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ENVIRONMENTAL MANAGEMENT STRATEGY FOR ACHIEVING TOTAL SANITATION: PREPARATION OF ENVIRONMENTAL SANITATION INDEX OF INDIA

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ABSTRACT

Sanitation is unequivocally a preventive measure in achieving human health and environmental upkeep. Sanitation is a holistic package comprising personal hygiene, safe drinking water, and unpolluted neighborhood, facilities for safe disposal of sewage and solid waste and provision for disposal of human waste. Measurement of sanitation facilities is no easy task as it involves both qualitative and quantitative inputs. An attempt was made to engage secondary source of quantitative information on sanitation variables like drinking water and access to toilet facilities in framing and Environmental Sanitation Index. This paper aims to discuss the methodology of preparation of Environmental Sanitation Index and the estimated indices for all the states and union territories of India. The Environmental Sanitation Index shall help identify the performing states vis-à-vis underperforming states in regard to sanitation. This may act as a reckoner for policy making body to plan for enhanced sanitation facilities in India.

Key words: Drinking water, Sanitation, Millennium Development Goals, Index and Diseases.

INTRODUCTION

Sanitation is more important than independence", said Mahatma Gandhi (The Hindu 12th March 2014). It is increasingly evident that there have been concerted efforts towards provision of adequate sanitation facilities to ensure human health and dignity. The Millennium Development Goals (MDGs) gave impetus to sanitation provision as part of its set goals to be accomplished before 2015. Sanitation is an age old concept encompassing several cleanliness practices. The World Health Organization (WHO) defines it as "sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and faeces. Inadequate sanitation is a major cause of disease worldwide and improving sanitation is known to have significant beneficial impact on health of households and communities" (WHO 2014). Sanitary is a Latin word, meaning healthy and sane. Sanitary measures are essentially meant for ensuring cleanliness, protection of human health and safe disposal of solid waste and sewage (Wikipedia 2013). The present paper aims to present an estimation of availability of safe drinking water and

toilet facilities in different states and union territories in India and more importantly to present the framing of sanitation Index. The index would support the sanitation planning authorities towards a comprehensive sanitation drive which would establish clean living environment.

MATERIAL AND METHODS

Methodology of framing sanitation Index has been evolving over the recent years. No doubt, the rationale and method used in formulating sanitation index reflecting the reality of the situation is a difficult task. Already a few studies gave a lead in an attempt to device a method of formulating sanitation index. Mukherjee and Kathuria (2006) used factor analysis method to rank the sanitation situations of 14 major states of the country. Environmental Quality Index (EQI) was prepared based on causes and indicators of air pollution, water pollution, indoor air pollution potential, green house gases (GHGs) emission, pollution from energy generation, degradation of forest resources, non point source of pollution and degradation of land resources (Mukherjee and Chakraborty 2007). Environmental performance Index accommodated environmental pollution factors which were divided into two broad categories and further classified into twenty two indicators namely Air pollution, Water pollution, Waste management, Climate etc. (Indrani Chandrasekharan et. al 2013). Environmental Quality Index and Environmental Performance Index both were framed by taking cue from Human Development Index (HDI) methodology. The authors of the paper too toed in line with the formulation of Human Development Index (HDI) and made an earnest attempt to formulate Environmental Sanitation Index, for the Indian nation as a whole. The outcome is presented and discussed in this paper. This could support ranking of states on chosen indictors of sanitation. It also aids the identification of the status (rank) of a state in sanitation through a consolidated measurement system thereby solving the problem of data conflicts that might arise due to different positions of a state at various sanitation indicators.

The Government of India's census report is the major secondary source engaged in calculating Environmental Sanitation Index (ESI) for the period 2001 – 2011. Despite the fact that there are qualitative and quantitative aspects involved in the formulation, only two crucial parameters viz., access the drinking water and usage of toilet are considered for the purpose. This may appear to be a limitation of the Index under discussion. However, the World Health Organization is emphatic on defining sanitation with respect to 'the provision of facilities and services for the safe disposal of human urine and faeces'. Moreover water and sanitation fulfils both necessary and sufficient conditions besides their significance in contributing to environmental sanitation.

As an offshoot of water and sanitation, there are nine relevant variables, which are considered. They include:

1. Access the toilet facility
2. Access the drinking water facility
3. Treated drinking water (Tap)
4. Access the drinking water with in premises
5. Covered well water
6. Open air defecation
7. Untreated drinking water (Tap)
8. Uncovered well water

9. Non availability of drinking water in close proximity

It is important to mention that whether the variable is positive or negative depending upon the characteristics of services. For instance, open defecation is construed as negative, while access to toilet is treated as positive. Access the toilet facility, access the drinking water facility, treated drinking water, covered well water, access the drinking water with in the premises are grouped under positive. Open defecation, untreated drinking water, uncovered well water, and non-availability of drinking water in close proximity are treated negative.

The United Nations Development Programme (UNDP, 1990) propounded following formula for calculating Human Development Index (HDI). As indicated in the preceding paragraphs, the same is being customized for calculating Environmental Sanitation Index also for the positive variables.

$$X \text{ index} = \frac{\text{(actual value – minimum value)}}{\text{(maximum value – minimum value)}}$$

And for the variables that are negative in nature applied the formula given below.

$$X \text{ index} = \frac{\text{(maximum value - actual value)}}{\text{(maximum value – minimum value)}}$$

The Index was arrived by fixing minimum and maximum values. The maximum values were chosen in such a way that they are higher than or equal to the actual value of 28 states and 7 union territories in India. Similarly the minimum values are chosen in such a way that they were lower than or equal to the actual value.

The Environmental Sanitation Index (ESI) of Indian states and Union territories was obtained by calculating the arithmetic average of its two indices.

ESI = ½ (Access to drinking water + usage of toilet)

Only the relative positive of the performance of states and union territories were compared with the select indicators, units of direct measurement deemed not necessary. It could be seen that each of the indicators lies between zero and one and states are ranked according to how close its ESI is to one.

RESULTS AND DISCUSSION

Environmental Sanitation Index (ESI) score and rank of all the states and Union territories of India for the period 2001-2011 is given table 1. This is further classified into two categories separately based upon arithmetic mean scores of all the indicators covered under each category and ranking of every state and union territories of India based upon mean cumulative scores with an overall performance of total sanitation index score (figure 3). The union territory of

Chandigarh stands first in Environmental Sanitation Index of India, followed by National capital territory Delhi, states like Kerala and Goa, fifth position goes to Lakshadweep. Daman & Diu, Punjab, Mizoram, Himachal Pradesh and Puducherry ranked sixth to tenth respectively by looking from the bottom, Jharkhand state registered 35th rank. Surprisingly the state of Tamil Nadu did not fare well, scoring 25th rank in the order other sanitation states like Karnataka and Andhra Pradesh too performed badly ranking 26th and 28th respectively. Kerala state is the only exception in southern part of India with a rank of 3 in the order. States like Gujarat, Chhattisgarh, Odisha and Rajasthan ranked 30 and above.

Attributing causes for differences in ranking order may require a primary survey and further investigation. Nevertheless, it may be mentioned that water supply and toilet facility are strongly correlated. Those states endowed with water resources performed better in terms of provision of toilet facility and vice verse. Union territory like Chandigarh and National capital territory of Delhi registering first and third ranks and which can be attributed to high literacy rate and economic growth, both are placed around 86 percent of literacy rate in the year 2011 as per the ministry of Home affairs, Government of India sources (figure 4). Ranking of states and Union territories with access to toilet facilities above, Lakshadweep ranked first followed by Chandigarh, Delhi, Kerala and Mizoram. The state of Jharkhand stood last and the mean value toilet index was zero (figure 2). On the drinking water front, the households in Jharkhand state had accessed poor quality of drinking water source followed by Nagaland, Odisha, Madhya Pradesh, Manipur and Chhattisgarh. Figure 1 illustrates the water index for all the states and union territories of India; Chandigarh has achieved first rank in accessing the safe drinking water facilities followed by Goa, Puducherry, Delhi, Himachal Pradesh and Punjab.

As per the Census Report of the Government of India 2012 indicated that the percentage of households in India involved in open defecation stood at 49. 8. The state of Jharkhand recorded the maximum of 77 percent of households using open toilets, while the state of Lakshadweep showed the least of 1.8 percent. In South, Kerala state posted 3.8 percent the lowest, while Tamilnadu with 45.7 per cent, Andhra with 48 per cent and Karnataka with 45 per cent. Among the north eastern states of India, Sikkim, Manipur, Mizoram, and Tripura fared better in this regard by registering less than 12 per cent (table 2). Factors causing open defecation are myriad. Poverty, lack of dwelling units, shortage of water supply and illiteracy are a few forces behind the insanitary practices (Diane Coffey et al, 2014 and Balamurugan et al, 2013).

Table 2 clearly depicts number of person affected by lack of improper water and sanitation faculty. Waterborne diseases are caused by pathogenic microorganisms that most commonly are transmitted through contaminated fresh water. Infection commonly results during bathing, washing, drinking, preparation of food, or the consumption of food. Various forms of waterborne diarrhoeal diseases probably are the most prominent examples that affect mainly children in developing countries; according to the World Health Organization, such diseases account for an estimated 4.1% of the total daily global disease burden, and cause about 1.8 million human deaths annually. The World Health Organization estimates that 88% of that burden is attributable to unsafe water supply, sanitation and hygiene. This data was collected from the department of rural drinking water and sanitation, the data compiled from the Eleventh five-year plan (2007-2012) of Government of India. Diseases like typhoid fevers are predominantly affecting the two states Jharkhand and Rajasthan and from the table it shows that death rate was high. The states

like Goa, Gujarat, Jammu and Kashmir, Nagaland, Tamilnadu, Andaman and Nicobar Islands, D & N Haveli, Daman and Diu, and Lakshadweep registered no mortality owing to typhoid fever. A number of cases viral hepatic was prevalent in the state of Andhra Pradesh and Maharashtra, while Karnataka registered death of 1279 persons due to diarrhoeal disease. Comparative studies of all the states and Union territories of India revealed that the state of Goa, Nagaland, Daman & Diu, and Lakshadweep registered nil death and very low number of persons affected by water and sanitation based diseases.

Inadequate drinking water and sanitation are directly linked to literacy rate and economic growth (Balamurugan et al 2013). According to Government of India is Censes report 2011, literacy rate has been registered as 74.4 percent. (Ministry of home affairs, Population Census report 2011). Comparing with other countries it's a very low percent, because the average world literacy rate is 84% (Wikipedia 2014). Past studies have proved the following factors which cause illiteracy in India, lack of proper school facilities, inefficiency of teaching staff and shortage of classrooms to accommodate and in addition to that inadequate sanitation and drinking water facilities. A survey conducted by Kaushik Basu in about 188 government based primary schools in central and northern part of India and reported clearly that 41 percent schools have access to safe drinking water facilities and remaining 59 percent of the schools have no drinking water facility. Lack of toilet facility, just 11 percent schools and therefore 89 percent is forced into on open defecation. (BBC News, Kaushik Basu, 29 November, 2004).

Millennium Development Goals (MDGs) and sanitation

The United Nations formulated MDG in 2000 by setting eight goals as targets to be achieved by 2015. One of the goals is "Environmental Sustainability" it envisages providing potable water and ensuring sanitation facilities to all citizens. Countries under United Nations including India have been endeavoring towards creating better sanitation. India has already implemented a number of measures to achieve the target. In 1999, the Indian Government initiated the Total Sanitation Campaign (TSC) and now this was renamed as Nirmal Bharat Abhiyan (NBA) with the view to improving sanitation coverage to both rural and urban areas thereby eradicating the practice of open defecation before 2017. In 2014, the Prime Minister of India announced Swachh Bharath Abhiyan (SBA) programme with an intension to achieve the goal of total cleanliness drive in India and the roadmap for achieving the UN target by 2nd October 2019 (The Times of India, 6th October 2014).

Environmental sustainability under MDGs aimed at ensuring potable water and sanitation. But the success rate was high in provision of water while sanitation fell short of expectation. According to UNICEF and WHO, financial assistance, through a number of activities, was extended to developing countries in achieving the MDG goals within the stipulated time frame. India and china are the beneficiaries of assistance and it is reported that 1.8 billion people were benefitted from improved sanitation. Four out of ten people who have gained access to improved sanitation since 1990 live in china or India (WHO/UNICEF, 2012).

Sanitation coverage of households had seen a remarkable increase between 1981 and 2011 in India. The coverage was hardly 1 percent in 1981 while it had increased to 71.65 percent in 2011(Figure 5). Still it remains a paradox that India tops the list in terms of percentage of

population practicing open air defecation followed by Indonesia (WHO/UNICEF, 2014). The government of India might have succeeded in construction of toilets by usage of toilets by households is very low. Cultural factor can be attributed that households, rural households in particular prefer open air defecation (The Hindu, 8th October 2014). Macro level scenario also suggests that about 1.29 billion people deprived of improved sanitation live in India or China (WHO/UNICEF, 2012) Indians out number Chinese in this regard.

Poverty is the root cause of several socio-economic and environmental problems. Open defecation by people is strongly associated with poverty (The Hindu, 14th March 2012). It is evident from Table 2 that states live Bihar, Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh and Uttar Pradesh, where the people below poverty line ranged from 29.43 percent to 39.93 percent the percentage of open defecation also registered from 63 percent to 77 percent. Relatively the literacy rate was also lower in those states compared to other states in India.

Environmental Management strategies for improved water supply and sanitation are gaining more importance in the context achieving the United Nations Millennium Development Goals, which is time bound. The UN resolution 64/292 of 2010 clearly envisages "that access to clean drinking water and sanitation is a human right" (UN, 2013a, UN, 2013b). Management strategies as an offshoot of Environmental Sanitation Index are relevant. Performing and non-performing states are evident from the indices presented in Table 1. Both the Central and State Governments may plan to allot more financial assistance to non performing states thereby clean drinking water and sanitation can be achieved faster (The Hindu, 8th October 2014).

Inadequate water supply will have a cascading effect on sanitation facilities. For instance, states like Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan are deficient of water resources compared other states in India. This has caused high incidence of open defecation in the above mentioned states. The problem of utilizing groundwater source for drinking is compounded by power shortage and irregulation power supply in a few states (Indira Khurana and Romit sen, 2008). Access to toilet facility ensures privacy and human dignity. Further the government of India has been endeavoring to abolish manual scavenging through implementation of Act from 1993 till recently (The Hindu, 9th September 2013). But the success of this measure is far from satisfactory and leaving much to be desired.

CONCLUSION

Measures to improve sanitation are undertaken both at the national and global level. Preparation of Environmental Sanitation Index and the discussion in the preceding pages are part of the whole exercise. To reiterate, the indices will be a pointer to all the performing and non-performing states and union territories to restore to confidence to fulfill the sanitary mandates before the end of 2015 as stipulated by the Millennium Development Goals (MDGs). Total sanitation process is a continuation and the positive externalities are worthwhile. Environmental Sanitation facilitates achieving a win-win situation. It ensures human health and environmental protection on the other. Investment on sanitation makes economic sense as the benefits of human wellbeing and environmental cleanliness outweigh the cost. The indices presented will be useful but could be improved and the accuracy level of tool in indicating the sanitation status can be improved further in future.

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Table 1: Environmental Sanitation Index scores and ranking of States and Union Territories of India

India/States and Union Territories	TOILET				WATER									Total Sanitation Index	RANK
	Access the Toilet facility	Open defecation	Mean Value of Toilet Index	Toilet Rank	Access the Drinking water facility	Access to Drinking water facility within the Premises	Covered Well Water	Treated Drinking water (Tap)	Un Treated Drinking water (Tap)	Uncovered Well Water	Non availability of drinking water in close Proximity	Mean Value of Water Index	Drinking Water Rank		
Jammu & Kashmir	0.4115	0.4109	0.4112	27	1.0000	0.4579	0.1241	0.3488	0.4909	0.9276	0.4005	0.5357	23	0.4734	27
Himachal Pradesh	0.6272	0.6290	0.6281	14	1.0000	0.5621	0.0966	0.8918	0.9215	0.9800	0.7711	0.7462	5	0.6871	9
Punjab	0.7643	0.7646	0.7645	12	1.0000	0.9957	0.0069	0.4194	0.8431	0.9969	0.9183	0.7400	6	0.7523	7
Chandigarh*	0.9814	0.9814	0.9814	2	1.0000	1.0000	0.0000	1.0000	0.9690	1.0000	0.9700	0.8484	1	0.9149	1
Uttarakhand	0.5819	0.5838	0.5828	17	1.0000	0.6020	0.0414	0.5607	0.7628	0.9938	0.6158	0.6538	12	0.6183	16
Haryana	0.6258	0.6277	0.6267	15	1.0000	0.7190	0.0414	0.5828	0.7883	0.9646	0.7003	0.6852	9	0.6560	15
NCT of Delhi**	0.9800	0.9801	0.9800	3	1.0000	0.8887	0.0000	0.7958	0.9124	1.0000	0.8610	0.7797	4	0.8799	2
Rajasthan	0.1664	0.1689	0.1677	30	1.0000	0.2696	0.0759	0.3190	0.8686	0.8521	0.3243	0.5299	25	0.3488	30
Uttar Pradesh	0.1838	0.1862	0.1850	29	1.0000	0.5107	0.0345	0.1887	0.8942	0.9476	0.7003	0.6109	16	0.3979	29
Bihar	0.0146	0.0160	0.0153	33	1.0000	0.4850	0.0414	0.0000	1.0000	0.9430	0.7030	0.5961	17	0.3057	31
Sikkim	0.8722	0.8737	0.8729	8	1.0000	0.5207	0.0207	0.2881	0.0000	0.9969	0.5477	0.4820	28	0.6775	12
Arunachal Pradesh	0.5606	0.5612	0.5609	20	1.0000	0.3566	0.0897	0.2572	0.3102	0.9337	0.4414	0.4841	27	0.5225	23
Nagaland	0.8016	0.8045	0.8031	10	1.0000	0.1883	0.4483	0.0331	0.2737	0.7057	0.2589	0.4154	34	0.6092	18
Manipur	0.9068	0.9056	0.9062	6	1.0000	0.0000	0.1862	0.2483	0.7865	0.9276	0.0000	0.4498	31	0.6780	11
Mizoram	0.9387	0.9362	0.9375	5	1.0000	0.2154	0.1310	0.4007	0.6715	0.9584	0.4251	0.5432	22	0.7403	8
Tripura	0.8695	0.8710	0.8703	9	1.0000	0.2996	0.1931	0.1898	0.7883	0.6225	0.1471	0.4629	29	0.6666	13

Meghalaya	0.5659	0.5678	0.5669	19	1.0000	0.1141	0.4690	0.2726	0.8139	0.7165	0.1390	0.5036	26	0.5352	22
Assam	0.5832	0.5824	0.5828	16	1.0000	0.5521	0.1103	0.0673	1.0000	0.7350	0.5259	0.5701	19	0.5765	19
West Bengal	0.5073	0.5106	0.5090	22	1.0000	0.3210	0.0414	0.1976	0.9434	0.9168	0.3052	0.5322	24	0.5206	24
Jharkhand	0.0000	0.0000	0.0000	35	1.0000	0.1013	0.1241	0.0762	0.9708	0.4669	0.1608	0.4143	35	0.2071	35
Odisha	0.0053	0.0053	0.0053	34	1.0000	0.0899	0.1448	0.0762	0.9526	0.7334	0.0654	0.4375	33	0.2214	34
Chhattisgarh	0.0386	0.0399	0.0393	32	1.0000	0.0414	0.0483	0.1015	0.8704	0.8367	0.3079	0.4580	30	0.2486	33
Madhya Pradesh	0.0932	0.0931	0.0931	31	1.0000	0.1113	0.0690	0.1468	0.8978	0.7088	0.1989	0.4475	32	0.2703	32
Gujarat	0.4847	0.4867	0.4857	24	1.0000	0.6833	0.1517	0.4051	0.4909	0.9260	0.6921	0.6213	13	0.5535	20
Daman & Diu *	0.8842	0.8843	0.8842	7	1.0000	0.8602	0.0276	0.5684	0.6478	0.9969	0.9891	0.7271	8	0.8057	6
D & N Haveli *	0.4913	0.4920	0.4917	23	1.0000	0.5207	0.0897	0.2528	0.6496	0.9122	0.7302	0.5936	18	0.5426	21
Maharashtra	0.5712	0.5718	0.5715	18	1.0000	0.6177	0.1448	0.5872	0.8120	0.8120	0.6730	0.6638	11	0.6177	17
Andhra Pradesh	0.3715	0.3856	0.3786	28	1.0000	0.3866	0.0276	0.5066	0.6423	0.9091	0.4986	0.5673	20	0.4729	28
Karnataka	0.4248	0.4255	0.4251	25	1.0000	0.4051	0.0621	0.4205	0.5712	0.8767	0.5341	0.5528	21	0.4890	26
Goa	0.7923	0.8059	0.7991	11	1.0000	0.9073	0.2690	0.8709	0.9617	0.8906	0.8992	0.8284	2	0.8137	4
Lakshadweep*	1.0000	1.0000	1.0000	1	1.0000	0.9643	0.4690	0.0662	0.8212	0.0000	0.9755	0.6137	14	0.8069	5
Kerala	0.9734	0.9734	0.9734	4	1.0000	0.8787	1.0000	0.2241	0.9142	0.2696	0.8065	0.7276	7	0.8505	3
Tamil Nadu	0.4141	0.4162	0.4152	26	1.0000	0.2682	0.0759	0.5817	0.5876	0.9414	0.8392	0.6134	15	0.5143	25
Puducherry*	0.4221	0.6636	0.5428	21	1.0000	0.8745	0.0000	0.9680	0.9416	0.9723	1.0000	0.8223	3	0.6826	10
A & N Islands *	0.6591	0.6582	0.6587	13	1.0000	0.6348	0.0414	0.7252	0.7281	0.8983	0.6921	0.6743	10	0.6665	14

*Union Territories

** National Capital Territory

Note: Computed from the data supplied by the Ministry of Home Affairs, Population Census of India, 2011

Table 2: Open Defecation and related aspects.

S.No	INDIA/STATES	Total Households (2011)[2]	Diarrhoeal Disease (2006)[1]		Viral Hepatitis (2006)[1]		Typhoid (2006)[1]		Literacy Rate (%)[2] 2011	Below Poverty line (%)[3] 2011	Open Defecation (%)[2] 2011
			Cases	Deaths	Cases	Deaths	Cases	Deaths			
1	Jammu & Kashmir	2015088	519317	32	5882	0	42369	0	68.74	10.35	46.1
2	Himachal Pradesh	1476581	347055	28	835	11	26327	5	83.78	8.06	29.7
3	Punjab	5409699	182451	64	3829	17	17008	3	76.68	8.26	19.5
4	Chandigarh*	235061	…	…	…	…	…	…	86.43	21.81	3.2
5	Uttarakhand	1997068	94746	6	3381	0	15020	2	79.63	11.26	33.1
6	Haryana	4717954	285342	42	3983	11	5688	4	76.64	11.16	29.8
7	NCT of Delhi**	3340538	94398	85	4080	42	13774	18	86.34	9.91	3.3
8	Rajasthan	12581303	318169	21	3869	78	14084	131	67.06	14.71	64.3
9	Uttar Pradesh	32924266	284709	55	3716	6	42648	13	69.72	29.43	63.0
10	Bihar	18940629	…	…	…	…	…	…	63.82	33.74	75.8
11	Sikkim	128131	51433	8	290	2	428	2	82.2	8.19	11.3
12	Arunachal Pradesh	261614	32032	30	553	6	9098	23	66.95	34.67	34.8
13	Nagaland	399965	9176	0	112	0	2328	0	80.11	18.88	16.5
14	Manipur	507152	13614	17	346	0	2421	2	79.85	36.89	8.9
15	Mizoram	221077	18063	20	546	11	1392	2	91.58	20.40	6.6
16	Tripura	842781	150750	47	2520	14	18547	19	87.75	14.05	11.5
17	Meghalaya	538299	178260	33	294	2	6709	1	75.48	11.87	34.3
18	Assam	6367299	…	…	…	…	…	…	73.18	31.98	33.2
19	West Bengal	20067299	2622968	964	7433	205	110835	70	77.08	19.98	38.6
20	Jharkhand	6181607	14752	1	51	0	4707	284	67.63	36.96	77.0
21	Odisha	9661085	373748	40	2687	38	15387	9	73.45	32.59	76.6
22	Chhattisgarh	5622850	95202	13	1491	2	21474	6	71.04	39.93	74.0
23	Madhya Pradesh	14967597	318935	88	2499	9	28654	29	70.63	31.65	70.0
24	Gujarat	12181718	382056	4	9396	16	7290	0	79.31	16.63	40.4
25	Daman & Diu *	60381	109	0	3	0	33	0	87.07	9.86	10.5
26	D & N Haveli *	73063	74661	4	126	3	646	0	77.65	39.31	40.0
27	Maharashtra	23830580	695723	93	43215	131	39663	8	82.91	17.35	34.0
28	Andhra Pradesh	21024534	1215659	124	17846	28	135550	12	67.66	9.20	48.0
29	Karnataka	13179911	939221	1279	14980	24	96147	5	75.6	20.91	45.0
30	Goa	322813	7631	0	15	0	68	0	87.4	5.09	16.4
31	Lakshadweep*	10703	7316	0	86	0	6	0	92.28	2.77	1.8
32	Kerala	7716370	475510	4	7018	6	6219	2	93.91	7.05	3.8
33	Tamil Nadu	18493003	116062	12	4523	0	36973	0	80.33	11.28	45.7

34	Puducherry*	301276	137443	8	615	7	1936	1	86.55	9.69	27.1
35	A & N Islands *	93376	22752	2	213	4	3055	0	86.27	1.00	27.5

Sources:

[1]. Rural water and sanitation, planning commission Report, December 2007, Eleventh Five – Year Plan (2007-2012), Government of India, P-189. Note: …means not reported.

[2]. Ministry of home affairs, Population census data, Government of India 2011

[3]. Government of India, Planning commission July – 2013, (http://planningcommission.nic.in/news/pre_pov2307.pdf) Page No. 6

* Union Territories

** National Capital Territory

Figure 1: Drinking water ranking scores of the States and Union Territories of India

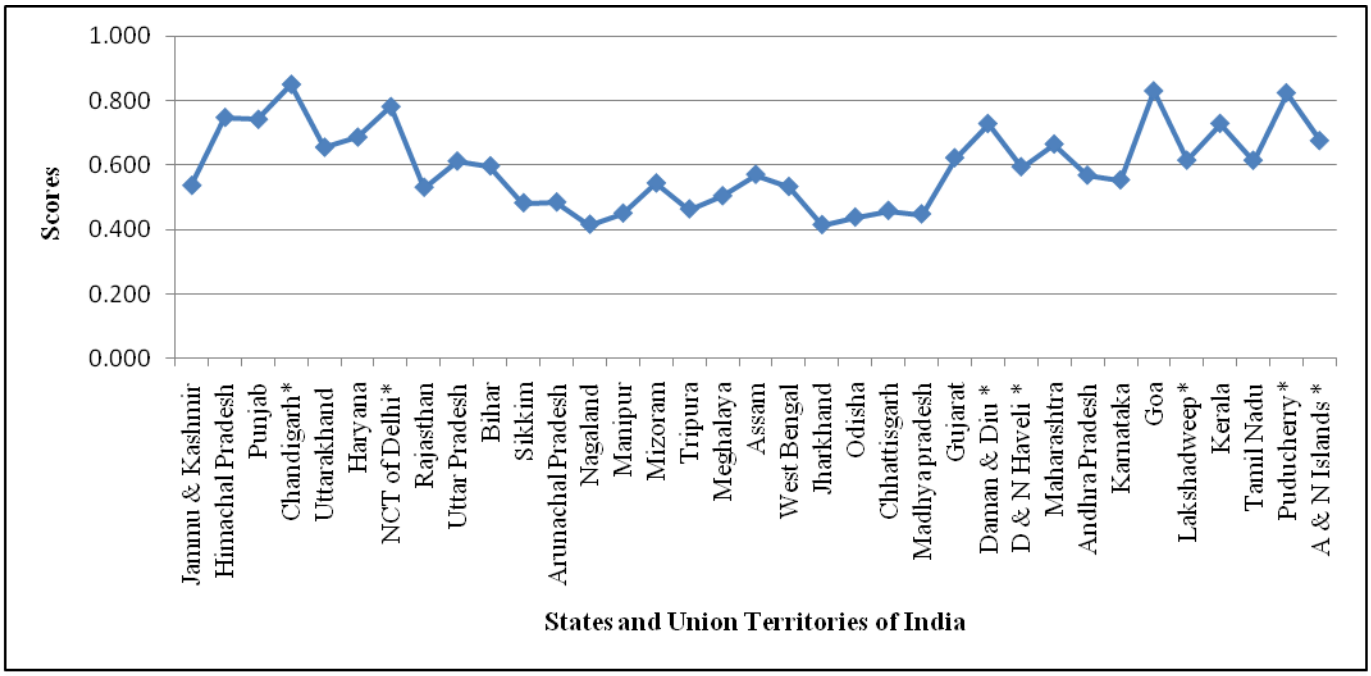


Figure 2: Toilet ranking scores of the States and Union Territories of India

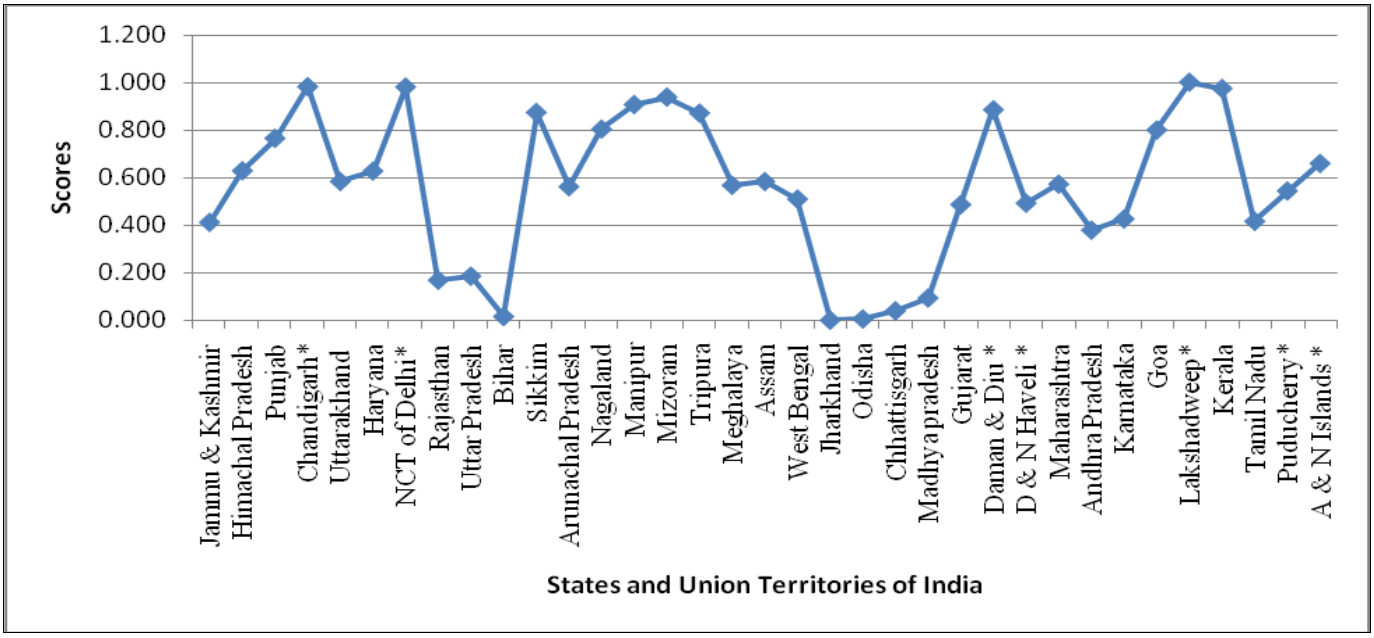


Figure 3: Total Environmental Sanitation scores of the States and Union Territories of India

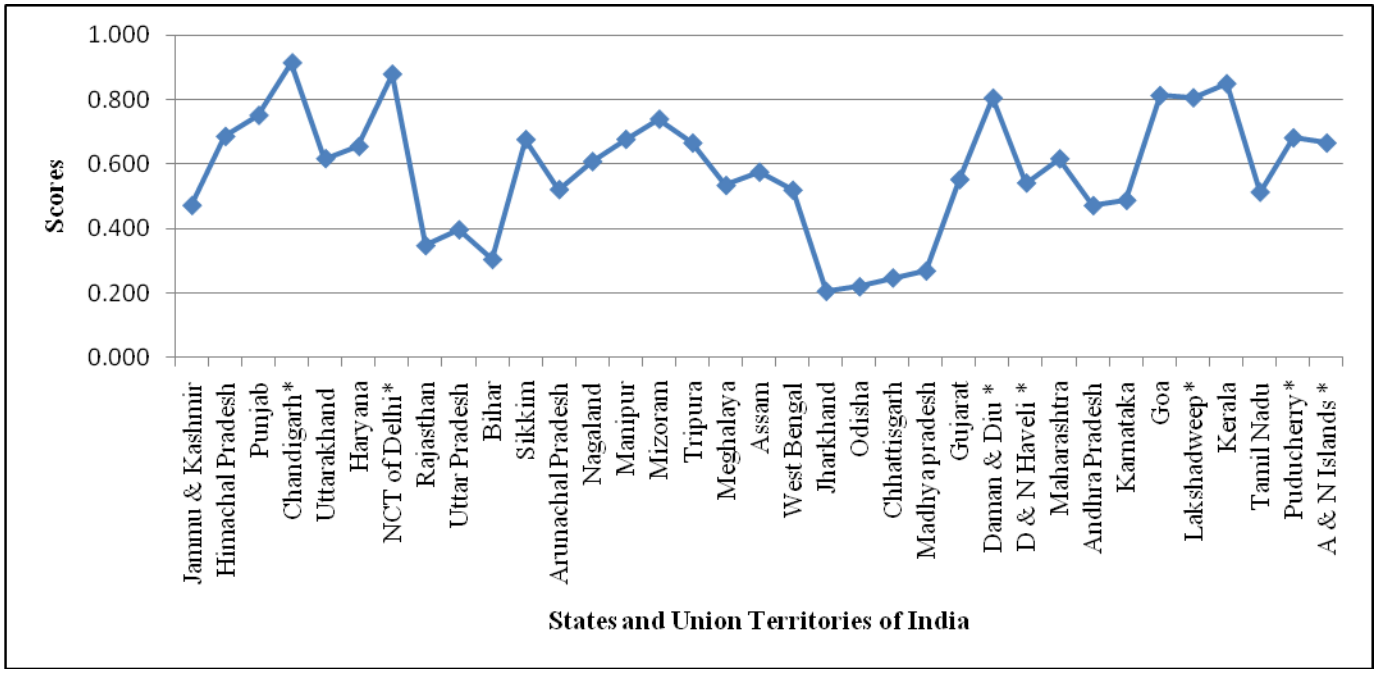


Figure 4: Literacy rate of the States and Union Territories of India in the year of 2011.

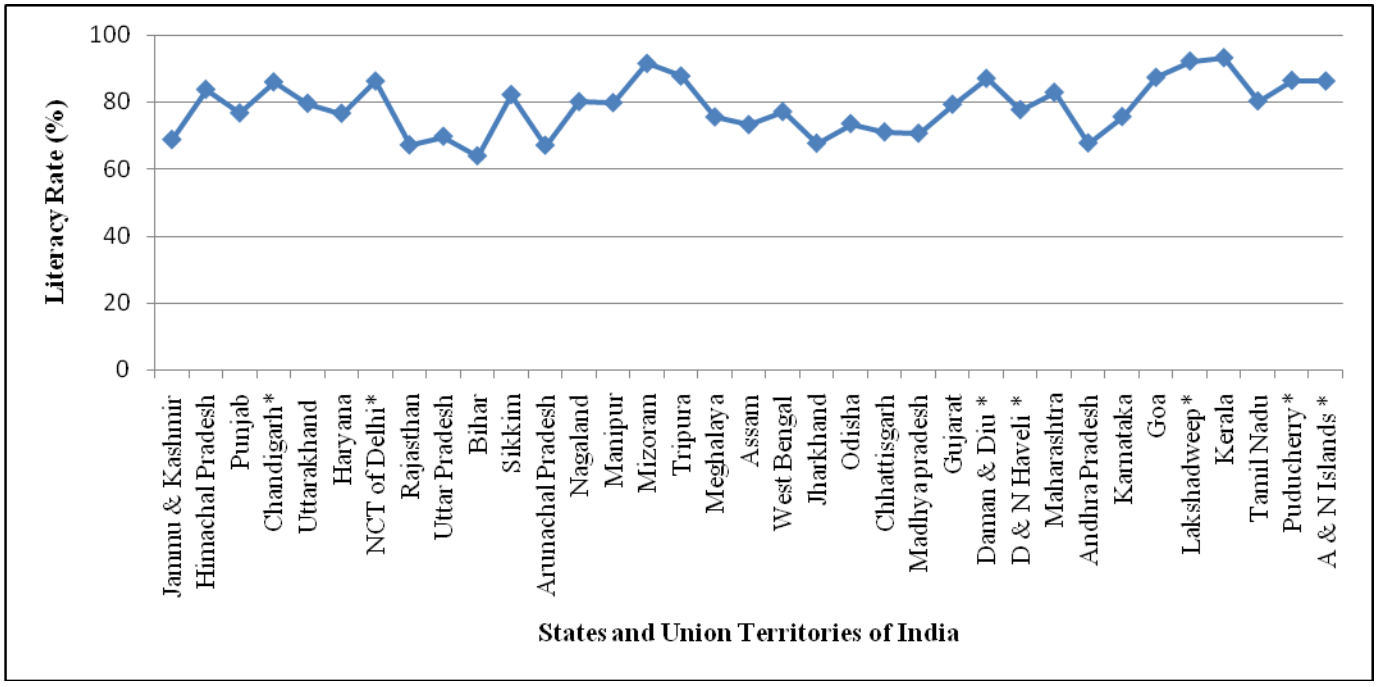
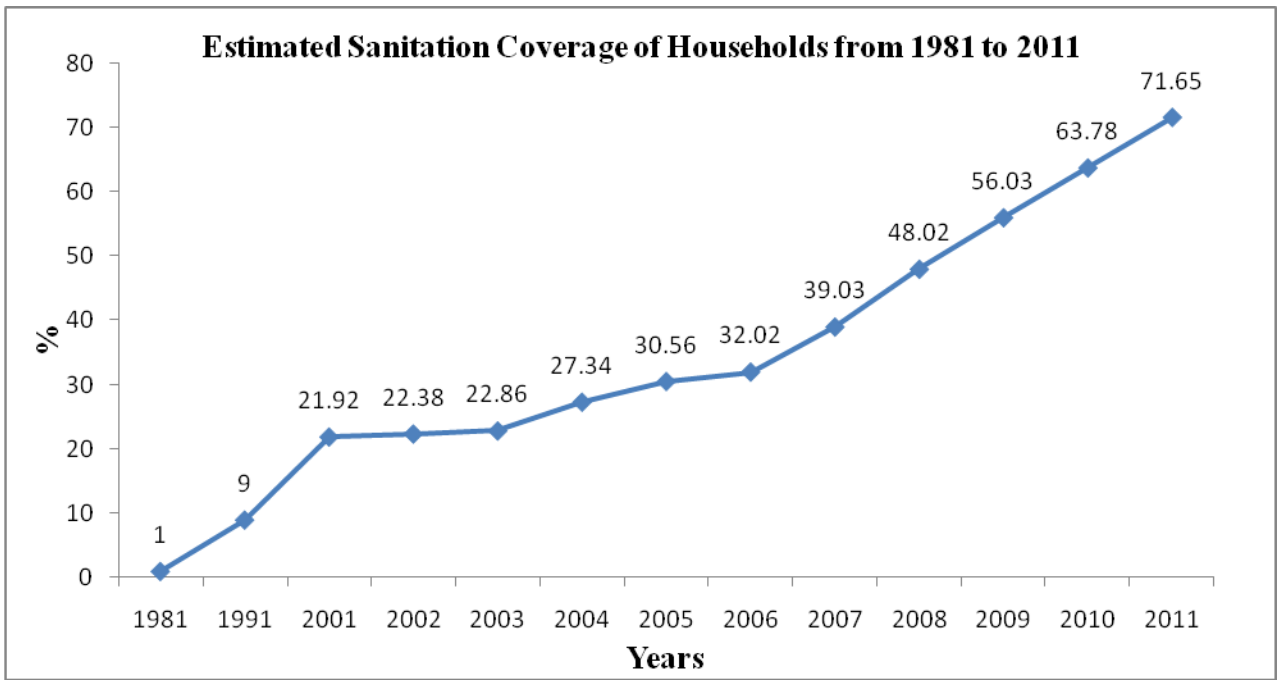


Table 5: Estimated Sanitation Coverage of Households from 1981 to 2011.



Annexure 1: Census Data-Complied for water and sanitation 2000-2010

S.No	India/States and Union Territories	TOILET		WATER						
		Access the Toilet facility	Open defecation	Access the Drinking water facility	Access within the Premises	Covered Well Water	Treated Drinking water (Tap)	Untreated Drinking water (Tap)	Uncovered Well Water	Non availability of drinking water in close Proximity
		%	%	%	%	%	%	%	%	%
		Positive	Negative	Positive	Positive	Positive	Positive	Negative	Negative	Negative
1	Jammu & Kashmir	54.0	46.0	100.0	48.2	1.9	34.7	29.2	4.7	23.1
2	Himachal Pradesh	70.2	29.7	100.0	55.5	1.5	83.9	5.6	1.3	9.5
3	Punjab	80.5	19.5	100.0	85.9	0.2	41.1	9.9	0.2	4.1
4	Chandigarh*	96.8	3.2	100.0	86.2	0.1	93.7	3.0	0.0	2.2
5	Uttarakhand	66.8	33.1	100.0	58.3	0.7	53.9	14.3	0.4	15.2
6	Haryana	70.1	29.8	100.0	66.5	0.7	55.9	12.9	2.3	12.1
7	NCT of Delhi**	96.7	3.3	100.0	78.4	0.1	75.2	6.1	0.0	6.2
8	Rajasthan	35.6	64.3	100.0	35.0	1.2	32.0	8.5	9.6	25.9
9	Uttar Pradesh	36.9	63.0	100.0	51.9	0.6	20.2	7.1	3.4	12.1
10	Bihar	24.2	75.8	100.0	50.1	0.7	3.1	1.3	3.7	12.0
11	Sikkim	88.6	11.3	100.0	52.6	0.4	29.2	56.1	0.2	17.7
12	Arunachal Pradesh	65.2	34.8	100.0	41.1	1.4	26.4	39.1	4.3	21.6
13	Nagaland	83.3	16.5	100.0	29.3	6.6	6.1	41.1	19.1	28.3
14	Manipur	91.1	8.9	100.0	16.1	2.8	25.6	13.0	4.7	37.8
15	Mizoram	93.6	6.4	100.0	31.2	2.0	39.4	19.3	2.7	22.2
16	Tripura	88.4	11.5	100.0	37.1	2.9	20.3	12.9	24.5	32.4
17	Meghalaya	65.6	34.3	100.0	24.1	6.9	27.8	11.5	18.4	32.7
18	Assam	66.9	33.1	100.0	54.8	1.7	9.2	1.3	17.2	18.5
19	West Bengal	61.2	38.6	100.0	38.6	0.7	21.0	4.4	5.4	26.6
20	Jharkhand	23.1	77.0	100.0	23.2	1.9	10.0	2.9	34.6	31.9
21	Odisha	23.5	76.5	100.0	22.4	2.2	10.0	3.9	17.3	35.4
22	Chhattisgarh	26.0	74.0	100.0	19.0	0.8	12.3	8.4	10.6	26.5
23	Madhya Pradesh	30.1	70.0	100.0	23.9	1.1	16.4	6.9	18.9	30.5

24	Gujarat	59.5	40.4	100.0	64.0	2.3	39.8	29.2	4.8	12.4
25	Daman & Diu *	89.5	10.5	100.0	76.4	0.5	54.6	20.6	0.2	1.5
26	D & N Haveli *	60.0	40.0	100.0	52.6	1.4	26.0	20.5	5.7	11.0
27	Maharashtra	66.0	34.0	100.0	59.4	2.2	56.3	11.6	12.2	13.1
28	Andhra Pradesh	51.0	48.0	100.0	43.2	0.5	49.0	20.9	5.9	19.5
29	Karnataka	55.0	45.0	100.0	44.5	1.0	41.2	24.8	8.0	18.2
30	Goa	82.6	16.4	100.0	79.7	4.0	82.0	3.4	7.1	4.8
31	Lakshadweep*	98.2	1.8	100.0	83.7	6.9	9.1	11.1	64.9	2.0
32	Kerala	96.2	3.8	100.0	77.7	14.6	23.4	6.0	47.4	8.2
33	Tamil Nadu	54.2	45.7	100.0	34.9	1.2	55.8	23.9	3.8	7.0
34	Puducherry*	54.8	27.1	100.0	77.4	0.1	90.8	4.5	1.8	1.1
35	A & N Islands *	72.5	27.5	100.0	60.6	0.7	68.8	16.2	6.6	12.4

Source: Data Computed from Ministry of Home Affairs, Population Census of India, 2011
*Union Territories
**National Territories of Delhi