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## **EVOLVING A HEALTH CARING WATER SUPPLY AND SANITATION SYSTEM- PUBLIC-PRIVATE PARTNERSHIPS IN A DEVELOPING ECONOMY**

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### **Abstract**

*The fast phase of urbanization in many developing countries is associated with growing environmental inequalities across the urban dwellers. The urban water supply in India is not only inadequate but also of very poor quality causing numerous health hazards. Drinking water and sanitation are the important components of the demand for urban environment by the people. This paper attempts a review of the status of urban water supply and its impact on the health status of the people.*

*The secondary data about the existing status of urban water supply and sanitation in India and Karnataka is collected from secondary sources such as Census and Government publications. A case of Gulbarga city is presented here to give the picture at micro level. The data for Gulbarga City is obtained from the municipal corporation. To assess the health impact of the existing system, the primary data is collected from a survey of households in Gulbarga city. The data on incidence of various diseases is collected from the Health Department at the district level.*

*Results show that the existing water supply arrangements are very inadequate to meet the demand for it. The parallel location of water supply and sewage pipes causes water pollution due to frequent breakages in the pipe- lines. The city has huge quantities of uncollected garbage. The incidence of water borne diseases such as Cholera, Typhoid, Gastroenteritis, Jaundice, Diarrhea is on the increase as revealed from the data for the past 6 years.*

*Proper management of water supply and sanitation calls for public, private and NGO partnerships. The sanitation systems developed by Sulabh International, the community contract systems in management of solid wastes, the women’s groups such as DWCUAs in Andhra Pradesh and the NGO partnership such as Wastewise in Bangalore are the examples which may help in establishing balanced equations of such partnerships for, evolving a better system of water supply and sanitation that is health-caring and environment friendly.*

### **Introduction**

Urbanization is a global phenomenon, but its consequences are more pronounced in developing countries. The fast phase of urbanization in many developing countries and in India

also, is associated with growing environmental inequalities. The urban resource-poor live in overcrowded slums under dangerous living conditions on account of abysmal and slushy surroundings. These slums are growing with the pauperization of farm families in the periphery, while against this, the resource-rich enjoy lavish lifestyles in the same city. It has now been brought out that Indian cities examined from various standards rate the lowest in the world. In many fields such as, the environment, infrastructure-mainly the provision of basic services like drinking water and sanitation and general 'livability' the cities lag much behind. (UWSS 1997).

The coverage of urban water supply and sanitation in India is not only inadequate but also of very poor quality causing numerous health hazards. Drinking water and sanitation are important components of the demand for urban environment goods by the people. These goods have a direct impact on the health status of the people and therefore, this also forms a part of the Human Development agenda of the current period. This paper attempts to review the status of urban water supply and sanitation and its impact on the health status of the people in India in general, and also to validate the results with the help of evidence at the micro level.

## **Methodology**

The paper attempts to take a bird's eye view of the existing status of urban water supply in India and also assess the position of the country in the South East Asian Region. The incidence of water borne and water related diseases is also assessed at the macro level. The data for this is collected from secondary sources. The results are then compared with those derived from field level data. The field data is collected for Gulbarga city in Karnataka. The data on diseases is collected from the records of Municipal Corporation and General Hospital in the city. The information about the nature of diseases at the household level is collected from a small sample of 120 households from six different wards in the city. The focus here was only on the nature of water-related diseases and the average monthly expenditure on treatment of these diseases.

## **Section I**

### **The Urbanization Scenario in India**

The urban population is growing at a fast rate in India. The natural growth of population, industrialization, reorganizations of habitats and migration are some of the important factors contributing to the growth of urban populations. The growth trend is made clear from the following table.

**Table1.1 growth of Urban Population in India**

Census Year	% of urban population to total population	No. of Towns
1961		2700
1971	11.17	3126
1981	23.34	4029
1991	25.72	4689
2001	27.78	

Source: Census of India Reports for various years.

Census 2001 puts the percentage of urban population of total population at 27.8. We have 35 metropolitan (having population more than a million) cities today as compared to 23 in 1991. These cities comprise 37.8 percent of India's urban population. There are six mega cities. The global experience indicates that when a country's urban population reaches the level of 25 percent of the total population, the pace of urbanization accelerates (Singh 1999). It is projected that by 2021 India will have the greatest concentration of such cities in the Asian region and 30 to 40 percent of people in these large cities will live in slums or in slum like conditions.

### Urban Water supply and Sanitation –Availability

In Asian countries about half of the population lacks access to adequate sanitation. The status in some of the major countries in South East Asia with regard to water supply and sanitation is indicated in the table 1.2.

**Table 1.2 Urban Water Supply and Sanitation coverage in major countries of South East Asia.**

Name of the Country	% of Urban population with access to water supply		% of urban population with access to sanitation	
	1990	2000	1990	2000
Bangla Desh	98	99	78	82
Bhutan	-	86	-	65
Korea (DPR)	-	100	-	99
India	92	92	58	73
Srilanka	90	91	93	91
Thailand	83	89	97	97
Nepal	96	85	68	75

Source : WHO (2000) Global Water Supply and Sanitation Assessment 2000, Geneva & Newyork.

It may be observed that people in some of the most populous South East Asian Countries have very low levels of access to sanitation. About 15 percent of the region population lacks access to safe drinking water. In case of India, it is estimated that 778 million people lack access to sanitation facilities. The percentage of population having access to sanitation is only 73 percent, which is the lowest in the region (except Bhutan). Our neighboring countries like Srilanka, Bangla Desh and even Nepal have been ahead in this field. In provision of water supply, the percentage of popuktion with access to drinking water has remained the same. This means in absolute terms the deprivation has increased over the time period. The number of people without drinking water facilities has increased from 21.7 million to 63.9 million during the decade.

In India the implications of the inadequacy of water supply and sanitation facilities are more pronounced in urban areas. The average water supply in Indian cities is on the average is only 5-6hours a day, which is very low compared with other major cities in Asia viz. Kuala Lumpur, Colombo and Bangkok. The availability of water in urban slums is around 30 LPCD.

The details about the existing status of water supply and also the percentage of population not served by any safe source of water are given in the tables 1.3 and 1.4

**Table 1.3. Percentage of population covered by water supply and sanitation**

Year	Drinking water	Sanitation facilities
1985	72.9	28.4
1990	83.8	45.9
1996	85.0	50.0

Source :Tata Energy Research Institute ,1999;28

**Table 1.4 Percentage of population not covered by any source of safe water (Tap &/or well)**

Size class	Tap	Well
Class I	18.1	5.5
Class- II	19.3	8.3
Class –III and below	29.8	14.1
Total	38.1	17.1

Source: Kundu A. (1994) "In the Name of the Urban Poor" Sage New Delhi p. 200

From the table, it is clear that 38 percent of population has no access tap water and 17 percent of population has no access to any safe source of water. The dependence on own private tube wells is increasing and as a result the water tables are falling at dramatic rates. Tap water supply for 24 hours a day is unheard of in almost all Indian cities (ADB1993). Further, the major proportion of population that depends on the tap water has to either share it with other neighbours or to fetch it from a community source. (Bajpai Peeyush and Bhandari Laveesh 2001, 3775).

Though the coverage of urban water supply and sanitation is reported as 90 percent and 60 percent respectively but the service levels in most of the cities are below the desired norm. Further these figures do not reflect upon the interstate and inter household disparities. In case of urban sanitation, though the coverage is reported to be 60 percent, only half of these households have a sewerage system and the balance have only a low cost sanitation. In case of solid waste collection, the facilities are reported for 70 to 90 percent of garbage collection but they have no proper arrangements for safe disposal.

Thus the inadequacy and poor quality of water supply and sanitation is evident from the existing data.

## **Section II**

### **Water, Sanitation and Health**

Drinking water and sanitation emerge as a joint public good because of its inter-relationship with health status. As the human development index has health as a basic component, health becomes fundamental to development, and clean water supply and sanitation

becomes fundamental to health (Logan J.1960). It is therefore an established fact that this joint public good has the maximum health benefit. The inadequacy of these services and their poor quality contribute to a large number of diseases. In such situations, the life giving water could turn into the killer too. Many diseases like diarrhea, poliomyelitis, hepatitis, amoebiasis, roundworm, whipworm, threadworm, typhoid are mainly water borne diseases. Though food safety and hygiene may also be the contributors, water principally acts as carrier of infection to the human body (WHO 2000). In developing countries, 80 percent of diseases result from a combination of poor hygiene, contaminated water and poor sanitation. In view of this, Dr. Mahler of WHO had pointed out long back, “the number of water taps per 1,000 persons will become a better indicator of health than the number of hospital beds”. (Mahler Halfdan 1984 :33).

In addition to this, the chemical contamination of drinking water is also a cause of some illnesses such as Arsenicosis and Fluorosis. High levels of arsenic (above 0.05 mg.) are observed in drinking water from wells in Bangladesh and West Bengal in India (WHO Water Supply and Sanitation situation in SEAR ,2000).

Fluoride contamination of water is also another cause of concern for India and Srilanka as well as Thailand.

A macro level study carried out by the Ministry of Health in India indicated that the death toll from Typhoid amounted to as high as from 102 to 219 per lac of population in 1984 in different parts of the country.

A quantitative measure that indicates premature death and temporary disability due to diseases is the Disability Adjusted Life Years (DALYs) The world development Report 1993 has estimated the burden of water related diseases in India in terms of DALYs. The loss due to different diseases is indicated in the following table.

**Table 1.5 Burden of Water Related Diseases in India**  
( millions of DALYs)

Diseases	Male	Female	Total
Diarrhoeal diseases	13.64	14.39	28.0
Intestinal helminthes	1.06	1.0	2.06
Trachoma	0.04	0.07	0.11
Hepatitis	0.14	0.17	0.31
Total	14.88	15.63	30.51

Source: World Development Report 1993 PP. 216-219

The total burden of water related diseases is estimated to be 30.5 million DALYs and Diarrhoeal diseases impose a high burden of 28 million DALYs.

## Evidence from a Micro level Study

In this section, the analysis is based on the data collected at the field level. The data pertains to Gulbarga city in Karnataka, India. Gulbarga city is a district headquarter of Gulbarga District. It is also a divisional headquarter of Gulbarga division. The whole division in the state is at the lower end of the development ladder. Gulbarga district occupies the bottom second position in Human Development Index of the State (HDK 1999). The city thus exists in a backward region, but it is growing at a faster rate in recent years. The emergence of educational institutions, Government offices, and growth of trade and commerce are some of the important causes contributing to the growth of the city. The population of the city was estimated to be 4.5 lakhs in 2001. The growth of population during the last four decades is given in the table 1.6.

**Table 1.6 Growth of population in Gulbarga City**

Year	Population
1971	1,45,588
1981	2,18,621
1991	3,03,139
2001	4,30,000

Source: District Census Hand Book for Gulbarga District for the concerned years.

The coverage of urban water supply and sanitation in the city is very inadequate. All the extension areas of the city lack these facilities. The city receives less rainfall, and as a result, there is acute water shortage in the summer season. About 60 to 65 percent of the city's population lacks access to sanitation and the services offered by the City Municipal Corporation for garbage collection are inadequate as well as of very low quality. The city is therefore prone to many health hazards caused by the lack of safe drinking water supply and sanitation facilities. Table 1.7 gives a picture of this.

**Table 1.7 Water borne and water related diseases in Gulbarga City (1995-2002)**

Year	Cholera	Typhoid	Gastroenteritis	Jaundice	Dysentery	diarrhoea	Total
1995-96	17	90	800	65	140	09	1121
1996-97	25	85	755	70	125	12	1072
1997-98	20	105	889	72	140	15	1241
1998-99	15	250	895	75	75	13	1323
99-2000	05	302	785	80	65	15	1252
2000-01	55	455	662	70	60	08	1310
01-02	N.A.	278	1076*				1354

\*This includes Dysentery, Diarrhoea and Gastroenteritis

Source : Records of Gulbarga Municipal Corporation for various years.

The table is self explanatory. The cases of Gastroenteritis are at high levels. The reported cases of water borne and water related diseases are increasing over the time period. This may not tell us the true story as these cases are those reported to the Government hospital. In the city, the

number of private clinics is very high and all the people from middle and upper groups visit the private system of health care for which the data is not available. Some of the poor households do not approach the health care system immediately due to lack of time, as this amounts to loss of work for a day. However, the data shows that the volume of waterborne diseases is considerable.

In table 1.8 the incidence of these water borne diseases is calculated per 10,000 population.

**Table 1.8 Incidence of Water Borne and Water Related Diseases  
(per10,000 population)**

Year	Cholera	Typhoid	Gastroenteritis	Jaundice	Dysentery	Diarrhoea
1995-96	0.3	2.1	18.6	1.5	3.2	0.2
1996-97	0.6	3.6	17.6	1.5	2.9	0.3
1997-98	0.5	2.4	20.6	1.6	3.3	0.3
1998-99	0.3	5.8	20.8	1.7	0.3	0.3
99-2000	0.1	7.0	18.3	1.7	1.4	0.3
2000-01	1.3	3.9	15.4	1.6	1.3	0.2
01-02	0.5	6.8	22.6			

Source :Computed from table 1.5

It is thus observed that the incidence of water related diseases is high in the city. A random survey of 120 households was carried out in six wards (out of 55 wards) in the city. The survey was conducted to get first-hand information for this paper. The households were selected from different income groups. The wards included in the sample covered the crowded as well as the less crowded areas in the city. In the crowded areas water scarcity is more pronounced and the households follow all the possible methods to get more water.<sup>i</sup> The city water supply pipes and sewage pipes are placed by side by side. In such cases, the breakage and leakages in the pipes cause water contamination. Lack of adequate sanitation facilities in the city has led to use of open spaces as toilets by the households.<sup>ii</sup>

In the survey of the households, a simple question was asked, whether any family member has suffered from any of the water borne diseases during the last six months. The answer was positive for 78.33 percent of the households. The types of diseases reported by the households are in table 1.8. The answers are multiple.

**Table 1.9 Sample Data on Water Related diseases.**

Nature of the disease	No. of H.H	Percentage to the total N=120
Cholera	14	11.66
Jaundice	48	40
Typhoid	49	40.83
Diarrhoea	78	65.00
No disease	26	22.66

Source: Primary Data



The average expenditure reported by the households who use both the private as well as public health care facilities is as shown in the table 1.10.

**Table 1.10 Average Expenditure on Health Care by the Households  
(During last three months)**

Expenditure	No. of Households
Rs.100-200	65 (54.17)
Rs.200-300	44 (36.67)
Rs.300-400	09 (07.50)
Rs.400-500	02 (01.66)
Rs.500and above	Nil

Source: Primary Data

Thus it is observed that the households spend a part of their scarce resources on health hazards caused by the inadequate and poor quality of the water supply and sanitation. In addition, for the poor households it also implies a loss of wage labour during those days. The city in general exhibits a very low profile of water supply and sanitation facilities and high incidence of water borne and water related diseases.

### **Section III**

#### **Perspectives on Future policy**

##### **Review of past and existing policies**

In India the responsibility of providing water and sanitation rests with the state governments and the local bodies. Urban water supply and sanitation is looked after by the Urban Water Supply and Sanitation Board. A total outlay of Rs. 1,51,137 crores was spent during last eight five year plans (1951-52 to 1997). An outlay of Rs. 18,624 crores during Ninth Plan (1997-2002). Despite these efforts, the coverage of these facilities is highly inadequate. It is estimated that the national target of full coverage of the urban population would require an investment expenditure ranging from 3.2 billion US \$ to 4.8 billion US \$ for water supply and 8.26 to 17.88 billion US \$ for sanitation. (Chiplunkar A & Bhatnagar R. 2002). The existing services can meet only 12 to 15 percent of these requirements. The resource crunch on the one hand and the efficiency issues on the other call for strategic reforms in the existing arrangements bringing about a change in the institutional set up for better provision and management of these services. A 'market friendly' policy package is an essential requirement to move in this direction.

##### **Institutional Requirements**

The urban water supply and sanitation in India suffers from many institutional deficiencies in organization management and provision of these services. The existing system is not only inadequate but also suffers from inefficiency leading to high costs of operation and maintenance. The information system is also inadequate. The question of sustainability requires active involvement of the ultimate users. In view of this the recent sector reforms are directed towards evolving 'market friendly' policies. A system of decentralised production and

distribution is devised based on a participative approach. The partners are the state, the private agencies, the community, the Panchayat institutions and the NGOs.

Flow of private sector investment is essential to fill the investment gaps. The private sector arrangements also help to build up the efficiency and improve the quality of services. The private contracts to build up the infrastructure and its maintenance in recent years have led to improvement in the quality of services. Private contracting for solid waste management and processing of hospital waste is working well in Tamil Nadu. The areas of public private partnerships have to be identified and should be promoted in coming years.

In solid waste management, collective and community based initiatives are desirable. Here, the initiative is either taken by the community or an NGO or Voluntary Organization. These community based enterprises operate closer to the community and they have various advantages in terms of community participation in keeping the garbage ready for collection and a payment of small fees for the same. The system offers cost reduction, control, reliability and sustainability. In recent years, this trend has been observed in many countries as well as in Andhra Pradesh in India. The working of the scheme through involvement of women's groups in Andhra Pradesh is working successfully. The experiment is both replicable and sustainable in other urban centres in India (Palnitkar Sneha 2000:100). The 'Swajal' project of Uttar Pradesh has also demonstrated the effective role of community contracting for arrangement of water supply and sanitation.

Community based enterprises are always more desirable than private enterprises as the latter are mainly concerned with profit and not about the community needs and environmental concerns. However, these successful stories do not tell the whole truth. The community based solutions call for awareness building and organizational as well as technical support. Lack of such awareness among the people in Gulbarga city has led to the failure of the system.<sup>iii</sup> NGOs have to play a significant role in this regard.

The coordination between the Health Department and the Urban Water supply and Sanitation Board is also essential to evolve an integrated approach.

## **Conclusion**

Adequate provision of drinking water and sanitation is fundamental to human health and therefore tops the agenda of 'Health for All'. The growing incidence of water borne and water related diseases, the recent outbreak of plague in Surat town of Gujarat state have raised serious questions about the adequacy, efficiency, access and effectiveness of the existing system and also the huge requirement of resources in this sector in coming years, all these issues have necessitated the promotion of 'market friendly' policies to bring the necessary corrections in the system. The emergence of new institutions in production and distribution of these services in recent years have promoted flexibility in the system. The new institutions are expected to promote capacity building, and equity in the system and also promote sustainability. However, though the transition towards the market is encouraging it is not yet very smooth. There are resistances and challenges. Awareness building among the participants and the ultimate users is therefore very essential for development and sustainability of the system. As safe drinking water

supply and sanitation forms the basic component of human health and human development, it will continue to remain at the top of development agenda of the coming years.

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### Notes

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<sup>i</sup> It is observed that some of the households put a whole to the main supply pipe and insert a rubber pipe to fetch more water. A small ditch is dug to take the water. In rainy season, the ditch fills with dust and rain water which enters into the main pipe line. The waste water is also gets into these ditches and the water gets contaminated. This is a common practice in big colonies such as Gajipur, Brahmapur, Mominpura etc.

<sup>ii</sup> The number of pigs in the city is increasing rapidly. These pigs clean the dirt and human excreta disposed off in the open spaces. These are called as 'sanitary inspectors' by the people.

<sup>iii</sup> In Gulbarga, labourers were hired on contract basis for garbage collection from door to door and put the garbage at a collection point. A small fees of Rs.10 was charged from each household for the same. But the system could not sustain as few households refused to pay the fess. Therefore, generation of awareness among the people is very essential.