

Water Pollution in Madurai City: Its Economic Implications on Human Health Care and Medical Expenditure

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Abstract

Water pollution is the direct or indirect human intrusion of substances into the water environment such as to harm living resources affecting human health by various cytotoxic and infiltrative disorders and impair water environment quality. Environmental degradation, water pollution and health problems are similar throughout the developing world. Pollution is the most widely discussed external diseconomy. This paper is an attempt to analyse the problem of water pollution in Madurai city and its health hazards thereby the costs involved in treating the diseases caused by pollution. This study is based on primary data collected from 120 sample respondents living in three different wards of Madurai city and a nearby village in Madurai. It shows that people of Madurai are exposed to water-borne diseases and a majority of them (37.5 per cent) spend on an average Rs.1500-2000 per month on the medical treatment for the diseases.

Keywords: Pollution, Disease, Testing Cost, Medical Expenditure.

Introduction

Pollution is the introduction by man into the environment of substances or energy liable to cause hazards to human health, harm to the living resources and ecological systems, damage to structures or amenity or interference with legitimate uses of the environment. Pollution had always been misused for contamination which can be defined as the presence of elevated concentrations of a substance in the air, water, soil or any other such thing not necessarily resulting in a deleterious effect. Water pollution, therefore, is the direct or indirect human intrusion of substances into the water environment such as to harm living resources affecting human health by various cytotoxic and infiltrative disorders and impair water environment quality.

Environmental degradation has become a new problem. The nature's self purification capacity is diminishing, that is, environmental degradation. Need of the poor, the greed of rich and careless application of technology have been the main cause and source of the environmental degradation of world¹. The state of economy, poverty and environment are inextricably linked in developing countries where the entire economy is

based on natural resources. Economic deprivation and environmental degradation reinforce one another in a vicious cycle. Population growth also has an adverse impact on economic and environmental resources. Pollution is the product of collision between man and nature. It poses a serious threat to the preparation of life on earth. Theoretical evidences show that pollution is unavoidable. Further, pollution problem is considered as more harmful than population growth. Empirical reports relating to pollution of land, water, air, noise and atmosphere are provided.

Water pollution is a phenomenon that is characterized by the deterioration of the quality of land water (rivers, lakes, marshes and ground water) or sea water as a result of various human activities. Human activities related with water pollution comprise various industries such as mine, agriculture, stockbreeding, fisheries, forestry, urban human activities, manufacturing industries, construction and various territory industries. Water pollution is any physical or chemical substance in water that can adversely affect organisms. It is a global problem, affecting both the industrialized and the developing nations particularly the non-industrialized nations. The water pollution problem in rich and the poor nations, however, are quite different in many respects. Heat, toxic metal, acids, sediment, animal and human waste and synthetic organic compounds foul the water ways of developed nation. Human and animal wastes, sediments and pathogenic organisms heal the list in the non-industrialized nations.

Initially, the pollution problem that unfolded as a problem of public health where many of the illnesses had their roots in a contaminated environment, has in recent years become a water system like lakes, ponds, rivers and seas, have always been the recipients of wastes of human society. But the fact that man might be abusing his natural environment was recognized only after the earlier warnings of Carson (1964), Rudd (1965) and Moore (1967). Hence a widespread concern about water pollution was aroused after this.

Water pollution can be defined as anything, physical or chemical, which affects the natural condition or intended use of water (Wilber 3). Obviously then, any degree of pollution irrespective of the intended function of a particular body of water: for instance, water judged too polluted for drinking, might be considered suitable for agricultural purposes. In general though, natural bodies of water are considered polluted if they give off offensive odors, are highly turbid, or are brownish in color (Wilber 6-7).

The different materials which cause water pollution can be broadly classified into three categories (Wilber 7). The first group, organic pollutants, generally consists of carbon containing substances which often originate with living organisms (Wilber 7). The second group, inorganic pollutants, includes noncarbonated contaminants (Wilber 7). The third and final category, miscellaneous water pollution, includes physical pollution and radioactive pollution (Wilber 7).

Water is essential for survival. But today about 200 million people in India don't have access to safe drinking water. Most of our water sources are polluted with untreated/partially treated wastes from industry, domestic sewage and fertilizer/pesticide run off from agriculture fields. According to Ministry of Rural Development, about 1.5 million under 5 year die each year due to water related diseases., and the country also losses our 200 million person days of work a year because of these diseases. Studies show that the better water supply and sanitation facilities can considerably reduce illness deaths due to water related diseases. Deaths due to diarrhea can be reduced by 65 percent while overall child mortality can be reduced by 55 per cent.

The subject of water pollution encompasses an enormous field of study. It involves biological and biochemical aspects such as disease causing organisms and different chemical contaminants. These diverse components tend to alter the environment. Since Americans now spend more than ten billion dollars a year on medical problems caused by outdoor pollutants (Grove 517), whatever has an effect on the environment also has direct implications for human welfare.

Earlier Studies

The literatures reviewed below explain the various dimensions of the problem of water pollution and its effects on human health.

Owing to Poor environmental conditions unhygienic behavioral practices the wells get frequently contaminated; the incidence of water - borne diseases gets there by aggravated (Jalasangesh, 1994).The water pollution directly affects human health through diseases like Jaundice, Cholera, typhoid etc. The author used only the Secondary data. The author suggested that the sewage treatment, Recycling method need to be implemented by the government (Arumugam, N., 1995).

Water quantity, quality, sanitation, hygiene practices and sanitation intervention cause less diseases and mortality rate among children The author argued that collective effects of all these are more than sum of their individual effects. So, he argued that with water in enough quantity and of good quality, hygiene practices and sanitation are also important to reduce morbidity of water borne diseases. So, health awareness and interventions are very important for it (Hoddinott. John, 1997).

Over exploitation of ground water and pollution of surface water sources are the key problems. Water - borne diseases account for more than half (80 percent) of all diseases in the country (Soundarapandian, M., 1999).The lack of coordination between environmental and public health objectives, a complex and fragmented system to manage water resources, and the general treatment of water as a common property resource mean that the water quality and quantity problems observed as well as the health threats identified are likely to become more acute(Changhuawu, et.al.,1999). The main point sources of pollution are industrial operations and municipal waste water treatment plants.

Ground water pollution is caused by manure, sewage, waste, fuel, and chemicals and pesticides (Claude E. Boyd 2000).

The farmer's health is affected by cancer; stomach problem etc. by the use of pesticides. The study concluded that there is a need to raise farmer's awareness to use protective handling pesticides (Chitra, G.A., et.al., 2004). Ground Water is mostly affected by fertilizer and pesticides used in agriculture field. The study concluded that the pollution control norms may be effectively used and to enable them to implement environment management projects (Dinesh kumar, M., 2004). Human health is mostly affected by skin problem, liver and lunges problems due to Argenic Water Pollution (Rajashri das Gupta, 2004).

Industrialization and technological development processes have led to the introduction of Hazardous chemical into the environment - Water, air and land. These have increased the number and level of dangerous chemicals such as environmental pollutants (heavy metals), agrochemicals (herbicides, pesticides, halogenated polycyclic hydrocarbons), sewage wastes, food additives and other allied contaminants, thereby, exposing man and animals health wise (Hugg C. C. Maduka, 2006). Human health is mostly affected due to underground drainage water and sewage water is mixing with drinking water as the hand pumps are just above the drainage channel (Lakshmi Kumar, A.C., 2007).

High content of pollutants in the water, which has rendered thousands of people there physically incapacitated due to deadly diseases of cancer (Prakash Singh Badal, 2008). Children's health fever is mostly affected by diseases like botulism, cholera, typhoid due to unclean water. The author suggested that the Drinking water for the baby should be given boiled and cold water at least for the first year of life (Mohamed, A S., 2010).

Drinking water sources, both surface and groundwater are contaminated with coli forms, toxic metals and pesticides throughout the country. Various drinking water quality parameters set by WHO are frequently violated. Human activities like improper disposal of municipal and industrial effluents and indiscriminate applications of agrochemicals in agriculture are the main factors contributing to the deterioration of water quality. Microbial and chemical pollutants are the main factors responsible exclusively or in combination for various public health problems (Azizullah et al., 2010).

Statement of the Problem

Environmental degradation, water pollution and health problems are similar throughout the developing world. Environmental degradation hits the poor worst whose number is over a billion. The Madurai people are the most vulnerable section of the society who is exposed easily to pollution to unclean water in sanitary surroundings. They do not have income to invest in the natural resources such as conservation or to cope up with the risks associated with ecological imbalances. As they do not have choice, they over exploit the natural resources. Neither they are educated nor have political clout to protest against

pollution caused by the environmentally harmful industrial production. Pollution is certainly the most widely discussed external diseconomy. So an attempt is made to find out the presence of water pollution in Madurai city and analyse its health hazards and to find out the costs involved in treating the pollution.

Methodology

The study is analytical and descriptive. The study is based on primary data. For the study, primary data were collected through direct personal interview method by using pre-structured interview schedule. This study covers the geographical area of Kochadai, Goripalayam, Munthirithoppu in Madurai city and Virakanoor, a nearby village panchayat in Madurai District. The study covers a period of one year April 2010 March 2011. For this, a well designed and a pre- tested interview schedule was prepared to collect the information relating to the study. Data were collected from 120 respondents selected by using purposive random sampling method (30 respondents from Kochadai (Ward No 72), 30 respondents from Goripalayam (Ward No15), 30 respondents from Munthirithoppu (Ward No 10) and 30 respondents from Virakanoor village). Initially 10 respondents from each area were approached through pilot study. After the pilot study, some questions were altered in the interview schedule. The researcher collected primary data from 140 respondents. Some 20 interview schedules were not taken into consideration due to inconsistencies and inadequacies in the provision of data by the respondents. Finally data collected from 120 respondents were used and analysed.

Results and Discussion

Water and Health in Madurai City

The Madurai Corporation has provided 91,417 Water Supply Connections of which 86,910 are Domestic Connections, 3690 are Commercial Connections and 817 are Industrial Connections. For Madurai Corporation Water Supply, an annual quantum of 1500 mcft of surface water has been allotted and to be drawn from Vaigai Dam. Out of 1500 mcft, 900 mcft. of water is presently drawn directly from Vaigai Dam. The balance quantity of 600 mcft./year from Vaigai Dam for river bed wetting purpose, is drawn through a system of collector well, infiltrations walls and infiltrations galleries at Thatchampathu, Melakkal and Kochadai.

The Public Health Department of Madurai Corporation looks after the health care system. The town has both government and private run hospitals and clinics. There are approximately 226 hospitals (major & minor) of which 26 major hospitals, 45 maternity and family planning centers, 37 nursing homes and other small clinics. The major hospitals are Rajaji Government Hospital, Christian Mission Hospital, Aravind Eye Hospital, Meenakshi Mission Hospital, Grace Kennet Hospital and Appolo Orient Hospital.

The Corporation maintains 16 Maternity Homes, 17 Urban Health Posts and 19 Dispensaries. Apart from these there are Siddha and Ayurvedic dispensaries maintained by the corporation. There is one school health team that serve school going children. There are separate wings in the health department of the corporation, responsible for malaria and mosquito control and school health programme.

The Corporation implementing several health improvement schemes, viz. Malaria Eradication Programme, Mother child care Programme, Family Welfare Programme, Pulse Polio Programme, School Health Programme and Vazhavoli Thittam.

Sources of Water

The sources of water used by the respondents are presented in Table 1.

Table 1: Sources of Water

S.No	Sources	No. of Respondents	Percentage
1.	Own well	11	9.17
2.	Bore well	25	20.83
3.	Public Tap	55	45.83
4.	Private Tap	29	24.17
Total		120	100.00

Table 1 reveals that 25 respondents (20.83 percent) are using bore wells and 55 respondents (45.83 percent) are using public tap and 29 respondents (24.17 percent) are using private tap. A majority uses public tap.

Uses of Water

Table 2: Uses of Water

S.No	Water	No. of Respondents	Percentage
1.	Drinking	32	26.67
2.	Washing	12	10.00
3.	Cooking	14	11.67
4.	Personal	15	12.50
5.	Hygiene	10	8.33
6.	Gardening	10	8.33
7.	Animals	5	4.17
8.	Cleaning	10	8.33
9.	Other	12	10.00
Total		120	100.00

Table 2 illustrates the data related to the uses of water of the respondents. From the Table 2, it is clearly understood that out of the 120 respondents, highest 32 respondents (26.67 percent) use water for drinking, 12 respondents (10.00 percent) use it for washing, 14 respondents (11.67 percent) use it for cooking and 15 respondents (12.50 percent) for personal.

Consumption Pattern of Water

The water consumption pattern of the respondents is given in Table 3.

Table 3: Water Consumption Pattern

Sl. No	Consumption pattern	No. of Respondents	Percentage
1.	Corporation	45	37.50
2.	Panchayat	20	16.67
3.	Private Water Supply	16	13.33
4.	Own Source	25	20.83
5.	Others	14	11.67
Total		120	100.00

It is clearly shown in Table 3 that out of 120 respondents, 45 respondents (37.50 percent) are provided by corporation water and 20 respondents (16.67 percent) are provided by panchayat water, and 25 respondents (20.83 percent) are getting water from own sources.

Quality of Bore Well Water At Home

The quality of home water in the study area is mostly either salt or potable, which is presented in Table 4.

Table 4: Quality of Bore Well Water At Home

S.No	Home Water	No. of Respondents	Percentage
1.	Salt	59	49.17
2.	Potable	62	51.67
Total		120	100.0

Out of 120 sample respondents, as vividly presented in table 4, 58 respondents (48.33 percent) have pointed out that the quality of their home water is salty and 62 respondents (51.67 percent) are of the view that it is potable.

Cleaning of Water Storage Facility

The cleaning of water storage facility at home by respondents is presented in Table 5.

Table 5: Cleaning of Water Storage Facility

S. No	Frequency of Cleaning	No. of Respondents	Percentage
1.	Fortnightly	20	16.67
2.	Monthly	42	35.00
3.	Quarterly/Half-yearly	58	48.33
Total		120	100.00

Table 5 exhibits that 42 respondents (35.00) are cleaning it monthly, and the majority 58 respondents (48.33 percent) clean it either quarterly or half-yearly.

Water Related Diseases

Table 6: Water Related Disease

S.No	Diseases	No.of Respondents	Percentage
1.	Diarrhoea	39	32.50
2.	Viral Fever	11	9.17
3.	Cholera	28	23.33
4.	Others	42	35.00
Total		120	100.00

The water related diseases found from the study are listed in Table 6 It is clearly shown in table 6 that out of 120 respondents, 39 respondents (32.50 percent) are found to be affected by diarrhea and 11 are affected by viral fever. The diseases

like cholera have affected 28 respondents (23.33 percent). The other diseases like skin diseases; itching, wounds etc are reported by 42 respondents (35. 00 percent).

Means of Water Pollution

Table 7 explains the various means of water pollution in Madurai city.

Table 7: Means of Water Pollution

S. No	Means of water	No. of Respondents	Percentage
1.	Disposal of Domestic wastes	22	18.33
2.	Drainage	11	9.17
3.	Hospitals	16	13.33
4.	Unawareness of the people	26	21.67
5.	Others	45	37.50
Total		120	100

The study has found out certain means that pollute water. According to table 7, 26 respondents (21. 67 percent) treat lack of unawareness about pollution among people is the main means of pollution. Drainage and Hospitals disposals are identified by 11 respondents (9.17 percent) and 16 respondents (13.33 percent)

respectively. The other 22 respondents (18.33 percent) have said that the disposal of domestic wastes pollutes water. The other reasons like chemical concentration, mixing of human waste, improper cleaning of water storage at home etc are pointed out by 45 respondents (37.50 percent).

Water Related Diseases Affected in the Previous Two Years

Table 8 explains the water related diseases affected in the previous two years.

Table 8: Water Related Diseases Affected in the Previous Two Years

S.No	Disease Affected	No. of Respondents	Percentage
1.	Yes	28	23.33
2.	No	92	76.67
Total		120	100.00

Out of 120 sample respondents, as vividly presented in Table 8, 28 respondents (23.33 percent) have revealed that the water related diseases affected their health in the

previous two years and 92 respondents (76.67 percent) have opined that the water related diseases have not affected their health in the previous two years.

Average Amount of Expenditure for Water per Day

Table 9 sets out the information regarding average amount of expenditure for water per day.

Table 9: Amount of Money Spent for Water per Day

S. No	Amount of money spent	No. of Respondents	Percentage
1.	Below Rs 5	35	29.17
2.	Rs.5 - Rs.10	15	12.50
3.	Rs.10 - Rs.20	30	25.00
4.	Rs. 20- Rs.30	11	9.17
5.	Rs.30 - Rs.40	29	24.16
Total		120	100.00

According to Table 9, out of the 120 respondents, 35 respondents (29.17 percent) spend below Rs. 5 for water per day, 15 respondents (12.50 percent) spend Rs.5 - Rs.10 for water per day and 30 respondents (25.00 percent) spend Rs.10 - Rs.20 for water per day. Eleven respondents (9.17 percent) spend Rs.20 - Rs.30 for water per day and 29 respondents (24.16 percent) spend Rs.30 - Rs. 40 for water per day.

Water Purifier at Home

The availability of water purifier in the houses of the respondents is given in Table 10.

Table 10: Water Purifier At Home

S. No	Water Purifier at Home	No. of Respondents	Percentage
1.	Installed	28	23.33
2.	Not installed	92	76.67
Total		120	100.00

Table 10 implies that only 28 respondents (23.33 percent) are using water purifier at home and 92 respondents (76.67 percent) are found not to be using water purifier.

The Cost of Reverse Osmosis System Installed for Home

The cost of reverse osmosis system installed for home by respondents is presented in Table 11.

Table 11: Cost of Reverse Osmosis System Installed for Home

S. No	Cost	No. of Responstns.	Percentage
1.	Below Rs.8000	5	17.86
2.	Rs.8001-Rs. 10000	9	32.14
3.	Rs.10001-Rs. 12000	4	14.29
4.	Above Rs. 12000	10	35.71
Total		28	100.00

According to Table 11, 5 respondents (17.86 percent) spend below Rs.8000, 9 respondents (32.14) spend Rs.8001-Rs.10000, 4 respondents (14.29) spend Rs.10001-Rs.12000 and remaining 10 respondents (35.71) spend above Rs.12000 for the installation of

Reverse Osmosis System for their homes. It is clear that the majority of respondents spend in the range between Rs.8001 and above Rs.12000 towards installation of Reverse Osmosis System.

Total Dissolved Solid (TDS) For Home Water

Table 12 shows the information regarding Total Dissolved Solid (TDS) for home water.

Table 12: Total Dissolved Solid (TDS) For Home Water

S. No	Total Dissolved Solid	No. of Responst.	Percentage
1.	Below 600 ppm	14	50.00
2.	Between 601 ppm to 800ppm	2	7.14
3.	Between 801 ppm to 1000ppm	0	0
4.	Above Rs 1000 ppm	12	42.86
Total		28	100.00

Table 12 illustrates the total dissolved solid (TDS) for home water conducted by private agency on behalf of the corporation. It is shown that 14 respondents (50 percent) say that the TDS for home water is below 600 ppm, 2 respondents (7.14 percent) point out that the TDS for home water is between 601 ppm to 800 ppm and 12 respondents (42.86 percent) reveal that the TDS for home water is above 1000 ppm.

The Cost of Maintenance of Reverse Osmosis System per Annum

The cost of maintenance of reverse osmosis system installed for house by respondents is presented in Table 13.

Table 13: Cost of Maintenance of Reverse Osmosis System per Annum

S. No	Cost	No. of Responst.	Percentage
1.	Below Rs.800	3	10.71
2.	Rs. 801-Rs. 1000	6	21.42
3.	Rs. 1001-Rs. 1200	11	39.29
4.	Above Rs. 1200	8	28.58
Total		28	100.00

The table shows that of 28 respondents, who installed reverse osmosis system at home, 3 respondents (10.71 percent) spend below Rs.800, 6 respondents (21.42) spend Rs.801 - Rs.1000, 11 respondents (39.29) spend

Rs.1001-Rs.1200 and remaining 8 respondents (28.58) spend above Rs.1200. It is understood from the table that the majority respondents' maintenance cost per annum with regard to Reverse Osmosis System ranges from Rs.1001 to above Rs.1200.

Water Testing At the Home

The responses regarding testing of home water done by the respondents are given in Table 14.

Table 14: Water Testing At the Home

S. No	Response	No. of Responds.	Percentage
1.	Tested	38	31.67
2.	Not Tested	82	68.33
Total		120	100.00

It can be concluded from Table 14 that 82 respondents (68.33 percent) have not tested their home water and 38 respondents (31.67 percent) state that they have tested the water available at home. It shows

that the majority of people don't understand the importance of water testing.

Cost of Water Testing

The cost of water testing done by respondents is presented in Table 15.

Table 15: Cost of Water Testing

S. No	Cost	No. of Responds.	Percentage
1.	No test conducted	69	57.50
2.	Below Rs. 500	14	11.67
3.	Rs. 500- Rs.1000	26	21.66
4.	Rs.1000-Rs.1500	11	9.17
Total		120	100.00

Table 15 exhibits that 26 respondents (21.66 percent) reveal that the cost of water testing ranges between Rs. 500 and Rs. 1500. Fourteen respondents (11.67 percent) point out that it is below Rs. 500 and 11 respondents (9.17 percent) are of the view that it is from Rs. 1000 to Rs. 1500.

Charges Collected by the Water Testing Agency

Table 16 sets out the information regarding charges collected by the water testing agency.

Table 16: Charges Collected by the Water Testing Agency

S. No	Amount of money spent	No. of Responds.	Percentage
1.	Below Rs 500	35	29.17
2.	Rs.500 - Rs.1000	15	12.50
3.	Rs.1000- Rs.2000	30	25.00
4.	Rs. 2000-Rs.3000	11	9.17
5.	Rs.3000- Rs.4000	29	24.16
Total		120	100.00

According to Table 16 out of the 120 respondents, 35 respondents (29.17 per cent) paid below Rs.500, 15 respondents (12.50 percent) paid Rs. 500-Rs.1000, 30 respondents (25.00 percent) paid Rs. 1000-Rs.2000 for water testing by

different agencies. Eleven respondents (9.17 percent) paid Rs. 2000-Rs.3000 and 29 respondents (24.16 percent) paid Rs.3000-Rs.4000 for testing the water.

Nature of Hospitals to Take Treatment for Diseases

The nature of hospitals to take treatment for diseases by respondents is presented in Table 17.

Table 17: Nature of Hospitals to Take Treatment for Diseases

S. No	Hospitals	No. of Responds.	Percentage
1.	Public Owned	56	46.67
2.	Private Owned	64	53.33
Total		120	100.00

Table 17 exhibits that 56 respondents (46.67 percent) reveal that the nature of hospitals to take treatment for diseases is public owned hospitals and 64 respondents

(53.33 percent) quote that the nature of hospitals to take treatment for diseases is private owned hospitals.

Cost of Treatment of Diseases in a Publicly Owned Hospital

The cost of treatment of diseases in a publicly owned hospital by respondents is presented in Table 18.

Table 18: Cost of Treatment of Diseases in a Publicly Owned Hospital

S. No	Cost	No. of Responds.	Percentage
1.	Below Rs. 20	26	21.67
2.	Rs.20-Rs. 30	16	13.33
3.	Rs.30-Rs. 40	45	37.50
4.	Rs.40 -Rs.50	22	18.33
5.	Above Rs.50	11	9.17
Total		120	100.00

According to Table 18, out of the 120 respondents, 26 respondents (21.67 percent) spend below Rs. 20 for publicly owned hospital, 16 respondents (13.33 percent) spend Rs. 20 - Rs .30 and 45 respondents (37.50 percent) spend Rs.30- Rs. 40.

Eleven respondents (9.17 percent) spend above Rs.50 for publicly owned hospital and 29 respondents (24.16 percent) spend Rs. 40 - Rs. 50.

Cost of Treatment of Diseases in a Private Owned Hospital

The cost of treatment of diseases in a private owned hospital by respondents is presented in Table 19.

Table 19: Cost of Treatment of Diseases in a Private Owned Hospital

S. No	Cost	No. of Responds.	Percentage
1.	Below Rs. 100	22	18.33
2.	Rs.100-Rs. 200	45	37.50
3.	Rs.200-Rs. 300	11	9.17
4.	Rs.300 -Rs.400	26	21.67
5.	Above Rs.500	16	13.33
Total		120	100.00

According to Table 19, out of the 120 respondents, 22 respondents (18.33 percent) spend below Rs. 100 for private owned hospital, 45 respondents (37.50 percent) spend Rs.100 - Rs.200, 11 respondents (9.17 percent) spend Rs. 30- Rs. 40, 26 respondents (21.67 percent)

spend Rs.300-Rs.400, 16 respondents (13.33 percent) spend above Rs. 500 for taking treatment in a private owned hospital.

Average Monthly Expenditure on Medical Treatment of Water-Borne Diseases

Table 20 illustrates the data related to the average monthly expenditure on medical treatment of water-borne diseases of the respondents.

Table 20: Average Monthly Expenditure on Medical Treatment

S. No	Monthly expenditure	No. of Responds.	Percentage
1.	Below Rs.1,000	26	21.67
2.	Rs.1,000- Rs.1,500	16	13.33
3.	Rs.1,500- Rs.2,000	45	37.50
4.	Rs.2,000 - Rs.2,500	22	18.33
5.	Above Rs.3,000	11	9.17
Total		120	100.00

From the above table, it is observed that 20 (21.67 percent) respondents are in the average monthly expenditure on medical treatment of water-borne diseases of below Rs.1,000, and 16 (13.33 percent) respondents are in the range of Rs.1,000- Rs.1,500. The study also found that 45 (37.50 percent) respondents spend on an average

Rs.1,500- Rs.2,000 per month, 22 (18.33 percent) respondents are in the Rs.2,000 - Rs.2,500 range of monthly expenditure and 11 (9.17 percent) respondents are in the monthly expenditure on medical treatment of water above Rs.3,000.

Findings and Conclusion

The important findings of the study are:

- The study reveals that 55 respondents (45.83 percent) are using public tap to fetch water.
- As inferred from the study, the highest 32 respondents (26.67 percent) use water for drinking.
- It is seen that 45 respondents (37.50 percent) are provided water by Madurai Corporation.
- The study also shows that 58 respondents (48.33 percent) are of the opinion that the quality of their home water is salty.
- It is found that the majority 58 respondents (48.33 percent) clean water storage facility either quarterly or half-yearly.
- As observed from the study, 39 respondents (32.50 percent) are found to be affected by diarrhea and the diseases like cholera have affected 28 respondents (23.33 percent).
- The study concluded that lack of unawareness about pollution among people, drainage and hospitals disposals, disposal of domestic wastes, chemical

concentration, mixing of human waste, and improper cleaning of water storage at home etc are the causes for water pollution.

- The study has shown that 28 respondents (23.33 percent) have exposed to the water related diseases affected their health in the previous two years.
- Another finding is that 35 respondents (29.17 percent) spend below Rs. 5 for water per day.
- As found from the study that 28 respondents (23.33 percent) are using water purifier at home.
- It is known from it that the majority of respondents (35.71) spend in the range between Rs.8001 and above Rs.12000 towards installation of Reverse Osmosis System.
- It is shown that 14 respondents (50percent) say that the TDS for home water is below 600 ppm and 12 respondents (42.86 percent) reveal that the TDS for home water is above 1000 ppm. When the TDS is below or equal to 700 ppm, water is potable.
- It is understood from the table that the majority (39.29 per cent) respondents' maintenance cost per annum with regard to Reverse Osmosis System ranges from Rs.1001 to above Rs.1200.
- The study further reveals that the majority of people (68.33 percent) don't understand the importance of water testing.
- It is also found that according to 30. 83 percent respondents, the cost of water testing ranges between Rs. 500 and Rs. 4000.As understood from the study, the 35 respondents (29.17 percent) paid below Rs. 500 for testing the water.
- The study has shown that 56 respondents (46.67 percent) utilized public owned hospitals to take treatment for diseases and 64 respondents (53.33 percent) got treatment from private owned hospitals.
- According to the study, the cost of treatment in publicly owned hospital ranges from Rs.20 - Rs. 50 per visit. It is higher in private owned hospital since the cost ranges from Rs.100 to above Rs. 500 for taking treatment.
- The study has brought out that the average monthly expenditure on medical treatment of water-borne diseases ranges from Rs.1000 to above Rs.3000. The study also found that 45 (37.50 percent) respondents spend on an average Rs.1,500-Rs.2,000 per month.

Conclusion

In conclusion it can be stated that water pollution due to the causes best known to the people and that can be avoided makes Madurai people easily exposed to water-borne diseases. The disposal of domestic wastes, open defecation in Vaigai River, hospital wastes, irregular cleaning of water storage facility, unplanned drainages and so on so forth need to be well addressed in order to avoid water polluting substances intruding into the living mechanisms which affect human health. If it is checked, then the health care expenditure can be avoided.

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