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**URBAN ENVIRONMENTAL HEALTH AND  
HYGIENE  
IN SUB-SAHARAN AFRICA**

**Erik Nordberg  
Uno Winblad**

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## SUMMARY

Despite local and regional differences, urban areas all over Africa have much in common: rapid population growth, more than half the urban population in squatter settlements, a public sector unable to provide basic services, and deteriorating environmental conditions.

Africa's urban population is expected to increase from 210 million in 1990 to 340 million in 2000. The number of urban dwellers without access to safe water is expected to increase from 26 million to 80 million. The number of people without access to an acceptable latrine will during the same period grow from 43 million to 90 million.

In spite of this we suggest that development efforts should continue giving priority to rural development. In most of SIDA's programme countries 70-90% of the population is rural. Even with rapid urban growth this rural population will go on increasing for the next 30 years. Besides, rural Africa's health and hygiene problems are still largely unsolved: much remains to be done to increase the coverage, improve the functioning and generate sustainability of rural water supplies, most remains to be done on rural sanitation and virtually nothing has been done regarding control of disease vectors.

In a longer term perspective we see three main policy options for SIDA:

1. continued concentration on rural programmes;
2. continued strong support to rural development programmes, combined with an increased involvement in small and medium-sized towns; and
3. involvement in pure urban projects, also in large cities.

We recommend the second option.

As a preparation for a possible future urban involvement SIDA should monitor the health and environmental problems in urban areas in the major programme countries. We also recommend SIDA to initiate/carry out a number of studies: on urban health, health care and health service inequities, a review of non-published data on morbidity and mortality statistics and health care utilization in different urban sub-populations, a study of on-site disposal and re-use of excreta, garbage and waste water at high population densities, and methods for small-scale, intensive food production in urban areas involving the re-use of excreta and waste water.

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### SUMMARY

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## **ABBREVIATIONS**

<b>AMREF</b>	<b>A voluntary agency in East Africa</b>
<b>GoK</b>	<b>Government of Kenya</b>
<b>HESAWA</b>	<b>A SIDA-funded health, water supply and sanitation project in the Lake Regions of Tanzania</b>
<b>IDRC</b>	<b>International Development Research Centre, Canada</b>
<b>NGO</b>	<b>Non-government organization</b>
<b>PHC</b>	<b>Primary Health Care</b>
<b>ROEC</b>	<b>Reid's Odourless Earth Closet - a ventilated pit latrine</b>
<b>SIDA</b>	<b>Swedish International Development Authority</b>
<b>VIP</b>	<b>Ventilated Improved Pit latrine</b>
<b>WHO</b>	<b>World Health Organization</b>

# 1. INTRODUCTION

Urban and peri-urban shantytowns with extreme crowding, poor housing quality and unsanitary environmental conditions are a growing health and social problem in sub-Saharan Africa and elsewhere in low-income countries. This situation is a result of several related processes.

Rapid population growth in combination with accelerating rural-urban migration of poor and underemployed rural dwellers is increasing urban populations. Urban space is limited, planning and implementation capacity is poor and resources for infrastructure development are scarce. Population densities in low-income areas run out of control, settlements are established in unsuitable locations (riversides, steep slopes, close to hazardous industries etc), and levels of air and water pollution are high and rising. Legal so called "low cost" housing is expensive for poor people. Illegally constructed houses are often the only affordable option, used by up to half of the inhabitants in many cities. Normal urban services such as water supply, garbage collection, excreta disposal, drainage, and electricity supply are rarely available in these settlements. Many cities are characterized by a colonial type discrimination: well-served residential areas for the rich and unserved or poorly served areas for the poor.

The sanitary and other environmental problems in the growing urban low-income settlements are tremendous. Slums, shantytowns and other low-income housing areas are high-risk environments with regard to illness and injury. Some of these settlements, e.g. on the outskirts of provincial and district towns, happen to be geographically within areas covered by SIDA-supported programmes. Current projects notwithstanding, it is apt for SIDA as well as for other development assistance organizations to pay attention to problems in urban areas where 20-30 years from now about half of the people in most developing countries will reside.

SIDA recently commissioned a study of environmental hygiene problems in rural Africa (Nordberg and Winblad: *Environmental hygiene in SIDA-supported programmes*, 1990) and has now decided to let it be followed by a study of urban low-income areas in sub-Saharan Africa. Its main objective is to increase SIDA's collective knowledge about environmental hygiene and health in urban development. Its purpose is to provide guidance for SIDA's decisions on continued studies and possible future involvement in urban areas. The study is also expected to contribute to a policy paper on urban infrastructure to be prepared by SIDA's Infrastructure Division.

Much of the published literature in this field is highly technical and relatively narrow in scope. Useful overviews have been published by WHO (1988 and 1991; Tabibzadeh et al 1989), by Hardoy and Satterthwaite (1989), by Rodwin (1987) and by the World Bank, for instance in documents prepared by Kalbermatten (1980) and by Feachem et al (1980). An annotated bibliography of IDRC- and World Bank-supported research on low-income shelter projects in El Salvador, Zambia, Senegal and the Philippines was published by IDRC in 1982. Ward has written a critical analysis of self-help housing programmes (1982). "A useful guide to literature" was published in the first issue of *Environment and urbanization*(Vol 1, No1, April 1989). Other sources are mentioned in the text and specified under "References" at the end of the report.

Dr Stefan Hansson has assisted us in the research for this report.

The views, interpretations and proposals in this report are those of the authors and should not be attributed to officials of SIDA.

Table 1 Basic statistical data on sub-Saharan Africa + India and Nicaragua

Country	GNP per caput 1988	% of population below absolute poverty level 1980-88 <sup>1)</sup>		Official developm. assist. received 1988 USD/caput	% urban population 1989	Annual urban growth rate %	Infant mort. rate 1989	% adult literacy rate 1985 (%)		Sec. school enrolment ratio 1986-88		% pop. with access 1985-88				Co. prevalence 1980-88	1986-		
		Urban	Rural					M	F	M	F	to safe water		to high serv.					
												Urb.	Rural	Urb.	Rural				
1. Angola	1130	?	?	16.8	28	5.7	173	50	23	?	?	87	15	-	30	-	1	49	
2. Botswana	1010	40	55	127.7	26	9.9	64	82	60	31	33	84	46	100	85	33	130		
3. Ethiopia	120	60	65	20.5	13	4.5	133	-	66	-	18	12	69	9	-	46	-	2	193
4. India	340	28	40	2.6	27	3.8	96	58	29	50	27	76	50	?	?	34	77		
5. Lesotho	420	50	55		20	6.9	97	?	?	18	26	65	30	pp	-	80	-	5	68
6. Kenya	370	10	55	36.0	23	7.6	70	77	53	27	19	61	21	?	?	27	90		
7. Mozambique	100	?	?	59.3	25	10.0	173	39	16	7	4	38	9	100	30	4	38		
8. Namibia	1030	?	?	?	27	5.2	103	-	40	-	?	?	?	?	?	?	?	123	
9. Nicaragua	830	21	19	58.8	59	4.5	59	-	78	-	29	58	76	11	100	60	27	237	
10. Somalia	170	40	70	73.4	36	5.8	129	27	9	?	?	58	22	50	15	?	38		
11. Sudan	480	?	85	38.6	22	4.1	105	39	10	23	17	60	10	90	40	9	229		
12. Tanzania	160	?	?	39.6	31	10.9	103	93	88	5	3	90	42	99	72	1	16		
13. Uganda	280	?	?	22.1	10	5.4	100	57	29	16	9	37	18	90	57	5	96		
14. Zambia	290	25	?	63.3	49	6.3	78	77	59	?	?	76	41	100	50	1	73		
15. Zimbabwe	650	?	?	29.3	27	5.5	63	70	55	49	42	?	32	100	62	43	85		

Source: UNICEF: The state of the world's children, 1991, p 102-127

1) "the level below which a minimum nutritionally adequate diet plus

essential non-food requirements is not affordable"

## 2. POPULATION INCREASE AND URBAN GROWTH

The world's population is expected to reach 6,200 million by the year 2000. From early in the next decade over half will live in cities. By year 2025 the world's population is likely to be 8,200 million out of which 5,000 million are expected to be living in urban areas. Urban growth will be particularly fast in those Third World nations where already 1,300 million people live in urban centres. Conservative estimates indicate that more than 1,000 million people in cities throughout the world live in grossly inadequate housing; more than 100 million have no housing whatsoever (Hardoy et al 1990).

Growth has been particularly fast in sub-Saharan Africa where cumulative urban growth is calculated at 382% between 1972 and 2000. The environmental problems accompanying this growth have reached crisis proportions. Neither local nor central authorities are able to provide utilities and build houses to cope with the situation. Urban populations do get housed one way or the other but most of this growth takes place in unplanned, underserviced shantytowns - "transitional urban settlements". Shantytowns are by far the fastest growing parts of urban areas and in many cities the shantytown population is likely to double within the next 10 to 12 years.

The problems this gives rise to may vary from one country to another but in spite of local and regional differences there are a number of identifiable urban conditions that have a degree of uniformity all over Africa. One of these is the lack of basic utility systems. Poor water supply, coupled with inadequate waste collection and no facilities for disposal of excreta, is a typical condition for most urban settlements in Africa (Winblad 1974).

Table 2: *Estimated and projected total, urban and rural population by region or area, 1990-2020* (millions)

Region or area		1990	2000	2010	2020
World total	total	5,246	6,122	6,989	7,822
	urban	2,234	2,854	3,623	4,488
	rural	3,012	3,268	3,366	3,334
Developing regions	total	4,036	4,845	5,658	6,446
	urban	1,357	1,904	2,612	3,425
	rural	2,679	2,941	3,046	3,021
Africa	total	645	872	1,158	1,468
	urban	210	340	528	766
	rural	435	532	630	702
Eastern Africa	total	196	272	373	484
	urban	42	77	133	206
	rural	154	195	240	278
Middle Africa	total	69	92	122	154
	urban	27	44	67	95
	rural	41	48	55	59
Southern Africa	total	42	55	69	84
	urban	23	33	45	60
	rural	19	21	23	24

Tabibzadeh et al (1989)

Water scarcity is already a problem in some areas. By the year 2000 most countries of eastern and some of southern Africa will be water stressed "and eight of them will have arrived at absolute scarcity by 2025 " (Falkenmark 1989).

Table 2 provides an overview of the projected development in urban and rural areas up to 2020 - including the expected decline of the rural population in parts of the Third World from around 2015.

More than half of the urban population lives in small and middle sized (intermediate) towns. The proportion for Kenya in 1979 was 49.5%, for Sudan in 1973 69% and for Tanzania in 1978 65.9%. Definitions of "urban", "small" and "intermediate" are, however, somewhat arbitrary and may not be applicable world-wide. For African conditions a minimum population of 2,000 or 2,500 appears to be a useful and common definition, but in any given country various authorities may apply different criteria (such as being a chartered municipality or having at least one hotel, a permanent shop and a weekly market), and they may also be changed over time (Baker 1990). An upper limit at 20,000 people for small towns and 250,000 for intermediate towns have been suggested by Hardoy and Satterthwaite (1989).

Table 3 reflects the ongoing rapid growth of some African cities while Table 4 shows the shantytown population around 1980. Table 5 summarizes urban growth 1975-2000 by region.

Table 3: *The growth of some African cities*

	Population in millions			City's pop. (1980) as % of	
	1950	1980	2000	national pop.	urban pop.
Cairo	2.5	7.4	12.9	17.6	38.6
Addis Ababa	0.2	1.7	5.8	5.2	36.6
Nairobi	0.1	1.3	5.3	7.9	57.3
Kinshasa	0.1	3.1	8.0	11.0	28.0

Rossi-Espagnet 1984

Table 4: *Percentage of urban poor in substandard housing with inadequate or no services, 1980*

Angola	44-60%
Ethiopia (Addis Ababa)	79
Kenya (Nairobi)	40
Leshoto	59
Malawi	80
Mozambique (Maputo)	80
Sierra Leone	80
Somalia (Mogadiscio)	60-80

Tabibzadeh et al 1989

Table 5: *Cumulative urban growth 1975-2000 by region*

Area	tot.urb.pop.	increase	increase
	in 1975 (millions)	1975-2000 (millions)	1975-2000 %
Less dev.regions	838.4	1,283.7	253
Northern Africa	38.2	71.6	287
Sub-Sah. Africa	66.0	185.9	382

Donohue in *Assignment Children* 1982; 57-58:21-41

Most urban population growth is due to natural increase. According to Preston (1988) about 1/3 of the urban population growth in developing countries is due to rural-urban migration, except in Africa where the proportion is likely to be higher. A study for Thika in Kenya (Kamba et al 1983) showed that 5% out of a total growth rate of 8% was due to migration.

Migration seems to be increasingly a "push" effect resulting from rural people having insufficient land and no stable employment and therefore leaving to explore the opportunities in urban areas. It is not so much a "pull" to expected job opportunities or other greener pastures in peri-urban shantytowns (Tabibzadeh et al 1989).

Most developing countries appear keen to slow down the rural-urban migration process because of the inadequate urban infrastructure, the shortcomings of the existing public services, the environmental stress etc (UN 1981). Efforts to deal with these problems have been made, and four prominent approaches (Tabibzadeh 1989) are summarized below:

- To improve social and economic conditions in rural areas through agrarian reforms, labour and tax policies etc.
- To control migration through legislation, including forced residence at workpoints, slum removal, and obligatory resettlement.
- To redistribute the rural population within the rural areas.
- To accommodate migrants in urban areas through housing projects, "sites and services" schemes etc.

So far no Third World country has really succeeded in preventing large scale rural-urban migration through any of these approaches. In some cases the effect has been the opposite, thus aggravating urban environmental health and hygiene conditions.



### 3. HEALTH AND ILLNESS

Low-income groups in urban areas are standing with one foot in the traditional society and one in a developing industrialized environment. Their health problems stem from both - a mix of undernutrition, infections, intestinal parasites, urban pollution, STDs and accidental injuries associated with unsafe workplaces, just to take a few examples.

Health status differences between the urban poor and the rural poor are a matter of much debate. It is widely agreed that malnutrition tends to be more common among the urban poor, partly because they cannot maintain a kitchen garden and because food prices in towns tend to run away from most salaries (Nelson and Mandl 1978). Early weaning, excessive dilution of powdered milk, and too few meals per day also contribute.

The health status of urban dwellers in developing countries is on the average better than that of rural dwellers. But averages are misleading and the urban poor are in a health situation much similar to low-income groups in rural areas and possibly worse. Certain urban subgroups, such as the unemployed, the homeless, children in single-parent households, single or divorced women with small children and the unsupported elderly, tend to fare particularly badly as they are exposed both to rural health risks (infections, malnutrition, poor access to care when needed) and to harmful factors associated with urban life (environmental pollution, crowding, sexually transmitted disease, accidents).

Unfortunately data are scarce, of doubtful quality and poorly standardized, which complicates comparisons between communities and countries. A review has recently been published by Harpham and Stephens (1991) who reject the notion that the urban poor are marginalized in third world cities. They summarize published and some unpublished literature on urban health in all parts of the third world, including Africa.

Many of the very low-income squatter areas are formally "illegal" which is an excuse for excluding them from maps, survey sampling frames and service distribution systems (WHO 1991). It is not surprising, therefore, that few data exist. The bulldozer approach temporarily wipes out groups of dwellings, destroys communities under formation as well as private property, frustrates local efforts to coordinate community development and thus undermines attempts to improve health and health care.

A few comments regarding selected disease categories:

*Diarrhoea* is very common, particularly in children aged 6 to 36 months, and is often severe. The number of episodes may be 5-8, and occasionally up to 12 (Bhatnagar 1986), per year per child in very poor households. Episodes are particularly severe in malnourished children. Diarrhoea is a major killer among small children and only a small proportion of all cases are seen at health care facilities. Diarrhoea may be caused by a large number of different microorganisms, most of which are transmitted via water and food. Use of contaminated drinking water and poor sanitary arrangements are associated with high incidence of diarrhoea.

*Upper respiratory infections* may be caused by a variety of viruses and bacteria and are associated with crowding, ventilation and dampness. They are also very common and 8-10 episodes annually per person are not unusual. Most episodes are mild and of short duration but complications such as pneumonia are more likely among the malnourished. Crowding and poor indoor air quality increase the risk of transmission. These infections are likely to be more severe as well as more common in low-income urban areas (Lima Guimataes et al 1985).

*Tuberculosis*, especially lung tuberculosis, often spreads within households and cause serious disease, particularly in malnourished or otherwise weakened individuals. Crowding facilitates transmission and immunization provides only partial protection. Poor slum dwellers are at high risk, and early diagnosis and treatment is unlikely due to high cost of curative care in urban areas. Individuals with impaired

immune defense systems, such as HIV-positives, are particularly vulnerable to tuberculosis developing into severe illness, and urban areas with high levels of HIV seropositivity also tend to have high rates of tuberculosis.

*Sexually transmitted diseases* are common in urban areas and along major transport routes. Gonorrhoea is estimated to be 10-40 times more common in Sub-Saharan communities than in industrialized countries, and the incidence in large African cities is believed to be 3,000-10,000 per 100,000 people per year (De Schryver & Meheus 1990). Early diagnosis and treatment - important to avoid complications such as sterility and to prevent transmitting the infection to others - is expensive, and poor patients often try to save by self-medication or buying antibiotics from pharmacies and street vendors with unsatisfactory result. AIDS is a growing problem with a high mortality rate, and the incidence is particularly high among promiscuous adults with high rates of other STDs, several of which appear to increase the risk of HIV transmission. This has made the incidence of AIDS climb rapidly in urban areas. A 1986 survey in Rwanda showed HIV seropositivity at 17.8% in urban and 1.3% in rural dwellers (Bizimungu et al 1989) and surveys in Uganda have shown similar rates: 15% in Kampala and 1.4% in West Nile (Carswell et al 1986) which illustrates the shortcomings of national statistical averages. These urban-rural discrepancies are likely to slowly decline over time while rates of seropositivity and AIDS incidence continue to climb.

*Other infectious diseases* include skin infections which are common where personal hygiene is unsatisfactory due largely to poor access to water. Eye infections are common under similar conditions although rarely serious. Pneumonia is often a complication following upper respiratory infections and may be serious, particularly if effective treatment is delayed. Parasitic diseases are also common in Third World cities, partly because of poor personal and public hygiene, but partly also due to a continuous immigration of infected individuals from rural areas where the disease is endemic. An analysis of the health and health care situation in Luanda, Angola, has shown a growing malaria problem among the poor with a wet season parasite rate of 42% among 5-9 year old children and increasing rates of drug resistance (Kanji and Harpham 1992).

*Injury* is usually among the top five causes of hospital admission, often the result of road traffic accidents and interpersonal violence - both common in urban areas. Injuries are a particularly prominent cause of death and morbidity in young adults, as has been shown in Brazil (1988), and factors associated with high injury rates in children have been studied in Rio de Janeiro by Reichenheim and Harpham (1989). Occupational injuries are quite common and so far rarely subject to preventive measures; notification of occupational disease and injury is hardly ever done (Jinadu 1987). A review of the published literature on unintentional injuries in developing countries has recently been published (Smith and Barss 1991).

*Malnutrition* is widespread in low-income groups both in rural and urban areas, and it is possible that severe malnutrition is more common among the urban poor than among the rural poor. This is the case for instance in Ivory Coast (Kerejan 1981) and in central America, while in Egypt higher rates of stunting were observed in poor rural households (Brink et al 1983). It is possible that much of the variations and inconsistencies are due to different sampling methods applied. Estimates that 65% of Mathare Valley children in Nairobi are malnourished illustrate the size of the problem (UNICEF and GoK 1988). Girls in urban slums tend to be less well fed than boys, at least in India (Editorial, *Br Med J* 1988).

*Mental illness* is probably more common in urban shantytowns than elsewhere, partly due to migration of mentally ill from rural areas to more tolerant environments

in large towns and aggravated by weak family support. This assumption is supported by studies of urbanization in Khartoum, Sudan (Williams 1990). Alcohol and drug abuse, causing much mental illness, is particularly widespread in urban areas, and the general stress of urban life is provoking mental illness in vulnerable individuals.

Specialist psychiatric care and treatment is concentrated to the larger cities which may also attract people with chronic or recurrent mental problems. However, such care is economically inaccessible to most low-income urban dwellers.

There are large inter-district differences as regards child nutrition, infant mortality rates, educational levels, duration of breastfeeding and other health-related variables (UNICEF and GoK 1988). A study in squatter areas of Amman, Jordan, found correlations between infant mortality and the mothers education, housing quality, occupation of household head and income (Tecke, Shorter 1984). There are of course also considerable differences in vector-borne disease depending on the local presence or absence of vectors. Less is known about morbidity and mortality differences between parts of African cities although we are generally aware that there are extreme differences between rich and poor urban dwellers. This has been demonstrated for instance by Basta (1977) who found infant mortality rates three times higher in the Manila slums than elsewhere in the city; tuberculosis was nine times and diarrhoea twice as common in the slums. Urban health problems have been described also by Ebrahim (1984), by Kloos (1987) and by Rossi-Espagnet (1984).

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Health status differences between the urban poor and the rural poor are a matter of much debate. It is widely agreed that malnutrition tends to be more common among the urban poor, partly because they cannot maintain a kitchen garden and because food prices in towns tend to run away from most salaries (Nelson and Mandl 1978). Early weaning, excessive dilution of powdered milk, and too few meals per day also contribute.

Tuberculosis has been found much more common (five times) in towns than in rural areas (Coulibaly 1981), and the prevalence of *Ascaris* in Soweto has been found seven times higher than in rural areas (Richardson 1969). In the slums of Port-au-Prince, the capital of Haiti, infant mortality was found to be three times higher than in rural areas (Rodhe 1983), and AIDS is also particularly common in large cities.

A few studies on urban variations have been done in Africa. Excess child mortality in low socio-economic areas have been found in urban Nigeria by Oni (1988).

Hookworm infestation in Dar es Salaam was significantly higher among the poor (Killewo et al 1990). The same was found for ascariasis in South Africa (Elsdon-Dew 1953) and in Lagos, Nigeria, 95% of slum school students were infested with helminths as compared to 52% in a group of rural school children (Fashuyi 1988), but conflicting results have been obtained elsewhere. Diarrhoea in Addis Ababa was twice as common in a low-income area (Kloos 1987). Studies of this kind are surprisingly few considering their importance and the convenient access to urban populations for study. It is also possible that data are available but not much used to measure socio-economic differences in mortality, morbidity and nutrition.

It has been noted by Basta (1977) that urban health statistics look relatively satisfactory partly because squatters and slum dwellers, often legally non-existent, are not represented. It is important, therefore, that health indicators used to describe and evaluate health problems and trends in different groups (WHO 1981) are selected so as to identify risk groups and risk factors. Patients seeking care at health facilities are obviously a self-selected group, unlikely to reflect the disease burden or the actual disease pattern in the area. Still, their disease conditions - or, rather, their assumed disease conditions - crudely

indicate the ill-health in the catchment area. The six-months statistics from a health centre in Lunga-Lunga, a Nairobi shanty town, is shown in Table 6, but we don't know to what extent additional cases were managed at home or brought elsewhere for care.

Table 6: *Medical conditions found in new patients at Kahawa HC, LungaLunga, Nairobi, Sept 1986-Feb 1987*

Respiratory Tract Disease	3775	Malnutrition	63
Malaria	734	Ear infections	55
Diarrhoea	577	Anaemia	36
Diseases of the skin	527	Measles	28
Accidents, fractures, burns	378	Pneumonia	27
Eye infection	377	Abortion	23
Rheumatism, joint pains	312	Mental disorders	9
Intestinal worms	151	Chickenpox	8
Gonorrhoea	110	Dis. of puerp. & childbirth	1
Fever of unknown origin	80	All other diseases	395

Okello 1990

Household health surveys can provide a more accurate picture of the situation, but the sampling then has to be carefully conducted if the lowest income households and individuals - which may be officially non-existing - are to be included.

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#### Household health survey in two Nairobi squatter areas

Kahawa and Mukuru are two squatter areas in north-east Nairobi and south of the city centre respectively. In Kahawa, Soweto village with a population of 6,000, and in six villages in Mukuru, 506 households were surveyed by AMREF after cluster sampling.

The population is young, 61% of the adults are between 20 and 29 years and less than 1% are over 45. 52% are immigrants from rural areas. One third of them have stayed 1-4 years in the area while another third have stayed longer. Families are relatively small (average 3 members per family). Most women are housewives (44%) or engaged in small business (selling food, baskets, charcoal etc). Some are engaged in brewing, some in prostitution. Of the men 63% have salaried jobs while others are self employed. Their income is stated to be insufficient, but an average income could not be determined. The main expenditure is on food (1,000 KES/month) and the lowest on health (63% receive free medical care). An average of 300 KES/month was spent on rent. Over half of the households are tenants. There is a higher proportion of owners among women headed households.

The squatters have failed to win recognition from the Nairobi City Commission and from the central government. However, the squatters are protected by a government dictum stating that registered squatters will not be removed until alternative sites have been found for them. Also the government cannot evict them on behalf of private plot owners.

70% of the houses are constructed with clay walls and floor with a roof of corrugated iron sheets or tin sheets. Most families occupy a single room and 90% cook within the same room. 95% of the households have tap water within the compound and 51% use 60-80 liters of water per day (= 20-25 l/person/day). 61% claim that drinking water is normally boiled and stored. 73% report it to be stored in a container that is washed daily. 60% of the households have excreta disposal facilities, mainly pit latrines (43%) while 2% have flush toilets; 31% have no excreta disposal facilities. Waste water is either disposed in common open drains (46%) or discarded indiscriminately outside the house.

The main problems facing members of these communities were identified as:

- insecurity of tenure
- poverty
- unemployment
- unhealthy environmental conditions
- high population growth and consequent overcrowding

AMREF Child Survival Baseline Survey  
of Nairobi Slums, Nairobi 1990

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## 4. HEALTH CARE SERVICE

In big cities and large towns the health care system is dominated by large hospitals - public and private - providing relatively high-technology, curative care largely for the urban well-to-do. In many cases this reflects a past colonial system, with discrimination based on race, culture and socio-economic factors (Doual 1981). This does, however, apply not only to countries with a colonial past but also to other developing countries. The presence of these large institutions is a result of extreme inequalities in developing nations with influential, affluent urban minorities having medical care needs much different from those of the large low-income groups. This state of affairs has hampered the development of a balanced health service infrastructure, and it is hard to find good networks of health centres and dispensaries in Third World cities. The urban service system has a strong curative bias (Harpham et al 1985), and the serious environmental and nutritional problems in the shantytowns are left largely unattended. It is rarely actively involved in local primary health care development (Hardie 1984).

Public health services are supplemented by private care providers which are particularly common in the towns in the form of private medical practitioners, traditional healers, pharmacies, private hospitals, nursing homes etc. Typical for all these is the neglect of preventive programmes and environmental improvements in their respective catchment areas.

Externally supported projects often aim to adjust this imbalance, and Laquian (1983) concludes that "health programmes in most projects have stressed preventive rather than curative programs, environmental rather than disease aspects of health, and long-term rather than immediate health needs". But, as noted by Kanji and Harpham (1992) regarding Luanda, the resources needed for a significant and general water supply, sanitation and nutrition improvement are not available, and the client-perceived quality of health services is poor.

Health care utilization in 1.500 urban households in Accra, Ghana, have been studied by Fosu (1989) who concludes that urban health problems have been relatively neglected although a large proportion of the limited resources is allocated to urban care. He points out the importance of poor health as a major predictor for use of all types of health care services and is concerned with inequitable access to care. "What is needed is a radical, innovative, low-cost alternative to the current expensive, curative-oriented approach, which reaches too few people." The need for painful reallocation of scarce resources has been emphasized by Rossi-Espagnet et al (1991) who suggest the following ways to be considered:

- increase the efficiency of and liberate resources from secondary and tertiary health facilities and services to reallocate them to the primary level;
- obtain and wisely use bilateral and multilateral external cooperation funds;
- elicit contributions (of different kinds) from local communities.

Good descriptive studies of urban health care systems and their users in sub-Saharan Africa are not available. We particularly need to know more about how low-income households use - or fail to use - existing public and private care providers, how different urban households spend scarce resources (money, time, home-care by family members) on different kinds of health care, and how they perceive the quality of care and services obtained. Such studies are justified in small and medium-sized towns as well as in big cities.

## 5. SHELTER, WATER SUPPLY and SANITATION

### Shelter

One of the main concerns of this study is the relation between the health of the urban poor and their housing conditions. "Housing" here includes the provision of shelter, water supply, sanitation and drainage.

The more important requirements for healthy housing are, according to WHO (1987):

- adequate and safe water supply, sanitary excreta disposal and adequate surface water drainage
- solid wastes management
- health education
- adequate supply of structurally adequate shelter
- food hygiene and preparation
- protection against air pollution indoors
- protection against thermal hazards
- protection against excessive noise
- adequate siting
- access to community services
- meeting special needs for elderly, handicapped etc.

If basic requirements of these kinds are not met, the health status of the population will suffer. The same report indicates that the aspects of housing especially associated with diseases and health hazards are water supply and sanitation facilities.

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"Well planned, low-cost housing schemes improve the health of the community, not so much because of better accommodation but because the amenities and facilities that go with them - water, sanitation, access to employment, and education."

Tabibzadeh et al 1989

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Most governments have been reluctant to spend scarce *capital resources* on housing. For a majority of households land for self-help construction is not available or is too expensive. As a result they have no alternative but to live illegally in self-built settlements or in dilapidated tenements and shanty-towns. Such settlements are not a temporary phenomenon brought about by a dysfunction in the development process but rather a permanent feature of the urban scene, being the product of very low wage levels and the inability of governments to make housing available for the urban work force (WHO 1987).

Housing according to *official norms and standards* is almost always unaffordable to the poor. Poor households construct their own shelters - often illegally, on land intended for other purposes or on polluted and dangerous sites. An important consideration for poor households is the need to live close to job opportunities. The houses are built with whatever materials are available. When bulldozed by law-enforcing municipality squads they are usually rebuilt. The households try - and usually fail - to obtain public services such as water, electricity, drainage, excreta disposal and garbage collection.

The excessive official standards are due to a combination of factors forming what Gakenheimer and Brando (1987) call an "unintentional conspiracy": A set of mutually reinforcing behaviour in which engineers seek substantial, modern solutions, in which responsible government agencies seek the safety of strong, "failure-proof", "maintenance-free" construction, and in which policy actions required to change standards are not taken because of a tendency for elected officials to leave them to technicians and to avoid a sense of "demodernizing" the service. A well-educated

professional elite, trained in a western tradition and in established technologies and disliking minimum standards and professional compromise, have a heavy influence on policy and legislation. Technical professional fees, usually calculated as a percentage of project costs, are also contributing to high technology solutions and to maintaining high and expensive standards. Suppliers of equipment have a similar preference for high technology solutions. There are good reasons to avoid large contractors with vested interests in high technology; to remunerate for actual work done rather than on a project value percentage basis and to give priority to labour-intensive implementation methods. In a situation where local interests are in conflict there may be opportunities for donor agency representatives to help promote appropriate technologies.

Most of these "illegal" settlements are tolerated by the authorities but some are pulled down. It can be argued that these "illegal" schemes are more appropriate, given the level and regularity of income, household composition, local climate etc, than those meeting government legal requirements. These requirements largely reflect European values and standards. They were introduced to serve the colonial power and to provide its administrators with segregated, low density, well serviced residential areas. The pattern set by the colonial powers has in many cases survived 30 years of independence as shown by the example of Nairobi where 60% of the urban area is set aside for the rich while the poorest half of the population lives on 20% of the area (Barnow 1983).

Housing standards above certain minimum requirements will not necessarily lead to health improvements.

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"Many so-called low-income housing projects have resulted in the displacement of the urban poor and their replacement by relatively well-off families. Thus the poor remain badly housed and may even become poorer. It is essential to reduce requirements for housing standards to realistic levels and to provide affordable housing units that can be gradually improved. In Nairobi, for example, a nongovernmental organization helped slum dwellers to build their own houses at a fraction of the cost of a major governmental and international scheme nearby. Leaving aside the obvious advantages of lower costs, there is proof that, once certain minimum requirements are fulfilled, more expensive housing will not necessarily produce better health."

Tabibzadeh et al 1989

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Laws, rules and regulations may to some extent help maintain certain minimum standards but they raise the *cost of housing* beyond the resources of low-income households. They may also be purposely used to discourage affordable housing for the poor and to make many of their efforts illegal. This illegality exposes slum dwellers to the risk of eviction and to exploitation by landlords, police, businessmen and others (Hardoy and Satterthwaite 1989; McAyslan 1987). Governments often use these inappropriate "standards" to estimate the amount of "substandard" housing, and it is obviously wise to be sceptical to such estimates which are often presented to potential donors.

*Security of tenure* is important for squatters who may wish to improve their shelters and have some means to do so. It is understandable that poor households are reluctant to invest their meagre savings in property that is not legally theirs and which could be bulldozed any day without compensation. It is remarkable that WHO in its list of "important requirements for healthy housing" (WHO 1987) makes no reference to the crucial question of tenure and to legal rights of tenants to remain on the allotted piece of land and to enjoy the benefits of whatever development or improvement he or she has contributed. Any future SIDA involvement in housing programmes may require conditionalities with regard to tenure, and SIDA should consider commissioning a descriptive study of the current practices and the legislation in one or two countries prior to any involvement in urban housing schemes.



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A self-help housing project in Lusaka, where in the early eighties around half of the population of 600.000 were squatters, has been described by Martin (1982). He notes that Zambia's Second National Development Plan (1972-76) made appreciative statements about the squatter areas ("... represents assets in both social and financial terms ... require planning and services and ... demolition ... is not a practical solution") and reviews the negotiations between Lusaka City Council, the World Bank and a National Housing Authority team, ending in 1974 with an agreement regarding a US\$20 million credit matched by an equal government contribution in support of a project which included self-help elements, site-and-service schemes, off-site infrastructure and communal facilities; the project was designed to improve housing for 25.000 households, or one-third of all Lusaka households at the time. Problems involved delays due to bureaucratic red tape, uncontrolled sub-letting and conflicts of interest within the participants, but, on the whole, the project seems to have stayed on track.

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The scarcity of land and the continuous in-migration of poor people have generated a variety of rental and sub-rental systems. Low and irregular income is forcing people to accept the cheapest possible accommodation, usually a small rented space in a low-quality, illegally constructed house. Houses are increasingly subdivided into smaller units - with little or no access to services such as water, latrines, kitchen, electricity - and in extreme cases people are even renting a bed for a certain number of hours per day, thus maximizing the landlord's profits. In some unauthorized settlement areas, e.g. in Kibera, Nairobi, some buildings have been threatened with demolition while a few landlords have managed to obtain permission to put up buildings for rental. This has increased the number of absentee landlords, some of whom control over a hundred rooms (Amis 1984).

A possible explanation of the preference for rented housing and for a reluctance to invest in private housing in urban Africa is the strong attachment of urban dwellers to their rural home and their intention to return there sooner or later (Andreasen 1990). Household investment is rather allocated to the rural property, if any, and the facilities there certainly help support a temporary stay in the town. The willingness to invest in urban housing is much stronger among those who do not own rural land.

Housing *density and crowding* is linked to communicable disease transmission, fire risk, levels of pollution and degree of privacy. Building codes therefore tend to regulate sizes of plots, dwellings and rooms.

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Kenya's Building Code contains "Grade II by-laws" applicable to non-permanent houses of minimum space standards in urban areas. The Grade II by-laws do not set standards for water supplies and excreta disposal. These are instead regulated in the Public Health Act, which is applied equally in high and low income housing areas by public health authorities.

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Over the past few decades three general policy responses to shanty-towns have emerged. These policies have been described by Rondinelli (1988) to be either *laissez-faire*, *restrictive* or *supportive*.

In their efforts to apply supportive policies municipalities and national governments have tried four approaches (Eygelar 1977):

1. complete housing in permanent materials, piped water with house connections, sewerage etc;
2. complete housing in traditional materials (and simple water supply and excreta disposal facilities);

3. site and service schemes (land with services provided but allottees build their own houses according to agreed standards); and
4. "site only" schemes (unserved land).

To this can be added a fifth approach - rehabilitation and upgrading.

The first approach, in the form of heavily subsidized public housing, was used until the 1970s. By and large, this approach failed. Limited funds meant that it could not reach the bulk of the urban population. Illegal shantytowns became the predominant source of new housing (Mayo 1986).

The typical outcome of "low-cost public housing" schemes appears to be that only a small fraction of the planned houses are actually built, that they turn out to be several times as expensive as expected, and that they are eventually occupied by middle-income families.

The second approach is in most cases not feasible. In urban areas traditional materials like thatch, cow dung and timber poles are not easily available and may even be as expensive as modern, permanent building materials.

For low-income groups the only options are no 3 and 4. The tendency from the 1970s and onwards has been to apply the third approach. Most of the urban shelter projects in the World Bank's lending programme have been of this type.

In Asia, where a high percentage of site and service schemes have failed, the emphasis has moved to upgrading. This approach, under the name of "conservative surgery", was advocated by Patrick Geddes in India already in the beginning of the century (Geddes 1918), and by John Turner et al (1972) in Latin America fifty years later.

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"When dwellers control the major decisions and are free to make their own contributions in the design, construction, or management of their housing, both this process and the environment produced stimulate individual and social well-being. When people have no control over nor responsibility for key decisions in the housing process, on the other hand, dwelling environments may instead become a barrier to personal fulfillment and a burden on the economy."

Turner (1972)

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The problem of shelter for the urban poor is basically political and institutional (Rodwin 1987). The central issue is that of security of tenure.

## Water supply

The provision of urban water supply and sanitation has been one of the objectives of the International Water Supply and Sanitation Decade (1981-1990) proclaimed by the UN General Assembly in 1980. The African urban water supply coverage achievements of the Decade are summarized in table 7 (United Nations 1990).

Table 7: *Urban water supply coverage in Africa 1980-1990, and expected coverage for year 2000 at current rate of progress* population in millions

	population	% coverage	served	unserved
1980	119.77	83	99.41	20.36
1990	202.54	87	176.21	26.33
2000	332.49	76	253.01	79.48

According to these figures, the percentage of people with safe water supply increased slightly during the Decade. But the number of urban residents without safe water supply

increased during the same period by six million (29%). The estimates for year 2000 indicate that although another 76 million people are expected to be provided with safe water during the 1990s, there will be more than three times as many urban residents without access to safe water by 2000 as there are today.

Middle- and high-income areas have piped supplies with multiple in-house taps and water borne sanitation. The situation in low-income areas is quite different. At best there may be a yard tap or communal standpipes. Those not served by the public system have to draw water from any source available: streams, ponds, wells and rainwater tanks. Or they may have to purchase water from itinerant vendors or from water kiosks.

Addis Ababa has a population of well over 2.2 million. The official coverage rate for water supply is about 97%. There are 120,000 individual connections and some 250 public water points (Lium 1992). This means that each public water point has to serve on the average more than 8,000 persons!

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"The urban poor not only have to fetch water, but frequently they have to pay for it. They usually pay by the bucket, and they are often charged an exorbitant price by the owner or operator of the well, tap or tanker truck, or by the vendor with yoke or donkey-cart who comes calling door-to-door."

Hardoy et al 1990

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Some periurban squatter areas with over 5,000 people, for instance in Nairobi, have no water collection points within its boundaries, and others have only a limited number of standpipes. Water consumption in such areas is often less than 15 liters per person per day while two or three times this amount is required for a reasonable level of hygiene and reduced water-related ill-health. At 10 - 15 liters per day most of the water is used for drinking and cooking and only a minimum for washing. Baths or showers are out of the question and clothes remain dirty for days and weeks. The following embarrassment hampers social contacts and job seeking. The hygienic, social and psychological effects of severe water scarcity have been pointed out, e.g. by Hollsteiner (1979).

The 87% coverage figure in table 7 presents too bright a picture of today's situation. Urban water supplies in Africa have a number of severe problems:

- The *cost recovery* is far below what is required to finance operation and maintenance. This is due to a combination of factors including lack of political will, inefficient procedures, corruption and unauthorized connections.

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"Increasingly it has been recognized that supplying free water does not necessarily ensure greater equity. Limited resources make it impossible for entire populations to be reached and those most likely to remain without access to clean water or adequate sanitation are the poorest and most vulnerable sections of the population. "Free" water often ends up being more costly to the poor than to the rich in terms of time and energy lost in obtaining adequate sources of drinking water, and, for some severely affected areas, in terms of money required to buy from private vendors during water-scarce seasons of the year. Moreover, large-scale subsidies that are involved in providing free water often undermine financial discipline, lead to higher overall costs and result in inefficient use of scarce resources. As a result of difficulties encountered from relying on limited government resources for the long-term sustainability of water and sanitation services, the need to recover costs from alternative resources, i.e. the users, has become imperative."

Garn 1990

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- The *capacity* of the water supply systems is generally far below what is required. Substandard performance is often the result of a gradual expansion of the system

beyond its capacity. Most supplies operate intermittently, providing water for only part of the day. This leads to contamination of the water and to long queues at public standpipes.

- The *treatment* of the water is sometimes badly done due to lack of funds, spare parts, chemicals and/or human resources.
- *Leakages* of between 30% and 60% of the water treated and pumped into the system.

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"The leakage is frequently exacerbated by the numerous unauthorized connections to the water mains made by private individuals. They are often improvised out of inappropriate materials such as old motor tires and wire. They may result from high water charges, from delays and corruption in the allocation of water connections, or from a refusal to provide connections to squatters."

Hardoy et al 1990

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- *Lack of maintenance* - a general problem for publicly owned infrastructure in Africa.

The increasing relative water scarcity in sub-Saharan Africa calls for sanitary and hygienic - as well as industrial - solutions which minimize water consumption, protect ground and surface water sources and facilitate water recirculation. This means a preference for dry (pit or composting) latrines, roof catchment and protection of surface water.

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"Most of the East and some of the South African countries will be water stressed already by 2000, and eight of them will have arrived at absolute scarcity by 2025."

Falkenmark 1989

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Roof catchment of rainwater is possible but not commonly practiced. Ground water sources such as shallow wells are used in some areas and are exposed to possible chemical as well as microbiological contamination from garbage dumps, pit latrines, industrial waste water effluents and through insufficiently covered well-tops. Where such contamination has already reached harmful levels, groundwater sources may have to be abandoned in favour of piped supplies from safer sources elsewhere, possibly combined with rainwater harvesting. It should also be noted that as a general rule groundwater - even when slightly contaminated - is safer than surface water sources in the same area (ponds, streams).

Water standpipes within 50-100 m from any house and water provided at rates affordable to the poorest should be a minimum requirement. Until this service level can be achieved a system of legalized water vending should be introduced. Preferably through women's groups as has been done in Kenya. Roof catchments and household storage tanks tend to be more expensive than standpipe systems but do provide an invaluable back-up when the standpipe system breaks down. Another advantage is that roof catchments can be operated and maintained by the users. The next upgrading level would be yard taps, combined with simple waste water drainage possibly combined with evapotranspiration beds and/or the irrigation of kitchen gardens.

High water consumption (150-250 liters per person per day) in high- and middle-income areas can be reduced to less than 100 by reducing water flow (from 20 to 30 litre/minute to around 10 litre/minute), repairing leakages, improving preventive maintenance of the system and gradually replacing ordinary cistern flush toilets with low-

volume flush toilets or dry latrines (VIP, ROEC or solar-heated compost latrine, see Winblad 1985). This cuts costs, facilitates a more equitable use of an increasingly scarce resource and minimizes the problem of waste-water management.

Priority should be given to the implementation of an equitable pricing system based on a policy of a high degree of cost recovery.

Another priority area is that of capacity building of agency staff and private entrepreneurs.

## Sanitation

Sanitation in urban areas tends to be more of a problem than water supply. Table 8 summarizes the coverage achievements of the Decade in the field of urban sanitation in Africa (United Nations 1990).

Table 8: *Urban sanitation coverage in Africa 1980-1990, and expected coverage for year 2000 at current rate of progress* population in millions

	population	% coverage	served	unserved
1989	119.77	65	77.85	41.92
1990	202.54	79	160.01	42.53
2000	332.49	73	242.17	90.32

The UN figures indicate that 82 million urban residents in Africa were provided with "satisfactory sanitation" during the Decade. The number of people without sanitation remained constant, however. The estimates for year 2000 indicate that although another 82 million people are expected to be provided with sanitation during the 1990s, there will be more than twice as many urban residents without access to sanitation by year 2000 as there are today.

The Decade report (UN 1990) does not define the criteria for "served" used in compiling the statistics for table 8. This category probably covers a wide range of solutions, from family flush toilets connected to public sewers or private septic tanks to traditional pit latrines shared by a number of households. In our experience the number of households categorized as "served" tend to be exaggerated. The previously quoted UNDP-World Bank report (Lium 1992) gives the urban sanitation coverage for Addis Ababa as 60% but hastens to add "However, a large (unquantified) proportion of the installations are not in a condition that could be termed 'sanitary' or 'satisfactory'. Thus the situation in urban areas is probably much worse than indicated by coverage figures." Even so, the official statistics make clear that an increasing number of urban residents lack access to even the most simple form of latrine.

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### Excreta disposal problems in Addis Ababa

During a seminar for sanitarians in Addis Ababa in 1980 the participants were asked to list major problems:

- Insufficient number of latrines. Usually 3-30 households share one pit latrine or cesspool.
- Nobody takes the responsibility for cleaning and maintenance of a latrine that is shared by several households.
- The housing density is in many parts of the city so high that it is no longer possible to find a suitable site for a latrine, or to dig a new pit when the old one is full. A common system in the crowded parts of the city (like Etege Mesk, Cherkos, the outskirts of Mercato and the area near the French Embassy) is to deposit faeces in a tin can, put it aside until dusk and then discreetly empty it at a 'suitable' place in the neighbourhood.
- The groundwater table is in certain parts of Addis Ababa so high that conventional pit latrines cannot be used. In other parts of the city the sub-

soil consists of bedrock which makes the digging of pits impossible. In other parts of the city pits tend to cave in due to unstable soil conditions.

- Latrines, cesspools and septic tanks must be emptied from time to time. For that purpose the Municipality of Addis Ababa operates a fleet of vacuum trucks equipped with a 25 m long hose. The distance from the road to the latrine is often more than 50 m.

- The charge for emptying a latrine or cesspool is 30 birr and for a septic tank 25 birr. The vacuum truck has a capacity of 7 cum. Two trips are often required to empty the receptacle. In this case double charges have to be paid.

- In certain areas (for instance in "Higher" 20, 21 and 24) with relatively new houses and WCs, the sewers are run directly to nearby streams, bypassing the septic tanks.

- Effluent from septic tanks is often drained into storm water channels.

- Building materials, especially cement, are often not available except at black market prices.

From Winblad, U (1980). Sanitary problems in Ethiopia

- a travel report to SIDA, Stockholm

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Satisfactory sanitation is particularly important for the urban poor as they often live in densely populated areas. Their problems cannot be solved by conventional sewerage or small-bore sewers. Water-borne systems are expensive to install and operate even under the most favourable conditions (see Table 9). In a typical African urban area with a fast growing population, lack of funds, irregular settlement pattern, water shortage, the use of solid objects for anal cleaning and lack of recipients for treated or untreated sewerage, conventional sewerage is not even an alternative to consider (Winblad 1974, Kalbermatten 1980). Nor is a system depending on vacuum trucks. Mechanical emptying of latrines requires complicated equipment which is expensive, has to be imported, is oil consuming and requires a lot of maintenance. A third world country selecting a technology of that type increases its dependence on the industrialized countries. Besides, mechanical emptying, to the extent that it can be made to function, takes away jobs for unskilled labour.

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Dar es Salaam established its sewerage system between 1955 and 1959, initially with an outlet to the ocean north of the harbour. The pipes are now in poor shape, broken and leaking, some blocked. Later, some other systems with waste stabilization ponds, were established for residential, institutional and industrial developments. Few ponds were in proper operation a few years later. By 1985 about 78 % were using pit latrines, 10 % used septic tanks and 12 % were served by sewerage. The City Council established a Sewerage and Sanitation Department in 1982. The population was then about one million, there were some 60,000 latrines and 9,000 septic tanks. The department was to be responsible for sewer maintenance and repairs, VIP latrine construction and pit and septic tank emptying. The cost of emptying of septic tanks was US\$2-4 per plot in 1985, but services were severely constrained due to lack of both staff and budget. Overflowing latrines are a serious problem during rains and emptying services are grossly inadequate. Only about one-quarter of the refuse is being collected. This is a smaller proportion than in most other capital cities studied.

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"A survey in Mathare valley, a large squatter settlement outside Nairobi which in 1964 had 4,000 inhabitants and now around 200,000 showed in 1969 population densities between 100 and 800 people per hectare and 20-47 people per latrine (usually located on the outskirts of each 'village'. There were 600-2500 people per water point (Etherton 1976). Much has happened since then, but in many Nairobi shantytowns the situation is as bad or even worse."

Eygelaar 1977

A more recent study of 205 households in the Kibera Division in Nairobi gives the following information: 99.5% use pit latrines 94% share their pit latrine with other households (by as many as 20 households), 10% of the households do not know how many other households share their latrine.

Table 9: *Typical range of capital costs per household of alternative sanitation systems (1990 prices)*

	US\$
Twin pit, pour-flush latrine	75 - 150
VIP latrine	68 - 175
Shallow sewerage	100 - 325
Small-bore sewerage	150 - 500
Conventional septic tanks	200 - 600
Conventional sewerage	600 - 1,200

Hardoy 1990

For urban and peri-urban low-income areas in Africa there are as yet, for individual households, no alternatives to rural-type solutions: traditional pit latrines, VIP or ROEC latrines, bucket latrines and various types of twin-pit or double vault (composting) latrines. It should be possible to adapt some these technologies to high, even very high, densities. This will require some action research on technology, methods of pit/vault emptying and final disposal/reuse as well as on organization and methods of dissemination.

An alternative to be seriously considered for urban areas is on-site sanitation combined with re-use of human excreta and household refuse in horticulture and agriculture. This in turn means urine separation, composting latrines, frequent collection of urine and occasional collection of compost. The output of such a system - urine and compost - has a potential market value (Mena-Abraham 1991). In a low-income country this value might even be higher than the collection and transport cost - there is no a priori upper limit. Urine and faeces processed separately are much easier to handle than sewage. There is no need for access by motor vehicles. Simple cartage systems can be used instead of vacuum trucks (Rijnsburger 1990).

Communal (public) latrines have a bad reputation (poor privacy, poor cleaning and maintenance, poor accessibility) but might be the only option where private solutions are unaffordable or impossible to accommodate due to lack of space. The employment - and supervision - of a cleaner or a full time attendant is a prerequisite if a communal latrine is to function satisfactorily.

### **Solid waste disposal**

Solid waste disposal (household waste, commercial refuse, institutional refuse, street sweepings, construction debris and industrial waste) is an expensive urban service absorbing some 20-40 percent of municipal revenue (Coitreau 1982). Most of this is spent on transport. Low-income housing areas have hardly any space for storing garbage, are hardly served at all and are characterized by stinking heaps of rotting garbage,

attracting dogs, pigs and birds and generating plenty of flies. Sewers, if any, are usually blocked, and dustbins, if any, are overloaded and rarely emptied; "illegal" houses are obviously not well served by municipalities. The composition and energy content of refuse varies with socio-economic status of the household and to some extent with the season. Dustbins must be provided in proportion to the number of people in each house, health education must be arranged, and laws must be enforced. Markets and shops need their own dustbins. Collection is infrequent and irregular, particularly in low-income areas where, therefore, on-site composting and the keeping of pigs, goats or other refuse-eating animals should be considered.

Trucks and other motor vehicles are less and less affordable. Street-sweepers combined with donkey-carts, hand-carts or wheel-barrows with portable bins have proved useful in many Asian cities, and tricycles are used in many towns (Pickford 1984). Such non-motorized modes of transport could be used for short range transfer of refuse to permanent communal storage sites or to a larger motorized vehicle. Any improvement usually requires household behaviour change and, thus, community participation, but such cooperation is more easily established if local priorities are respected. If these include drainage, latrines, paved roads, lighting, there may be little problem - particularly if some degree of cost-sharing is acceptable. If other priorities are expressed, other service sectors than health may have to be involved.

Local or on-site composting should be encouraged in view of the potential savings, the usefulness of compost as fertilizer and the high vegetable content of most household refuse (over 75% in India; as compared to below 30% in Britain).



## 6. OTHER URBAN ENVIRONMENT ISSUES

Low-income urban households are generally more crowded and less smoky than rural ones, but problems and risks vary widely between different kinds of households. Illegal periurban squatter houses are often damp, located along river valleys or otherwise poorly drained, and typically lack electricity, water supply and functioning refuse disposal while a crowded rented and subdivided central city apartment may be fairly served but on the other hand noisy, poorly ventilated and exposed to industrial pollution and vehicle exhaust gases.

Dampness and high levels of air pollution are associated with increased incidence of respiratory infection in small children (Martin et al 1987). Crowding and poor ventilation facilitate transmission of airborne infections such as influenza and other virus infections, whooping cough, tuberculosis and many others. Dampness has an uncertain effect on adult morbidity, however, while air pollution appears to have a significant effect on respiratory illness at any age (McCarthy et al 1985). Associations are rarely clear cut, however, due to a variety of confounding factors at play.

Some settlements are at considerable risk of industrial accidents such as explosions, unintended leakages of toxic materials, and traffic accidents. Adequate safety zones around industries are rarely maintained. High rates of malnutrition, associated with low levels of defense against infection, make poor household members particularly vulnerable and contribute to high rates of infection in low-income settlements.

Many urban work environments are harmful in the sense that they are often highly polluted with toxic chemicals, dark, crowded, noisy, poorly ventilated and accident prone, and also in the sense that employees are relatively poorly trained, inadequately protected and often in poor health, underage and overworked. Harmful effects of the working conditions are added to the impact of an unhealthy home environment, and it may be difficult in any given case to determine the contribution of each of the two. The growing tobacco smoking epidemic in Third World countries are further increasing the harmful effects of indoor air pollution both at home and in the workplace. Social security is unsatisfactory, sick leave is poorly or not at all compensated, and it is difficult to obtain reasonable compensation in case of work related injury or illness. Legislation exists but enforcement is generally weak.

## 8. CONCLUSIONS

The urban population in Africa is growing rapidly - from 210 million in 1990 to an expected 340 million in 2000. The development of urban infrastructure is not keeping pace and urban environmental conditions are deteriorating. The number of urban dwellers without access to safe water is expected to increase from 26 million in 1990 to 80 in 2000. The number of people without access to an acceptable latrine will grow from 43 million to 90. Less than half, possibly less than a quarter, of all urban household refuse is being collected and safely disposed of. Urban populations consist of extremely diverse subgroups, essentially an affluent, well educated and well-housed minority and a poor majority living under pressing economic and social conditions in poorly serviced and unhealthy shantytowns. However, the social epidemiology in these areas, and the different disease patterns in various urban sub-populations, are not well described, and their health care needs are largely unknown.

At present SIDA is only marginally supporting African programmes and projects aimed at improving urban environmental conditions:

- The HESAWA programme in Tanzania includes support to water supply and sanitation in seven district towns in the three HESAWA regions.
- Support, via the World Bank, for urban rehabilitation in Lobito/Benguela in Angola.
- Support, via ARO for an urban housing project in Cap Verde.
- Support, via a women's programme, of a building materials production and self-help housing project in Nairobi.

Rural and urban development are in many ways linked and interdependent. Households are physically divided between urban and rural areas and their income is often partly rural, partly urban. Solutions to their problems require development in the urban as well as in the rural environment. While most of the poor and vulnerable households will continue for decades to be found in rural parts of sub-Saharan Africa, there is a need for development agencies, including SIDA, to increase their attention to the problems of low-income urban households and to such development programmes in both rural and urban areas that are likely to alleviate their situation. These may include educational programmes to empower disadvantaged rural and urban households to secure a fair share of the service output, assisting efforts to establish organizations and institutions to facilitate a more equitable access to resources, and direct support to health-related environmental improvements.

For the time being there are good reasons for SIDA to continue its present policy of giving priority to rural development. Rural Africa's health and hygiene problems are still largely unsolved and growing. Much remains to be done to increase the coverage, improve the functioning and generate sustainability of rural water supplies. Most remains to be done on rural sanitation. Virtually nothing is being done regarding control of disease vectors.

Our recommendation is therefore for SIDA to continue its long-standing emphasis on rural programmes in the field of environmental hygiene, at least for the next 5-10 years. This policy includes certain investments in *small and medium sized towns* in areas with SIDA-funded programmes. As regards health and environmental problems in *big cities* SIDA should in its programme countries monitor more closely the current situation and ongoing development programmes implemented by municipalities, ministry agencies and NGOs, for instance through specific consultancy studies with reports submitted to sector review missions.

With a medium-term perspective, say 10-20 years, we see three main policy options for SIDA:

- Continued stress on rural programmes in the fields of health, water supply and

hygiene.

- Continued strong support to rural development programmes, combined with an increased SIDA involvement in small and medium sized towns.
- Increased involvement in pure urban projects, also in big cities.

There are essentially three arguments in favour of the first option. First, in all sub-Saharan countries except Zambia, the majority of people - and an even larger majority of the low-income groups which are targets for SIDA assistance - live in rural areas (see table below).

Table 10: *Percent rural population in SIDA's major programme countries in Africa (1988)*

Uganda	90%	Mozambique	76%
Ethiopia	87	Zimbabwe	73
Kenya	78	Tanzania	70
Botswana	78	Zambia	46

World Bank 1990

Even with rapid urban growth Africa's rural population will go on increasing for the next 30 years. Second, most if not all rural development problems remain unresolved and in need of continued support. With the small resources SIDA is able to allocate to the 19 bilateral programme countries, there are no strong reasons to divert resources to new urban projects. Third, SIDA has acquired a considerable amount of knowledge and experience of rural African development which should be applied where most useful.

The second option means that a certain proportion of total resources is diverted from the rural effort. An argument in support of this option is that small and medium-sized towns are so much related to and functionally integrated into the rural development process that they can be seen as an important support factor in need of attention and assistance. It is also possible that such projects would improve our understanding of district and provincial town problems and constraints for the benefit of future rural projects and programmes.

The average urban dweller has access to resources far in excess of his/her rural counterpart. When SIDA's health assistance to Kenya was evaluated in 1986 it was for instance calculated that the average urban resident consumed health care at an estimated value of KES 200 per year while the corresponding amount for a rural dweller was KES 5. Even if such figures are uncertain there is clearly need for more equity between different urban groups as regards access to public services. However, it is hardly from the already disadvantaged rural people but from the relatively healthy and well-served urbanites that resources should be reallocated to benefit the urban poor.

An important argument in support of the third option is that SIDA, while continuing to tackle unresolved rural problems, also needs to generate its own urban development know-how, alone or in collaboration with other agencies. Moreover, urban beneficiaries are more easily accessible, and the visibility of urban programmes is attractive both to the recipient government and to the donor agency concerned.

A PHC model for urban shantytowns with strong emphasis on environmental health and hygiene and on reproductive health needs to be developed and tested by municipalities and local community groups.

We recommend modest but long-term SIDA support to formulation, implementation and evaluation of a few urban PHC projects in bilateral programme countries and focused on low-income housing areas. This task might be given to applicant institutions with solid PHC experience, such as municipalities, local NGOs and academic institutions or combinations of these. In Kenya, for example, possible institutions include Nairobi City Commission, AMREF, and the Department of Community Health of the University of

Nairobi. In Ethiopia institutional candidates include the Municipality of Addis Ababa, the Medical Faculty of the AA University, and Save the Children Fund.

We also recommend SIDA to initiate a few studies:

- Data on urban health, health care and service inequities are scarce and shaky. An in-depth study of health self-care, health care provision and service utilization in a few selected urban groups could help identify crucial problems and obstacles.

Households in low-income shantytowns should be included in such a study. Local government or NGO research institutions could formulate and implement studies of this sort, and a SIDA institutional consultant could coordinate the execution.

- A review of non-published data on morbidity and mortality statistics, health related practices and health care utilization in different urban sub-populations; this task could be sub-contracted to local research institutions, possibly supported by a backstopping institution in Sweden.

- Low-cost methods for on-site disposal and/or re-use of human excreta, garbage and waste water at high population densities. Most writers assume that there are upper limits beyond which on-site methods must not be used. Is this assumption correct?

Where are the upper limits? - The study should specifically consider the problems of multi-million cities with large shantytown populations. (Since this report was drafted SIDA has initiated a research and development study of no-cost/low-cost sanitation.)

- Non-conventional methods for intensive food production in urban areas with special reference to the possibility of recycling human excreta and waste water, for instance something like Dr Gus Nilsson's "productive homesteads" in Botswana (Winblad 1992) or UNDP's "rooftop garden" pilot project in Colombia (Robson 1989).

Some of the recommended studies can be conducted by local institutions after the study design and methods have been agreed between SIDA and the local institution concerned. There is a strong case for helping to develop, in a few countries, an interest in these issues as well as an in-country capability to implement such studies. The Swedish resource base with regard to environmental health and hygiene is small and must be expanded. This would be helped by establishing a couple of bilateral junior expert positions and some SIDA contract jobs for suitable professionals in association with selected water development and sanitation programmes.

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"The researchers conclude that governments should do things that governments do best, and leave to others what others do best.

"Governments should 1) provide infrastructure of an appropriate, affordable standard; 2) recover infrastructure costs through efficient taxes and user charges; 3) provide security of tenure to squatters; 4) improve land markets and information systems; 5) promote housing finance institutions; 6) upgrade slums and provide sites and services for the poor; 7) reduce building codes to affordable levels; and 8) encourage private house building, especially for renting.

"Governments should not 1) adopt policies that cause significant market distortions and are hence counterproductive; 2) demolish slums; 3) displace private investment by public activities; 4) underpriced public housing or infrastructure. Subsidies are often inefficient and should be recast to reach the intended beneficiaries."

Mayo 1986

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