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Community water supply and sanitation: needs, challenges and health objectives

Report by the Director-General

In January 1995 the Executive Board identified environmental health as a priority programme for WHO and water supply and sanitation as an area meriting particular attention. The growing needs of Member States for water and sanitation services and inadequate progress towards meeting the goals of the International Drinking Water Supply and Sanitation Decade suggest that greater efforts are required both from countries and from support agencies. Although the health benefits of improvements in water supply and sanitation can be clearly demonstrated, investments in this sector do not give sufficient importance to health objectives. WHO needs to emphasize its central role in identifying and promoting health objectives in water and sanitation development. A new WHO strategy for targeting health objectives is emerging in response to that need. This document outlines the future steps that WHO and its Member States can take to ensure more effective health outcomes in water and sanitation development which, in turn, should lead to more rapid extension of essential services to the unserved and especially those at greatest health risk.

INTRODUCTION

1. Every eight seconds a child dies from a water-related disease. Every year more than five million human beings die from illnesses linked to unsafe drinking-water, unclean domestic environments and improper excreta disposal. At any given time perhaps one-half of all peoples in the developing world are suffering from one or more of the six main diseases associated with water supply and sanitation (diarrhoea, ascariasis, dracunculiasis, hookworm, schistosomiasis and trachoma). In addition, the health burden includes the annual expenditure of over 10 million person-years of time and effort by women and female children carrying water from distant, often polluted, sources.

2. Half a century of efforts by WHO and other international organizations to improve water and sanitation conditions around the world have contributed to global awareness of needs, the establishment of international programmes and the strengthening of national institutions. However, nearly a quarter of humanity remains today without proper access to these two most basic facilities for human existence. Clearly, human health and its contribution to the quality of life is the essential concern in water and sanitation development. Access to safe water and sanitary means of excreta disposal are universal needs of all peoples. At the global and

national levels, the responsibility for action falls most heavily upon WHO and its Member States and especially national ministries dealing with health and with water and sanitation.

3. Against this background, it is considered useful to review the progress of water and sanitation development to date and to assess whether the health objective is being achieved. The time is particularly opportune for such a review as only five years remain to reach the goals of health for all and universal access to safe water and sanitary means of excreta disposal by the year 2000.

CURRENT STATUS

4. During the 1981-1990 International Drinking Water Supply and Sanitation Decade, or "Water Decade", some 1600 million additional people were served with safe water and about 750 million with adequate excreta disposal facilities. However, because of population growth of 800 million in the developing countries, by 1990 there remained a total of 1015 million people without safe water and 1764 million without adequate sanitation.

5. Overall progress in reaching the unserved has been poor since 1990. Table 1 shows that approximately 1400 million people around the world still lack safe water and perhaps 1900 million do not have adequate excreta disposal facilities. Not apparent from these data is the fact that rapid population growth and lagging expansion of coverage has left more people without access to safe water and proper sanitation today than in 1990.

TABLE 1. WATER SUPPLY AND SANITATION COVERAGE, 1994
(in millions)

Region*	Water supply		Sanitation	
	Served	Unserved	Served	Unserved
Africa	259	304	208	352
The Americas	373	99	311	161
South-East Asia	769	432	396	805
Eastern Mediterranean	287	155	150	292
Western Pacific	1 024	418	1 168	274
Global	2 712	1 408	2 233	1 887

* Europe is not shown, as the statistics are for developing countries only.

Source: WHO/UNICEF.

6. Unless the current rate of coverage is increased, the expansion of water and sanitation services will continue to be matched, or exceeded, by population growth into the foreseeable future. In other words, "business as usual" in providing water and sanitation services will leave unchanged the number of unserved people.

GOALS: THE LEGACY OF THE WATER DECADE

7. Twenty years ago the world was entering an era of high hopes for improved health through water supply and sanitation. The 1977 United Nations Water Conference in Mar del Plata, Argentina, gave birth

to the concept of a decade on drinking-water and sanitation, while the 1978 International Conference on Primary Health Care in Alma-Ata, Kazakhstan, made water and sanitation part of an integrated health care approach. The International Drinking Water Supply and Sanitation Decade was established in response to a clearly perceived need for concerted action at all levels - international, national and local. The propelling theme of the Decade was the provision of water supply and sanitation services to all peoples by 1990. National water supply and sanitation plans were prepared during the Decade for nearly all countries, and most adopted 100% coverage in both water supply and sanitation as their national goal. One of the problematic legacies of the Decade, however, was the practice of setting ambitious coverage goals without a clear understanding of the national commitments necessary to achieve them. Few of the goals were achieved and, as a result, the credibility of national coverage goals as a mechanism for encouraging water and sanitation improvements suffered.

8. The 1990s have seen the start of another round of bold pronouncements of lofty goals. The 1990 World Summit for Children in New York called for universal access to safe drinking-water and sanitary means of excreta disposal by the year 2000. The following year the United Nations General Assembly reaffirmed the Decade goals of providing safe water and sanitation for all (General Assembly resolution 45/181, 20 February 1991). Similar sentiments were expressed at the 1992 United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, whose Agenda 21 action plan proposed a "realistic" target of universal access to water and sanitation by the year 2025 (for urban areas it proposed that by the year 2000 all residents should have access to at least 40 litres per day of safe water and that 75% of urban dwellers should have proper sanitation).

9. The World Summit for Children goals of universal access to safe water supply and sanitary excreta disposal by the year 2000 have been accepted by 156 nations and every United Nations body. To provide an interim target for the mid-Decade, WHO and UNICEF established a 1995 goal calling for a narrowing of the gap between the actual levels of access that existed in 1990 and the desired level of universal access by the year 2000. By 1995, this gap was to be reduced by 25% in the case of water and 10% in the case of sanitation. As can be seen from Table 2, available data indicate that progress towards mid-Decade goals has been poor.

TABLE 2. PROGRESS TOWARDS MID-DECADE GOALS

	Actual coverage (1990)	Mid-Decade goal (1995)	Expected coverage (1995)
Water supply	68%	76%	66%
Sanitation	51%	56%	54%

Source: WHO/UNICEF.

10. Clearly the Summit goals are not going to be achieved, and the danger is that countries may find themselves farther behind at the end of the century than they are today.

FINANCING UNIVERSAL ACCESS

11. An obvious problem with unrealistic coverage goals is that their achievement would require a vast amount of resources. A comprehensive cost assessment of universal access has not been undertaken. However, at the 1990 Global Consultation on Safe Water and Sanitation for the 1990s in New Delhi, it was stated that universal coverage by the year 2000 would require annually some US\$ 50 000 million, a fivefold increase in current investment levels. Drawing upon the experience from the Water Decade, Agenda 21

estimated that the average annual cost of working towards universal access by the year 2025 would be US\$ 20 000 million. Agenda 21 also stated that a third of the needed funds would have to be provided as development aid.

12. In WHO's 1992 monitoring of the Decade it was estimated that a total of US\$ 133 900 million had been invested in water supply and sanitation during the period 1981-1990, of which 55% was spent on water and 45% on sanitation.¹ Urban areas received 74% of the total and rural areas only 26%. Contrary to widespread perceptions, almost two-thirds of all funds were provided by national sources and only a third by external organizations.

13. UNICEF in 1994 concluded that limiting universal access to rural and periurban areas would cost US\$ 9000 million per year during the period 1990-2000 on the basis of 20 litres per capita per day available at a distance of one kilometre or less. This would serve between 80% and 90% of the total population, exclusive of those served by high-cost water and sanitation systems in the urban areas. For the regions considered to be most in need - South-East Asia, Africa and Latin America - UNICEF calculated that US\$ 54 000 million would be needed in 1990-2000 to reach everybody in the rural and periurban areas. This was more than three times the amount spent in these areas during the Decade. UNICEF argued that the additional funds could be raised through restructuring of the sector (27%), application of cost-recovery mechanisms (30%) and additional funding from government (13%) and donor (30%) sources.

WHAT HAVE WE LEARNED?

14. Experience with water supply and sanitation development over the past half century, and particularly since the onset of the Water Decade in 1980, has provided a rich legacy of lessons. This should be used to guide future activities.

Conditions for achieving health benefits

15. In general, water supply and sanitation development can be viewed as a process having three interactive elements. The most important is the availability of safe drinking-water and sanitary means of excreta disposal. This means 20 to 40 litres of water per person per day must be available within a reasonable distance from the household. Safe water implies protection of water sources as well as proper transport and storage within the home. It also implies the availability of facilities for bathing and for washing clothes and kitchen utensils which are clean and well-drained. Sanitary excreta disposal involves the isolation of faeces from both adults and children so that they do not come into contact with water sources, food or people. To break the chain of transmission of faecally-related diseases, good standards of personal and domestic hygiene, beginning with handwashing after defaecation, are essential.

16. Sophisticated technologies are no guarantor of good health. A well-constructed handpump or a protected spring can be as good a source of safe water as multiple household taps. From a health standpoint, the determining factor is more often individual behaviour than the type of technology. An indoor flush toilet and a simple pit latrine can be equally protective of health if they are clean and well-maintained.

17. A second element in water and sanitation development is the proper use and care of facilities. This is dependent on the knowledge, attitudes and behaviour of users of systems. People must use their water and sanitation facilities correctly if they are to obtain health benefits from them. They must know how to protect and store water safely, how to ensure personal and domestic cleanliness, how to maintain excreta disposal

¹ Document WHO/CWS/92.12 (available on request).

facilities and how to avoid or minimize unsanitary environmental conditions. Knowledge transfer, behaviour change and personal responsibility are the key factors.

18. The third of the interactive elements is the institutional support from communities, development agencies and government that provides a framework for water and sanitation improvements. Although some improvements can be carried out by the individual household, organized efforts are often necessary to provide essential services. Experience has shown that community-based efforts, whether in a small village or a large metropolis, are most effective in identifying and meeting peoples' needs. Governments, especially at regional and national levels, are more effective in facilitating the development process than in carrying out water and sanitation improvements. Facilitation includes establishing regulatory, training and financial environments which are supportive of community actions to ensure adequate water and sanitation services to all.

19. Together, these elements provide an overall water supply and sanitation environment. Individually each element is incomplete and may produce no lasting health improvements. It is only by bringing together community action, education, behaviour change, institutional support and technologies that health benefits can be achieved.

Direct health outcomes

20. No single type of intervention has greater overall impact upon national development and public health than the provision of safe drinking-water and the proper disposal of human excreta. The direct effects of improved water and sanitation services on health are most clearly seen in the case of water-related diseases, which arise from the ingestion of pathogens in contaminated water or food and from exposure to insects or other vectors associated with water. Improved water and sanitation can reduce the morbidity and mortality of some of the most serious of these diseases by 20%-80%, as shown in Table 3.

21. Numerous studies conducted in developing countries over the past quarter of a century clearly show that broad and demonstrable improvements in health for all age groups can be expected from better water supply and sanitation. Table 4, which summarizes the results of over a hundred studies of the impact of improved water supply and sanitation upon six major diseases, shows median reductions in morbidity/mortality of 26% for diarrhoea, 29% for ascariasis, 78% for dracunculiasis, 77% for schistosomiasis and 27% for trachoma. Combining several interventions, for example, improved water quality, proper excreta disposal, and increased supply of water for personal and domestic use, greatly enhances this impact. Water supply, sanitation and hygiene education are part of the WHO strategies for control of many communicable diseases apart from poliomyelitis, bancroftian filariasis and onchocerciasis.

Indirect health outcomes

22. To achieve health benefits, water and sanitation systems must reduce the risks of infection, people must use the systems properly and a sustainable supporting environment must be maintained. In other words, technology, human behaviour and institutional support are essential requirements for obtaining health benefits from water and sanitation development. The actual construction of facilities represents only a fraction, often relatively small, of the total effort necessary to achieve desired health benefits.

23. Supporting elements of water supply and sanitation greatly contribute to health outcomes. They include the promotion of behavioural change through hygiene education, the establishment of drinking-water quality guidelines based on health considerations, the incorporation of health principles in the preparation of maintenance and management guidelines and the encouragement of environmental management to control disease vectors. As reliable information is crucial in all of these areas, the development of monitoring and information databases also contributes to achievement of the health objectives of water supply and sanitation.

TABLE 3. ESTIMATED MORBIDITY AND MORTALITY OF WATER-RELATED DISEASES

Disease	Morbidity (episodes/year, or as stated)	Mortality (deaths/year)	Relationship of disease to water supply and sanitation
Diarrhoeal disease	1 000 000 000	3 300 000	Strongly related to unsanitary excreta disposal, poor personal and domestic hygiene, and unsafe drinking-water
Infection with intestinal helminths	1 500 000 000 ¹	100 000	Strongly related to unsanitary excreta disposal, and poor personal and domestic hygiene
Schistosomiasis	200 000 000 ¹	200 000	Strongly related to unsanitary excreta disposal and absence of nearby sources of safe water
Dracunculiasis	100 000 ^{1,2}	-	Strongly related to unsafe drinking-water
Trachoma	150 000 000 ³	-	Strongly related to insufficient face washing, often in the absence of nearby sources of safe water
Malaria	400 000 000	1 500 000	Related to unsatisfactory water management, water storage, operation of water points and drainage
Dengue fever	1 750 000	20 000	Related to unsatisfactory solid waste management, water storage, operation of water points and drainage
Poliomyelitis	114 000	-	Related to unsanitary excreta disposal, poor personal and domestic hygiene, and unsafe drinking-water
Trypanosomiasis	275 000	130 000	Related to the absence of nearby sources of safe water
Bancroftian filariasis	72 800 000 ¹	-	Related to unsatisfactory water management, water storage, operation of water points and drainage
Onchocerciasis	17 700 000 ^{1,4}	40 000 ⁵	Related to unsatisfactory water management in large-scale projects

¹ People currently infected.

² Excluding Sudan.

³ Active trachoma. There are approximately 5 900 000 cases of blindness or severe complications of the disease annually.

⁴ Includes an estimated 270 000 blind people.

⁵ Mortality resulting from blindness.

Source: WHO.

TABLE 4. RESULTS OF STUDIES OF IMPACT OF IMPROVED WATER SUPPLY AND SANITATION IN REDUCING DISEASE MORBIDITY/MORTALITY

	All studies		Detailed studies	
	No.	Median reduction	No.	Median reduction
Diarrhoea (morbidity)	49	22%	19	26%
Diarrhoea (mortality)	3	65%	-	-
Ascariasis	11	28%	4	29%
Dracunculiasis	7	76%	2	78%
Hookworm	9	4%	-	-
Schistosomiasis	4	73%	3	77%
Trachoma	13	50%	7	27%
Overall impact on child mortality	9	60%	6	55%

Source: Esrey S.A. et al. *Bulletin of the World Health Organization*, 1991, 69(5): 609-621.

24. To enable measurement of health outcome, intermediate elements supportive of health objectives in WHO water and sanitation programmes must be identified and targeted. WHO programmes do not directly influence coverage and, therefore, should not have coverage goals as operational objectives. The continuing challenge is to establish health-related objectives that meet country needs and whose attainment is within WHO capabilities.

THE WORK OF WHO IN WATER SUPPLY AND SANITATION

25. In recent years, WHO has concentrated on strengthening the supporting elements of water supply and sanitation, especially interagency coordination, community involvement, training and behavioural change. Its programmes have evolved in response to country needs and resource availability. Emphasis is currently given to supporting those elements of water and sanitation development that will have the greatest health impact on Member States and the communities within them. At present WHO has water and sanitation activities in 108 countries with 30 sanitary engineers assigned to country posts (see box for examples of specific activities). Overall, approximately 70 WHO staff of various professional disciplines have significant water and sanitation responsibilities.

26. The following are the chief technical areas in water supply and sanitation in which WHO is working at present:

- **Drinking-water quality** has long been associated with WHO programmes. Current efforts include support to the setting of national standards, establishment of surveillance systems and strengthening of laboratories.
- **Basic sanitation and hygiene behaviours**, and the creation of low-cost facilities for unserved communities and schools, are emphasized at all levels of WHO. Activities centre on the development of hygiene education methods, and the promotion of health-related behavioural changes and participatory community involvement.

EXAMPLES OF WATER AND SANITATION INTERVENTIONS SUPPORTING THE ACHIEVEMENT OF HEALTH OBJECTIVES

Disease reduction

Diarrhoeal disease. A programme in Guatemala targeted the key behaviour of handwashing in order to reduce diarrhoeal disease. A promotional campaign linking handwashing with having a "pretty, happy child" stimulated the construction and use of many household handwashing facilities.

Dracunculiasis. An international effort focusing on water supply improvements, vector control, use of cloth filters and health education has reduced the frequency of the disease from over 10 million cases per year in some 30 countries in Africa and Asia in the early 1980s to under 100 000 cases in 17 countries in 1995 (excluding Sudan for which the data are inconclusive). Through specific targeting of endemic villages, this campaign is likely to result in the eradication of the disease by the year 2000.

Dengue fever. In Saint Lucia, a pilot project in the late 1980s to control *Aedes aegypti*, the vector of both dengue and yellow fever, resulted in a reduction of 80%-90% in the *Aedes* house index. The project was based on a community-based environmental management approach involving community participation, health education, school clean-up campaigns, elimination of larval breeding sites and improvement of showers, water standpipes and laundries.

Schistosomiasis. When combined with drug treatment and mollusciciding, programmes including health education and the improvement of water supplies and sanitation have been shown in many parts of the world to reduce the prevalence of the disease by 40%-80%. A WHO expert committee in 1991 noted that schistosomiasis control programmes are more sustainable when they have water supply and sanitation components.

Other health-related objectives

Hygiene behaviour changes. Since 1985, a school health and sanitation project has been under way in the United Republic of Tanzania to help communities identify and overcome their water- and sanitation-related health problems. Results achieved through health screening of schoolchildren, hygiene education of parents and community involvement in the preparation of an action plan include the construction or upgrading of latrines, sanitary disposal of rubbish and better cleaning and storage of cooking utensils.

Expansion of safe water services through loss control. During the period 1977-1992, the city of São Paulo, Brazil, carried out an intensive programme of operation, maintenance and improvement of existing water supply facilities which resulted in a 25% reduction in water loss due to leakage and unauthorized withdrawals. The savings allowed the addition of 400 000 new house connections in the periurban fringes of the city serving approximately 2 000 000 people, or nearly 15% of the population of São Paulo, who had been using unsafe water from a variety of contaminated sources.

Sustainability of facilities. A WHO teaching package on "Management of rural water supply and sanitation systems" has been incorporated into the regular training programmes of Namibia and Burkina Faso. National staff are now better prepared to maintain facilities in working order and, therefore, to achieve health objectives associated with water and sanitation systems.

Environmental health services monitoring. The South African Department of Health has developed a monitoring system to evaluate basic subsistence facilities, including water supply and sanitation. It is now being adapted by the Department of Water Affairs and Forestry as a national water supply and sanitation information management system to assist in extending water and sanitation facilities to the estimated 12 000 to 15 000 communities without adequate services.

Water supply and sanitation monitoring. In Togo, monitoring capacities have been expanded in recent years to allow reporting on water and sanitation services on a provincial basis. This has for the first time given the Government the possibility of allocating funds to provinces for water and sanitation improvements on the basis of needs in relation to health risks.

- **Operation and maintenance** of water and sanitation facilities are promoted through the development of guidance materials, support for policy consultations and assistance in training workshops. WHO coordinates international efforts to improve the effectiveness and sustainability of systems through improved technology and management.
- **Water and sanitation monitoring** has been an international responsibility of WHO for over 25 years. Since 1990, WHO and UNICEF have been collaborating in a joint monitoring programme to strengthen country capabilities to monitor and manage their water supply and sanitation sector.
- **National sector studies** for water and sanitation planning and for integrated environmental management planning are carried out in all regions. WHO participates in interagency missions to help coordinate follow-up programmes.
- **Technology development** focuses on use of wastewater for agriculture, simple techniques for drinking-water disinfection and field-testing of basic sanitation systems.
- **Environmental management support** includes the provision of technical guidance in water- and sanitation-related vector control and the promotion of healthy cities and villages. Participatory methods for involving community members are stressed.

27. WHO capabilities in the above areas are most effectively used when they form part of comprehensive regional initiatives for water and sanitation. For example, the Region of the Americas is implementing a regional plan for investment in the environment and health, the African Region is supporting the AFRICA 2000 initiative for water supply and sanitation, and the South-East Asia Region is launching a regional strategic plan for health and environment.

CONSTRAINTS ON ACHIEVING HEALTH BENEFITS

Declining investments in water supply and sanitation

28. Since the end of the Water Decade overall investments in water supply and sanitation have been declining. This may be attributed to donor fatigue, to the worldwide economic recession of the past few years and to competition of other development sectors. To some extent the decline may also result from the lack of a focused approach to water and sanitation and the lack of a high-visibility "champion" to speak out on these issues.

29. Many development agencies have reduced their budgets for water supply and sanitation since 1990. Current investment levels in this field are unknown, but there are no indications that total investments in the sector have increased since the end of the Water Decade. WHO has also experienced these declines, as both budgets (in real terms) and numbers of staff devoted to water and sanitation have fallen over the past 10 years. The decline has been particularly severe at the country level.

Competing environmental priorities

30. With the end of the Water Decade in 1990, the concerns of international agencies began to shift away from water supply and sanitation development towards broader environmental issues such as water resources management.

31. There is clearly a need for greater WHO attention to broad environmental issues and their health implications; yet at the same time Member States consistently call for specific measures to ensure safe water and better sanitation to protect the health and improve the dignity of their peoples. In Africa, for example,

water supply and sanitation remain the basis of environmental health, and 27 countries in the Region have provision for activities in this field in the WHO budget for 1996-1997. Improved water and sanitation services tend to be given priority by the developing countries because the satisfaction of basic needs is paramount, while integrated environmental concerns tend to have priority at the global level and among industrialized countries. This shift to an environmental paradigm often takes place at the cost of traditional health concerns regarding water supply and sanitation. The consequence of designing programmes primarily to meet environmental objectives is that optimal health benefits may not be achieved.

Problems of health leadership

32. WHO has a long tradition of country support, interagency collaboration and innovative leadership in water supply and sanitation. It has always promoted direct technical cooperation with countries, and over the years has worked jointly with UNDP, UNICEF and the World Bank, among others. At present, every major WHO effort in this field involves collaboration with other organizations, usually traditional partners in the United Nations system, supporting bilateral agencies or collaborating centres.

33. The current roles of the main water and sanitation organizations have changed in recent years. Where 40 years ago only WHO concerned itself with the health consequences of water supply and sanitation, now all major agencies have some operational capabilities in this respect. This has increased the possibility that organizations may put out conflicting health messages in their water and sanitation work. As the authority in international health matters, WHO must strive to minimize such conflicts by working with other organizations to ensure that the health components of their programmes are technically sound and generally supportive of overall WHO objectives.

WHAT CAN WHO DO?

34. Because of its mandate and tradition, WHO has the responsibility to maintain health as the central focus of water and sanitation development. In January 1995 the WHO Executive Board made environmental health one of the Organization's five priority areas for programme action for the 1996-1997 biennium. Within this field, water supply and sanitation were given special emphasis. Consequently, WHO is reshaping its water and sanitation strategies in line with the following principles:

- **WHO water and sanitation programmes should emphasize the provision of health-related guidance in support of sustainable development in Member States.** The programmes must have definable health objectives which strengthen the developmental capacities of both Member States and external organizations working in this field.
- **WHO should target its water and sanitation activities on specific health objectives.** "Health targeting" involves the establishment of programmes to meet particular health needs in full consultation with Member States and with the collaboration of other development organizations.
- **WHO should be a stronger advocate of health objectives in water supply and sanitation development.** WHO needs to be clearly identified with the promotion of health outcomes in activities in this field.
- **WHO should become the health partner of other major water and sanitation organizations.** Through its emphasis on health objectives and health targeting, WHO can complement the work of the other organizations.

WHAT CAN MEMBER STATES DO?

35. Through vigorous public advocacy and innovative national programmes, Member States can influence the level of investments in their water and sanitation sectors. The following actions should be considered:

- support health targeting in water and sanitation investments;
- give priority to lower cost interventions in order to extend water and sanitation services to more people;
- insist upon greater collaboration between external agencies working in the country;
- encourage all water and sanitation organizations to follow a common approach in the country;
- work with other countries to support international initiatives to establish regional and subregional programmes;
- support WHO in providing a health complement to the water and sanitation work of other organizations;
- work with WHO to establish more country-level technical posts in water supply and sanitation.

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