Forschungsberichte
Working Papers

Institut für Wirtschafts- und Sozialgeographie
Department of Economic and Social Geography
Johann Wolfgang Goethe-Universität Frankfurt

Herausgeber Harald Bathelt und Eike W. Schamp
ISSN 1439-2399

Jacob Songsore

Urbanization and Health in Africa: Exploring the Interconnections Between Poverty, Inequality and the Burden of Disease

IWSG Working Papers 12-2000

Die Herausgeber bedanken sich bei Johannes Glückler für die Gestaltung des Layouts und die Unterstützung der Produktion dieser Reihe.

This is a revised version of a paper prepared for the "20th African Health Sciences Congress", Accra, Ghana, 19-23 April, 1999 which was also presented at a workshop on "Urban Health in Developing Countries: Research Priorities and Approaches", 20-24 September 1999, Basel, Switzerland.

Autorenanschrift Prof. Dr. Jacob Songsore
Department of Geography and Resource Development
University of Ghana
P.O. Box 59, Legon
Fon 223-21-500394, Fax 233-21-500392
Email geograf@ug.edu.gh

1 Introduction

There are few changes in the history of human existence comparable to urbanization in scope and potential to bring about biologic change. The transition in the developed world from an agricultural to an industrial-urban society has already produced substantial changes in human health, morphology and growth (Schell, Smith and Bilsborough, 1993, p.1).

By the year 2000, about 50% of the world's total population will be living crowded in urban areas and soon thereafter, by the year 2025 as the global urban population reaches the 5 billion mark more of the world's population will be living in urban areas. This has enormous health consequences. By the close of the twenty-first century, more people will be packed into the urban areas of the developing world than are alive on the planet today (UNCHS (Habitat), 1996, p.xxi).

"Africa presents a particularly poignant example of the problems involved, as it has the fastest population and urban growth in the world as well as the lowest economic development and growth and many of the poorest countries, especially in Tropical Africa. Thus it exemplifies in stark reality many of the worst difficulties of urban health and ecology" (Clarke, 1993, p.260).

- This essay is therefore concerned to analyse the trends of urbanization in Africa.
- This is followed by an overview of the environmental conditions of Africa's towns and cities.
- The subsequent section explores the links between the urban environment and health. Although the focus is with physical hazards it is important to note that the social milieu is also vital in the reproduction of health.
- The paper concludes by providing some policy recommendations.

2 Urbanization Trends and Prospects in Africa

2.1 Africa's Urbanization in Global Context

The first point to note is that today's developing countries are urbanizing not only more rapidly than the more developed industrial nations are now but also more rapidly than the industrial nations did in the heyday of their urban growth (Davis, 1967). Between 1950 and 1990 the urban population of Africa, Asia and Latin America grew from 286 million to more than 1.5 billion. This urban population alone

is already larger than the total population of Europe, North America, Japan, the former Soviet Union and Australasia combined (Hardoy, Mitlin and Satterthwaite, 1992, p. 29). Much of this urban population in the developing countries is concentrated in Asia and Latin America.

As shown in Fig. 1, Africa is currently rated among the least urbanized regions of the world and has few, if any of its mega-cities, although its process of urbanization is very rapid. In the period between 1950 to 1990 many African cities experienced more than tenfold increase in their populations, including Abidjan, Dar-es-Salaam, Khartoum, Kingshasha, Lagos and Nairobi. "UNCHS (Habitat) estimates that from 1990 to 2020 the number of cities in Africa with more than 1 million inhabitants will increase from 68 to 370 and that those with more than 4 million inhabitants from 20 to 240. By 2010 three urban areas in sub-Saharan Africa-Kingshasha, Lagos, and Abidjan, will have reached or passed 10 million inhabitants. There will also be some 8200 towns with 5000 or more inhabitants" (UNCHS (Habitat), 1992, p.2).

Fig. 1: Percentage of Total Population that is Urban, 1950-2010

Region	1950	1965	1980	1995	2010*
Africa	14.6	20.7	27.3	34.9	43.6
Asia	17.4	22.4	26.7	34.7	43.6
Latin America and the Caribbean	41.4	53.4	64.9	73.4	78.6
Rest of the World**	55.3	64.1	70.5	74.2	78.0

*Projected, ** Rest of the World includes all countries in Europe, Northern America and Oceania

Source: Drawn from figures in United Nations, 1998, World Urbanization Prospects: the 1996 Revision, (Population Division, New York)

It is, however, important not to overdramatise these growth trends. As at 1990 Africa contained a mere 12% of the world's total population and only 8.8% of total population living in urban areas. It had a mere 7.5% of the world's population living in cities with 1 million or more inhabitants. It had none of 12 mega-cities with over 8 million inhabitants each (UNCHS (Habitat), 1996, p.13).

It is however the belief that Africa, with its rapid rate of urbanization, will in future also be part of what Toynbee has called the `world city' or `ecumenopolis' according to Doxiadis with the majority of the world population living in a network of urban centres.

Africa and the world as a whole stand at the veritable crossroad in history. "Urbanization holds out both the bright promise of an unequalled future and the grave

threat of unparalled disaster, and which it will be depends on what we do today" (UNCHS (Habitat), 1996, p. xxi).

2.2 Urbanization without Development in Africa

Historically, cities have played important roles in economic growth, rising wealth and contributed beneficial effects for health and the quality of life. If the urban transition of the advanced industrialised countries has been associated with rising human well-being, it may be valid to assume that the rapid rate of urbanization in the developing world and especially Africa today will induce similar positive effects.

Yet for these rapidly urbanizing developing countries, the sustainable development of these cities and urban settlements appear threatened by the poor quality of their environments with the associated negative impacts on human health and well-being. The driving forces behind the rapid urbanization in Africa today are a combination of rural-urban migration and natural increase within towns and cities themselves. This is worsened in some regions by forced migrations precipitated by various stresses including ethnic conflicts, wars, droughts and famine (ECA, 1996, p. 28). Africa's urbanization has therefore been termed demographic urbanization rather than economic urbanization because it is not driven by radical transformations in agricultural productivity and industrialization (Escallier, 1988, p.179; Clark, 1993, p.265; Gould, 1998, p.175).

The global economic problems of recent decades have helped drive most African countries into a grave economic crisis. As a result of this enduring crisis, structural adjustment lending has assumed a prominent place in the political economy of Africa. In most African countries, the IMF and the World Bank have taken over the initiative in economic policy formulation with urban poverty becoming particularly problematic in countries undergoing macro-economic adjustment. "Reduced subsidies to food, water, transport and energy in urban areas, coupled with shifting demand for labour and transitional unemployment, have reduced urban real incomes. Lower-middle class groups have been affected most, pushed into the lower-income category until the assumption of growth leads to improved opportunities for employment, higher productivity and increased wages. These social costs of adjustment have been particularly visible in the political arena" (Songsore and McGranahan 1993[a], p.3, also see World Bank, 1991, p.9).

The rapid growth of population in towns and cities in an unfavourable economic environment has led to a rapid increase in the number of inhabitants living in

substandard housing and overcrowded conditions, without resources for decent shelter. Some 30 to 60% of urban populations in Africa live in slums and squatter settlements (UNCHS (Habitat), 1992, p.3). As a result, in virtually every urban centre from national capitals to regional centres and small towns, many people live in neighbourhoods with little or no provision of infrastructure, services and facilities that are essential to good health. Most African cities and towns therefore face a daunting environmental health challenge.

2.3 Conceptual Framework for Understanding the Health Challenges of Urbanization in Africa

The conceptual models of relevance to the understanding of the health challenges of urbanization in Africa are the urban environmental transition model (McGranahan and Songsore, 1994; McGranahan, Songsore and Kjellen, 1996; and McGranahan et al, 2000 in press, McGranahan et al 1999, p.138) and the environmental risk transition model of Smith and Lee (1993).

The urban environmental transition model as shown in Fig. 2 argues that the nature of environmental problems in cities changes with levels of economic development. Cities have two general categories of human environmental risk: those that directly affect health; and those that operate indirectly by impairing ecosystems that humanity depends on (Smith and Lee, 1993, p.161). As a general rule, the urban environmental hazards that are immediately health – threatening are those found in poor homes, neighbourhoods and workplaces of cities in Africa and other developing countries. Among these are inadequate water supply and sanitation facilities, poor and crowded housing, smoky kitchens, insect infestation, contaminated food, piles of uncollected garbage and bad drainage (McGranahan and Songsore, 1994).

By contrast, whilst the home and neighbourhood problems recede in importance in middle-income cities, the most extreme examples of city-wide problems such as ambient air pollution and polluted rivers become dominant. The wealthiest cities of the North have taken measures to reduce city-wide pollution. In turn, the wealthiest cities in the North through their excessive consumption draws more heavily on the global resource base and generate a disproportionate share of global pollution accounting for a large share of global warming, acid rain, and depletion of the ozone layer. These tend to have less direct and delayed effects on human health. “The logic behind the transition is that the wealthy use more resources and create more

waste, but also use part of their wealth to avoid personal exposure to unpleasant and hazardous pollutants "(Kjellen and McGranahan, 1998, pp. 67-68).

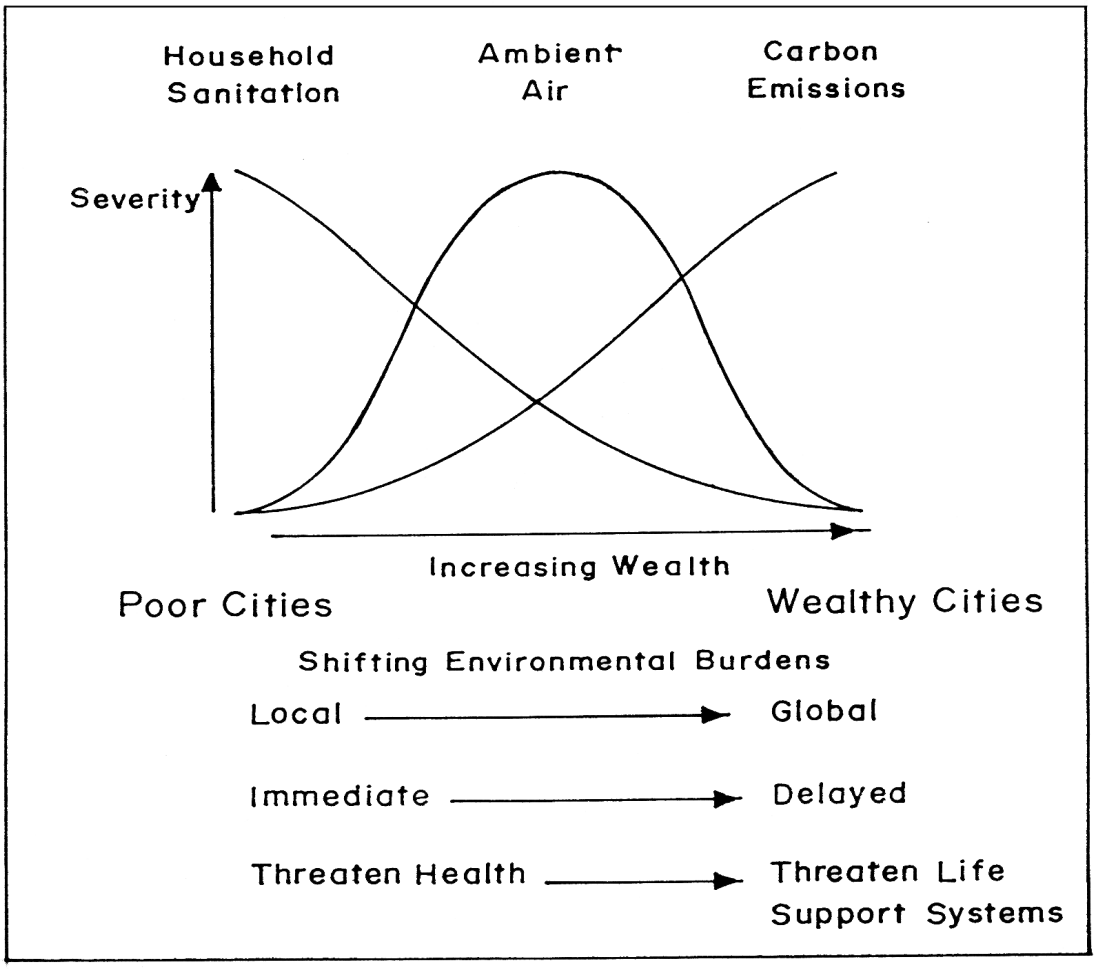

Fig. 2: An Urban Environment Transition From Sanitation to Sustainability

Closely related to the above model is the concept of environmental risk transition developed by Smith and Lee (1993). Economic development is associated with a major reduction of some kinds of ill health and increases in others. "The historically high `traditional' sources of ill health associated with rural poverty, such as infectious and parasitic diseases, trend downward with economic development, although at varying rates. As traditional diseases decline as causes of death, `modern' diseases

like cancer and heart disease take over. One definition of the *transition point* might be the level of development at which there is equal probability of dying by modern and traditional causes" (Fig. 3) Smith and Lee 1993, p.161). These two frameworks provide a logical basis for epidemiological transition (Omran, 1971).

The urban poor majority in African cities are more luckless than others having to face the double burden of infectious disease arising from their own poverty and the degenerative diseases of industrialisation and urbanization which are created by other people's wealth (Smith and Lee, 1993; Eckholm, 1997; Stephens, 1996). Even though development and urbanization have brought about dramatic reductions in the burden of ill-health this is not equally shared by all groups in Africa's cities. But what is the nature of the environment of African cities that generates this double burden of disease for the majority of their populations?

3 The Environmental Profile of African Cities

For purposes of analytical simplicity, the city environment is divided into 3 layers: the home and neighbourhood environment; the workplace and city-wide environment; and the environment of the city region. For reasons discussed above the regional impact of the city is not as important to health and therefore is discussed along with the city-wide environment for purposes of completeness.

3.1 Environmental Problems of the Home and Neighbourhood

Although all constituents of the environment of our planet ultimately exert some influence on human health and well-being, the environment which exerts the greatest and most immediate influence on people's health and well-being is the intimate environment of their home and neighbourhood (Songsore and McGranahan, 1993). "A health-promoting home and urban environment embody the fundamental aspirations of the majority of people, where the quality of their lives depends on having a clean, decent, safe home in which to live and raise a family" (Novick, 1990, p.xv). This however remains an unmet need for most poor residents in Africa's cities.

Environmental problems of poor neighbourhoods is perhaps the most important avoidable environmental cause of ill-health. This section reviews access of urban residents to environmental services or amenities that promote good health and the exposure to environmental hazards that induce ill-health within the home and neighbourhood.

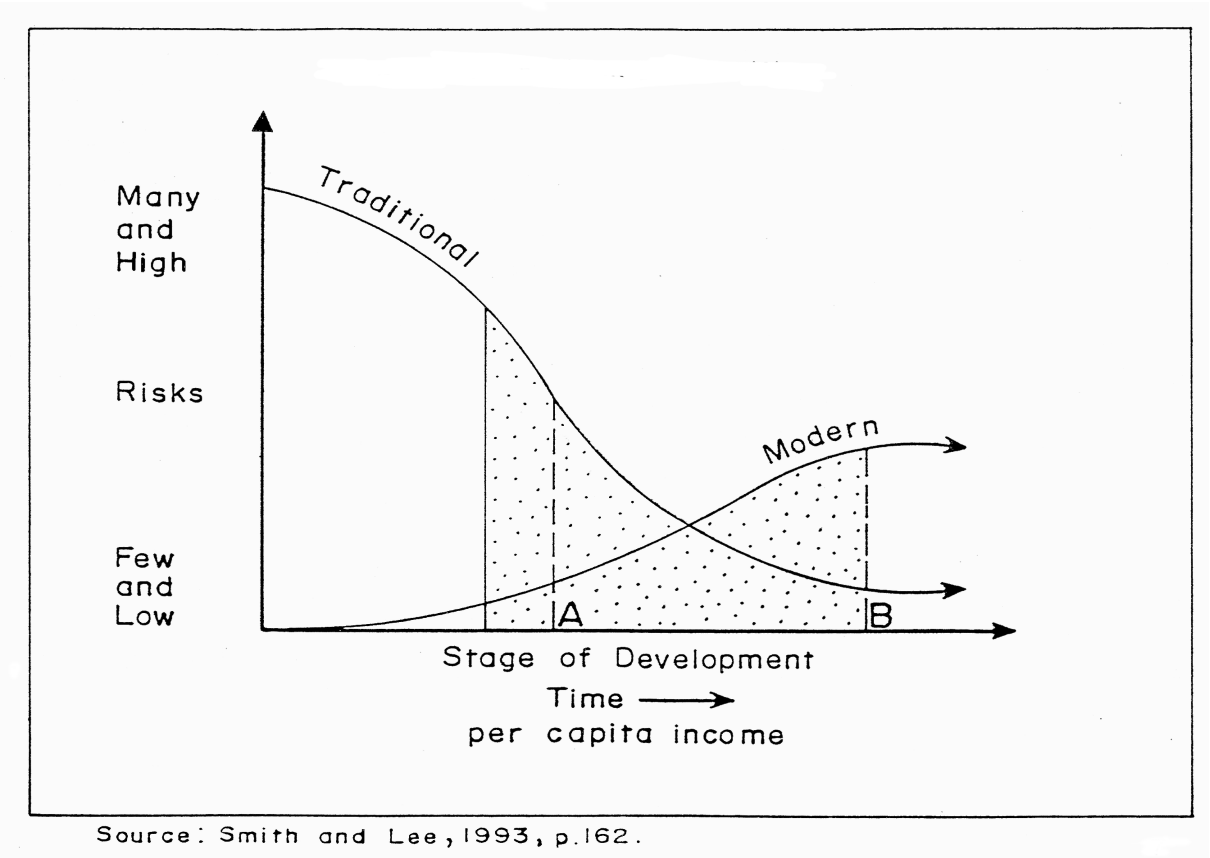

Fig. 3: The risk transition

3.1.1 Access to Environmental Services

It is impossible to estimate with any precision the proportion of urban dwellers in Africa that live in poor housing with inadequate provision for water, sanitation, solid waste disposal and other basic housing and environmental services. Fig. 4 shows the proportion of households with access to water, sanitation and garbage removal services for some large cities in 37 Africa countries.

Even for these large capital cities which are better provided with environmental services than other urban places, less than 50% of their households, on average, are connected to a water source. The percentage with water connections range from 92% in Tunisia to 1% in Monrovia (Fig. 4). Yet the importance of adequate potable water supply and good sanitation facilities for health is now well established. One estimate of the World Health Organisation suggests that between 70-80% of Third World hospital beds are occupied by patients with waterborne diseases (Smith and Lee, 1993, p.68; Wurzel, 1989). This picture for the Third World is generally representative of the African condition.

Fig. 4: Percentage of Households with Access to Environmental Services for Major Cities in Africa.

Country	City	Water	Sewerage	Waste Water Treated (percent)	Garbage Collection
Angola	Luanda	41	13	0	50
Benin	Porto Novo	16	1	x	25
Botswana	Gaborone	40	33	95	98
Burkina Faso	Ouagadougou	32	0	0	40
Burundi	Bujumbura	35	29	4	41
Cameroon	Douala	19	3	5	60
	Yaounde	22	3	20	44
Central Africa Rep.	Bangui	13	1	0	25
Congo, Democratic Rep.	Kinshasa	50	3	3	0
Congo, Rep.	Brazzaville	63	0	0	72
Cote d'Ivoire	Abidjan	62	45	58	70
Egypt	Cairo	89	91	98	65
Ethiopia	Addis Ababa	58	0	x	2
Gabon	Lebreville	40	0	0	40
Gambia, The	Banjul	36	13	0	35
Ghana	Accra	46	12	0	60
Guinea	Conakry	48	17	0	50
Kenya	Nairobi	78	35	90	47
Lesotho	Maseru	30	5	0	7
Liberia	Monrovia	1	1	0	x
Madagascar	Antanarivo	31	17	0	x
Malawi	Lilongwe	17	12	30	x
Mali	Bamako	26	2	0	95
Mauritania	Nouakchoff	18	4	10	15
Morocco	Rabat	87	95	0	90
Mozambique	Maputo	28	23	x	37
Namibia	Windhoek	90	75	99	93
Niger	Niamey	30	0	0	25
Nigeria	Ibadan	68	0	x	40
	Lagos	65	2	2	8
Rwanda	Kigali	36	x	20	x
Senegal	Dakar	41	25	4	75
Sudan	Khartoum	52	3	45	12
Tanzania	Dar es Salaam	22	6	2	25
Togo	Lome	43	0	x	37
Tunisia	Tunis	92	73	82	61
Uganda	Kampala	30	9	27	20
Zambia	Lusaka	36	36	36	x
Zimbabwe	Harare	89	93	93	100

Source: World Resources Institute, UNEP, UNDP, WB, 1998, p.278.

The percentage of households in the same cities with sewerage connections are far lower than those with access to water connection within the home. On average, less than 10% of the households are connected to sewerage facilities and still a smaller share of the wastewater that is generated is treated as shown in Fig. 4. Other less privileged towns and cities outside these large capital cities tend to be worse off in terms of access to water and sanitation services. As a general rule, however, urban areas tend to be better served with potable water supply and sanitation facilities than rural settlements.

As shown in Fig. 4, on average, between 30 to 70% of all garbage or solid waste generated in the cities remain uncollected although in some cities, the proportion is much higher. Such garbage is indiscriminately dumped along streets, open spaces, drainage channels etc. They therefore serve as breeding grounds for disease vectors – especially flies and rats in the neighbourhoods. This is a health hazard for all inhabitants especially for children in deprived neighbourhoods who play on these streets and open grounds contaminated by faecal bearing refuse or in stagnant pools of sullage. These stagnant pools are also important mosquito breeding sites (Cuentro and Gadji, 1990, p.169).

The inadequate attention to the analysis of intra-urban environment and health differentials has been one reason for the perception of urban areas as being better endowed in terms of access to environmental services. The urban poor remain in the `shadow of the city' since their conditions are eclipsed with the use of average statistics at the city level. And yet these intra-urban disparities can be very large as shown in Box 1.

Box 1: Intra-Urban Inequalities in Access to Environmental Services in Accra

This section reviews some of the most relevant intra-urban inequalities with regards to access to environmental services such as potable water and sanitation for Accra, Ghana. Fig. 5 shows a close relationship between wealth and access to potable water and sanitary services. Most households surveyed in Accra rely on the piped system for their water supply but the distribution pattern is highly uneven and service delivery erratic throughout the system especially in low income areas and new developments in the peri-urban zone. About 35% of households had access to in-house piping, 24% private standpipe with another 8% relying on communal standpipe as their drinking water source. As much as 28% of households depended on the informal water vendor for their daily water supply. Perhaps the most disadvantaged households were 4 per cent of GAMA residents whose main source of water supply was from open waterways, rainwater collection, wells and other private sources.

Given the widespread practice of unhygienic water handling and storage in deprived low income areas it is not enough to focus on bringing "water to the tap" as what is happening "between the tap and the mouth" is also critical in determining health outcomes from water use (Lindskog and Lundqvist, 1989, p.16; Benneh et al., 1993, p.20).

Whilst most rich households have in-house piping, typically connected to overhead storage containers, the poorest and most deprived households rely mostly on water vendors, communal standpipes and other less efficient water supply sources (Fig. 5 A). These require in-house storage of water in drums and other containers that easily become contaminated as shown by the results of the physical tests of water quality (Benneh e al., 1993, pp. 20-26). The use of communal dip cups for drinking water also encourages drinking water contamination.

Sanitation management which is closely linked to access to water supply also has very critical health implications. About 36 per cent of households in GAMA have access to flush toilets; 41 per cent use pit latrines (some of which are Kumasi Ventilated Pit Latrines); 20 per cent use bucket or pan latrines; and 4 per cent have access to no toilet (Songsore & McGranahan, 1993, p.20).

As Fig. 5 B, C, and D shows, inequalities in access to toilet facilities is related to household wealth as pit latrines are popular with low income households, whilst flush toilets (both sewered and septic) dominate higher wealth groups. Those most affected are women and children who together manage the home environment and spend most of their time at home. (Songsore and McGranahan, 1996; Songsore and McGranahan, 1998).

Source: Songsore, McGranahan and Kjellen, 1997, pp.7-9.

Fig. 5: Access to Water and Sanitary Services by Wealth Quintile of Household (%)

	Wealth Quintile				
A. Water Source	**1-Poorest**	**2**	**3**	**4**	**5-Wealthiest**
	col.%	**col.%**	**col.%**	**col.%**	**col.%**
In-house piping	6	17	26	49	78
Private Standpipe	16	28	35	30	12
Communal Standpipe	21	8	6	4	3
Vendor	49	41	29	15	7
Other	7	6	4	3	1
Total	100	100	100	100	100
(Sub-sample size)	(205)	(187)	(210)	(100)	(198)
B. Toilet facility	**1-Poorest**	**2**	**3**	**4**	**5-Wealthiest**
	col.%	**col.%**	**col.%**	**col.%**	**col.%**
Flush Toilet	7	17	30	47	77
Pit/KVIP Latrine	72	54	45	24	12
Pan Latrine	15	25	22	28	8
Other/None	6	4	2	2	3
Total	100	100	100	100	100
(Sub-sample size)	(205)	(187)	(210)	(200)	(198)
C. Toilet Sharing	**1-Poorest**	**2**	**3**	**4**	**5-Wealthiest**
	col.%	**col.%**	**col.%**	**col.%**	**col.%**
Not Shared	6	14	18	31	65
Share with≤10hh	20	21	28	39	19
Share with >10hh	69	62	51	28	12
No response	5	3	2	3	5
Total	100	100	100	100	100
(Sub-sample size)	(205)	(187)	(210)	(200)	(198)
D. Outdoor Defecation[a]	**1-Poorest**	**2**	**3**	**4**	**5-Wealthiest**
	col.%	**col.%**	**col.%**	**col.%**	**col.%**
No	53	74	72	77	88
Yes	48	26	28	13	12
Total	100	100	100	100	100
(Sub-sample size)	(205)	(187)	(210)	(200)	(198)

(a)Refers to reported outdoor defecation by neighbourhood children.

Source: Songsore, J. and McGranahan, G. 1993. "Environment, wealth and health: Towards an analysis of intra-urban differentials within the Greater Accra Metropolitan Area, Ghana." Environment and Urbanization. 5 (2): 10-34

3.1.2 Exposure to Environmental Hazards and Pests

Households living in the slums and shanty towns of large cities and in unserviced small towns are often exposed to numerous hazards and pests within their home and neighbourhood environment. The most common pests include malarial mosquitoes, flies, cockroaches and rats. These pests and vectors thrive in the tropical environment where high temperatures combine with high rainfall.

Past studies suggest that some malarial mosquitoes are adapting to the urban environment in Ghana with, for example, increased breeding in household water containers. As a result, malaria remains the single most important cause of ill-health

even in urban areas in Ghana (Chinery, 1984, p.75, Benneh, et.al, 1993). Houseflies are also a great risk because of the insanitary condition of towns and cities. Most households use some form of insect control especially for mosquitoes including nets, house screening, mosquito coils and aerosol and pump insecticides. The use of these chemicals to control insects, of course, creates its own health risks.

Other important hazards include indoor air pollution and crowding within the home. "Indoor air pollution can be particularly hazardous to health because it is released in close proximity to people. The most prominent source of indoor air pollution in developing countries is household use of biomass and coal for heating and cooking, usually involving open fires or stoves without proper chimneys" (WHO/EHG/97.12, 1997, P.15). Findings from personal air pollution monitoring in one study in Accra shows that the highest exposure to respirable particulates arises from wood use. Wood users were exposed to a mean concentration of respirable particulates of 587.1$\mu g/m^3$, charcoal users to 341.2 μg/m3 and kerosene, LPG and electricity users together to 195.2$\mu g/m^3$. The maximum permissible level of total suspended particulates (TSP) in residential areas in Ghana is 150 $\mu g/m^3$ (averaged over 24 hours). The levels measured for Accra are therefore disturbingly high. For carbon monoxide (CO), charcoal users were the group most exposed to the highest levels of CO as compared to the other fuel users which were much lower. About 6% of the charcoal users were exposed to an average CO concentration greater than 25ppm, the UNEP-WHO guidline for 1 hour of exposure (Benneh, et.al, 1993, pp.65-71).

3.2 Workplace and City-Wide Environments

Industrial production brings with it the need to control and manage wastes from the production sites for the protection of local ecology and health. Most work environments in African cities expose workers to hazards that contribute to injuries, respiratory disorders, cancer, musculoskeletal disorders, reproductive disorders, allergies, cardio-vascular diseases, mental disorders, psychological disorders, eye damage and hearing loss as well as communicable diseases (WHO, EHG/97.12, 1997). Industrial pollution from large industries is still restricted to a few cities. Because heavy and chemical industries which are the major polluters seem to be limited or non-existent, it is not appreciated that for most urban centres, the bulk of workplace pollution arises from dispersed medium and small-scale industries which are prevalent in Africa's urban centres. Uncontrolled discharge of hazardous contaminants from these industries results in build-ups of toxic constituents in surface

water supplies and contamination of groundwater. In addition, open dumping of solid hazardous residues including biomedical wastes and emission of toxic gasses pose serious environmental and health risks (ECA, 1996, P.18).

The existence of clusters of obsolete industrial establishments generate excessive air pollution which are however localised whilst the primate cities with heavy motor vehicle traffic further compound air pollution problems. With a few exceptions such as Cairo, Alexandria, Lagos and Johannesburg most African cities do not have the city-wide ambient air pollution problems of the mega-cities of Asia and Latin America (ECA, 1986). On account of their small size, low levels of industrialization and poverty, most of Africa's towns and cities do not pose a threat to the global sinks as cities in the North do. Industrial, water and air pollution have not yet become major problems although there is growing concern about these city-wide problems for the primate cities. If global or city-level ecosystems are not yet threatened, the same cannot be said about the environmental hazards causing most ill-health in poor homes, neighbourhoods and workplaces eg. inadequate water supply, sanitation, solid waste, sullage disposal, smoky kitchens, pests and pesticide use, food contamination and crowding. Hence the preponderance of environmentally related and communicable diseases in Africa's towns and cities as they are still in the early stages of the urban environmental transition as presented in Section 2. (Songsore, 1997, pp.21-22).

4 The Burden of Disease in African Cities

4.1 Environment and the Burden of Disease

The most pressing environmental health problems today, in terms of deaths and illness worldwide are those associated with the poor home and neighbourhood environments in developing countries. According to WHO and the World Bank, environmental improvements at the household and community level could lower the incidence of major killer diseases by up to 40% globally, (World Resources Institute, UNEP, UNDP and WB, 1998, p.75), see (Fig. 6).

Fig. 6: Improving The Household Environment: The Benefits To Health

Disease	DALYs* (millions per year)	Relevant environmental problem	Percentage of DALYs* that would be averted by feasible environmental interventions	Preventive strategies
Acute Respiratory Infections	119	Indoor air pollution, crowding	15	▪ Improve ventilation ▪ Improve cookstoves ▪ Provide electricity to rural households and urban poor
Diarrhea	99	Sanitation, water supply, hygiene	40	▪ Improve quality of drinking water ▪ Increase the quantity of water used by improving accessibility and reliability of water supply ▪ Improve sanitation, Improve hygiene (behavior changes include washing hands, boiling water, preventing casual use of unprotected sources)
Intestinal worms	18	Sanitation, water supply, hygiene	40	▪ Same as for diarrhea ▪ Reduce need for contact with infected water ▪
Malaria	X	water supply	x	▪ Improve surface water Management ▪ Destroy breeding sites of Insects ▪ Reduce need to visit breeding site ▪ Use mosquito netting
Denque fever	X	Water supply, garbage collection	X	▪ Improve surface water management ▪ Destroy breeding sites of Insects ▪ Reduce need to visit breeding site ▪ Use mosquito netting
Tropical Cluster (includes schistoso-miasis, trypanoso-miasis, and filariasis)	8	Sanitation, garbage disposal, vector breeding around the Home	30	▪ reduce need for contact with infected water ▪ control snail population ▪ filter water
Tuberculosis	46	Crowding	10	▪ Improve housing quality and quantity
Chronic Respiratory Diseases	41	Indoor air pollution	15	▪ Same as for acuterespiratory infections

* DALYs = disability-adjusted life years, Source: World Resources Institute, UNEP, UNDP and WB, 1998, p.75.

The 1993 World Development Report which focused on health, also estimated that improving household environments could avert the annual loss of almost 80 million

`disability free' years of human life – more than the feasible improvement attributable to all other identified environmental measures combined (McGranahan, Songsore and Kjellen, 1996, pp.111; World Bank, 1993).

Fig. 7 provides a list of diseases each responsible for about 10% of the total burden of disease by gender in Sub-Saharan Africa. These are equivalent to the top five burdens of disease: malaria, injuries, respiratory infections, diarrhoeal diseases, the childhood cluster plus HIV/AIDS and other STDs. These collectively account for about 50 percent of the total burden of disease. These diseases common as they are in urban slum areas are also the same communicable diseases afflicting rural dwellers. Almost all of these with the exception of HIV/AIDS are environmentally related (Listorti, 1996, p.8). There are however fewer deaths from these diseases in urban areas when compared to rural areas because the technology of death control is better developed in urban areas.

Fig. 7: Rank and Share of Burden of Disease in Sub-Saharan Africa (SSS) (1990)

Female		Male	
Rank	Share (%)	Rank	Share (%)
Malaria	11	Injuries	13
Respiratory infections	11	Respiratory infections	11
Diarrheal diseases	10	Malaria	11
Childhood Cluster*	9	Diarrheal diseases	10
HIV/AIDS & other STDs	9	Childhood cluster	10
Top five sub-total	49	Top five sub-total	55

*Childhood cluster = whooping cough, polio, diptheria, measles, tetanus, Source: Listorti, 1996, p.8

Disability-adjusted life years (DALYs) concept provides the most comprehensive concept of the burden of disease covering all major diseases and injuries. "Each DALY indicates the loss of a year of healthy life-that is, time lived with a disability or time lost through premature death. The number of DALYs in different regions provides a guide to the relative distribution of disease burden: the higher the DALYs, the greater the burden" (WHO/EHG/97.12, 1997, P.23). Most of the DALY burden arises from premature death (i.e. years of life lost-YLL) although the disability component is important for chronic illness. Fig. 8 gives a more detailed picture of these top five by showing their collective socio-economic impact in DALYs.

While averages of disease, malnutrition and death for many cities tend to be lower than in the rural areas, an analysis of intra-urban differentials reveal that the poor in urban areas usually suffer similar rates of disease and death as rural dwellers. "The close proximity of large numbers of people in environments that provide no protection

from the pollution caused by city wastes creates favourable conditions for the rapid spread of a variety of infectious diseases, often in disastrous epidemics" (WHO, 1992, p.37) (see Box 2 on morbidity differentials in Accra).

Fig. 8: Burden of Disease in SSA by DALY (1990)

Disease/Condition	Years with Disability	Annual Deaths	DALY
Respiratory disease (of which:)	**3,017,000**	**1,565,000**	**45,312,000**
- respiratory infections (of which:)	1,714,000	1,029,000	31,639,000
- children under 5	575,000	756,000	25,834,000
- TB	1,303,000	536,000	31,673,000
Malaria	**4,708,000**	**805,300**	**31,504,000**
Diarrheal disease (of which:)	**662,000**	**887,100**	**30,356,000**
- children under 5	81,000	795,900	26,663,000
plus			
Intestinal worms (of which:)	**806,000**	**1,439**	**852,000**
- ascaris	419,000	1,439	440,000
- trichuris	290,000	not avail.	304,000
- hookworm	97,000	not avail.	108,000
Childhood cluster	**1,501,000**	**788,000**	**28,093,000**
Injuries (of which "Unintentional:")	**5,322,000**	**335,300**	**15,067,000**
- traffic	398,000	114,000	3,710,000
- falls	2,522,000	20,400	2,985,000
- drowning	<1,000	48,300	1,554,000
- burns	607,000	13,000	1,006,000
- poisoning	10,000	19,500	535,000
- occupational	18,000	15,500	405,000
- other	1,767,000	104,600	4,872,000
Tropical Cluster or Vector-related (of which:	**3,356,104**	**318,000**	**4,418,104**
- schistosomiasis	2,887,000	21,000	3,490,000
- onchocerciasis	182,000	297,000	641,000
- filariasis	184,000	not avail.	184,000
- guinea worm	103,104	not avail.	103,104
SUBTOTAL (from above data)	**19,372,104**	**4,700,139**	**155,602,104**
SUBTOTAL (remaining burden of disease)	**48,158,000**	**3,236,861**	**137,236,104**
GRAND TOTAL	**67,530,104**	**7,937,000**	**292,838,208**

Source: Listorti, 1996, p.9.

Box 2: Intra-Urban Inequalities in Diarrhoea Prevalence in Accra

One detailed study of diarrhoeal prevalence in Accra showed that the diarrhoeal problem reflected a complex of environmental risks in poor households with a high prevalence of the disease. The more the high risk conditions a household is exposed to the higher the prevalence of the disease (Fig. 9). On the other hand, ecology or residential sectors based on the survey strata effectively structure those risks (Fig. 10). There is a clear difference in diarrhoeal morbidity between middle and high class sectors (MCS and HCS) of the city on the one hand and most of the poor areas such as the Rural Fringe (RF), High Density Low Class Sector (HDLCS), High Density Indigenous Sector (HDIS) and the Medium Density indigenous Sector (MDIS) on the other. Other intra-urban differentials such as differences in wealth status of the household and education of the principal homemaker (often women) were related to diarrhoea prevalence (Fig. 11).

Even though most risk factors are correlated, results of a logistic regression analysis indicate that a large number of variables remain significant. Fig. 12 shows the approximate relative risks of the high risk environmental factors monitored for diarrhoeal prevalence. Most of these high risk conditions are related to the water sanitation complex. Poverty and multiple deprivation including malnutrition are the underlying social conditions for the reproduction of the above environmental risk factors.

Fig. 9: Number of Risk Factors Household Faces and Children's Diarrhoea Prevalence

Number of High Risk Conditions	Size of Sub-sample	Two-week Prevalence of Diarrhoea (%)
None	19	0.0
One	50	0.0
Two	133	3.0
Three	119	14.3
Four	77	14.3
Five	68	23.5
Six	21	57.1
Seven	13	69.2

Source: Songsore & McGranahan, 1993, p.30.

Fig. 10: Residential Sector and Children's Diarrhoeal Prevalence (%)

Residential Sector	Number in Sub-sample	Two-week Prevalence of Diarrhoea (%)
RF	29	24.1
HDLCS	274	13.5
HDIS	81	25.9
MDIS	61	4.9
MCS	70	4.3
HCS	22	4.5
Total Sub-sample	537	13.4

Source: Songsore & McGranahan, 1993, p.30.

Fig. 11: Socio-economic Characteristics and Children's Diarrhoea Prevalence (%)

Category	Size of Subsample	Two-week Prevalence of Diarrhoea (%)
Wealth Quintile		
1. Poorest	130	22.3
2.	95	11.6
3.	107	12.2
4.	114	9.7
5. Wealthiest	91	8.8
Education of Principal Homemaker		
No Formal Education	150	16.0
Some Primary	279	15.1
Some Secondary	108	5.6

Source: Songsore & McGranahan, 1993, p.30

Fig. 12: Approximate relative risk of environmental factors with respect to diarrhoea among childrenunder age 6.

Environmental factor	Approximate relative risk
Pot used for storing water	4.3
Water interruptions occur regularly	3.1
Toilet shared with more than 5 households	2.7
Prepared food purchased from vendor	2.6
Water stored in open container	2.2
Neighbourhood children defecate outdoors	2.1
Many flies in kitchen during interview	2.1
Hands not always washed before food is prepared	2.0

Source: Songsore, McGranahan and Kjellen, 1997.

4.2 Emergence of New Infectious Diseases and Persistence of the Tropical Cluster

"Until well into the twentieth century, infections were an expected part of the human condition. Then triumphs of modern science and technology led the public-and many experts-to expect instead nearly complete freedom from infectious diseases. Today the pendulum of expectation is swinging back. Arguably, the process of emerging disease may be accelerating. Profound changes in the world increase the likelihood that some of the known infectious diseases will increase and that additional, currently unknown infections will be recognized. This new reality challenges our confidence in the power of science and technology to control nature" (Wilson, 1994, p.1).

During the past 20 years, at least 30 new diseases have emerged threatening the health of millions of people worldwide (WHO/EHG/97.12, 1997, P.26). This is particularly true in Sub-Saharan Africa which is characterised by the persistence of the tropical cluster of infectious diseases, the re-emergence of old diseases such as yellow fever and the emergence of new virulent infections such as AIDS (Brinkmann, 1994, p.303).

Of the tropical cluster, malaria stands out as the most persistent and the greatest health threat in Africa. About 90 percent of the malaria burden is estimated to occur in Sub-Saharan Africa originating largely from *Plasmodium falciparum*, the parasite species associated with the most severe and fatal forms of malaria. As indicated earlier, malaria is not just a rural problem as there are equally severe problems with malaria in urban areas, most especially in peri-urban zones where it is one of the main causes of illness and death (UNCHS (Habitat), 1996, p.136). Other diseases within the tropical cluster that afflict urban populations include schistosomiasis, filariasis and onchocerciasis. These are however more common in rural environments.

New infections such as HIV/AIDS and the re-emergence of the old infections, such as TB, may be a major hidden contributor to cause of death in cities of the developing world in general and Africa in particular. In contrast to the other major infections, these communicable diseases tend to have the greatest impact on the adult working population (Stephens, 1996, p.120).

In spite of major public health interventions in the 1960s which eliminated or subdued major diseases like smallpox, sleeping sickness, yellow fever, yaws, leprosy, onchocerciasis and even malaria, the average life expectancy in Africa in 1990 was only 53 years. This stands in sharp contrast to a developing country average of 61

and 74 for the developed world (Clarke, 1993, p.268). These modest gains have largely escaped such war-torn and disaster-ridden areas of the Sahel, the Horn of East Africa, Uganda, Mozambique, the Democratic Republic of Congo (Zaire) and Angola where life expectancy in some cases is less than 50 years.

As a general rule, because modern health care delivery services have diffused from urban to rural areas, life expectancy and child survival tend to be higher in the towns. For example, in Ghana, the infant mortality rate is 54.9 per thousand life births in urban areas as compared to 82.2 per thousand life births in rural areas (UNDP, 1997, p.25). This overall picture of lower mortality in cities is, in some cases, undergoing a reversal as a result of the AIDS epidemic which is bridging the rural-urban gaps by dragging down life expectancy in cities. The spread of AIDS, particularly associated with urban prostitution and sex tourism is one major reason (Clarke 1993, p.268). In Zimbabwe, for example, life expectancy has climbed down from 65 years to under 40 years as a result of the AIDS epidemic. “An analysis of cause of death in adult cadavers in Abidjan, Cote d’ Ivoire, found HIV infection in 41% of adult male cadavers and 32% of adult female cadavers examined in 1988 and 1989” (Stephens, 1996, p.120; see also Faechem et.al, 1990). A new `urban penalty’ of higher mortality may be asserting itself in the slums and squatter settlements in Africa similar to the historical experience in Europe where urban mortality was significantly higher than in the rural areas in the early period of the industrial revolution (Gould, 1998, pp. 171-181).

4.3 Chronic Non Infectious Disease Burden

Available studies, limited as they are seem to present a general picture of urban populations in developing countries suffering the `worst of both worlds’ in their mortality profile as they are confronted by infectious diseases arising from their own poverty and chronic diseases associated with industrialization and urbanization (Smith and Lee, 1993, p.179; Stephens, 1996). These risk overlaps are particularly common in urban slum areas where modern risks have begun to rise at a time when traditional risks are still significant although declining. It is the urban poor who live close to factory districts, in inner city lead belts caused by smoke from the cars of the wealthy.

In Accra, for example, while the malfunctioning of public toilets (pit latrines) have local consequences, suffered by local residents, the lack of treatment of municipal sewage affects the poor in Gamashie besides the rich benefiting from the sewerage

services. This way the environmental burdens of the rich fall back on the community at large rather than the polluters themselves. The same could be said for emmissions of pollutants from the cars of the wealthy in down town Accra and also traffic accidents that cause death and disability to poor pedestrians (Kjellen and McGranahan, 1998, p.70).

For almost every category in the international classification of diseases, those living in poverty experience higher mortality (and morbidity) rates than the wealthy. In developing countries such as those in Africa urban poverty is clearly a predictor of poor health. A recent study of Accra which examined mortality differentials by age for infectious, respiratory and circulatory diseases suggest that those living in socio-economic and environmental deprivation are at a consistently higher risk of death, for each cause group and for adults as well as children (Fig. 13), (see also Stephens et al, 1994).

Fig. 13: Summary age-adjusted mortality differentials between socio-environmental zones in Accra (Ghana) 1991. Mortality rates (per 10,000) and Relative Risks (RR).

	Circulatory diseases	Infectious and parasitic diseases	Respiratory diseases
Zone	Rate (RR)	Rate (RR)	Rate (RR)
1 (worst)	16.4 (2.3)	9.2 (2.0)	7.6 (1.9)
2	14.6 (2.1)	14.4 (3.0)	7.5 (1.9)
3	13.5 (1.9)	10.1 (2.1)	6.5 (1.6)
4(best)	7.0 (1.0)	4.7 (1.0)	4.0 (1.0)

Source: Stephens, 1996, p.123.

5 Conclusion

Evidence from the above analysis would seem to suggest that major determinants of health outcomes lie outside the health care system itself. The infrastructural sector or environmental health sector contains enormous untapped potential not available to the health sector to help improve the quality of life. As much as 44% of the burden of disease in SSA is amendable to infrastructure investments (Listorti, 1996, p.3). This calls for an inter-sectoral approach to health-care delivery.

As an increasing share of Africa's poor move into the slums of cities, it has become even more pertinent to adapt primary health care approaches to the urban slums and squatter settlements in order to reduce the preventable fraction of the toll of communicable diseases on the urban poor. This will help avoid the occurrence of an urban penalty of disease and death.

In terms of research priorities for the benefit of the urban poor, the focus should be on research and development activities targeting old and new infectious diseases such as malaria, and AIDS. Research and development work on chronic non-infectious diseases primarily benefits the wealthy as the poor stay sick and die young from simple preventable environment-related and poverty-related diseases.

Medical and health-related researchers should be equally concerned about the struggle by NGOs and other civil society organizations world-wide to redress the unjust world economic order that reproduces poverty for the majority as part of its internal logic for there is no vaccine for poverty which is the underlying cause of ill-health and poor quality of life of the urban and rural poor in Africa.

6 References

Benneh, G., Songsore, J., Nabila, J.S, Amuzu, A.T., Tutu, K.A., Yangyuoru, Y. and McGranahan, G., (1993), Environmental Problems and the Urban Household in the Greater Accra Metropolitan Area (GAMA) – Ghana, (Stockholm Environment Institute, Stockholm).

Brinkman, U.K., (1994) "Economic Development and Tropical Disease," in M.E. Wilson, R. Levins and A. Spielman (eds), Disease in Evolution: Global Changes and Emergence of Infectious Diseases, (New York Academy of Sciences, New York). P.303-331.

Chinery, W.A., (1984), "Effects of Ecological Changes on Malaria Vectors *Anopheles funestus* and the *Anopheles gambiae* complex of Mosquitoes in Accra, Ghana," Journal of Tropical Medicine and Hygiene, Vol. 87, pp.75-81.

Clarke, J.I., (1993), "Polarisation and Depolarisation in Africa," in L.M., Schell, M.T. Smith & A. Bilsborough (eds), Urban Ecology and Health in the Third World, (Cambridge University Press). pp.260-273.

Cuentro S. de Coura and Gadji, D.M., (1990), "The Collection and Management of Household Garbage," in Hardoy, J.E., Cairncross, S. and Satterthwaite, D. (eds), The Poor Die Young: Housing and Health in Third World Cities, (Earthscan Ltd, London); pp.169-188.

Davis Kingsley, (1967), "The Urbanization of the Human Population," in Cities; A `Scientific American' Book, (Penquin Books Ltd.) pp. 11-32.

ECA, (1996), Urban Environment and Health in ECA Member States, (E/ECA/SER.A/11).

Eckholm, E.P., (1977). The Picture of Health: Environmental Source of Disease, (Norton, New York).

Escallier, (1988), "La croissance des populations urbaines en Afrique. Quelques elements d' introduction," Espace, Populations, Societes, Vol. 2, pp.177-182.

Faechem, R, Kjellstrom, T., Murray, C., Overs, M. and Phillips, M., (1990), The Health of Adults in the Developing World, (World Bank, Washington DC).

Gould, W.T.S, (1998), "African Mortality and the New `Urban Penalty,' Health and Place, Vol.4, No.2, pp.171-181.

Hardoy, J.E., Mitlin, D. and Satterthwaite, D., (1992), Environmental Problems in Third World Cities, (Earthscan Ltd., London).

Kjellen, M. and McGranahan, G. (1998), "Multi-City Study on Household Environmental Problems in Third World Countries", Urban Health and Development Bulletin, Vol.1, No.2, June, pp.64-70.

Listorti, J.A., (1996) Bridging Environmental Health Gaps: Lessons from Sub-Saharan Africa Infrastructure Projects: Volumes 1 (AFTES Working Paper No. 20, World Bank).

McGranahan, G. and Songsore, J., (1994), "Wealth, Health and the Urban Household: Weighing Environmental Burdens in Accra, Jakarta and Sao Paulo," Environment, Vol. 36, No.6, July/August, pp. 4-11, 40-45.

McGranahan, G., Songsore, J., and Kjellen, M. (1996), "Sustainability, Poverty and Urban Environmental Transitions," in C. Pugh (ed), Sustainability, the Environment and Urbanization (Earthscan, London).

McGranahan, G., Jacobi, P., Songsore, J., Surjadi, C. and Kjellen, M. (2000, in press), Citizens at Risk: from Urban Sanitation to Sustainable Cities, (London, Earthscan).

McGranahan, G., Lewin, S., Fransen, T., Hunt, C., Kjellen, M., Pretty, J., Stephens, C. and Virgin, I., (1999), Environmental Change and Human Health in Countries of Africa, the Caribbean and the Pacific, (Stockholm).

Novick, R.E. (1990) Foreword in Hardoy, J.E., Cairncross, S. and Satterthwaite, D. (eds), The Poor Die Young: Housing and Health in Third World Cities, (Earthscan Ltd, London).

Omran, A.R., (1971), "The Epidemiologic Transition: A Theory of the Epidemiology of Population Change", Milbank Memorial Fund Quarterly, Vol. 49, No, 4 Pt.1, pp. 509-538.

Schell, L.M, Smith, M.T. and Bilsborough, A. (1993), "Human biological approaches to the study of Third World Urbanism," in L.M. Schell, M.T. Smith & A.

Bilsborough (eds), Urban Ecology and Health in the Third World, (Cambridge University Press).

Smith, K.R. and Lee, Y.F. (1993), "Urbanization and the Environmental Risk Transition" in J.D. Kasarda and A.M. Parnell (eds), Third World Cities: Problems, Policies and Prospects, (Sage Publications, Newbury Park).

Songsore, J., (1997), "Strategies Pertaining to Urban Environmental Health Problems in Africa: The Case of Accra", Study Prepared for ECA. (Draft Report).

Songsore, J. and McGranahan, G. (1993[a]), "Structural Adjustment, the Urban Poor and Environmental Management in the Greater Accra Metropolitan Area (GAMA), Ghana," Open Seminar on Urban Environment and Human Welfare in Southern Cities: Lessons from Five Case Studies, (Stockholm Environment Institute, Stockholm).

Songsore, J. and McGranahan, G., (1993[b]), "Environment, Wealth and Health: Towards an Analysis of Intra-Urban Differentials within the Greater Accra Metropolitan Area, Ghana," Environment and Urbanization, Vol. 5, No.2, Oct., pp.10-34.

Songsore, J., McGranahan, G., and Kjellen, M. (1997), "An Environmental Health Indicator Profile for the Greater Accra Metropolitan Area (GAMA). Ghana," prepared for Workshop on Public Participation and Urban Environmental Health Services, A Concerted Action Financed by the European Commission, 23-26, September, Bamako, Mali.

Songsore, J., and McGranahan, G., (1996), Women and Household Environmental Care in the Greater Accra Metropolitan Area (GAMA), Ghana, (Urban Environment Series Report no.2, Stockholm Environment Institute).

Songsore, J., and McGranahan, G., (1998) "The Political Economy of Household Environmental Management: Gender, Environment and Epidemiology in the Greater Accra Metropolitan Area", World Development, Vol. 26, No. 3, pp. 395-412.

Stephens, C., (1996), "Research on Urban Environmental Health," in S. Atkinson, J. Songsore, and E. Werna, (eds), Urban Health Research in Developing Countries: Implications for Policy, (CAB International, Wallingford). Pp.115-134.

Stephens, C., Timaeus, M., Akerman, M., Avle, S., Maia, P.B., Campanario, P., Doe, B., Lush, L., Tetteh, D. and Harpham, T., (1994), Environment and Health in Developing Countries: An Analysis of Intra-Urban Differentials using Existing Data. Collaborative Studies in Accra and Sao Paulo and Analysis of Urban Data for Four Demographic and Health Surveys, (London School of Hygiene and Tropical Medicine, London).

UNCHS (Habitat), (1996), An Urbanizing World: Global Report on Human Settlements 1996, (Oxford University Press, Oxford).

UNCHS (Habitat), 1992), "The Role of Human Settlements in Improving Community Health in Africa," International Conference on Community Health in Africa, Brazzaville, Congo, 4-6 September.

UNDP, (1997), Ghana Human Development Report, (Accra, Ghana).

WHO, (1992), WHO Commission on Health and the Environment: Report of the Panel on Urbanization, (Geneva).

WHO/EHG/97.12, (1997), Health and Environment in Sustainable Development: Five Years after the Earth Summit, (World Health Organization, Geneva), Executive Summary

Wilson, M.E., (1994) "Disease in Evolution: Introduction," in M.E. Wilson, R. Levins and A. Spielman (eds), Disease in Evolution: Global Changes and Emergence of Infectious Diseases, (New York Academy of Sciences, New York) pp.1-23.

World Bank Policy Paper, (1991), Urban Policy and Economic Development: An Agenda for the 1990s, (The World Bank, Washington, DC).

World Bank (1993), World Development Report: Investing in Health, (Oxford University Press, Oxford).

World Resources Institute, UNEP, UNDP, WB, (1998), World Resources 1998-99: A Guide to the Global Environment, (Oxford University Press, Oxford).

Wurzel, P. (1989), "Water Supply and Health in the Humid Tropics," Paper read at the International Colloquium on the Development of Hydrologic and Water Management Strategies in the Humid Tropics, 15-22 July, Townsville, Australia.

IWSG Working Papers

10-1999 **Harald Bathelt**: Technological change and regional restructuring in Boston's Route 128 area

12-1999 **Johannes Glückler**: Management consulting – structure and growth of a knowledge intensive business service market in Europe

02-2000 **Sam Ock Park**: Knowledge-based industry and regional growth

10-2000 **Michael H. Grote**: Frankfurt – An Emerging International Financial Centre

11-2000 **Eike W. Schamp, Heike Bertram, Johannes Glückler**: Die Südwestpfalz: Umstrukturierung durch erfolgreiche Unternehmen – Ergebnisse einer Lehrstudie.

12-2000 **Jacob Songsore**: Urbanization and Health in Africa: Exploring the Interconnections Between Poverty, Inequality and the Burden of Disease