | 345 | 93 | 17 | 1 | 362 | 13 |
| Guinea | 14 | - | 46 | 60 | 13 | 391 | - | 391 | 87 | 451 | 100 | 60 | 2 | 511 | 13 |
| Ivory Coast | - | - | 110 | 110 | 12 | 65 | 45 | 110 | 12 | 220 | 23 | - | - | 220 | 5 |
| Kenya | 440 | 75 | - | 515 | 47 | 341 | 250 | 591 | 53 | 1 106 | 100 | 4 453 | 45 | 5 559 | 50 |
| Liberia | 30 | 1 | 1 | 32 | 26 | 79 | 10 | 89 | 74 | 121 | 100 | 100 | 9 | 221 | 19 |
| Madagascar | 10 | - | 20 | 30 | 3 | 350 | 570 | 920 | 97 | 950 | 100 | - | - | 950 | 14 |
| Mali | - | - | - | - | - | 390 | - | 390 | 63 | 390 | 63 | - | - | 390 | 8 |
| Mauritania | 60 | - | - | 60 | 68 | 28 | - | 28 | 32 | 88 | 100 | - | - | 88 | 7 |
| Mauritius | - | 35 | 61 | 96 | 23 | 90 | 8 | 98 | 23 | 194 | 46 | 449 | 100 | 643 | 74 |
| Niger | - | - | - | - | - | 30 | - | 30 | 9 | 30 | 9 | 2 | 0 | 32 | 1 |
| Uganda | 100 | 26 | 24 | 150 | 22 | 435 | 6 | 441 | 64 | 591 | 85 | 7 000 | 87 | 7 591 | 87 |
| Upper Volta | - | - | - | - | - | 195 | - | 195 | 95 | 195 | 95 | - | - | 195 | 4 |
| Zaire | - | - | 25 | 25 | 1 | 200 | - | 200 | 7 | 225 | 8 | 875 | 6 | 1 100 | 6 |
| Zambia | 42 | 21 | - | 63 | 6 | 92 | 4 | 96 | 10 | 159 | 16 | 550 | 16 | 709 | 16 |
| LATIN AMERICA AND THE CARIBBEAN | | | | | | | | | | | | | | | |
| Argentina | 1 000 | 200 | 5 000 | 6 200 | 31 | 10 000 | - | 10 000 | 51 | 16 200 | 82 | 4 200 | 89 | 20 400 | 83 |
| Bolivia | - | 100 | 243 | 343 | 21 | 90 | - | 90 | 6 | 433 | 27 | 127 | 4 | 560 | 12 |
| Brazil | 1 200 | 120 | 14 280 | 15 600 | 29 | 29 880 | - | 29 880 | 56 | 45 480 | 85 | 10 384 | 26 | 55 864 | 59 |
| Colombia | - | 100 | 7 717 | 7 817 | 60 | 2 000 | - | 2 000 | 15 | 9 817 | 75 | 3 060 | 35 | 12 877 | 59 |
| Costa Rica | 57 | 2 | 151 | 210 | 31 | 232 | - | 232 | 34 | 442 | 66 | 467 | 40 | 909 | 50 |
| Dominican Republic | 117 | 24 | 136 | 277 | 16 | 796 | - | 796 | 47 | 1 073 | 63 | 1 444 | 54 | 2 517 | 58 |
| Ecuador | ... | 50 | 1 333 | 1 383 | 57 | ... | ... | ... | . | 1 383 | 57 | ... | . | 1 383 | 22 |

| | Urban excreta disposal facilities | | | | | | | | | | Rural with adequate disposal | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Connexion to public sewerage system | | | | | Household systems | | | | Total urban | | | | |
| | conventional treatment | oxidation ponds | without treatment | Total | | pit privy, septic tank | buckets | Total | | | | | | |
| | N'000 | N'000 | N'000 | N'000 | % | N'000 | N'000 | N'000 | % | N'000 | % | N'000 | % | N'000 | % |
| LATIN AMERICA AND THE CARIBBEAN (continued) | | | | | | | | | | | | | | | |
| El Salvador | - | - | 524 | 524 | 36 | 393 | - | 393 | 27 | 917 | 64 | 272 | 13 | 1 189 | 34 |
| Guatemala | ... | 9 | 716 | 725 | 45 | 83 | ... | 83 | 5 | 808 | 50 | 515 | 14 | 1 323 | 26 |
| Guyana | - | - | 66 | 66 | 25 | 154 | - | 154 | 58 | 220 | 83 | 450 | 92 | 670 | 89 |
| Haiti | - | - | - | - | - | 669 | - | 669 | 70 | 669 | 70 | 43 | 1 | 712 | 13 |
| Honduras | 15 | 2 | 403 | 420 | 58 | 30 | - | 30 | 4 | 450 | 62 | 173 | 9 | 623 | 23 |
| Jamaica | 94 | - | - | 94 | 12 | 396 | - | 396 | 52 | 490 | 64 | 1 249 | 100 | 1 739 | 86 |
| Mexico | ... | 700 | 7 072 | 7 772 | 26 | ... | ... | ... | . | 7 772 | 26 | ... | . | 7 772 | 15 |
| Nicaragua | - | 2 | 285 | 287 | 33 | ... | ... | ... | . | 287 | 33 | 90 | 8 | 377 | 18 |
| Panama | - | - | 482 | 482 | 68 | 118 | - | 118 | 17 | 600 | 85 | 520 | 66 | 1 120 | 75 |
| Paraguay | - | ... | 131 | 131 | 14 | ... | ... | ... | . | 131 | 14 | ... | . | 131 | 5 |
| Peru | 250 | 300 | 2 950 | 3 500 | 50 | 300 | - | 300 | 4 | 3 800 | 54 | 1 000 | 15 | 4 800 | 35 |
| Uruguay | 150 | 5 | 1 060 | 1 215 | 53 | 900 | 20 | 920 | 40 | 2 135 | 93 | 66 | 11 | 2 201 | 76 |
| Venezuela | 50 | ... | 3 150 | 3 200 | 43 | ... | ... | ... | . | 3 200 | 43 | 1 535 | 45 | 4 735 | 43 |
| WEST ASIA AND NORTH-EAST AFRICA | | | | | | | | | | | | | | | |
| Afghanistan | 15 | - | - | 15 | 1 | 1 278 | - | 1 278 | 99 | 1 293 | 100 | 2 400 | 15 | 3 693 | 21 |
| Ethiopia | - | - | 155 | 155 | 8 | 1 500 | - | 1 500 | 79 | 1 655 | 87 | 1 800 | 8 | 3 455 | 14 |
| Iran | 200 | - | 300 | 500 | 4 | 11 056 | 300 | 11 356 | 96 | 11 856 | 100 | 8 500 | 50 | 20 356 | 71 |
| Iraq | 178 | 14 | 20 | 212 | 5 | 4 270 | - | 4 270 | 91 | 4 482 | 96 | 20 | - | 4 502 | 46 |
| Libyan Arab Republic | 210 | - | 10 | 220 | 18 | 800 | - | 800 | 67 | 1 020 | 85 | 300 | 42 | 1 320 | 69 |
| Saudi Arabia | - | 150 | - | 150 | 8 | 800 | - | 800 | 42 | 950 | 50 | 700 | 12 | 1 650 | 21 |
| Tunisia | 420 | - | 266 | 686 | 30 | 1 570 | - | 1 570 | 70 | 2 256 | 100 | 984 | 34 | 3 240 | 63 |
| Algeria | ... | ... | 100 | 100 | 2 | 380 | ... | 380 | 6 | 480 | 8 | 480 | 6 | 960 | 7 |
| Morocco | 267 | 20 | 2 876 | 3 163 | 55 | 768 | 355 | 1 123 | 20 | 4 286 | 75 | 368 | 4 | 4 654 | 29 |
| SOUTH-EAST ASIA | | | | | | | | | | | | | | | |
| Bangladesh | - | - | 500 | 500 | 11 | 2 000 | 1 200 | 3 200 | 70 | 3 700 | 81 | 100 | 0 | 3 800 | 5 |
| Burma | 58 | - | 205 | 263 | 5 | 1 600 | 600 | 2 200 | 42 | 2 463 | 47 | 7 200 | 32 | 9 663 | 34 |
| India | 4 000 | 500 | 35 500 | 40 000 | 34 | 14 000 | 40 000 | 54 000 | 46 | 94 000 | 80 | 5 000 | 1 | 99 000 | 18 |
| Indonesia | 410 | - | 50 | 460 | 2 | 10 000 | ... | 10 000 | 47 | 10 460 | 49 | 4 250 | 4 | 14 710 | 12 |
| Nepal | - | - | 40 | 40 | 8 | 150 | 20 | 170 | 32 | 210 | 39 | 5 | - | 215 | 2 |
| Sri Lanka | - | - | 364 | 364 | 14 | 600 | 1 400 | 2 000 | 78 | 2 364 | 92 | 4 000 | 39 | 6 364 | 50 |
| Thailand | - | | | - | - | 3 600 | - | 3 600 | 66 | 3 600 | 66 | 2 500 | 8 | 6 100 | 17 |

| | Urban excreta disposal facilities | | | | | | | | | | Rural with adequate disposal | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Connexion to public sewerage system | | | | | Household systems | | | | Total urban | | | | |
| | conventional treatment | oxidation ponds | without treatment | Total | | pit privy, septic tank | buckets | Total | | | | | | |
| | N'000 | N'000 | N'000 | N'000 | % | N'000 | N'000 | N'000 | % | N'000 | % | N'000 | % | N'000 | % |
| EAST ASIA AND WESTERN PACIFIC | | | | | | | | | | | | | | | |
| Fiji | 14 | 5 | 17 | 36 | 28 | 75 | - | 75 | 59 | 111 | 87 | 400 | 95 | 511 | 93 |
| Khmer Republic | - | - | 739 | 739 | 83 | 150 | - | 150 | 17 | 889 | 100 | 120 | 2 | 1 009 | 14 |
| Malaysia | 192 | 4 | 202 | 398 | 9 | 1 617 | 1 509 | 3 126 | 69 | 3 524 | 77 | 3 259 | 51 | 6 783 | 62 |
| Philippines | 130 | - | 350 | 480 | 4 | 11 185 | - | 11 185 | 84 | 11 665 | 88 | ... | . | 11 665 | 30 |
| Republic of Korea | - | - | 3 840 | 3 840 | 31 | 340 | 3 490 | 3 830 | 31 | 7 670 | 61 | ... | . | 7 670 | 24 |
| Republic of Viet-Nam | 5 | 10 | 3 485 | 3 500 | 79 | 608 | 300 | 908 | 21 | 4 408 | 100 | ... | . | 4 408 | 24 |
| Singapore | 1 000 | - | - | 1 000 | 47 | 170 | 800 | 970 | 46 | 1 970 | 93 | ... | . | 1 970 | 93 |
| Western Samoa | - | - | - | - | - | 37 | - | 37 | 100 | 37 | 100 | 91 | 79 | 128 | 84 |