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Potable Water Privation and Health Issues in Varanasi District

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Abstract

Water pollution has emerged as one of the gravest environmental threats in India. This study focuses on the implications of water borne diseases due to polluted drinking water in Varanasi district. Polluted water is not only virulent for human beings but also harmful for the aquatic ecosystem. Contaminated ground water is leading to health degradation, with its usual socio-economic impact on individuals, households and the economy through economic loss, which is the sum of productivity loss due to lost days of work and wages, and treatment cost. People of urban and rural areas are wasting more than 3% of their total expenditure as economic loss and slum people are wasting more than 10% of their total expenditure as economic loss due to water borne diseases in the Varanasi district. This study has looked at the problem of potable water scarcity and concomitant issues such as incidence of water borne diseases, out of pocket expenses on healthcare and man-days lost due to illness.

Keywords: Water Pollution, Waterborne Diseases, Health Degradation, Productivity loss, Treatment Cost, Economic Loss

Introduction

Environmental degradation encumbers human life in many ways and out of this health is one of the prominent ways. Degraded environments affect health directly and adversely. It is well recognized that the main economic burden associated with water pollution is cost of pollution on human health. Adequate supply of fresh and clean drinking water is a basic need for all human beings on the earth, yet it has been observed that millions of people worldwide are deprived of this because they are not getting clean drinking water. Most of metropolitan cities are facing the problem of water pollution. Not only metropolitan cities while other big cities such as Kanpur, Allahabad, Varanasi, which are situated near to bank of Ganga, facing the problem of water pollution at an exorbitant level. In these cities marginalized population live near to the bank of Ganga. Fulcrum of all above explanation is that, these cities are equally facing the problem of water pollution as metropolitan cities are faced. Axiomatic problem is that, owing to above explained plight situation of "over exploitation and poor management of

fresh water is taking place". Water quality continuous to deteriorate in the country is failing to reimburse with the norms of safe drinking water. Hundred millions of people suffer from ill health and morbidity due to environmentally degraded and contaminated water quality. The World Health Organization (WHO, 2002) estimates 54.2 million DALYs (Disability Adjusted Life Year Lost) lost worldwide per year due to vulnerable water. According to WHO , DALY's(Disability Adjusted Life Year) is the sum of the years of potential life lost due to premature mortality and the years of conducive life lost due to disability. If no action is taken to address unmet basic human need for water as many as 135 million will die from these diseases 2020 (Glecik , 2002)

Literature Review

Poor health is directly linked with to human capital deficits that affect adversely to both present and future conduciveness in terms of wage or salary loss. It clears that Healthy population are more conducive population. Without a healthy and productive labor force, the process of economic growth cannot sustain in long run. Healthy population in any country depends upon the healthy natural environment specifically fresh air, pure water etc. but fast rate of urbanization is responsible for the quality degradation of the natural resources. As a nuance the problem of water pollution in urban cites is peculiarly augmented. So many studies are taken into account of water pollution which shows that how urbanization responsible for water scarcity, water pollution, and finally for increasing health problems. If we focus on the world condition about fresh water availability than we find that less than 3% of the world's water is fresh and the rest is sea water and undrinkable and Of this 3%over 2.5 %is frozen, locked up in Antarkitica, the Arcitic and glacier and not available to man. Fulcrum of above explanation is that only 0.5 % water is available for human. This sort of notion exhibit that our earth is made from water but the water which is available for human activities and usable is only .5% (report-facts and trends water, 2005).

It is important to note that available 0.5 % fresh water is not equally distributed on earth. Means only nine countries possess 60% of the world's available fresh water supply: Brazil, Russia, China, Canada, Indonesia, U.S., India, Columbia and the Democratic Republic of Congo (report- facts and trends water, 2005). However, local variations within countries are also finding at wider scale. These all information clears that the problem of water scarcity is present at global scale because of unequal distribution of water. A country considered under the category of water crisis when the availability of water falls below 1000 cubic meters per person per year (Chandrika R., 2006). Historically, India has been well endowed with large Freshwater reserves, but the rapidly increasing population and over exploitation of fresh water from surface and groundwater sources over the past few decades has resulted in water scarcity problem in some regions (Water –The India Story, March 23, 2009). This can be axiomatic by some facts such as In India; the current per capita water available is at 1880 cubic meters. In 1951, this availability was at 3450 cubic meters and by 2050, it is expected to fall to 760 cubic meters (Chandrika R. ,2006) . Water is distributed unequally naturally, that's why it is natural problem. But now water scarcity problem is also increase owing to uneconomic use of water. And at last scarcity problem of water generate nexus problem of vitiate water. Owing to that scarcity problem degrades water quality which results in the form of many water borne

diseases. This is axiomatic by many facts such as 3,900 children die each day due to vitiate water or poor hygiene 1.8 million people die every year from diarrheal diseases (including cholera) – the equivalent of 15 killer tsunamis each year or 12 Boeing 747 crashes every day (report- facts and trends water, 2005). Reddy et. al. (2006) has explained the morbidity rates in water pollution area (25%) are much higher than the national or state average (10%). Pandey, et. al. (2005) has observed in his study that the Ganga water pollution has very significant effect on occurrence of enteric diseases in Varanasi city. By 2025, India, China and selected countries of Europe and Africa will face water scarcity problem if adequate and sustainable water management initiatives are not implemented as soon as possible (Water –The India Story, March 23, 2009).

Objective of the Study

- 1- To know about water scarcity problem in Varanasi district.
- 2- To know the status of water borne diseases out of total diseases burden in Varanasi.
- 3- To know Total Economic Loss due to water borne diseases in Varanasi as percentage of Total Household Expenditure.

Area of the Study

The study area for this work is Varanasi. And its result and findings are depending upon the pilot survey of the Varanasi. Varanasi is divided into 90 wards for electoral purposes. The total numbers of blocks in Varanasi are 8. For the pilot survey, households were selected from urban, rural as well as slum areas. Total 20 questionnaires were filled during the pilot survey. The selection of ward, block and slum colony is based on the random sampling methods. In this way two wards are selected: Dashaswamedh ward and Nagawa ward, and one village Chhitupur selected which comes under Kashividhyapith block. Than slum areas are selected on the basis of list provided by the Nagar Nigam, Varanasi. In the pilot survey I have taken the slum families living near to Sundarpur Mohllala. Sunderpur is a well-maintained Mohalla and comes under Nagawa ward but some areas surrounding the road are inhabited by very poor people and considered as a slum by Nagar Nigam.

Analysis of Water Scarcity Problem in Varanasi District

The first objective of the study is to know about water scarcity problem in Varanasi. Water scarcity is a problem which is related to water, that's why so indispensable work has been done in this reference. Abdual Shaban (2008) done a study and according to this study minimum water supply of 200 liters per capita per day (lpcd) (As per the Bureau of Indian Standards, IS:1172-1993), should be provided for domestic consumption in cities with full flushing systems and this study has also mentions that according to IS:1172-1993 the amount of water supply may be reduced to 135 lpcd for the LIG and the economically weaker sections (EWS) of the society and in small towns (Modi, 1998). But if we compare this data with Varanasi data then we find that average water supply in urban area is only 33.61 liters per capita per head which should be 200 liters at least because this section representing economically strong section of the society of the Varanasi. On the other hand, water supply in rural areas is 42.95 liters per capita per head in Varanasi district, which is also very low because it should be at least 135 lpcd, but its condition is better than urban colonies. Here if we focus the condition of the

slum areas in context of water availability, it is worse. Slum areas are getting only 7.37 liters water lpcd. This whole explanation is showing problem of water scarcity in Varanasi district.

Analysis of Diseases Pattern in Varanasi District

Table -3 is showing that out of 20 households 13 households are suffering from different type of diseases. Means this shows 65% households are that type where at least one person is sick and table 5 is also showing that diseases pattern in urban and rural households are almost same. But this is also showing that slum people are more severely affected from different type diseases. Here another Table 4 is showing that total number of person who suffered from diseased are 14 out of 20 households. And the total population living in these 20 households is 102 (table-2) and out of 102 persons, 14 are suffering from different type diseases. Means 13.72 % households are sick in Varanasi. And out of these 14 people 13 are diseased from contaminated water. Means 92.85% people are diseased from water borne diseases and rest 12.7 % are diseased from other diseases. The above findings are clearly showing that water borne diseases are playing very significant role out of total diseases burden.

Find out Total Economic Loss as a percentage of Total Expenditure Due to Waterborne Diseases across urban, rural and slum areas of Varanasi

Explanation of Table-5, In this Table, 1 to 8 questionnaires are related with Urban Households and next eight means 9 to 16 are related with rural households and next four are related with slum households. The income level of the households is calculated on the basis of "Total Consumption Expenditure" on monthly basis and it is multiplied by 12 to find out the annual expenditure. Here total expenditure is the sum of Expenditure on food, expenditure on durable goods, expenditure on education, expenditure on some other important items. Basically these all questions are taken from NSSO schedule. Than table -6 is showing "Total Economic Loss" which is addition of two major components in this study. These two components are "cost of illness" and "productivity loss". Here cost of illness is sum of "Cost of Treatment", "Transportation Cost", and "Spending on Special Diet" because of illness and on the other hand productivity loss is examined in the form of "Wage Loss" due to illness.

Table 6 is showing that "Total Economic Loss" because of illness across urban, Rural and Slum areas of the Varanasi district. Here the column of the total monthly income is showing the sum of all households of that particular group. Means Urban Total Monthly Income is the sum of all eight urban households' income. And rural and slum households are also sum of their group. Here the column number- 2 is showing the Total Economic loss in terms of absolute values. Means column number 2 is also part of column number- 1 but it is showing the expenditure which is spending on the treatment because of illness. And last column is showing the loss in terms of percentage of total income. Here one thing is very clear, slum people invest more portion of their income on the illness as compare to Urban and rural peoples. In absolute values of the expenditures or loss due to illness on the rural area is lower than the urban area. But income level of the urban area is also higher than the rural area. So that in terms of percentage it is not showing any significant difference in between urban and rural household's expenditure on illness. Chart 1 and chart 2 is also showing the same findings.

Conclusion

Water pollution is one of the indispensable issues at international level that's why it has place in the United Nations Millennium Development Goals (MDGs). Polluted environment shows adverse effect on the health of the human being and also harmful for the aquatic ecosystem. In this way it adversely affects to natural environment finally generates negative externality

The above discussion is showing that Water pollution has emerged as one of the gravest environmental threats in India (WWF-India, 2011). "Its biggest sources are cities swage and industrial waste that are discharge without treatment into the rivers and Despite the best effort of the government, only small percentage of the waste water that is generated in the cities is treated and the rest is discharge into the rivers without any treatment" (WWF-India, 2011). This polluted water increase toxicity of the river and ground water. And ultimately, entry of toxic subsistence into water bodies like lakes, streams and rivers leads to deterioration in the quality of water and also adversely affect to aquatic ecosystem. Due to this even the ground water gets contaminated and contaminated water is responsible for health degradation. And finally these degraded health adversely affect to the productivity of the human being and on the other hand also shows extra money burden because of ill health. Means water pollution finally shows in the form of "Total Economic Loss". Here Total Economic Loss is the sum of productivity loss and cost of illness. Productivity loss is the loss of income/ wage /salary due to illness. And cost of illness is the sum of all type cost which spends by the patient due to illness. The health implications of deteriorated water quality have become a topic of much concern in recent years. In this context, researchers in environmental and ecological economics are prompted to estimate and appreciate the environmental damage and abatement cost functions.

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Table 1: Water Related Information across Urban, Rural and Slum Households

Sl. No.	Area	Ward No.	Main Source of Drinking Water	Adequate Drinking Water Available round the year	Drinking Water Available (Hours)	Amount Consumed for Drinking Water Purpose	Amount Consumed for Other Purposes	Access to Principal Source of Drinking Water	Distance from Principal Source of Drinking Water	Time to Get Water and Come Back
1.	U-1	1	3	1	24	15	20	5	3	10
2.	U-2	1	3	1	8	10	25	2	2	5
3.	U-3	1	3	1	24	25	35	2	2	2
4.	U-4	1	3	1	8	10	20	1	1	0
5.	U-5	1	3	1	10	10	100	1	1	0
6.	U-6	2	4	1	24	25	400	1	1	0
7.	U-7	2	4	1	24	20	300	1	1	0
8.	U-8	2	4	1	24	30	200	1	1	0
9.	R-1	3	4	1	24	30	400	1	1	0
10.	R-2	3	4	1	24	60	500	1	1	0
11.	R-3	3	3	2	7	25	50	3	4	15
12.	R-4	3	3	2	6	20	80	1	1	15
13.	R-5	3	3	2	6	15	50	1	1	20
14.	R-6	3	3	2	6	20	200	1	1	0
15.	R-7	3	4	2	6	15	200	1	1	25
16.	R-8	3	3	2	6	20	200	1	1	0
17.	S-1	4	4.1	1	24	5	25	5	4	15
18.	S-2	4	4	1	24	15	30	5	5	20
19.	S-3	4	5	1	24	15	35	5	4	15
20.	S-4	4	5	1	24	5	25	5	5	15

Table 1: Findings based on Table 1

	Total No. of Households	Total No. of Family-member	Average Size of Households	No. of Households having Supply water facility	No. of Households having hand-pump/bore-hole	Wells	Average Water Consumed for drinking	Per person availability of water for drinking	Average Water used for other purposes	Per person availability of water for other purposes
Urban	8	37	4.63	5	3	0	18.1	3.919	137.5	29.7
Rural	8	44	5.5	5	3	0	25.6	4.773	210	38.18
Slum	4	21	5.25	0	2	2	10	1.905	28.75	5.47

Table 3: Number of People Sick During Study Period

Area	No. of people reported being sick	No. of people reported not being sick	No. of Respondents
Urban	5	3	8
Block/Rural	5	3	8
Slum	3	1	4
Total	13	7	20

Table 4: Diseases Reported by the Respondents

Area	Enteric Fever	Dysentery	Diarrhea	Typhoid	Any Other	Total
Urban	2	2	0	1	0	5
Block/Rural	2	1	1	0	1	5
Slum	2	2	0	0	0	4
Total	6	5	1	1	1	14

Table 5: Interrelationship between total expenditure and total economic loss

Sl. No	Annual Total Expenditure	monthly Total expenditure	Cost of Treatment	Transportation Cost	Spending on Special Diet	wage loss	Total Economic Loss
1	22140	1845	290	0	50	0	340
2	44540	3711.67	310	0	0	0	310
3	68640	5720	150	0	0	0	0
4	203040	16920	0	0	0	0	0
5	106300	8858.33	325	25	0	0	350
6	264080	22006.7	0	0	0	0	0
7	113010	9417.5	170	10	20	0	200
8	107280	8940	1200	15	20	0	1235
9	193680	16140	0	0	0	0	0
10	36770	3064.17	30	10	10	0	50
11	34390	2865.83	690	0	20	0	710
12	69180	5765	0	0	0	0	0
13	73120	6093.33	50	20	0	0	70
14	60980	5081.67	408	10	0	0	418
15	73570	6130.83	0	0	0	0	0
16	58800	4900	308	20	30	0	358
17	11694	974.5	301	25	80	0	406
18	49100	4091.67	290	20	40	40	390
19	39280	3273.33	0	0	0	0	0
20	14944	1245.33	140	20	25	100	285
Total	1644538	137045	4662	195	325	140	5322

Table 6: Finding based on Table 5

Area	Monthly Income in terms of Total Expenditure	Total Economic Loss	Loss in terms of Percentage
Urban	77419.1667	2635	3.291521366
Rural	50040.8333	1606	3.109580775
Slum	9584.83333	1081	10.13516681

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