punjab geographer

A JOURNAL OF THE ASSOCIATION OF PUNJAB GEOGRAPHERS, INDIA

VOLUME 4 OCTOBER 2008

SANITATION RELATED DISEASES IN HARYANA: A GEOGRAPHICAL ANALYSIS

Rajeshwari

Abstract

There is a direct relationship between availability of water, sanitation, nutrition and human well-being. In this context, the present paper draws attention to the sanitation situation in Haryana and its relationship with hygiene associated diseases. Haryana has been taken as a case study because in terms of per capita income and provision of physical infrastructure, it is one of the developed states of India. The paper seeks to study whether the wealth gets transformed in human well-being in terms of eradication of parasitic and infectious diseases, as these are invariably related to water, sanitation and hygiene. Hence, present study focuses on two issues. Firstly, it analyses district-wise sanitation pattern in the state and secondly, it tries to relate disease pattern with prevailing sanitation conditions. The paper is based on secondary sources of data. Interventions that are needed to meet these challenges are also suggested.

Introduction

Sanitation is a broad term that includes disposal of human waste, wastewater, solid waste, domestic waste and personal hygiene etc. The lack of sanitation has a detrimental effect on health status and negates developmental efforts therefore, it has become a yardstick of socio-cultural and economic development of a nation. Lack of sanitation and hygiene is the primary cause of almost all infectious diseases. There is a direct relationship between availability of water, sanitation, health services, nutrition and human well-being. The burden of disease linked to water and sanitation conditions is enormous. According to WHO, it accounts for 60 million disability-adjusted life years lost each year, or 4 per cent of global total (UNDP 2006). Human excreta alone cause many infectious and parasitic diseases such as cholera, dysentery, typhoid, paratyphoid, infectious hepatitis, hookworm, diarrhea, polio, etc. It is estimated that one gram of faecal contains about 1 crore virus, 10 lakh bacteria, 1000 parasite cyst and 100 parasitic eggs and with 65 per cent of rural India defecating in the open, the daily faecal load is estimated to be about 2 lakh metric tones (www.undp.org). Over half of all polio cases in the world are reported in India whereas this crippling disease has virtually been wiped out in the developed countries. India alone accounts for about one-fourth deaths out of 25 lakh deaths in the world every year due to diarrhoea (http://www.who.in). Jaundice, viral, gastro-enteric and cholera outbreaks is almost an annual feature in many villages. High levels of malnutrition (national average being 41 per cent) are also attributed to poor sanitation. Water borne diseases and intestinal worms lead to loss of nutrition as these parasites consume

nutrients and aggravate under nutrition from the already insufficient diets of the rural people and consequently results in deficiency diseases like night blindness, poor growth, vitamin deficiencies, low immunity etc. and retard child's physical development. Not only this, certain maternal health conditions are also the manifestations of the cycle of infectious diseases. Further, various kinds of skin diseases are also attributed to lack of water, sanitation and hygiene. At the root of most public health problems is poor sanitation and hygiene. Studies have shown that sanitation alone can reduce the incidence of infectious diseases by up to 80 per cent by inhibiting disease generation and interrupting disease transmission (WHO 1998).

Access to sanitation is also critical to social and economic progress. It should also be noted that over a billion people in the world do not have access to safe water and over 2 billion lack adequate sanitation. Out of this, about 636 million reside in India alone. The lack of toilet facilities and open defecation at a large scale in the rural areas contaminates the soil and water bodies with pathogens (GOI 2002). This is a key causative factor behind the high prevalence of soil and water borne diseases in rural India. Sanitation is one of the determinants of quality of life and human development index. Further, its availability can be linked to women empowerment as they are more affected by the lack of sanitation facilities in terms of dignity and privacy.

It is generally believed that the provision and coverage of water, sanitation and hygiene increases with increase in income. It is guided by the argument that these services have to be financed out of household budget. However, the global snapshot reveals that in many countries, wealth and provision of water and sanitation has not much correspondence. For example, Phillipines, as compared to Sri Lanka and India in comparison to Bangladesh have much higher income, yet their citizens have lower access to sanitation coverage (UNDP 2006: p.36). In case of India also, one finds that sanitation, hygiene and sewerage facilities (generally associated with the poor economy, low purchasing power, low levels of literacy and other such social indicators), are poor in many economically developed states such as Maharashtra and Haryana (35 per cent each) Gujarat and Tamil Nadu (45 per cent each). On the other hand, the states of Kerala and Assam have 80 to 84 per cent of households provided with sanitation (toilets) facilities (Census 2001). Further, what is more disturbing is the fact that in economically developed states, the gap between provision of water and sanitation is quite high. Sanitation provision basically lags far behind access to water. These gaps matter not just because access to sanitation is intrinsically important, but also because the benefits of improved access to water and to sanitation are mutually reinforcing. In this context, Haryana has been taken as the study area.

Objectives

The major objectives of the present paper are:

(i) To present a spatial pattern in the provision and availability of sanitary facilities in Haryana taking district as a unit;

(ii) to outlines the disease pattern and existing spatial variations in it; and

(iii) to relate the various infectious and parasitic diseases (water and sanitation borne) to sanitation facilities in the state.

Data Base and Methodology

Present paper is based on the secondary sources of data. The data on sanitation have been taken from the Tables on houses,

household amenities and assets, series 7, Directorate of Census Operations, Haryana, for the year 2001. Similarly, the data on various diseases in Haryana have been obtained from the Directorate of Health Services, Haryana, Chandigarh. The disease pattern is based on the data of total (indoor and outdoor) patients treated for various diseases in government hospitals of respective districts. The classification of diseases is based on 9th International Classification of Diseases.

To highlight the sanitation effect, detailed classification of infectious and parasitic diseases has been taken into consideration. For this analysis, water borne and human excreta borne diseases have been separated. Though many such diseases are a combination of scarcity of water and lack of sanitation and hygiene due to low availability of water, yet an attempt has been made to classify water borne, human excreta borne and other tropical diseases (Table 1).

In the present study, a district-wise pattern of infectious and parasitic diseases has been presented and within this broad category, the pattern of a combination of human excreta borne and water contaminated diseases has been analysed. The diseases of skin and subcutaneous tissues are also discussed as these are considered to be strictly water-washed, i.e. spread in absence of proper hygiene. The researcher would like to highlight that although the data collection methodology of the state regarding disease scenario has improved, yet it suffers from few problems. The disease pattern in the state is basically calculated as percentage of treated patients from total treated patients (suffering from all diseases) in the respective districts. Hence, the data may be an undercount as it takes into account only those people who

Table1
Classification of Infectious and Parasitic Diseases

Category	Diseases	Major Cause of transmission
Intestinal infections	Cholera, typhoid, para typhoid, ameobiasis, gastroenteritis, and other related intestinal diseases	Faecal-oral (Human excreta borne)
Viral diseases	Polio, measles, entric fever, encephellities, viral hepatitis, chickenpox, trachoma, Dengu and others	Human excreta and water-contamination borne
Other bacterial diseases	Diptheria, whooping cough, tetanus, meningococcal infection, septicaemia, leprosy	Tropical and childhood diseases
Veneral Disease	Syphilis, Gonococal infection, others	Lack of sanitation.
Tuberculosis	Tuberculosis of various types	
Malaria	Various types of malaria, Leishmaniasis	Water-based (insect vector)
Other Infectious diseases	Mycosis, Filariasis, Nicatoriasis, late effects of polymyelitis and other infections and parasitic diseases.	Water and Sanitation borne.

Source: Feachem et. al. 1983.

reported for treatment in public hospitals only. Yet, this gives a broad regional pattern of diseases in the state. Further, simple statistical methods like percentages have been used to analyze the data. Correlation Matrix has been computed to understand the relationship between sanitation borne diseases and indicators of sanitation i.e. pre cent of households with safe water supply, households with drainage facility and households with toilet facilities.

Spatial Pattern of Sanitation in Haryana

Data of 2001 census on household amenities reveal that about 44 per cent of the households in the state were having toilet facilities. It is generally said the sanitation is the conscience of the city. But If we take rural-urban break up, one finds that in urban areas also, about one-fifth of the households do not have sanitation facility. Meaning thereby that our towns and cities are not clean and a large population is still defecating in open. It also indicates about the poor health of the people living on the fringe. One can imagine the enormous pollution effect on the cities and towns due to lack of sanitation, more so in the context of high population growth and squeezing open spaces in urban areas.

It may be obtained from Table 2 that in urban Haryana also, not even a single district has the distinction of 100 per cent toilet facility. One can also finds large inter-district disparities within urban areas. In Mahendragarh and Kaithal districts, 35 to 33 per cent of urban households do not have any

Table 2
Haryana: Availability of Toilet Facility (Per cent households,2001)

Districts	Total	Rural	Urban	Per cent Rural-urban Gap
Jind	27.46	14.51	76.84	62.33
YanunaNagar	49.19	24.85	86.28	61.43
Jhajjar	45.94	18.7	78.82	60.12
Rohtak	35.48	25.3	83.98	58.68
Gurgaon	42.12	27.5	84.35	56.86
Sonipat	40.72	26.9	81.59	55.4
Panipat	52.22	29.6	84.11	54.46
Karnal	44.55	29.9	83.95	54.03
Faridabad	56.54	23.3	77.19	53.87
PanchKula	56.43	29.0	82.26	53.26
Rewari	34.11	25.2	78.27	53.1
Ambala	48.90	30.5	82.23	51.7
Kurukshetra	45.99	32.0	83.34	51.36
Hisar	45.04	31.6	81.41	49.79
Bhiwani	35.48	26.1	74.49	48.42
M.Garh	24.61	18.2	65.53	47.34
Kaithal	31.66	23.0	67.01	44.0
Fatehabad	48.53	41.2	83.49	42.29
Sirsa	74.81	69.8	88.17	18.33
Haryana	**44.50**	**28.7**	**80.17**	52.0

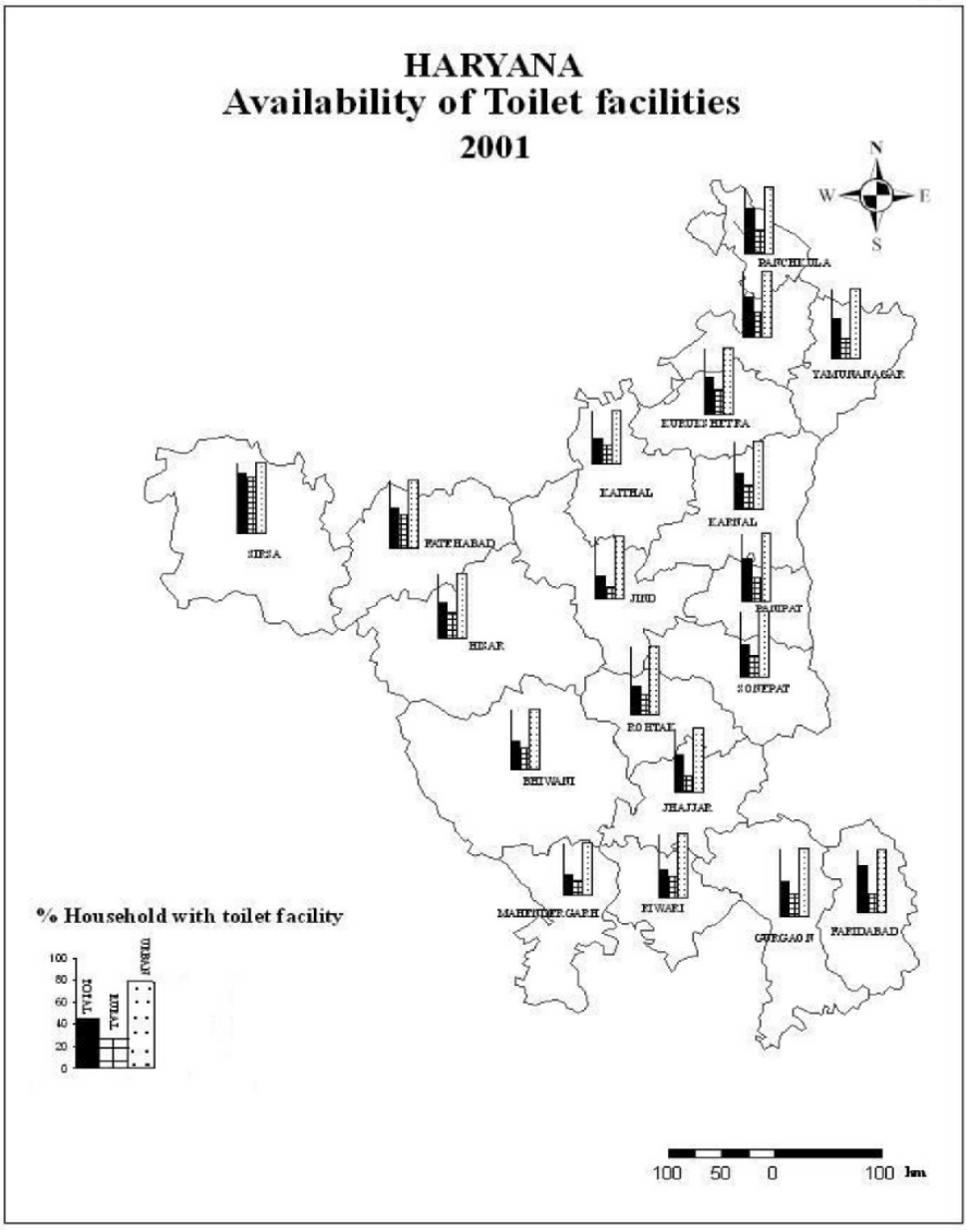
Source: Census of India (2001), Tables on houses, Household amenities and Assets, Series 7, Directorate of Census Operations, Haryana

toilet facility. On the other hand in Sirsa district 88 per cent of its urban households have got toilet facility.

Rural areas in Haryana continue to lag behind many states in terms of provision of drainage facilities, access to sanitation and safe drinking water supply. Census 2001 data show that only 37.8 per cent of its rural population is provided with safe drinking tap water. The picture for sanitation is an eye opener as it shows that only 28.7 per cent of its rural households have provision of toilets. This might be due to multiplicity of factors, such as; low awareness of potential health benefits of better hygiene, perception of the costs of its construction being unaffordable and sheer convenience in the availability of open space or cultural factors.

Wide inter-district variations and the pattern present a very interesting picture (Fig. 1). Located in the extreme western part of the state with 5.28 per cent of total population

Fig. 1



of Haryana, it is Sirsa district which has the distinction of having about 75 per cent of its total and about 70 per cent of its rural households having toilet facilities (Table 2). Further, the rural-urban gap in the provision of toilet facility in Sirsa is also lowest in the state. It must be noted that in terms of total literacy and women literacy, the district stands well below the state average. The reasons for better sanitation in the district may be attributed to purely cultural factors. Again, its adjoining district Fatehabad is the second ranking district in the availability of toilet facility in its rural households. Though the gap between the two districts is large, in Fatehabad, only 48 per cent households have access to sanitation facility. Surprisingly, this is also one of the least urbanized districts, with highest proportion of scheduled caste population, and with low levels of female literacy. Paradoxically, in terms of district level development index as calculated by taking 18 parameters of household amenities, the district of Fatehabad and Sirsa rank among the least developed ones.

As shown by Fig. 1 and Table 2 the worst situation in terms of rural sanitation can be seen in the district of Jind where about 86 per cent of its rural households are not having toilet facility, followed by the districts of Mahendragrah (75 per cent in urban areas and 82 per cent in rural areas) Jhajjar and Kaithal (82 per cent rural and 70 per cent total).Table 2 shows that the problem of sanitation is not confined to rural areas only. Even in urban areas, open defecation is practiced in the districts of Mahendragarh and Kaithal where about one-third of its households do not have toilets. The situation is more alarming in rural areas. What is more disturbing is that the districts of Panchkula, Ambala and Kurukshetra which are the first three ranking districts in terms of development composite index (Census 2001), have about 71 per cent of their rural households with no sanitation facilities, which is an eye opener and highlights the gravity of situation in terms of women and children health, as they are the ones who are adversely affected. The absence of toilet facilities indicates a practice of open defecation in large parts of State. As faecal matter constitute a major source for bacteriological contamination of water, one can imagine the threat to nearby environment by open defecation, in terms of land, water and other host of pollutants and also health risks to a large segment of population. It suggests that priorities in sanitation provision should be taken in a big way in both rural and urban areas (Kundu, 1991). Further, there are studies which indicate that like other basic amenities, the sanitation and sewerage systems organized by the local governments also have not benefited the urban poor as much as the other sections of urban population. This vertical inequality is often reflected in their spatial segregation, which further poses a major threat to the micro level environment in slums and low income settlements in city.

Disease Pattern

As discussed earlier, Infectious and parasitic diseases are the result of poor availability of water, sanitation and hygiene. An attempt has been made to further segregate the infectious and parasitic diseases, such as; i) intestinal diseases or faecal-oral diseases caused by human excreta contamination, like cholera, dysentery, typhoid, paratyphoid, infectious hepatitis, hookworm, diarrhoea etc; ii) viral diseases which are also water contaminated and human excreta borne diseases; iii) venerral diseases such as Syphilis and Gonococal infections mainly associated with improper sanitation and hygiene; iv) water based vector borne disease i.e. malaria of various types; and v) tuberculosis (Table 3).

Table 3
Haryana: Distribution of Patients by Infectious and Parasitic Diseases, 2003

Districts	Total patient of I&P*	I**	II**	III**	IV**	V**	VI**	VII**
Ambala	46150	49.2	1.4	3.0	10.9	23.8	17.4	13.7
Bhiwani	47681	61.2	3.7	1.0	9.7	9.8	4.4	11.1
Faridabad	133462	64.6	15.6	0.4	0.2	2.7	2.1	14.6
Fatehabad	16225	66.4	0.8	0.0	0.1	12.9	4.2	17.7
Gurgaon	109558	71.8	3.9	1.8	9.2	2.9	3.0	8.0
Hisar	91214	73.2	2.4	0.5	18.4	6.1	10.3	1.6
Jhajjar	30714	59.8	5.9	9.5	0.9	2.4	0.8	20.7
Jind	29422	82.0	2.0	0.0	0.02	6.8	5.0	5.0
Kaithal	26985	78.0	1.7	0.2	2.6	4.8	2.1	11.3
Karnal	66348	61.1	12.9	1.7	3.0	1.6	4.5	15.3
Kurukshetra	34382	58.5	3.1	0.3	23.4	8.5	2.5	4.8
M.Garh	51078	44.3	7.8	1.4	31.2	9.3	7.0	1.6
Panchkula	52116	53.5	9.8	1.6	15.8	4.6	3.6	11.5
Panipat	54328	81.4	6.8	2.3	3.0	3.5	0.05	3.2
Rewari	81436	84.6	1.1	2.7	4.9	1.5	3.0	2.4
Rohtak	71871	47.3	6.1	34.4	4.8	3.5	3.0	11.9
Sirsa	33729	62.2	3.4	0.5	14.4	15.2	2.0	2.9
Sonepat	66465	68.2	4.2	0.5	6.3	5.1	1.8	14.5
YamunaNagar	67022	79.1	5.9	2.4	0.3	5.5	2.0	5.01

Source: Direcorate of Health Services, (2003), Haryana Health Scenario: A Disease Profile, DGHS, Haryana, Chandigarh
Note: (i) * Infectious and Parasitic diseases.
(ii) ** I is intestinal infections or faecal oral diseases. These are cholera, typhoid, ameobiasis, gastroentritis and other intestinal related to feacal-oral. II is Viral diseases, i.e. polio, measles, encephalitis, enteric fever, viral hepatitis, trachoma, chickenpox, and others; III Veneral diseases; IV Malaria, V is Tuberculosis of various types; VI is other bacterial diseases like diphtheria, whooping cough, tetanus, meningococcal infections etc. and VII refers to other infections i.e. late effects of parasitic diseases

Table 3 reveals that the patients treated from infectious and parasitic diseases vary from 16 thousand in Fatehabad to 1.33 lakhs in Faridabad district. This might be largely due to the difference in the concentration of population in these districts. However, within infectious and parasitic diseases, one may find that faecal-oral diseases account for about 80 per cent in Mahehdragarh and Rewari districts each. Though one may find that in Jind and Kaithal districts, the percentage of patients treated from infectious and parasitic diseases was about 7 per cent, yet one finds that here also about 80 per cent of these were treated for faecal-oral disease transmission. In case of Mahendragarh, however, one may find that one-third of total patients were treated for water-based vector disease, i.e. malaria. It indicates that the benefits of water and sanitation (invariably availability of toilets and drainage) are mutually reinforcing. The table clearly shows that the districts, which are better served in the availability of toilet facilities namely the districts of Sirsa and Fatehabad, have relatively lower percentage of cholera, typhoid, paratyphoid, amoebiasis, gastroenteritis etc. Similarly, the patients treated from polio, measles, hepatitis, trachoma and other viral diseases are also less in these districts.

The role of sanitation in preventing intestinal worm infection has been well

documented. Studies indicate that worm infection cause stunting of children growth and impede their cognitive performance and development (Connolly and Kvalsvig, 1993). A study in Lucknow (Srivastava, et.al, 1981) concluded that roundworm was responsible for 66 per cent of cases of childhood asthma in the city (through the damage its larva do to lungs). Among adults, the hookworms contribute to anemia in pregnancy and hence to the toll of maternal mortality. The Table 3 reveals that in Rewari, Jind, Kaithal, Panipat and Yamunanagar districts, the cases of amoebiasis and gastro-enteritis are very high which suggest the potential role of sanitation facilities in the areas.

Other health benefits of sanitation are less known, such as impact of sanitation on trachoma. Trachoma is second leading cause of blindness worldwide (UNDP, 2006). More than 70 per cent of this infection is caused by flies, of a species which prefer to breed in scattered human faeces. Toilets have been shown to reduce the population of these flies by depriving them of their breeding sites (Emerson, et.al, 1999). The researcher would like to highlight that in case of Haryana also, in the category of viral diseases, it is the Trachoma disease which dominates. The data show (Table 3, disease II) that such cases were high in the districts of Faridabad and Karnal, followed by Panchkula, Mahendragarh, Panipat, Rohtak and Yamunanagar districts, all having less provision of toilets.

The above discussion shows that for Haryana as a whole, about 70 per cent of the infectious and parasitic diseases are faecal-oral or broadly human-excreta borne. However, there are inter-district variations. The statistics regarding the districts of Kaithal, Jind, Rewari, Panipat and Yamunanagar show that about 80 per cent of infectious and parasitic diseases are directly or indirectly related to lack of sanitation. A look at Table 2 also shows that these are the districts where the toilet facilities are least in rural areas and in totality as a whole. Further, human excreta remain one of the most serious sources of drinking water contamination also. Hence, attention towards this preventive measure is crucial.

Relation between Diseases and Sanitation

In this section, an attempt has been made to relate the various infectious and parasitic diseases with the parameters of quality of water and sanitation. For this analysis, district-wise data on sanitation and disease have been taken (Table 4). These are:

X1 Per cent households with toilet facilities;
X2 Per cent households with drainage facility;
X3 Per cent households with tap water supply;
X4 Per cent patients suffered from Intestinal disease or fecal-oral transmission disease;
X5 Per cent patients suffered from Intestinal, viral and veneral diseases.

The correlation results, as presented in Table5 show that the value of correlation coefficient of fecal-oral transmission diseases with availability of toilet facility is negative. But its relationship is weak. When we combine first three infectious diseases broadly faecal-oral transmitted and water contaminated together, we find that the correlation value increases. Varible X5 shows significant correlation with tap water (at .5 per cent level of significance). With all other variables, the value remains low and insignificant. It should be pointed out that these are very broad variables and the data is also aggregated at district level. The situation may be bleaker than what the statistics suggest. As the total patients here refer only to those who were treated in government hospitals only and not the ones who had taken treatment privately and not reported at all. Further, the explanatory variables taken here are also very broad. The households with

Table 4
Haryana: Variables Used for Calculation of Correlation Coefficient

Districts	Households with toilet facility (Per cent)	Households with drainage facility (Per cent)	Households with protected water supply (Tap water) (Per cent)	Patients suffered from feacal-oral disease (Per cent)	Patients suffered from intestinal, viral and veneral diseases (Per cent)
Jind	27.46	83.8	30.9	82.0	84.0
YanunaNagar	49.19	80.5	39.9	79.1	87.4
Jhajjar	45.94	79.9	29.9	59.8	75.2
Rohtak	35.48	85.5	36.2	47.3	87.8
Gurgaon	42.12	63.0	49.3	71.8	77.0
Sonipat	40.72	92.1	35.2	68.2	72.9
Panipat	52.22	89.2	45.7	81.4	90.5
Karnal	44.55	88.8	47.9	61.1	75.5
Faridabad	56.54	82.0	52.8	64.6	80.6
PanchKula	56.43	82.8	80.3	53.5	64.5
Rewari	34.11	62.0	57.3	84.6	88.4
Ambala	48.90	88.0	56.6	49.2	53.6
Kurukshetra	45.99	81.7	58.8	58.5	61.9
Hisar	45.04	75.8	54.3	73.2	76.1
Bhiwani	35.48	64.7	55.4	61.2	65.9
M.Garh	24.61	55.0	49.4	44.3	53.5
Kaithal	31.66	83.6	33.6	78.0	79.9
Fatehabad	48.53	62.0	46.2	66.4	67.2
Sirsa	74.81	57.0	64.4	62.2	66.1

Source: Census of India (2001), Tables on houses, Household amenities and Assets, Series 7, Directorate of Census Operations, Haryana

Table 5

Correlations

		Percent Households withToilet Facility	Percent Householdsw ithDrainage Facility	Percent Householdsw ithTapwater Supply	Percent PatientsOf FeacalOral Disease	Percent Patientsfrom Intestinal Viraland Veneral Disease
PercentHouseholdswith ToiletFacility	Pearson Correlation	1	.014	.504 *	-.074	-.108
	Sig. (2-tailed)	.	.956	.028	.762	.660
	N	19	19	19	19	19
PercentHouseholdswith DrainageFacility	Pearson Correlation	.014	1	-.308	.060	.298
	Sig. (2-tailed)	.956	.	.200	.809	.216
	N	19	19	19	19	19
PercentHouseholdswith TapwaterSupply	Pearson Correlation	.504 *	-.308	1	-.294	-.469 *
	Sig. (2-tailed)	.028	.200	.	.222	.043
	N	19	19	19	19	19
PercentPatientsOf FeacalOralDisease	Pearson Correlation	-.074	.060	-.294	1	.705 **
	Sig. (2-tailed)	.762	.809	.222	.	.001
	N	19	19	19	19	19
PercentPatientsfrom IntestinalViraland VeneralDisease	Pearson Correlation	-.108	.298	-.469 *	.705 **	1
	Sig. (2-tailed)	.660	.216	.043	.001	.
	N	19	19	19	19	19

*. Correlation is significant at the 0.05 level (2tailed).

**. Correlation is significant at the 0.01 level (2tailed).

drainage facility need to be further segregated in terms of having open or closed drains. Similarly, education about hygiene is equally important and for which there is no source of taking data at secondary level. Hence, this is just a broad analysis. It also suggests that improvement in toilet facility alone may not automatically result in disease reduction. The additional factors like availability of water, water quantity, hygiene education regarding proper disposal of excreta, waste management and hand washing etc. also need to be taken into account, which is not possible with the existing secondary data. Hence, it suggests that micro-level studies with all these explanatory variables need to be corroborated further.

Conclusion

The above observations highlights that despite much technical progress, the state has a poor record in terms of availability of toilet facilities. There are wide inter-district variations, which does not correspond with the level of agricultural development in the state. Moreover, the non-availability of toilet facilities in urban areas suggest that open defecation is not a problem of rural areas alone. Further, the rural-urban gap within districts is also large, which suggest that the sanitation campaign should be taken on a war footing in the rural areas.

The study also stresses the need of sanitation due to the fact that even in the developed state like Haryana, water and filth borne diseases still dominate while seeing the pattern of diseases in Haryana. Hence, in order to break the vicious circle of communicable diseases improvement in sanitation is the need of the hour. Such diseases can be reduced through control of flies and increasing awareness towards the hygiene behaviour. The analysis on correlates of disease also suggests that in addition to reducing faecal-oral diseases, the availability of water should also be studied while explaining the disease pattern. The findings need to be corroborated with primary data undertaking micro-level studies in the area.

Water and sanitation are the most powerful preventive measures and investment in sanitation and water can be an effective mechanism in reducing risks and deaths due to killer diseases like childhood diarrhea. It should be noted that preventive measures are much cheaper and effective in elimination of diseases as immunization has proved in reduction of measles. Hence, sanitation measures once undertaken will go a long way in improving the environmental health of population and overall health promotion.

The study also suggests that the sanitation problem is both provision of facility and behavior change. (As the present study shows that it is not only the economically backward states and districts that lag behind in its provision, economically better districts and states are equally poor in terms of sanitation and hygiene). Hence until the need for and benefits of sanitation are realized and internalized, mere provision of facilities will not provide the expected results. For this large scale sanitation campaign is required. The campaign need to be carried out with involvement of women and children as they are the most vulnerable in terms of sufferings..

References

Census of India (2001): *Tables on Houses, Household Amenities and Assets,* Series7, Haryana. Directorate of Census Operations, Haryana.

Connolly, K.J. and J.D. Kvalsvig (1993): "Infection, Nutrition and Cognitive Performance in Children", *Parasitology,* (107), pp.S187-200.

Emerson, P.M, S.W.Lindsay, G.E Walraven (1999): "Effect of Fly Control on Trachoma and Diarrhoea", *The Lancet,* 353: pp.1401-03.

Feachem, R.G., D.J. Bradly, H.Garlick and D.D. Mara (1983): *Sanitation and Disease: Health Aspects of Excreta and Wastewater Management,* John Wiley and Sons, Chichester, p.501.

Government of India (2002): *India Assessment, 2002- Water Supply and Sanitation* (AWHO-UNICEF Sponsored Study), Planning Commission, New Delhi,p.39.

Government of Haryana (2006): *Economic Survey of Haryana 2005-06,* ESA, Planning Department, Haryana.

Kundu, Amitabh (1991): "Microenvironment in Urban Planning: Access to Poor to Water Supply and Sanitation", *Economic and Political Weekly,* Vol. XXVI, No.37 pp.2171-2173.

Srivastva, V.K, G.K. Malik and S.K.Agarwal (1981): "Ascarial Infection in Asthamatic Children", *Indian Journal of Parasitology,* 5: pp.255-256.

UNDP, (2006): *Human Development Report 2006,* Beyond Scarcity: Power, poverty and the global water crisis, United Nations Development Programe, New York,p.45.

UNDP Homepage, http://www.undp.org

WHO (1998): Guidelines for safe recreational-water environments: coastal and fresh-waters, Draft for consultation, *World Health Organisation,* Geneva,p.6

WHO (2002): *The World Health Report 2002,* World Health Organisation, Geneva.

http://www.sulabhenvis.in/newsletter/oct-dec.06

http:// www.who.in

Dr. Rajeshwari,
Department of Geography,
Kurukshetra University,
Kurukshetra.