Urbanisation and the State of Infrastructure in the Developing World Cities

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ABSTRACT: The dominant policy decision emphasis on urbanisation problem in developing countries is its rate of growth, ignoring the level of provision of resources, including the infrastructure, to match this growth. It is against this background that the paper undertook a broad analysis of the state of infrastructure in developing countries using such indices as access and quality of water supply, sanitation and solid waste management, to explore how their provision and improvements over time could gradually match the rate of urbanisation. Extensive literature review was adopted for data collection in articles and journals which were analysized using content analysis technique. There is significant proportion of population using unimproved drinking water sources (42%), unimproved sanitation facilities (50%) and without access to designated waste disposal sites (44%). Water, sanitation and hygiene are key to improving health and development. Providing sustainable access to these infrastructures is the most important things that can be done to reduce disease and improve human development.

Keywords: *Urbanization, Developing world cities, Infrastructure.*

INTRODUCTION

Urbanisation is a process whereby comparatively increasing number of people lives in urban areas as against the rural areas. It is a function of population growth and its associated needs like housing, education, health, employment, transportation, security, administration infrastructures etc. It is a demographic shift but the concern in developing countries is that the rate of this shift is so high that the rates of economic and social development are not catching up with the rate of urbanisation. There is need to strike a balance in the agglomeration of people and their needs in urban areas or communities for better living. Urban communities have been defined in a number of ways to include population size, population density, administrative, political boundaries, or economic functions of the communities. For instance, population size definitions include defining an urban area as a community with a population of 200 or more as in the case of Demark; or community with a population of 1,000 as obtain in Canada; or a size of 2,000 people in France; 2,500 in the United States of America; 3,500 as in the case of Britain or 5,000, which is the preference of India; or the 20,000 people mark that Nigeria adopts, a figure which doubles Spain's 10,000 population parameter but less than 30,000 and 40,000

that Japan and South Korea used respectively as the criterion for adjudging a community as a city. It has been projected that by 2025, there would be about 7 billion people living in the urban areas of the world, which represents an increase of 2 billion people over the present urban population of about 5 billion. This made Wolfensohn (2000) to conclude that "the increased strain that this population will have on transportation, clean water, waste management, education and other essential urban services will be major, perhaps, unprecedented in modern times." This is expected in cities like Harare, Lagos, etc.

A number of broad conceptual approaches have always been suggested as necessary ingredients in understanding the forces driving urbanisation. The first is the push factor, which refers to the extraordinary high population growth. High population growth has been known to be accompanied by reduction in supply of agricultural land in rural areas thus driving rural dwellers to migrate to the cities. The second approach is the pull factor. This results from the attractions of the cities through better lifestyles, economic conditions, opportunities, etc. The sharp disparity serves as magnet drawing migrants from the rural areas to the urban centres. The third factor represents a combination of the previously defined push and pull factors, as in the case of cities which Lagos, the economic

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capital of Nigeria typifies. In economic geography, the spatial concentration of economic activities results in centripetal (converging) and centrifugal (diffusing) forces. The after effect, for instance, of combined concentration of economic activities and companies would be to attract labour, an influx of migrants from rural areas in search of employment opportunities in the urban centre with its attendant large concentration of households. Fujita et al. (1999) underlines the most important centripetal forces driving spatial concentration of economic activities as knowledge spill-over, positive externalities from large labour market and forward, backward linkages in large domestic markets. Against these are such centrifugal forces as immobile factors, land rents and negative externalities such as population and congestion costs.

Cities have always been noted to be the focal points for economic growth, innovation, and employment. Indeed, many cities grew historically out of some natural advantage in transport or raw material supply. Cities, particularly capital cities, are where the vast majority of modern productive activities are concentrated in the developing world and where the vast majority of paid employment opportunities are located. In developing countries, certain reasons come to play and reinforce each other, leading to the creation and further spatial and demographic growth of urban centres. The reasons according to Ades & Glaeser (1995) include:
The historical dimension emphasized by the hub and spoke model, leading to the emergence of urban centres as a result of historical heritage of centralized functions;
The effects of import substitution industrialisation, leading to low participation in international trade flows and engineering the minimization of trade costs in the local markets, and motivating the concentration of economic activities in usually the largest city;
The effects of dictatorial intentions of political class. Studies have shown that the proportion of population residing in primate cities (or political capital city) in dictatorial regimes far exceeds the share of the same in stable and stronger economies; and
The concept of first city bias.

In spite of the negative consequences of high urbanisation rates, life in the cities are still perceived as desirable, and the concentration of population in the largest cities of the developing nations continues to increase. However, the rates of production of supporting urban infrastructure, housing facilities and employment opportunities cannot match the rapid growth of urban population, leading to severe deterioration of living conditions in urban areas. Goldin & Reinhert (2007) observed that the countries of the developing world became distinct by the nineteenth century as their per capita incomes began to demonstrate a significant lag behind those of other parts of the world. By 1820, for instance, the per capita income in Western Europe was found to approximately double that of the rest of the world. The exact causes of this are still subjects of debate. According to Fay & Yepes (2002), the monetary value of the world's infrastructure stock, at the average prices and excluding housing, is about $15 trillion. Of this, about 60% is in high-income countries, which contain 16% of the world population,

28% is in middle-income countries, with 45% of population, and 13% is in low-income countries with 39% of population. Hence, the rapid urbanisation in many developing countries over the past five decades have been accompanied by excessive high level of concentration of the urban population in very large cities (Henderson, 2002) with very low level of urban infrastructural investments.

The obvious consequence of this urbanisation trend in the developing nations is the growth of slums. Slums are areas of large population with very poor infrastructural facilities and substandard housing conditions. Available data suggest that an estimated 72% of the urban population of Africa now live in slums (UNCHS, 2004) and the proportion is 43% for Asia, 32% in the Pacific and Latin America, while Middle East and Northern Africa account for 30% (UNCHS, 2003b). Rapid urban growth throughout the developing world has seriously outstripped the capacity of most cities to provide adequate basic infrastructures, especially water supply and improve services like waste management and sanitation for their citizens. This is because percentage of population living in urban areas in the developing world is growing so rapidly that it is expected to be equal to rural population by about 2020 (Table 1). By 2030, it is also expected that less people would be in rural areas than in urban areas (UNCHS, 1996).

According to Cohen (2006), the world population has grown exponentially in the 20th century from around 1.6 billion in 1900–to around 6.1 billion 2006, with each additional billion people being added more rapidly than the last. The vast majority of this growth has occurred in the developing world. The study observed that in 1950, just over one-half of the population of the developed world and just under one-third of the population of the entire world lived in urban areas (Table 2). At that time, there were only around 733 million people living in urban areas around the world and eighty-three cities in the world that could boast a million or more residents. Continued urbanization over the last 50 years has resulted in a situation whereby close to half of the world's population (47.1 percent) now live in urban areas. In absolute terms, the numbers of urban dwellers almost quadrupled between 1950 and 2000 going from 733 million to 2.857 billion. Especially over the last two decades, globalization driven by advances in transportation and telecommunications, and a positive political climate has created a global economy characterized by unprecedented levels of urbanization and more and bigger cities than ever before. Many cities, particularly those in East Asian countries that have enjoyed robust economic growth have grown spectacularly over the past 25 years, in some cases more than quadrupling in size. Between 2000 and 2030, Cohen (2006) estimated that the world's population is expected to grow at an annual rate of 1.8 percent, and at this rate of growth, the world's urban population can be expected to double in 38 years. By 2030, demographers predict that around 61 percent of the world's population will be living in urban areas, at which time the world's urban population will be approaching 5 billion (Table 2).

Table 1. Megacities of the World (2008) (Source: Brinkhoff , 2008)

S/No	City	Country	Continent	Population (in millions)
1	Tokyo	Japan	Asia	28.0
2	Mexico City*	Mexico	North and Central America	18.1
3	Bombay*	India	Asia	18.0
4	São Paolo*	Brazil	South America	17.7
5	New York	USA	America	16.6
6	Shanghai*	China	Asia	14.2
7	Lagos*	Nigeria	Africa	13.5
8	Los Angeles	USA	America	13.1
9	Calcutta*	India	Asia	12.9
10	Buenos Aires*	Argentina	South America	12.4
11	Seoul*	South Korea	Asia	12.2
12	Beijing*	China	Asia	12.0
13	Karachi*	Pakistan	Asia	11.8
14	Delhi*	India	Asia	11.7
15	Dhaka*	Bangladesh	Asia	11.0
16	Metro Manila*	Philippines	Asia	10.8
17	Cairo*	Egypt	Africa	10.8
18	Osaka	Japan	Asia	10.6
19	Rio de Janeiro*	Brazil	South America	10.6
20	Tientsin*	China	Asia	10.2

* Cities in the Developing Countries

Table 2. Urban population size and distribution by major geographic area, 1950 – 2030 (Source: Cohen ,2006)

Region	1950	1975	2000	2030
Total Population (millions)				
World	2,519	4,068	6,071	8,130
More Developed Regionsa	813	1,047	1,194	1,242
Less Developed Regionsb	280	3,021	4,877	6,888
Rural Population (millions of inhabitants)				
World	1,786	2,552	3,214	3,185
More Developed Regions	386	344	311	228
Less Developed Regions	1,400	2,208	2,902	2,958
Urban Population (millions of inhabitants)				
World	733	1,516	2,857	4,945
More Developed Regions	427	703	882	1,015
Less Developed Regions	306	813	1,974	3,930
Percentage of Population Living in Urban Areas				
World	29.1	37.3	47.1	60.8
More Developed Regions	52.5	67.2	73.9	81.7
Less Developed Regions	17.9	26.9	40.5	57.1
Distribution of the World's Urban Population				

Table 2. Urban population size and distribution by major geographic area, 1950 – 2030 (Source: Cohen ,2006)

Region	1950	1975	2000	2030
World	100	100	100	100
More Developed Regions	58.3	46.4	30.9	20.5
Less Developed Regions	41.7	53.6	69.1	79.5
a The more developed regions comprise Europe, North America, Australia/New Zealand, and Japan.				
b The less developed regions comprise all regions of Africa, Asia (except Japan), Latin America and the Caribbean, plus Melanesia, Micronesia, and Polynesia.				

The existing urban infrastructure cannot cope with the proliferation of slums and squatter settlements due to influx of people and this brings inevitable social problems. These largely informal settlements remain big problem areas for urban planners and managers, in terms of the proliferation of self-built houses that defy planning regulations, and for which there have not been plan for provision of adequate potable water and electricity, education and healthcare. In the advent of the urbanisation consequences, the paper examined the state of urban infrastructures in order to determine their deficiencies for improvement and adequate provision in developing countries. Urbanisation also has direct effects on the overall environment such as increase in paved areas causing heats and flooding; higher concentration of automobiles which contribute to air pollution; and destruction of living eco-system.

With the contemporary notion of urbanisation, it is, however, challenging to look at the phenomena and dynamics shaping the processes of urbanisation, especially in the developing countries, assess the state of urban infrastructure in the cities, which have become major objects of interest to a broad spectrum of groups - the government as providers, the citizens as consumers, the private sector as partners, the professionals and the academics as experts and the international agencies as assistance donors. Specifically, due to its health effects on human living, a broad analysis of the state of infrastructure using such indices as access and quality of water supply, sanitation and solid waste management, is then undertaken and ended with articulation of ways and means considered helpful to improving the state of urban infrastructure in the developing countries.

MATERIALS AND METHODS

Extensive literature search on published articles and journals were employed. The secondary data obtained were on the population, water supply, sanitation and solid wastes management which were analysized using content analysis technique. The data sources and types include the WHO/UNICEF (2006) Joint Monitoring Programme for Water Supply and Sanitation (JMP) report on proportion of population with sustainable access to an improved and unimproved drinking water sources and sanitation. The proportion of the population with access to safe drinking water is an indicator expressed as the percentage of people using improved drinking water sources such as piped water into dwelling, plot or yard, public tap/standpipe, tube well/borehole, protected dug well, protected spring and rainwater collection. The unimproved sources include unprotected dug well, unprotected spring, cart with small tank/drum, bottled water, tanker-truck and surface water (river, dam, lake, pond, stream, canal, irrigation channels). The proportion of the population with access to basic sanitation is an indicator expressed as the percentage of people using improved sanitation facilities such as flush or pour-flush to: piped sewer system, septic tank, pit latrine, ventilated improved pit latrine, pit latrine with slab and composting toilet. The unimproved sanitation facilities include flush or pour-flush to elsewhere, pit latrine without slab or open pit, bucket, hanging toilet or hanging latrine, no facilities or bush or field.

Most of these data points are provided by Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), Living Standards Measurement Studies (LSMS) and World Health Surveys (WHS). Population data including population projections and a breakdown of urban population are obtained from the United Nations Population Division: World population prospects: the 2004 revision (POP/DB/WPP/Rev.2004/2/F1 – February 2005). Also, UNCHS data report on types, quantity, collection and disposal of solid wastes were used for the study.

RESULTS AND DISCUSSIONS
State of Urban Infrastructure in Developing Countries

Secondary sources such as articles and journals were used to obtain data on urban infrastructures such as access and quality of water supply, sanitation and solid waste management. The lack of adequate, efficient and affordable infrastructure is the bane of the economic growth of many developing countries. According to UNCHS (1996), the quality of infrastructure and service provision within any city or nation has become

increasingly important in attracting new investments and promoting its economic development. Provision of water, sanitation, drainage and safe disposal of wastes are central to good living conditions. Infrastructure supported with effective economic and financial policies has been recognised as a key element of the enabling environment for economic growth as recent studies have shown that reliable and affordable infrastructure can reduce poverty and contribute to the achievement of the MDGs (Briceno-Garmendia et al., 2004). It can also contribute directly by providing and supporting the delivery of key services such as those that have to do with increasing the access of households to safe drinking water, basic sanitation, and solid waste management. Consequently, this section will analyse the state of these vital urban infrastructure services in developing countries. In addition, the section will describe the inadequacy of these infrastructures that are regarded as socio-economic assets in the cities of the developing world. The reality however is that in many developing countries, these basic infrastructure services are still in serious short supply and of poor quality. Paradoxically too, in most of the cities of the developing nations, the quality of infrastructure and service provision has become important index measuring the potentiality for new investment attraction.

infrastructure and urban services (UNCHS, 1996). In cause-and-effect relationship, the lack of adequate investments in urban infrastructure and services in turn inhibited economic expansion. The perfect example came from a study by the World Bank on Lagos. The study found that "unreliable infrastructural services impose heavy costs on manufacturing enterprises. Virtually every manufacturing firm in Lagos has its own electric power generation to cope with the unreliable public supply. These firms invest 10% to 35% of their capital in power generation alone and incur additional capital and operating expenses to substitute for other unreliable public services. The burden of investment in power generating, water supply, transport and radio equipment in lieu of working telephone is disproportionately higher for small firms. In Nigeria, and several other low-income countries, manufacturers' high costs of operation prevent innovation and adoption of new technology and make it difficult for them to compete in international markets" (The World Bank, 1991).

Another sore side is that in developing countries, poorer neighbourhoods dramatically, have lower levels of basic services. Consequently, a large number of urban residents in developing countries suffer to a greater or lesser extent from severe environmental health challenges associated

Table 3. Extent of Deficient Infrastructure (Source: Arimah, 2002)

Infrastructure	Africa	Arab States	Asia Pacific	Latin American countries	Transitional
Households without water connection	64%	19%	43%	27%	7%
Households without access to water within 200m of residence	30%	10%	15%	16%	1%
Households without sewerage connection	88%	38%	64%	41%	11%
Refuse disposed in open dumps	69%	39%	49%	20%	41%
Households without regular refuse collection	55%	41%	30%	20%	12%
Untreated wastewater	83%	49%	67%	86%	37%
Households without electricity	59%	13%	14%	12%	2%

Table 3 shows the extent of the deficiency in households' access to infrastructural facilities in the urban areas of developing nations by Arimah (2002). Households without sewerage connection (88%), untreated wastewater (83%), refuse disposed in open dumps (69%) and households without water connection (64%), depict a poor state of sanitation, solid waste management and water supply quality in developing countries. These findings have earlier been confirmed by UNCHS (1996) and World Bank (1991).

As developing world cities continued to grow both in size and population in the last two decades, their declining economic situation led to a slide in the supply of basic

with insufficient access to clean drinking water, inadequate sewerage facilities, and insufficient solid waste disposal. A United Nations report on the state of water and sanitation in the world's cities found that water distribution systems in many cities in the developing world are inadequate, typically serving the city's upper- and middle-class neighbourhoods but not rapidly expanding settlements on the urban fringe. Furthermore, the current data on the provision of water and sanitation in urban areas is very weak and the true situation according to UNCHS (2003a) is actually worse than most international statistics suggest. The large projected increases in the number of urban residents in the developing world over the

next 20 - 30 years implies that urban managers responsible for these sectors face very serious challenges in the years ahead. In many cities, the scarcity of public water supplies forces many low-income urban residents to use other water sources such as private water vendors who charge many times more than the local public rate. Consequently, people in slums often pay much more for lower quality water than other urban residents (Satterthwaite, 1997).

Improving public sanitation is another major urban environmental challenge that needs to be immediately addressed in virtually all cities in the developing world. Failure to collect garbage as well as inadequate waste management and recycling policies and practices mean that cities are being inundated by their own waste. In African cities, waste management has been described as "a monster that has aborted most efforts made by city authorities, state and federal governments and professionals alike" (Onibokun, 1999). As is the case of the water supply distribution network, sewerage systems are far better at meeting the needs of upper-and-middle-class neighbourhoods than they are in servicing poorer neighbourhoods, particularly the informal neighbourhoods, on the urban periphery. A major environmental crisis is looming large as many developing countries' cities discharge ever increasing amounts of waste into the air or into freshwater bodies, threatening water quality and aquatic ecosystems.

Water Supply

UNCHS (1996) reported the findings of studies in several cities of the developing nations, showing the worrisome extent concerning the inadequacy of water supply. Coincidentally, cities in developing nations represent a huge paradox. It was found that the proportion of the population with piped water supplies is generally much lower in smaller urban centres. In Argentina for instance, the smaller the urban centre, the higher the proportion of households lacking piped water (Hardoy, Mitlin & Satterthwaite, 1992). In Dar-es-Salam, Tanzania, about 47% of the households lack access to piped water supply. Half of the population of Kinshasa (Zaire), Faisalabad (Pakistan), Calcutta (India) and Madras (India) are equally not served by a piped network. In Karachi (Pakistan) and Jakarta (Indonesia) two third of the population are not served by the amenity (Sivaramakrishnan & Green, 1986; Kulaba, 1989; Mbuyi, 1989; Hardoy, Mitlin & Satterthwaite, 1992; and Hasan, 1994).

This trend is increasing as WHO/UNICEF (2006) warned that millions are still without safe drinking water and 97 out of every 100 people do not have piped water and14% of the population drinks surface water - for example, from rivers, ponds, or lakes. The report highlights that over 40% of all people globally who lack access to drinking water live in sub-Saharan Africa. The report confirms that in cases where water supplies are not readily accessible, the burden of carrying water falls disproportionately on women and girls. In many countries, the wealthiest people have seen the greatest improvement in water and sanitation access, while the poorest still lag far behind. Drinking water supply can be broken down into three categories, namely, improved piped water located inside the user's dwelling, plot or yard; other improved drinking water sources like public taps, tube wells/boreholes, dug wells, rainwater collection; and unimproved drinking water sources such as surface water, tanker trucks, unprotected dug well and bottled water.

Improved drinking water coverage in Sub-Saharan Africa is still considerably lower than in other regions. Population forecasts suggest that an additional 784 million people worldwide will need to gain access to improved drinking water sources to meet MDG target (WHO, 2006). Accelerated progress is needed especially in sub-Saharan Africa, home to more than a third of those using unimproved drinking water sources. Nevertheless, it has increased from 49 per cent in 1990 to 58 per cent in 2006, which means that an additional 207 million Africans are now using safe drinking water. Use of other improved water sources like public taps, wells, boreholes, rainwater collection, etc. has gradually increased since 1990 in sub-Saharan Africa; use has increased from 33% in 1990 to 42% in 2006. But the use of these sources is decreasing – most notably in North Africa, where use declined from 30% in 1990 to 14% in 2006. WHO (2006) estimates show that the population reliant on unimproved drinking water sources is below one billion, and now stands at 884 million. Sub-Saharan Africa has the largest population using unimproved water sources but figures have dropped from 51% in 1990 to 42% in 2006.

Sanitation

There are three clear criteria to judge the provision of sanitation. The first criterion is the convenience and hygiene of the users. Households need to have access to a toilet that, if not within their compound, is at least very close and available. The second condition is the extent to which human contact with the waste can be avoided. The third one is the extent to which the facility is easily maintained (UNCHS, 1996). Studies have revealed that about one-third of the urban population in the developing world have no sustainable means of managing human wastes and even a higher proportion lack the means to dispose of waste waters (Sinnatamby, 1990; WSSCC, 1993). For most households, the unhygienic simple pit latrine is the most common method of human waste disposal. UNCHS (2006) has projected that if the current level of sanitation facilities' provision are maintained, the number of people without adequate sanitation, in our lifetime, will rise to over 3 billion people, i.e. about half of the world's population. Corroborating this projection, WHO/UNICEF (2006) explains that the global statistics on sanitation hide the dire situation in some developing regions. With an average coverage in developing regions of 50%, only one out of two people has access to some sort of improved sanitation facility. The regions presenting the lowest coverage are sub-Saharan Africa (37%), Southern Asia (38%) and Eastern Asia (45%). Western Asia (84%) has the highest coverage among developing regions. Out of every three persons unserved, two live in Southern Asia or Eastern Asia.

By 1991, over half of the African population had no provision for sanitation management. About one-fifth of the continent's urban population were still using the simple latrines; one-fifth had their homes connected to public sewers, while yet, another one-fifth were connected to septic tank systems. In Asia, about 50% of the population had no provision for sanitation. Out of those that have any provision, the simple latrines were the most popular. In Latin America and the Caribbean, the proportion of households with access to sanitation was much higher. Within the urban centres, about three-fifths of the population had house connections to public sewer systems.

From a household survey conducted in the late eighties in Dar-es-Salam, Tanzania, about 90% have simple latrines, while most households share sanitary facilities. In Khartoum (Sudan), the public sewage system served just about 5% of the town's area. Most of the population therefore relied on pit latrines while a sizeable proportion of the inhabitants had no toilet facilities at all. This trend of inadequate sanitary facility provision was also found in studies conducted in Calcutta and Madras (India), Faisalabad and Karachi (Pakistan), Jakarta (Indonesia) and Kingston (Jamaica). Generally, the problems with sanitation were often most visible in urban centres where the size and density of settlements made defecation outside difficult. The problem of sanitation in slums is critical and complex because of high population density, poor urban infrastructure, lack of space, lack of secure tenure, and sustained poverty. Communal facilities are used in many slums and obviously provide a better level of sanitation than practices such as open defecation, faeces disposal with solid waste, or the notorious flying toilets. WHO/UNICEF (2006) report highlights that sanitation is still far from target. Of 1.1 billion people who still practice open defecation, the vast majority (949 million) live in slum and rural areas of Latin America, the Caribbean and Northern Africa. Even the so-called BRIC countries, with rapidly growing economies, have large numbers of people who practice open defecation: 626 million in India, 14 million in China, and 7.2 million in Brazil. According to this report, the number of urban dwellers without access to improved sanitation will see an increase of almost 50% from the baseline year 1990 to 2015.

UNDESA (2005) observed that trends in sanitation coverage by region show marked differences. Southern Asia and sub-Saharan Africa still struggle with low coverage (41 per cent and 30 per cent, respectively). However, the two regions differ significantly from one another in the proportions of populations using facilities other than those classified as 'improved'. In sub-Saharan Africa, 45 percent of the population use either shared or unimproved facilities, and an estimated 25 per cent practise open defecation. In Southern Asia, the proportion of the population using shared or unimproved facilities is much lower, and open defecation is the highest of any region. Although the number of people resorting to open defecation in Southern Asia has decreased by 110 million people since 1990, it is still practised by 41 per cent of the region's population, representing 692 million people.

Solid Waste Management
The main challenge of most cities of the developing nations often times was compounded by difficulties connected with collection and disposal of the huge quantities of wastes generated by households and industries. Lagos, believed to be one of the most populous cities in the world, with about 17 million people generates about 9,000 metric tonnes of wastes daily (Famoroti, 2008). According to UNCHS (1996), in many of the urban centres in the very low income countries, only between 10% and 20% of solid wastes is collected and as much as between 20% and 40% of the municipal revenues are expended on solid waste collection and management. The agencies responsible for the collection and disposal of household wastes are always faced with the problems of collection trucks being out of use because there are no spare parts since they are in most cases imported. The consequence of these problems are obvious - the smells, the diseases, pests attracted by the accumulated wastes and the overflowing drainage channels clogged with garbage. "These problems are especially serious for the inhabitants of the larger and most densely populated informal or illegal settlements or tenement districts that have no regular garbage collection service since there is nowhere close-by where such wastes can be dumped" (UNCHS, 1988, 1996). From Arimah (2002) survey, the estimated average proportion of households that dispose refuse in open dumps is 44% in developing countries. UNCHS studies (1996) have shown that the quantity and composition of wastes vary depending on the per capita income of the country. In the less developed nations, average municipal waste level per person in a year can be as low as 100 kg, while in the developed countries, it can be as high as 1,000 kg. According to Briceno-Garmendia et al. (2004) access to infrastructural services in low income countries have been

Table 4. Access of Urban Populations to Infrastructure Services by Country Income Group1
(Source: Briceno-Garmendia et al., 2004)

Income	Income Electricity (1997-2001)	Water (2000)	Water (2000) Sanitation (2000)
Low	62.4% (24)	76.9% (56)	74.6% (55)
Lower Middle	95.1% (8)	90.8% (40)	90.5% (37)
Upper Middle	n.a	92.3% (23)	92.5% (22)

estimated to about 62% for electricity connection, 77% for water supply and 75% for environmental sanitation facilities (Table 4). The state of urban infrastructure in developing countries shows that a significant proportion of the population use unimproved drinking water sources, unimproved sanitation facilities and use any available open spaces/dumps for waste disposal. Water, sanitation and hygiene are key to improving health and development. Providing sustainable access to improved drinking water sources is one of the most important things that can be done to reduce disease. The state of sanitation remains a powerful indicator of the state of human development in any community. Access to sanitation bestows benefits at many levels. Cross-country studies show that the method of disposing of excreta is one of the strongest determinants of child survival: the transition from unimproved to improved sanitation reduces overall child mortality by about a third. Improved sanitation also brings advantages for public health, livelihoods and dignity-advantages that extend beyond households to entire communities. Comprehensive solid waste management framework that focused on technical and financial assistance is critical. Regional landfill and waste treatment approaches should be strongly considered since the economies-of-scale resulting from grouping smaller municipalities and sharing facilities significantly affect the affordability of services.

Both urbanisation and urban infrastructure have as near as symbiotic relationship. Urban infrastructure covers a wide spectrum of services and consists of potable water, sanitation, sewage systems, electricity and gas distribution, urban transport, primary health services and environmental regulation (The International Bank for Reconstruction and Development/The World Bank, 2004), all of which add up to enhance the quality of life of the urban dwellers and contribute to the overall economic development. Infrastructure is therefore indispensable to achieving development targets in developing countries. Some degree of urban concentration though, may be desirable initially to reduce inter and intraregional infrastructure expenditures. The costs of excessive concentration (traffic congestion, accidents, health costs from exposure to high levels of air, noise and water pollution, etc.) stem from the large size of megacities and underdeveloped institutions and human resources for urban planning and management (Henderson, 2002).

For developing countries, the provision of urban infrastructure is essentially problematic because they are largely produced by government through its various agencies. These agencies are usually severely constrained in terms of financial resources and management capabilities. As investments in urban infrastructure are funded through majorly direct sources, tax revenues, federal allocations, loans and foreign aid, the ability to maintain and expand the network and quality of service without imposing commensurate service charge, most times, become radical decision that many governments are unwilling to take. Hence, the decay, neglect, low quality of service, etc., that had become the evident realities characterising nearly all infrastructure facility types in virtually all the cities of the developing world.

Thus, serious challenges of growth and management confront the urban centres of the developing countries. Many are the manifestations of the reality of the concerns like congestion, insufficient infrastructure, inadequate service provision, poor power supply, unplanned transportation system, unhygienic solid waste management, environmental pollution, etc. These by-products, along with the poor management of the rapid urban growth, created grave effects on the national socio-economic development, the core lying at the critical questioning of urban planning and its capacity to organize towns, manage their growth and make them more efficient, liveable and sustainable. Indisputably, most of the developing nations' cities exhibit debilitating evidence of ineffective and inappropriate planning. Large sections of the cities are today completely bereft of planning with about half of the people living in informal areas. The resulting slums in many towns are worrisome, threatening the liveability of the urban areas, and challenging the integrity of urban planning and regulations. Contrarily, if well managed, urbanisation offers important opportunities for economic and social development. It would call for improving access and quality of urban infrastructure that demand significant increase in investment and associated spending on operation and maintenance of urban infrastructure.

Efforts are therefore needed to improve the enabling environment for private investment in infrastructure, which has dropped in developing countries in recent years from $128billion in 1997 to a mere $48billion in 2003 (Briceno-Garmendia et al., 2004). Actions on many fronts will be required to address the big gaps in infrastructure access and quality. Beyond new investments on urban infrastructure, good policies and governance would also have to be improved upon. Efforts also have to be made to build on previous gains, as a means to ensure that new investments bring about better infrastructure services to the urban underserved population and urban economy. To correctly estimate the quantum of investment required to fill existing gaps in access to, and quality of, urban infrastructure in the developing nations remains a herculean task. A set of estimates suggests that between 2005 and 2010, operating at the current level of efficiency, a whooping expenditure of about $600 billion will be required annually for investment, operations and maintenance of urban infrastructure (roads, rail, electricity, water, sanitation and telecommunications) in the developing nations (Briceno-Garmendia et al., 2004). If the developing nations are to achieve such an astronomical infrastructural investment level consistent with their needs, external assistance will, certainly, be un-avoidable, in the face of local fiscal constraints and limited private investments. Nevertheless, the use of both foreign and domestic public resources needs to be guided by clear priorities.

The issue of quality in infrastructure provision is as equally

important as the need to make adequate provisions for operation and maintenance. This is so because underinvestment in operation and maintenance is common practice since it is easier to raise funds for new investments or rehabilitation than to design service prices that cover operation and maintenance costs. The key determinant of the urban poor's access to infrastructure services is affordability. It is important therefore to consider the extent to which the service prices and quality options offered to consumers are consistent with their ability to pay. Without affordability, expanded access is of limited use to the poorest urban dwellers (Briceno-Garmendia et al., 2004). Effective delivery of infrastructural services especially at the local level calls for enhanced institutional management capacity. Efforts to build institutional capacity at this level and creation of adequate inter-governmental arrangement are imperative. Coordinated efforts by governments and donor agencies to provide technical assistance to build capacity would have a high pay-off. More so, private public partnerships in infrastructural provision, which are now becoming increasingly popular in this era of privatization, are positive alternatives that can further be exploited to achieve good results.

CONCLUSION

The cities of the developing world, confronted by the intractable problems of inadequate, inefficient, inaccessible and unaffordable infrastructural facility provision, all have a pervasive and crucial need for policies and socio-technological and socio-economic approaches that must be devised to fit different settings, meet different needs, solve different challenges and create different opportunities. The challenge of infrastructural provision to urban dwellers in developing nations is daunting yet no nation can develop economically and socially until it has been able to put in place the infrastructure necessary to support human activity. Therefore, uniquely country-focused but resourceful multilateral efforts are required by all developing nations to meet one of the critical challenges that can lead to their transformation.

ENDNOTES

1. Figures in parenthesis indicate the number of countries for which data are available

REFERENCES

Ades, A. F. & Glaeser, E. L. (1995). Trade and Circuses: Explaining Urban Giants. *The Quarterly Journal of Economics,* Vol.110, No. 1. pp 195 - 227

Arimah, Ben C. (2002). *Health Consequences of Deficient Infrastructure in Cities of Developing Countries* available at www.ihdp.uni-bonn.de/ihdw02/Presentations/participants/Arimah.doc.

Beauchemin, Ch. & Bocquier, Ph. (2003). *Migration and Urbanisation in Francophone West Africa: A Review of the Recent Empirical Evidence:* Document de Travail, Development et Insertim Internationale/Unite de Recherche CIPRE (September 2003).

Briceno-Garmendia, C., Estache, A. & Shafik, N. (2004). *Infrastructure Services in Developing Countries: Access, Quality, Costs and Policy Reform: World Bank Policy Reform:* World Bank Policy Research Working Paper 3468,

Cohen, B. (2006). Urbanization in developing countries: Current trends, future projections, and key challenges for sustainability. *Technology in Society* 28 (2006) 63 - 80 q 2005 Elsevier Ltd.

Famoroti, F. (2008). Wastes Pose Threat to Attaining Mega City Status. *The Punch Newspaper*, Wednesday, September 3, 2008. p3.

Fay, M. and Yepes, T. (2002) *Investing in Infrastructure: What is Needed from 2000 to 2010?* Washington DC: The World Bank, INFVP, Processed, 2002.

Fujita, M., Krugman, P. & Venables, A. J. (1999). *The Spatial Economy - Cities, Regions and International Trade,* MIT.

Goldin, I. & Reinhert, K. (2007). *Globalisation for Development - Trade, Finance, Aid, Migration and Policy (Revised Edition):* Washington DC: The International Bank for Reconstruction and Development/The World Bank.

Hardoy, Jorge E., Mitlin, D. & Satterthwaite, D. (1992). *Environmental Problems in the Third World Cities.* London: Earthscan Publications.

Hasan, A. (1994). *Profiles of Three Pakistani Cities: Karachi, Faisalabad and Thatta.* Background Paper prepared for the Global Report on Human Settlements, Karachi.

Henderson, J. V.(2002). Urbanisation in Developing Countries. *World Bank Research Observer,* Vol. 17. No. 1. pp 89 - 122, 2002.

Kulaba, S. (1989). Local Government and the Management of Urban Services in Tanzania. in Stren, Richard E. and White Rodney R., (eds.) *African Cities in Crisis.* Westview Press USA.

Mbuyi, K. (1989). Kinshasa: Problems of Land Management, Infrastructure and Food Supply. in Stren, Richard E. and White, Rodney R., (eds.) *African Cities in Crisis.* Westview Press USA.

Onibokun, A. G. (1999). *Managing the Monster: Urban Waste and Governance in Africa.* Ottawa: International Development Research Center.

Satterthwaite, D. (1997). *Urban Poverty: Reconsidering its Scale and Nature.* IDS Bull 1997; 28: 9 - 23.

Sinnatamby, G. (1990). Low Cost Sanitation. in Jorge E. Hardoy and others (eds.). *The Poor Die Young: Housing and Health in the Third World Cities,* London: Earthscan.

Sivaramakrishnan, K. C. & Green, L. (1986). *Metropolitan Management - The Asian Experience.* Oxford: Oxford University Press for the World Bank.

The International Bank for Reconstruction and Development/The World Bank. (2004). *Reducing Poverty, Sustaining Growth - What Works, What Doesn't, and Why: A Global Exchange for Scaling Up Success.* Scaling Up Poverty

Reduction: A Global Learning Process and Conference, Shangai, May 25 - 27 2004. Vyas Sameer "Addressing Urban Infrastructure Needs of the Poor: The Tamil-Nadu Experience of Public Private Partnership.

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

Brinkhoff, B. (2008). *Population of Cities and Agglomerations by Countries,* Ritrieved from

UNCHS. (1996). *An Urbanizing World: Global Report on Human Settlement.* Oxford: Oxford University Press for United Nations Centre for Human Settlements (UN-Habitat).

UNCHS. (1988). *Refuse Collection Vehicle for Developing Countries.* HS/138/88F. Nairobi: United Nations Centre for Human (UN-Habitat).

UNCHS. (2003a). *Water and Sanitation in the World's Cities: Local Action for Global Goals*. London: Earthscan.

UNCHS. (2003b). *The Challenge of Slums: Global Report on Human Settlements 2003*. London: Earthscan.

UNCHS. (2004). *The State of the World's Cities 2004/2005: Globalization and Urban Culture*. Nairobi/London: United Nations Centre for Human Settlements (UN-Habitat)/Earthscan; 2004.

UNCHS. (2006). *State of the World's CitiesUnited.* United Nations Centre for Human Settlements (UN-Habitat/.

UNDESA, 2005. The Inequality Predicament, Economic and Social Development, Report on the World Social Situation, Retreived from <http://www.un.org/esa/socdev/rwss/media%2005/cd-docs/fullreport05.htm> 2008/9/8.

WHO. (2006), Drinking Water Coverage. Retrieved from www.whqlibdoc.who.int/publication/2008/9/8.

WHO/UNICEF (2006), Joint Monitoring Programme for Water Supply and Sanitation: Meeting the MDG Drinking water and Sanitation target.

WSSCC. (1993). *Water Supply and Sanitation Sector Monitoring Report (1994).* Water Supply and Sanitation Collaborative Council, World Health Organisation and UNICEF.

Wolfensohn, J. (2000). President of The World Bank Opening Speech at the *2nd Annual World Competitive Cities Congress.* May 17th 2000.