CHAPTER SEVEN

Human Settlements

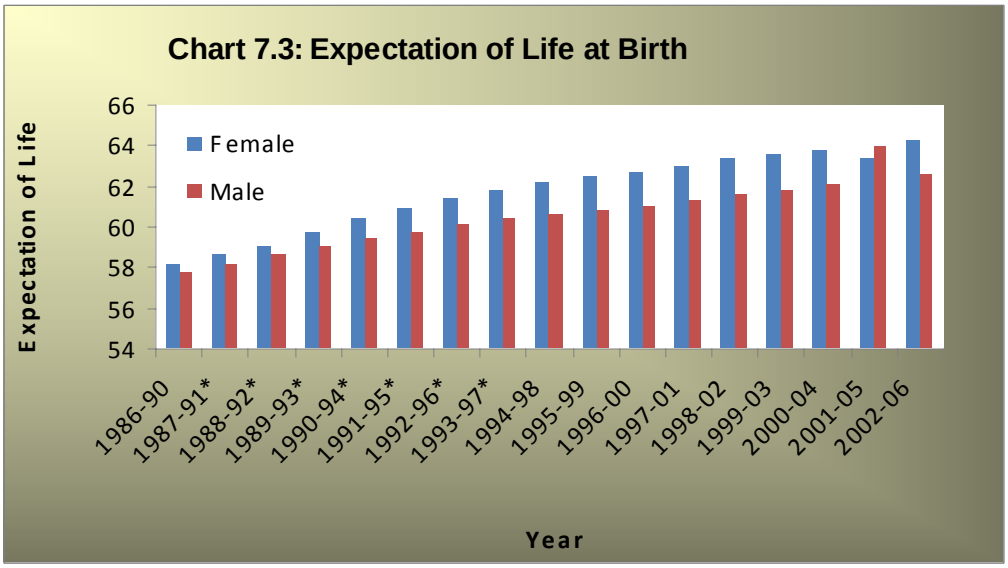
7.1 Introduction

7.1.1 The root cause of environmental degradation in India can be attributed to rapid growth of population. India has approximately 18 per cent of the world population but only 2 per cent of the geographical area. **The Country's population growth can be assessed from the table 7.1.1 at annexure 7.**

7.1.2 In 1972, in the Stockholm Conference on Environment, the then Prime Minister of India, Smt. Indira Gandhi had said that poverty is a great pollutant. Twenty years later, in 1992, World Bank stated, "poor are the agents and victims of environmental degradation". The poor become agents of environmental degradation when they are victims of it.

7.1.3 Human development is also adversely affected by the environmental degradation. Two of the environmental indicators, viz. access to the safe drinking water and the sanitation are closely linked with two of the very important human development indicators, viz. an infant mortality rate and the life expectancy. Polluted air and poor and unhygienic conditions in settlements contribute to reduction in life expectancy and increase in infant mortality.

7.1.4 In India, the expectation of life at birth of female which was lower than that of male till 1980 and has shown an upward trend during the decade 1981-90 and thereafter (**table 7.1.2 at annexure 7**).



7.1.5 Though there is not much variation in infant mortality rate sex wise, infant mortality rate is much high in rural India compared to the Urban Sector.

Table 7.1.3 Infant Mortality Rate in India

(Per Thousand Live Births)

Year	Sex		Sector		Overall
	Female	Male	Rural	Urban	
2	3	4	5	6	7
1985	98	96	107	59	97
1990	81	78	86	50	80
1995*	76	73	80	48	74
1996*	73	71	77	46	72
1997*	72	70	77	45	71
1998*	74	70	77	45	72
1999	70	71	75	44	70
2000	69	67	74	44	68
2001	68	64	72	42	66
2002**	62	62	69	40	63
2003*	64	57	66	38	60
2004	58	58	64	40	58
2005	61	56	64	40	58
2006	59	56	62	39	57
2007	56	55	61	37	55
2008	55	52	58	36	53
2009	52	49	55	34	50

As the data reveals, life expectancy in India is still low and the infant mortality rate is much more than desirable. The poor, therefore, take fertility decisions to compensate for all those factors and to avoid risks. Larger population leads to more poverty and worsens the environment, and creates a vicious cycle.

7.1.6 Poverty indicates a condition in which a person fails to maintain a living standard adequate for a comfortable lifestyle. In Urban India, nearly 25.7% and rural India 28.3% population (2004-05 estimates using Uniform Reference Period) are below the poverty line. The details are depicted in **Tables 7.1.4 a, 7.1.4 b & 7.1.4 c at annexure 7**.

7.2 HOUSING AND BASIC FACILITIES

7.2.1 The Housing facility available to Indian population can be assessed from the following table 7.2.1.

TABLE 7.2.1 : URBAN-RURAL BREAKUP OF TOTAL POPULATION, NUMBER OF HOUSEHOLDS, HOUSES AND AVERAGE SIZE OF HOUSEHOLDS, AVERAGE NO. O F HOUSEHOLDS AND PERSONS PER HOUSE

Sl. No.	Year	Total Population	No. of Households	No. of Houses	Av. Size of Households	Av. No of Household Per House	Av. No. of Persons Per House
1	2	3	4	5	6	7	8
1	1981*						
	Total	665,287,849	119,772,545	121782109**	5.6	1.0	5.5
	Urban	157,680,171	28,905,949	29,897,491	5.5	1.0	5.3
	Rural	507,607,678	90,866,596	91,884,618	5.6	1.0	5.5
2	1991+						
	Total	838,583,988	152,009,467	159425666**	5.5	1.0	5.3
	Urban	215,771,612	40,418,141	43,518,317	5.3	0.9	5.0
	Rural	622,812,376	111,591,326	115,907,349	5.6	1.0	5.4
3	2001++						
	Total	1,028,610,328	193,579,954	202973364#	5.3	1.0	5.1
	Urban	286,119,689	55,832,570	58,514,738	5.1	1.0	4.9
	Rural	742,490,639	137,747,384	144,458,626	5.4	1.0	5.1

Source : Office of Registrar General of India

* : Excluding Assam

\+ : Excluding J & K

** : No. of Occupied residential houses + No. of Census houses vacant at the time of house listing.

++ India figures are final and exclude those of the three sub-divisions viz. Mao Maram, Paomata and Purul of Senapati district of Manipur as population Census 2001 in these three sub-divisions were cancelled due to technical and administrative reasons although a population census was carried out in these sub-divisions as per schedule.

\# The occupied residential houses and vacant houses are based on Census 2001 Houselisting data.

The Urban –Rural wise break up of number of households, occupied residential and vacant houses along with population as per Census is presented in table 7.2.2 and the dwelling room facilities in Indian households is depicted in table 7.2.3 at annexure 7.

The details of homeless households and population in India is in table 7.2.4.

TABLE 7.2.4 : NUMBER OF HOMELESS HOUSEHOLDS AND POPULATION

Sl. No.		Numbers of Homeless households	Homeless Population		
			Total	Male	Female
1	2	3	4	5	6
1	**1981***				
	Total	629929	2342954	1376512	966442
	Urban	209520	618843	406154	212689
	Rural	420409	1724111	970358	753753
2	**1991+**				
	Total	522,445	2,007,489	1,180,368	827,121
	Urban	216,917	725,592	471,077	254,515
	Rural	305,528	1,281,897	709,291	572,606
3	**2001**				
	Total	447,585	1,943,766	1,136,496	807,270
	Urban	187,810	778,599	502,344	276,255
	Rural	259,775	1,165,167	634,152	531,015

Source: Office of the Registrar General of India

* : Excluding Assam

\+ : Excludes Jammu & Kashmir

Though, there is a reduction in the number of homeless people in 2001 over 1991, the homeless people still constitutes 0.11% of the Country's population.

7.3 Safe water and improved sanitation facilities

7.3.1 Access to safe drinking water and proper sanitation is both a right and a basic need. It has a significant bearing on the achievements of other Millennium Development Goals including poverty reduction, and gender equality. However, despite two decades of concerted efforts by national governments and international communities, equitable access to safe drinking water supply and improved sanitation for all remains elusive. It is a pressing development issue.

7.3.2 Access to safe drinking water remains an urgent need as only 68.7% of occupied housing unit in urban areas received organized piped water supply and rest have to depend on surface or ground water which is untreated. The situation in rural areas is much worse with only 24.3% households reported water supply through Tap Water. In India, almost all surface water sources are contaminated and unfit for human consumption. The diseases commonly caused due to contaminated water are diarrhea, trachoma, intestine worms, hepatitis. Inadequate access to safe drinking water and sanitation facilities leads to infant mortality and intestinal diseases. As per Census 2001, 78.1% rural households 26.3% urban households are still without toilet of any type.

7.3.3 The **details Rural –Urban classification of Households by water supply and toilet installation is in Table 7.3.1.**

TABLE 7.3.1 : HOUSEHOLDS CLASSIFIED BY SUPPLY OF WATER AND TOILET INSTALLATION BY RURAL AND URBAN

Year	Total number of Households	Households with Water Supply though Tap Water			Toilet Installation	
		Total	Inside	Outside	With Toilet of Any Type	Without Toilet of Any Type
2	3	4	5	6	7	8
2001						
Total	191,963,935	70,448,827	39,966,085	30,482,742	69,885,799	122,078,136
%	100.0	36.7	20.8	15.9	36.4	63.6
Urban	53,692,376	36,865,072	26,676,440	10,188,632	39,581,440	14,110,936
%	100.0	68.7	49.7	19.0	73.7	26.3
Rural	138,271,559	33,583,755	13,289,645	20,294,110	30,304,359	107,967,200
%	100.0	24.3	9.6	14.7	21.9	78.1

7.3.4 Water is a finite resource. Conserving water is one way of ensuring that more is available for those who do not have it. The reduction of non-revenue water in Asia (currently ranging from 25-70 per cent in most water utilities) will significantly lower capital requirements for new investments and conserve. It costs far less to reduce non-revenue water than to expand capacity and perpetuate system inefficiencies. Access can also be expanded by applying the results of research in new technologies that separate

water use (e. g., for cooking, drinking, bathing, sanitation), and through natural means such as rainwater harvesting and storage. In conjunction, water quality must remain a key focus area. **The state wise estimated requirement of water for domestic purposes including for cattle is presented in Table 7.3.2 at annexure 7.**

7.3.5 The source of drinking water is an indicator of development towards availability of safe drinking water. **The distribution of households by major source of drinking water in rural and urban areas is exhibited in tables 7.3.3a, 7.3.3b & 7.3.3 c at annexure.7**

7.3.6 Food, potable drinking water, adequate system for disposal of excreta, good sanitation and personal hygiene etc are pre – requisite to reduce prevalence of morbidity. Sewage treatment is an important initiative in this direction, however, in Indian Metropolitan cities, on an average; sewage treatment capacity is only 51% of the sewage generation. The data on this is depicted in **tables 7.3.4 a, 7.3.4 b&7.3.4 c at annexure 7.**

The facilities for garbage disposal in Indian households are a representative indicator of the cleanliness of its environment. The distribution of household by arrangement of garbage disposal is in **table 7.3.5 at annexure 7.**

7.4 Sources of Fuel and Lighting –Household purposes.

The primary source of energy for cooking and lighting is an indicator of conditions of living as well as within household air pollution. **The Tables 7.4.1 (a) & (b) and 7.4.2(a) & (b) at annexure 7 presents the sources of energy for cooking and lighting in India.**

7.5 SLUM POPULATION

7.5.1 In India, as per 2001 Census, 640 cities/ towns are reporting slums accounting for 42.6 million people living in the slums. The total slum population is 23.1% to the total urban population in these cities.

7.5.2 The large urban cities are the centres of economic growth and contributes significantly to the GDP of the country. Cities with population above 100,000 accounts for 60 % of country's population in 2001. About 17.7 million population lives in the citites with population above one million, which is 41.6 % of the total slum population in the country. In absolute numbers, Greater Mumbai has the highest slum population of around 6.5 million followed by Delhi 1.9 million and Kolkata 1.5 million. The slum areas of Surat, Hyderabad, Chennai and Nagpur have more than half a million population each. **The data on Slum Population in India is available in Tables 7.5.1a -7.5.1 d and 7.5.2 at annexure 7.**

7.6 SOLID WASTE AND HAZARDOUS MATERIAL MANANGEMENT

7.6.1 Due to a rapid growth of urbanization, there is a substantial increase in generation of solid waste in both absolute and per capita terms. Surveys have been conducted to assess for solid waste generation, collection, treatment and disposal in 291 Class I cities

and 345 Class II cities. It has been indicated that very little amount of waste generated is treated. The problems in management of wastes relate to its collection, handling, transport and disposal. Segregation of solid wastes is not uncommon in India as much of recycling work is being done either by ragpickers or non-Governmental agencies in few areas. Proper sanitary landfilling sites need to be developed which are effective in keeping the surface and ground water free from leachates.

TABLE 7.6.1 : HAZARDOUS WASTE REGULATORY QUANTITIES

Waste Category (Numbers)	Types of Wastes	Regulatory Quantities
1	Cyanide wastes	1 kilogram per year calculated as cyanide
2	Metal finishing wastes	10 kilograms per year the sum of the specified substance 'calculated as pure metal
3	Waste containing water soluble chemical compounds of lead, copper, zinc, chromium, nickle, selenium, bariumand antimony	10 kilograms per year the sum of the specified substance 'calculated as pure metal
4	Mercury, arsenic, thallium, and cadmium bearing wastes	5 kilograms per year the sum of the specified substance 'calculated as pure metal
5	Non-halogenated hydrocarbons including solvents	200 kilograms per year calculated as non-halogenated 'hydrocarbons
6	Halogenated hydrocarbons including solvents	50 kilograms per year calculated as halogenated 'hydrocarbons
7	Wastes from paints, pigments, glue, varnish and printing ink	250 kilograms per year calculated as oil or oil emulsions
8	Wastes from dyes and dye intermediates containing inorganic chemical compounds	200 kilograms per year calculated as inorganic chemicals
9	Wastes from dyes and dye intermediates containing organic chemical compounds	50 kilograms per year calculated as organic chemicals
10	Waste oils and oil-emulsions	1000 kilograms per year calculated as oil and oil emulsions
11	Tarry wastes from refining and tar residues from distillation or pyrolytic treatment	200 kilograms per year calculated as tar
12	Sludge arising from treatment of waste water containing heavy metals, toxic organics, oils, emulsions, and spend chemicals and incineration ash	Irrespective of any quantity
13	Phenols	5 kilograms per year calculated as phenols
14	Asbestos	200 kilograms per year calculated as asbestos
15	Wastes from manufacture of pesticides, herbicides, and residues from pesticides and herbicide formulation units.	5 kilograms per year calculated as pesticides and their intermediate products
16	Acidic/alkaline/slurry wastes	200 kilograms per year calculated as acids/alkalies
17	Off-specification and discarded products	Irrespective of any quantity
18	Discarded containers and container liners of hazardousand toxic wastes	Irrespective of any quantity

Source : Central Pollution Control Board

7.6.2 When this solid waste is not collected and disposed of efficiently and effectively, it attracts rodents and flies which then spread diseases. It also pollutes and degrades land and water resources. If these wastes are left untreated, they would ferment slowly and produce bio-gas which would be distributed in the atmosphere. The bio-gas contains 65-

70% methane gas which is a green house gas, have a global warming potential 34 times more than that of Carbon Dioxide. Therefore, development of suitable technologies for utilization of wastes is essential to minimize adverse health and environment consequences. Comprehensive guidelines are available with Central Pollution Control Board for Toxic Waste Management including hospital wastes.

7.6.3 **The State wise Status of hazardous waste generation in India can be assessed from the table 7.6.2 at annexure 7**.

7.6.4 **The details of quantities and waste generation rates (table 7.6.3), waste characterization (table 7.6.4) and status of landfill sites (table 7.6.5) in 59 cities as per a survey conducted by CPCB are presented at annexure 7.**

7.7 **Land fill leachates:** Leachate from a landfill varies widely in composition depending on the age of the landfill and the type of waste that it contains. It can usually contain both dissolved and suspended material. The generation of leachate is caused principally by precipitation percolating through waste deposited in a landfill. Once in contact with decomposing solid waste, the percolating water becomes contaminated and if it then flows out of the waste material it is termed leachate. Additional leachate volume is produced during this decomposition of carbonaceous material producing a wide range of other materials including methane, carbon dioxide and a complex mixture of organic acids, aldehydes, alcohols and simple sugars. The risks of leachate generation can be mitigated by properly designed and engineered landfill sites, such as sites that are constructed on geologically impermeable materials or sites that use impermeable liners made of geo membranes or engineered clay.

TABLE 7.7.1 : CHARACTERISTIC LAND - FILL LEACHATES

Sl. No.	Parameters	Concentration (mg/l)
1	2	3
1	pH	3.7 - 8.3
2	Tot. Dis. Solid	725 - 55,000
3	Chlorides	2 - 11,373
4	Tot. Kj. Nitrogen	2 - 3,320
5	Lead	0 - 14.2
6	COD	50 - 99,000
7	BODS	0 - 19,500

Source : Central Pollution Control Board
Above characteristics of Leachate are typical characterioties of leachate (Ref. Datta, M. (1997) Generation and Control of Leachate and Landfill Gas P. 90. In waste Disposal in engineering Landfill. Narson Publishing House, New Delhi) Tot. Dis. : Total Dissolved Tot. kj : Total Killo joule

7.8 PLASTICS WASTE MANAGEMENT

7.8.1 Use of plastics have grown manifolds all over the world as it has many advantages. They are light, easy to mould, durable and easy to adopt to different user

requirements. In the Indian context, it is seen that the growth of the plastic industries is phenomenal. However, plastics are difficult to destroy and are classified as non-biodegradable. On the other hand, it is easy to recycle plastics.

7.8.2 Also, about 60% of the plastic wastes generated in India are recycled. However, the remaining 40 % of the plastic wastes remains uncollected, un segregated, strewn on the ground, littered around in open drains or in unmanaged garbage dumps. The collection of such Soiled Waste including the one recycled three or even four times earlier, is not only uneconomical for recovery of material, but also unhygienic and undermines the environmental benefits of materials recycling. These indiscriminately disposed solid plastic wastes are of concern in view of causing chokage of municipal sewers, blocking of the storm water run-offs in drains particularly in hilly areas, causing deaths to many animals, like, cows which feed on the garbage food thrown in polythene bags.

TABLE 7.8.1 : PLASTIC WASTE MANAGEMENT STATUS IN INDIA

(In thousand tonnes)

Sl. No.	Item	1995-96	2001
1	**2**	**3**	**4**
1	Consumption of Plastic	1889	4374
2	Waste available for Recycling	800	2000
3	Total	2689	6374

Source : Parivesh Newsletter, CPCB

Plastic waste has attracted widespread attention in India, particularly in the last five years, due to the widespread littering of plastics on the landscape of India. The environmental issues due to plastic waste arise predominantly due to the throwaway culture that plastics propagate, and also the lack of an efficient waste management system. Stringent measures like blanket banning of plastic bags by Delhi Government in 2009, are being adopted by other States also to reduce the menace of Pollution through Plastic waste.

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