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Accessibility to Safe Drinking Water and Its Impact on Health A Case Study of EAG States and Assam

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Abstract

The access to basic household amenities like availability of safe drinking water, toilet facility and electricity etc. are critical determinants of well being of people. Over the last three decades there have been huge changes in availability of these facilities with large regional differences. Being a country of 246,692,667 number of households, in India only 85.5 percent of households have access to safe drinking water including within premises, near premises and away from the premises in 2011 while the same was only 77 percent during 2001(Census of India, 2011). In this paper an attempt has been made to investigate the condition prevailing in the eight EAG (Empowered Action Group) states which includes Uttarakhand, Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Orissa and Assam. The paper uses data from the Annual Health Survey 2011 (data of diarrhea) and Census 2011 (data on household amenities). The district level pattern of household's accessibility to safe drinking water and tap water from treated source for rural and urban areas has also been analysed for the study. The result shows that the problem of safe drinking water has two interfaces. One in terms of the source of drinking water and the other is distance from the source. Study shows that most of the districts have access to safe drinking water although there is a rural urban gap still persisting. Urban areas have better coverage of provision to safe drinking water than rural counterparts. The same scenario becomes much worse for household's access to tap water from treated source. The other finding indicates a possible association between safe drinking water and diarrhea.

Keywords: Safe Drinking Water, Accessibility, Availability and Diarrhea.

1. INTRODUCTION

Being a country of 246,692,667 number of households, in India only 85.5 percent of households have access to safe drinking water including within premises, near premises and away from the premises in 2011 while the same was only 77 percent during 2001(Census of India, 2011). Though the supply of safe drinking water has been given a high priority in Indian planning from its first implementation in 1950's the achievement so far is not satisfactory. While considering any health issue of Indian population three major sets of factors comes out i.e. health factors which include medical intervention, health promoting factors such as housing, water supply, sanitation and hygiene and non-health factors which include social and economic factors (Nayar, 1997). According to K. R. Nayar (1997), "....the health promoting

factors such as housing conditions, availability of drinking water, sanitary facilities, etc, could contribute to health improvement among the population sometimes even more significantly than health services". There are many studies which clearly show that there is a close association between health status and access to safe drinking water though the relation is not very simple because other factors comes into play. It is often said that the expenditures necessary to the adoption and maintenance of measures of prevention which include the availability of safe drinking water would amount much less than the cost of the disease.

The constitution of India in 1950 specifies that the responsibility to provide safe drinking water rest with the states, and funds have been provided in the state budgets right from the commencement of the First Five Year Plan (S. K. Pant, 1996). In recent years High Courts around the country have been recognizing the right to safe drinking water as a fundamental right. But if we see the history of Drinking Water provision in India, the S D Pravalkar Committee and the Bhore Committee (1949) consider the issue of housing amenities -health relationship for the first time. In 1969, the National Rural Drinking Water Supply program was launched with the technical support from UNCEF and Rs. 254.90 crore was spent during this phase. 1.2 million bore wells being dug and 17,000 piped water supply schemes being provided during implementation of this program. To increase the coverage area under drinking water supply, the Government of India introduced Accelerated Rural Water Supply Program (ARWSP) in 1972-73. During 1981 India joined the International Drinking Water Supply and Sanitation Decade as a party and declared to set up a national level Apex Committee to define policies to achieve the goal of providing safe water to all villages. The National Drinking Water Mission (NDWM) was launched to accelerate the process of coverage of the country with drinking water. During 1994, the 73rd Constitutional Amendment makes provision for assigning the responsibility of providing drinking water to the Panchayat Raj Institutions. The year 1999, was a major step forward in the issue of providing safe drinking water to rural areas. A separate Department of Drinking Water Supply was formed within the Ministry of Rural Development, Government of India. The national water Policy was revised in 2002 and priority has been given to serving villages that did not have adequate sources of safe water and to improve the level of service for villages classified as only partially covered. The amount invested for Domestic water and Sanitation has increased from 3 crore in 1951-56 to Rs.49000 crore during 11th Five year plan (2007-2012). In term of coverage areas, the number of households having drinking water within or near premises has increases both in rural and urban areas though there is a big question regarding the quality of the water. In India, many people and children dies each year by suffering from Diarrhea which is a major water-borne disease. The WHO estimates that diarrhea is the single largest contribution to the burden of disease linked with water, sanitation and hygiene, with children in developing countries comprising the majority of sufferers (Khanna, 2008).

There are plenty of studies done by scholar to relate the accessibility of safe drinking water and sanitation with diarrhea and other water-borne diseases for state level as well as district level. In this paper an attempt has been made to investigate the condition prevailing in the eight EAG (Empowered Action Group) states which includes Uttarakhand, Rajasthan, Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Orissa and Assam using the Annual Health Survey data of diarrhea and census 2011 data on household amenities. These are the bottom most state in terms of most of the development parameters. The district level pattern of household's accessibility to safe drinking water and tap water from treated source has also been analysed.

2. DATABASE & METHODOLOGY

Census of India and NSSO both collect the data on accessibility to 'safe drinking water' though there is no specific definition of 'safe drinking water. The Government of India defines safe or improved sources as water from taps, tube wells and hand pumps (K. Jessoe, 2010). Here, in this paper the census of India 2011 data has been used. In 2011 census, the data of drinking water has been collected for ten different sources which are: Tap water from treated source, Tap water from untreated source, Covered well, Uncovered well, Hand pump, Tube well, Spring, River/Canal, Tank/Pond/Lake and other source. In our study, we have considered four sources as sources providing 'safe drinking water' i.e. Tap water from treated source, Tap water from untreated source, Hand pump and Tube well. The distance of the household from the sources of drinking water is as important as the sources itself. In India, a rural woman travels 14000 km annually to fetch water. The issue of Drinking Water often considered as a gender issue. 'It is a tragic to see the young women and girls facing the drudgery of spending long hours in fetching water under strenuous situation' (Bose, 2000). For that reason, the households having access to safe drinking water within or near premises, has been considered here.

For assessing the impact of unsafe drinking water on health status of population, Diarrhea which is a major water-borne disease, has been taken into account. The data of people suffering from Diarrhea or Dysentery has been collected from Annual Health Survey 2010–11. Rank correlation has been run between percentage of households having access to safe drinking water and people suffering from diarrhea. For a better assessment of the impact of drinking water on health another correlation has been run between percentage of households getting tap water from treated source and number of people suffering from diarrhea. All the correlation has been done for total, rural and urban areas separately.

3. RESULT AND DISCUSSION

Though the provision to safe drinking water has been given prime importance throughout the last 61 years of India's Five year Plans, still, the larger part of India's population lacks this basic requirement till now. Though, the figures regarding accessibility to drinking water has improved over the last decades, but the tremendous adverse effect of unsafe water on health continues (R. Srikanth, 2009). According to 2011 census, in India, only 32 percent of households have access to treated tap water and 46.6 percent households have Drinking water facility within household premises. Where rural areas have only 35 percent households having access to drinking water within premises, in urban areas, 71.2 percent households have this facility within premises.

Here, the issue of 'access to safe drinking water and impact on health has been dealt in three separate sections. The first section has covered all India situation as well as the state level pattern of accessibility to safe drinking water. The second part has dealt with the condition prevailing in the EAG states. A district level analysis has been made for the EAG states covering the rural urban areas separately. In the last section, an attempt has been made to assess the impact of unsafe drinking water on health status.

3.1. State Level Scenario

The state level analysis (Figure.1) shows that in terms of provision of Safe drinking water the states located on north Indian plain except Jharkhand has a fare access to this. More than 90 percent households have access to safe drinking water either within premises or near premises in Himachal Pradesh, Punjab, Uttarakhand, Haryana, Uttar Pradesh, Bihar and West Bengal. Among the other states, Gujarat, Andhra Pradesh and Tamil Nadu have more than 90 percent households having access to safe drinking water. On the other hand, Kerala is the only state where only 33.7 percent households have

access to safe drinking water. This is mainly because of the category we have set for 'safe drinking water' here. In Kerala, most of the households (63.76 percent) use covered and uncovered well as the major source of drinking water. The other states which are currently facing the lack of provision to safe drinking water are Jharkhand, Meghalaya, Mizoram and Manipur. The scenario does not change for rural India (Figure. 2) though there are prominent changes in case of urban India (Figure. 3). Except some states like Kerala, Jharkhand, Chhattisgarh and North-East states like Nagaland, Manipur, Mizoram Meghalaya, and Assam, all the other states have more than 90 percent households in urban India access to safe drinking water.

The situation is much crucial in case of accessibility of treated tap water within or near premise of the household. While considering the overall Figures it shows that only three states i.e. Himachal Pradesh, Maharashtra and Haryana have more than 60 percent households having access to safe drinking water. In states like Bihar, Jharkhand, Chhattisgarh, Orissa, Assam and Nagaland, fewer households are using treated drinking water from tap (Figure 4).

There is a sharp rural urban difference in terms of using tap water from treated source. A larger part of India lacks access to drinking water from treated source. Most of the states have less than 20 percent households having access to treated tap water in rural areas (Figure. 5). In urban areas, most of the major states have more than 60 percent households having access to tap water from treated source (Figure. 6). Bihar and Nagaland are the only two states where less than 20 percent households have access to tap water from treated source in urban areas.

3.2. District level scenario of EAG states and Assam

A deeper insight into the EAG states and Assam reveals more other important issues regarding households' access to safe drinking water. The district level pattern of accessibility to safe drinking water shows a close association with the physiographic arrangement of the areas. As for example, the western part of Rajasthan which is a rain shadow zone, the areas located in the Chhotonagpur Plateau i.e. parts of Jharkhand, Chhattisgarh, Madhya Pradesh and Orissa; and the Karbi Anglong plateau of Assam are areas which lacks provision to safe drinking water according to 2011 census (Figure.7). On the other hand, Uttarakhand, Uttar Pradesh, Bihar, Eastern part of Rajasthan and some areas of Madhya Pradesh and Chhattisgarh have more 90 percent household having access to safe drinking water. Though the physiography of Uttarakhand does not indicate to high availability of safe drinking water, the effort at community level and state level enable it to provide safe drinking water to the larger part of its population. According to Bose (2000), 'a simple technology was developed to allow people to access subterranean water by means of an infiltration well/handpump technique'. As a result, women now have to carry 30 tonnes of water annually instead of 75 tonnes annually they have to carry earlier for drinking and household use.

Like the state level scenario, the rural urban contradiction persists for the districts as well. Most of the district of EAG states and Assam, lack access to safe drinking water in rural areas (Figure. 8). On the other hand, except specific pockets of Chhotonagpur plateau and Karbi Anglong plateau more than 90 percent households are accessing safe drinking water in urban areas (Figure. 9). Jharkhand, Orissa and Assam are the states where most of the districts still face the problem of providing safe drinking water to their urban households. In urban area about 71 percent districts have more than 90 percent household having access to safe drinking water while in rural areas have only 48 percent of the districts have more than 90 percent household accessing safe drinking water.

In case of treated tap water, the situation is much worse. More than 65 percent of all the districts of EAG states and Assam have less than 20 percent households accessing tap water from treated source, according to Census 2011 (Figure.10). Only 16 districts have more than 60 percent households having access to tap water from treated source. Most of these districts are part of Rajasthan and Uttarakhand. ALL the districts of Uttarakhand have more than 60 percent household having access to safe drinking water. The larger part of Uttar Pradesh, Bihar, Madhya Pradesh, Chhattisgarh, Jharkhand, Orissa and Assam lacks provision of tap water from treated source. In case of rural areas (Figure. 11), the number of districts having less than 20 percent households, accessing tap water from treated source increases where as in urban areas the same has decreased. In urban areas of EAG states only 23.5 percent of the districts have more than 60 percent households having access to tap water from treated source (Figure. 12). Most of these district falls within Rajasthan and Uttarakhand.

3.3. Relation between Health and Drinking Water

The World Bank estimates 21% of communicable diseases in India are water related. Of these diseases, diarrhea alone killed over 700,000 Indians in 1999 (estimated) – over 1,600 deaths each day. The highest mortality from diarrhea is said to be among children under the age of five, highlighting an urgent need for focused interventions to prevent diarrheal disease in this age group.[1] Various studies have established relation between drinking water and diarrheal morbidity.[2]

In this paper, we use diarrhea as the health indicator. There are several factors determining diarrhea. They are unhygienic condition and sanitation practices at household level, drinking water facilities, safe or unsafe and sewage facilities. Relation between diarrhea and safe drinking water and tap water from treated source is focused in this section.

Table 1: Showing Correlation Between Diarrhea/Dysentery and Drinking Water (Safe Drinking Water And Tap Water from Treated Source) at State Level

SAFE DRINKING WATER			TAP WATER FROM TREATED SOURCE		
Total	Rural	Urban	Total	Rural	Urban
0.45	0.30	0.26	-0.54	-0.40	-0.63

Source: Calculated from Census of India, 2011 and AHS 2010-11

[1] WHO/UNICEF, Meeting the MDG drinking water and sanitation target: A mid-term assessment of progress, WHO, Geneva, 2004

[2] Jalan and Ravallion (2001), estimated the impact of piped water on diarrheal outcomes among children under five in rural India using propensity score matching method. They find a lower incidence of diarrhea among children living in piped water households compared to without piped water households. However they find that these benefits largely bypass children in poor families and particularly where mothers are poorly educated.

Dasgupta (2004), the study shows that those with access to piped water are less vulnerable to diarrhea. Althogh the study finds no relation between diarrhea and sanitation facilities and education of head of the household . While it finds per capita income determine illness with better off families experiencing reduced illness.

[2] Khanna (2008), the study indicate that disease-specific awareness has strong marginal effects on reducing the probabilities of diarrheal outcomes among young children. She points out that disease-specific awareness have the largest impact on reducing the burden of disease i.e. diarrhea.

*Note: persons suffering from acute illness per 1,00,000 population has been taken for diarrhea/dysentery from AHS, 2011.

The group of eight EAG states and Assam show positive relation between safe drinking water and diarrhea. This may be due to the reason that safe drinking water includes tap water from treated and untreated source, handpump and tubewell. While the relation between diarrhea and tap water from treated source is negative for total, rural and urban. Negative correlation can be interpreted as if there will be more coverage of treated water source there will be lesser cases of diarrhea. The relation between treated water and diarrhea is found to be medium. As urban areas have high coverage under treated water therefore the relation is stronger compared to rural areas with low coverage. As the number of states is small (nine) therefore correlation is not significant.

Table 2: Showing Correlation Between Diarrhea/Dysentery and Drinking Water (Safe Drinking Water and Tap Water From Treated Source) at District Level

STATES	SAFE DRINKING WATER			TAP WATER FROM TREATED SOURCE		
	Total	Rural	Urban	Total	Rural	Urban
Assam	-0.2	-0.3	0.18	0.69	0.73	0.48
Bihar	0.51	0.58	-0.09	-0.63	-0.59	-0.03
Chhattisgarh	-0.21	-0.05	0.2	-0.12	-0.15	-0.09
Jharkhand	-0.28	-0.25	-0.51	-0.11	-0.29	0.15
Madhya Pradesh	0.04	0.19	-0.10	-0.09	-0.05	-0.21
Orissa	0.23	0.19	0.03	-0.12	-0.13	-0.30
Rajasthan	-0.03	-0.04	0.19	-0.22	-0.15	-0.21
Uttar Pradesh	0.22	0.26	0.05	0.13	0.19	-0.03
Uttarakhand	-0.22	-0.05	-0.31	-0.09	0.00	0.43

Source: Calculated from Census of India, 2011 and AHS, 2010-11.

*Note: persons suffering from acute illness per 1,00,000 population has been taken for diarrhea/dysentery from AHS, 2011.

The relation between diarrhea and safe drinking water and treated water could not be established. Only Bihar showed significant and negative relation between treated water and diarrhea. Although a weak negative relation between treated water and diarrhea is observed among the districts of Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan and Uttarakhand. While Uttar Pradesh and Assam showed positive relation. Relation between safe drinking water and diarrhea is found weak and negative only for the districts of Assam, Chhattisgarh, Jharkhand, Rajasthan and Uttarakhand.

4. SUMMARY

The study reveals that the problem of safe drinking water has two interfaces. One in terms of the source of drinking water and the other is distance from the source. Study shows that most of the districts have access to safe drinking water although there is a rural urban gap still persisting. Urban areas have better coverage of provision to safe drinking water than rural counterparts. The same scenario becomes much

worse for household's access to tap water from treated source. Except some parts of Rajasthan, Uttarakhand, Uttar Pradesh and Madhya Pradesh, most of the rural areas lack access to tap water from treated source. In Bihar, even in urban areas, almost all the districts have less than 30 percent of households having treated source of drinking water. The other finding indicates a possible association between safe drinking water and diarrhea. The relation between diarrhea and safe drinking water and treated water from tap was not established over districts of all states. This may be due to the fieldwork of AHS which was carried out over a period of six to seven months and in the process, districts were covered at different points of time (i.e., months / seasons). The seasonality effect and number of samples may have distorted the results. However, given the methodological and data limitations of this study, the association was found to be weak.

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Figure 1: Households having Access to Safe Drinking Water in India, 2011

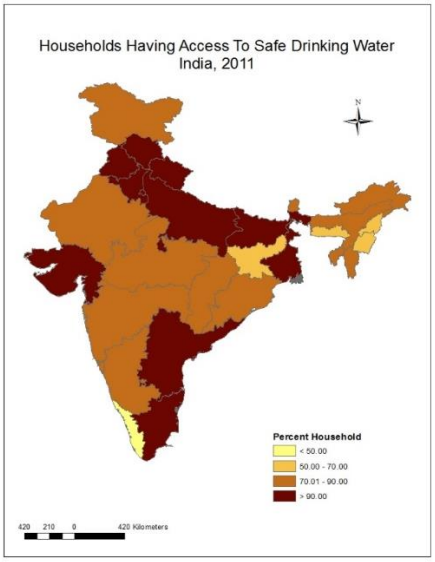

Figure 2: Households having Access to Safe Drinking Water in Rural India, 2011

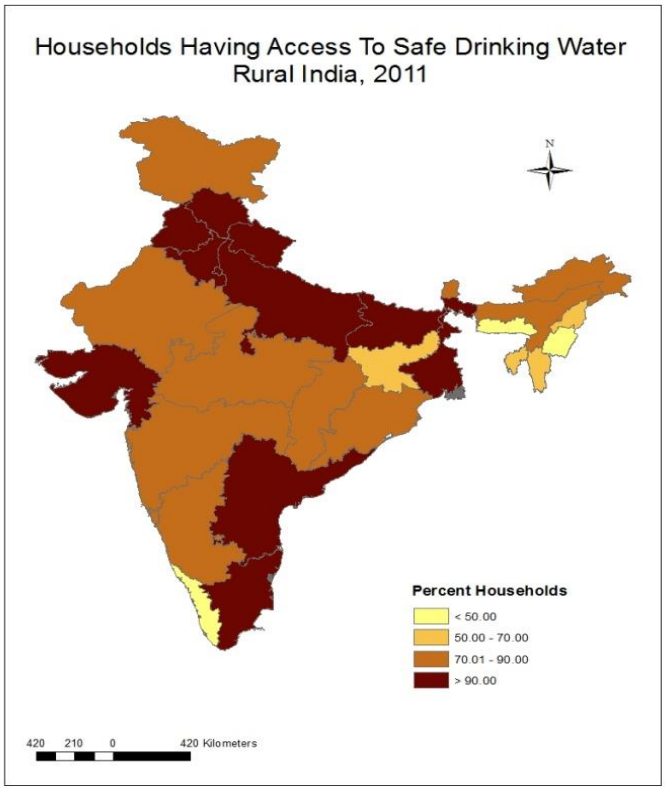

Figure 3: Households having Access to Safe Drinking Water in Urban India, 2011

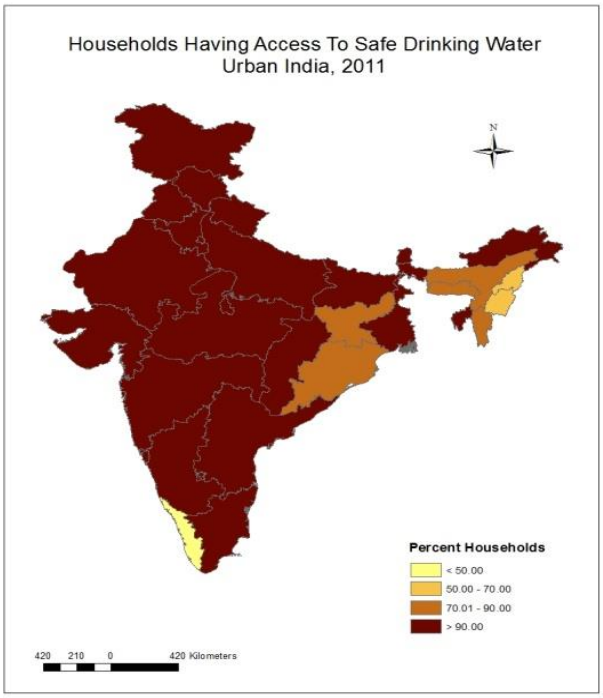

Figure 4: Households having Access to Tap Water from Treated Source in India, 2011

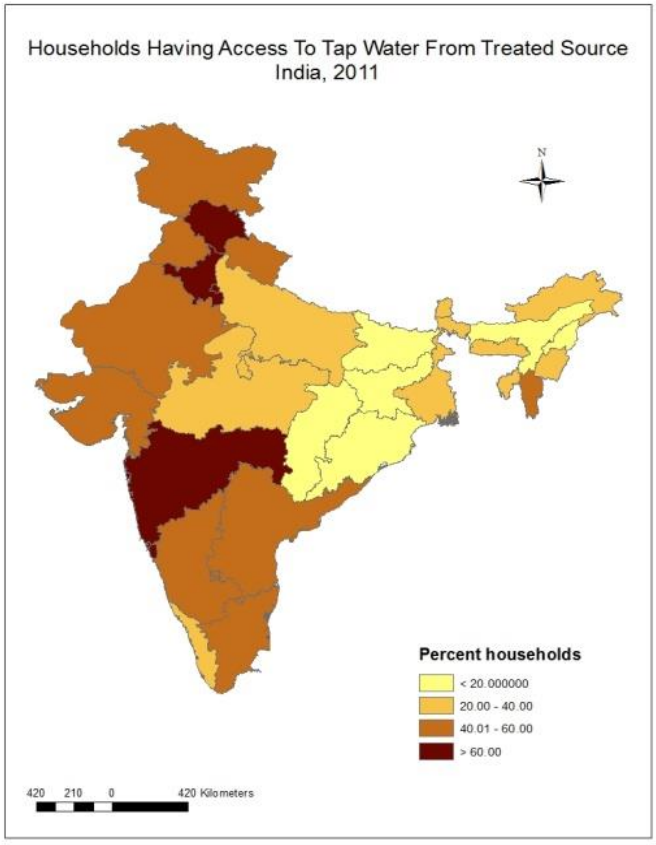

Figure 5: Households having Access to Tap Water from Treated Source in Rural India, 2011

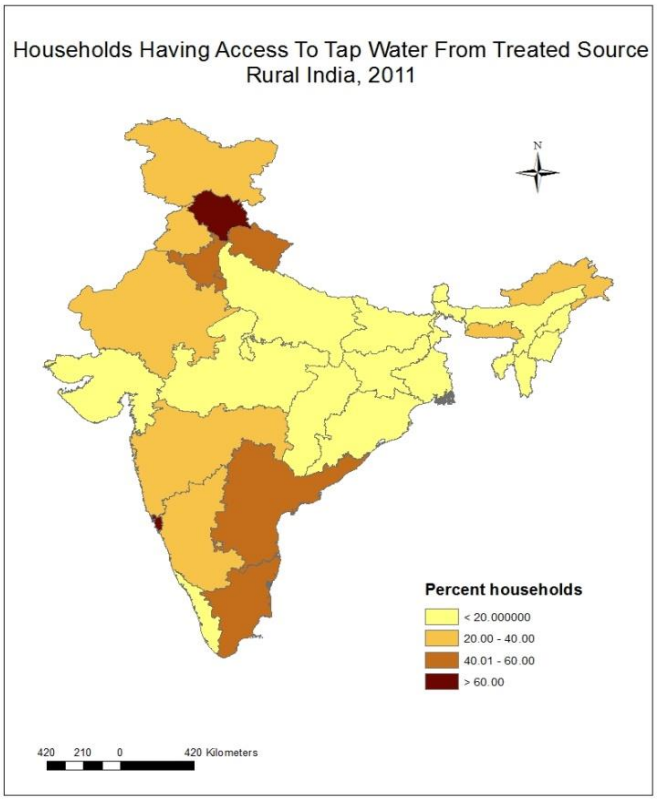

Figure 6: Households having Access to Tap Water from Treated Source in Urban India, 2011

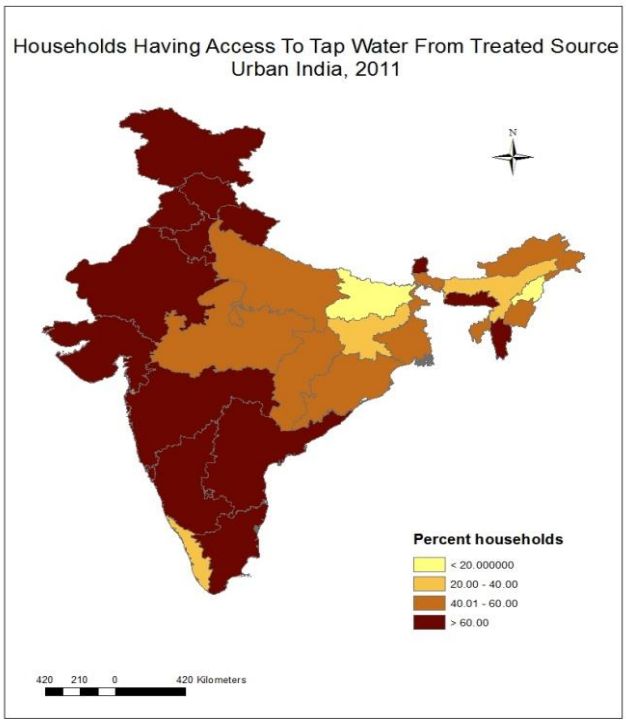

Figure 7: Households having Access to Safe Drinking Water in India (District Level), 2011

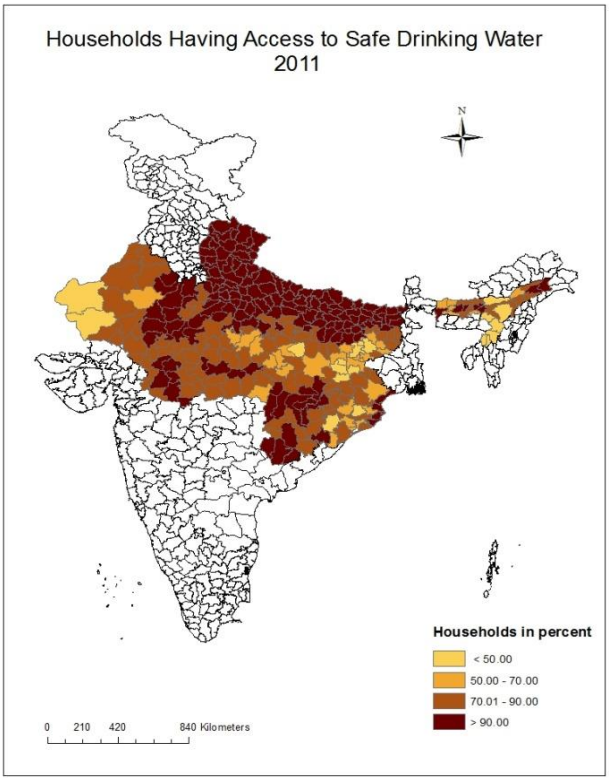

Figure 8: Households having Access to Safe Drinking Water in Rural India (District Level), 2011

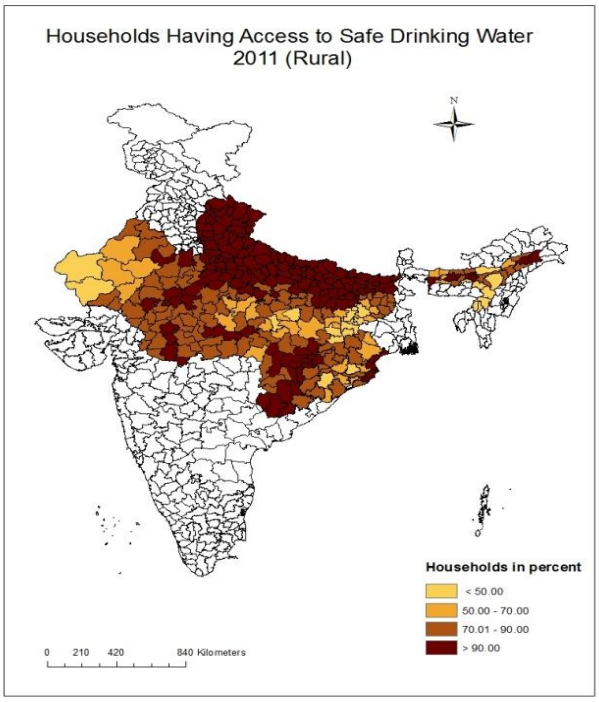

Figure 9: Households having Access to Safe Drinking Water in Urban India (District Level), 2011

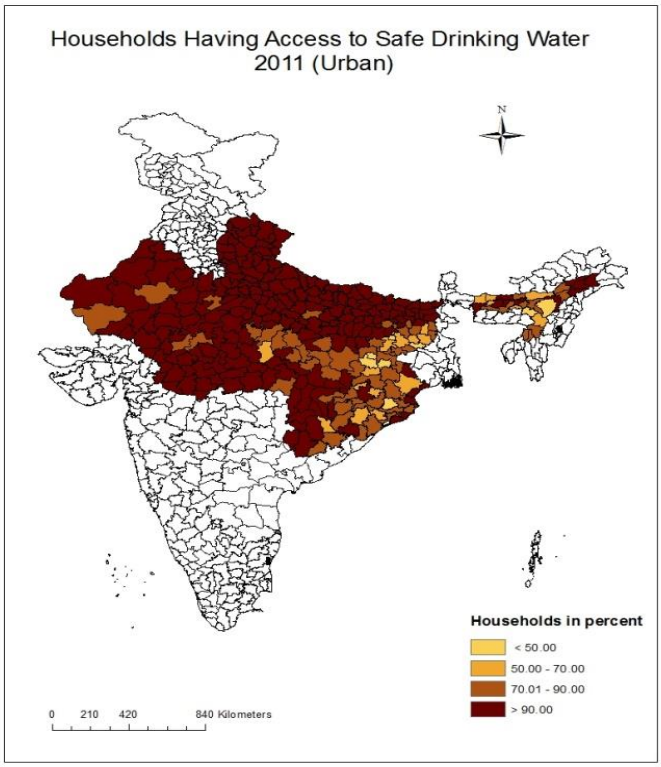

Figure 10: Households having Access to Tapwater from Treated Source in India (District Level), 2011

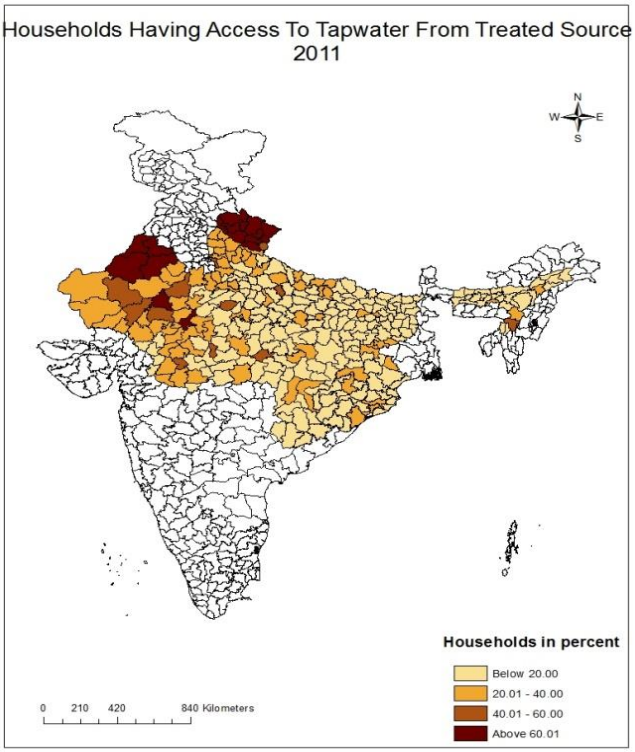

Figure 11: Households having Access to Tapwater from Treated Source in Rural India (District Level), 2011

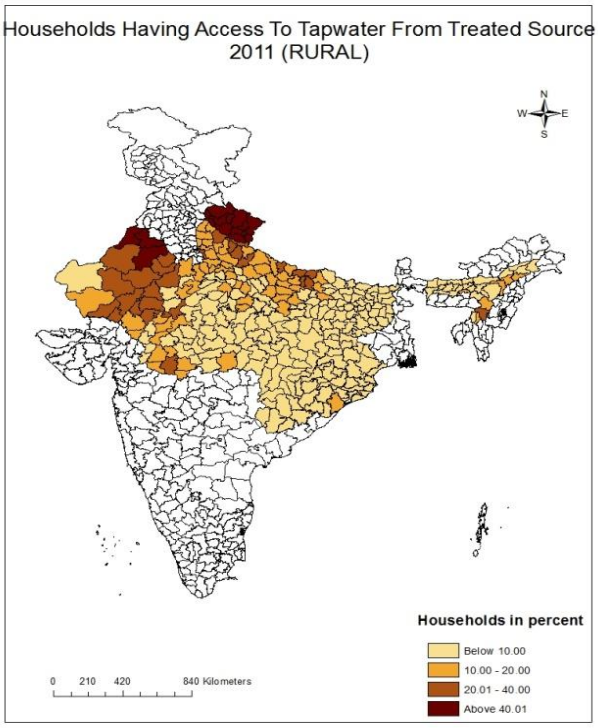

Figure 12: Households having Access to Tapwater from Treated Source in Urban India (District Level), 2011