

**A REPORT ON DRINKING WATER AND ISSUES OF HEALTH AND HYGIENE IN
URBAN POPULATION OF SOLAN (H.P.) INDIA****Shalini Chouhan***

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ABSTRACT

Safe drinking water and provision of sanitation are most important contributing factors for improvement of the public health. A small study was undertaken in Solan town by randomly selecting eight urban localities in February-March, 2016. We selected 120 households to generate quantitative and qualitative data on selected parameters and indicators. Respondents were asked to identify the main source of household water supply and interviewed elaborately about their methods of procurement, household level treatment of water, leakage of water pipes, leakage of sewerage pipes in the vicinity of household, hygiene practices and incidences of water borne diseases. The report brings together information about drinking water sources, methods of collecting and storing water at household level, chances of water borne diseases, hygiene practices and overall awareness amongst people. People used conventional filters as well as advanced filters while the most common method for decontamination was reported as boiling. 20.83% reported leakage of water pipes and 17.5% reported leakage of sewerage. Furthermore, 21.66% were reported to have suffered from water borne diseases during last six months. Effective household treatment, safe storage and hygiene practices can provide significant protection against water borne diseases.

KEYWORDS: Drinking water, health, hygiene, water borne diseases.**INTRODUCTION**

Providing safe drinking water and adopting proper hygiene practices should be one of the priorities for quality living by the states. The quality of drinking water serves as a very important component in maintaining good health of a population. Unsafe water, sanitation and poor hygiene contribute to a large number of deaths, estimated at about 0.45 million in India alone.^[1] The challenges associated with urban water supply and sanitation in India has been recognized recently. These challenges have been tried to be addressed by the Government in recent years, yet in some areas, the conditions are not satisfactory due to overcrowding and unawareness. According to a report, about 37.7 million Indians suffer from water-borne diseases due to poor quality of drinking water annually; 1.5 million children die due to diarrhea.^[2] Furthermore, it accounts for loss of 73 million working days every year which results in estimated economic burden of \$600 million every year. There are many reasons for such a scenario with regard to water supply that is not very suitable for consumption such as over population, uneven supply of water in states or cities, rural influx, poverty, unawareness, lack of education, practices and rituals, discharge of untreated sewage into water resources etc. There are countries like South Africa and Ecuador in the world where the Constitution specifically mentions a fundamental right to

water.^[3] Furthermore, despite of much litigation in different courts pertaining to water issues, in India minimum core obligation to supply minimal required amount to every citizen has not yet been defined and specified either by legislation or courts. However, many schemes have been implemented by the Government of India to provide clean drinking water since independence. According to a report, till 10th plan Rs 1105 billion have been spent on providing safe drinking water yet safe and secure drinking water continues to be a matter of concern and national economic burden.^[2] Having access to drinking water continues to be a problem, simultaneously assuring whether it is safe, is a challenge itself. Water quality is affected by a number of reasons such as pollution, drought, and flood and also from lack of awareness and education amongst users. There is an urgent need for the user involvement in maintaining water quality at the source and also looking at other aspects like hygiene, environment sanitation, storage and disposal for proper maintenance of water quality and community health at large.

Many schemes and policies have been made with respect to drinking water supply since independence which has undergone a transition due to change in technology and requirement. In 1949, the Environment Hygiene Committee recommended the provision of safe water

supply to cover 90% of India's population in timeframe of forty years.^[2] Further, a national water policy was implemented in 1987 which was revised in year 2002. Further, water quality is now being considered an important part of the Governmental programme. Since year 2000, monitoring of water quality has been given a high priority and many institutional mechanisms have been developed at national, state, block and panchayat levels. The government has also outlined certain requisite mechanisms to monitor the quality of drinking water and devise effective information, education and communication interventions to disseminate and educate people on health and hygiene.

If we talk about dealing with maintenance of water quality, the users and in large the communities have to play a key role in maintaining hygiene near water sources. One has to improve the ways of collecting and storing water so as to avoid contamination prior to use. Contamination of water by microorganisms continues to be a widespread problem across the country and is major cause of illness and deaths with 37.3 million people affected by water borne diseases annually.^[2] Major pathogens of water borne diseases are: Bacteria (*E.coli*, *V. cholera*), Viruses (*Hepatitis A*, *Rota Virus*) and Protozoans (*E. histolytica*, *Giardia*). Further, these major infectious agents are spread by oro-faecal route, therefore, besides clean drinking water, hygienic disposal of human excreta also plays an important role in community health. Unsafe water and sanitation contribute to 94% diarrheal disease burden.^[1] This study comes out three months after an outbreak of jaundice in Shimla and Solan towns due to contamination of water at source from a nearby sewerage plant. A survey was conducted from February to April, 2015 in randomly selected urban localities of Solan town to know how the users procure and store water, awareness about treatment of water, hygiene practices and whether there were incidences of any water borne diseases prior to 2-3 months of the study period. Further, we tried to find out if there was any relation between their economic status and the methods opted for household treatment. We also tried to find out whether people were aware about contamination of the drinking water due to leakage of sewage pipes around their houses.

METHODOLOGY

Study was undertaken in Solan town of Himachal Pradesh by randomly selecting eight urban localities. One twenty households were selected to generate data on selected parameters and indicators. A questionnaire was designed to gather information and respondents were asked to identify main source of household water supply, methods of procurement, household level treatment, leakage of water pipes, and leakage of sewerage pipes in the vicinity of household, hygiene practices and incidences of water borne diseases. Study areas included Sarita Bihar (Chambaghat), Chamunda Colony (Kather), Subzi Mandi, Surya Bihar, Shamti, Ward No-12, New

Bus Stand (Bye Pass) and Police Lines (Bye Pass).

The data was compiled and analyzed statistically. Chi square and Fischer's exact probability tests were applied wherever required.

OBSERVATIONS AND RESULTS

Solan is a district of Himachal Pradesh (H.P.), Northern state of India. Solan is located at 77.15E and 30.92N. District Solan is surrounded by Sirmour, Shimla and Bilaspur Districts of H.P. Total number of urban households in Solan are 9970 as per the records of Town and Country Planning Department of Himachal Pradesh, Shimla-9. Solan is fed by two surface water sources mainly; a) Ashani Khadd having its origin in Shimla and b) Giri which originates from Sirmour (Figs 1 & 2a,b). Sixty percent of the sample had water supply from Giri while the remaining thirty three percent received water from Ashani Khadd (Fig 3a). Further, 100% had piped water supply.

Sample under study fell into three income groups: low (34%), middle (52%) and high income (14%) groups (Fig 3b). The study revealed that 29% of the household consumed tap water directly without any treatment, 22% used conventional filters and 48% used advanced filters while 1% could not specify (Fig 3c). Further, it was reported during the study that the method of treating water at house hold level was independent of the economic status of the users ($p>0.05$). The study revealed that 91% people were taking measures with regard to cleaning of the candles of conventional filters while 6% did not clean the candles, 1% gave no response. Furthermore, 30% took care of the candle regularly every month. Similarly, 87% of the households using advanced filters also changed the candles (Fig 4 a, b & c). It was found out that 88% of the household boiled water before consuming irrespective of the water directly drawn from tap or using any kind of filtration method. Further, it was reported that boiling of water and no incidence of water borne disease was significantly dependent ($p<0.001$; Fig 5 a,b). It was revealed that boiling time and incidences of water borne disease were independent (Fig 5 c). It also came out during study that 76% of households stored water in containers of which 97.82% covered the storage containers. Further, there was no significant difference in monthly expenditure on common disease after consumption of tap water or after house hold treatment methods other than boiling (Fig 6). Another parameter taken was whether there was any leakage of sewers in the vicinity of households taken for study. It was found out that there were leakages of sewerage pipes around 18% of the households whereas many (21%) reported wastage of water by leakage of pipes (Fig 7&8). Twenty eight households reported that at least one member suffered different kinds of water borne diseases (Typhoid, Jaundice and Diarrhea) at least three months prior to this study.

Figure Legends

Figure 1: Map of Solan showing source of water (* Ashani, #Giri), Courtesy: <http://www.mapsofindia.com/maps/himachalpradesh/solan-city-map.html>

Figure 2: *a*, Ashani Water Plant (Source: himachalwatcher.com). *b*, Giri Water Plant.

Figure 3: *a*, Source of water for the households in area of study. *b*, Different income groups in the sample. *c*, Method of treatment of water at household level; as per Chi square different treatment methods were independent of economic status ($p > 0.05$, $n = 120$.)

Figure 4: *a*, Data for cleaning of candles of conventional filters. *b*, Routine of cleaning of candles of conventional filters. *c*, Changing of cartridges of advanced filters.

Figure 5: *a*, Data for boiling of water before consumption by households *b*, Pie chart showing the relation between boiling of water and incidences of water borne diseases; as per Chi square test, boiling of water and no incidence of water borne diseases are dependent ($p < 0.001$, $n = 90$). *c*, Bar diagram showing relation between incidences of water borne diseases and boiling time of water (Fischer's Exact probability test; $p = 0.705$, $N = 90$)

Figure 6: *a*, Bar diagram depicting monthly expenditure on common diseases by households using water from tap, conventional and advanced filters (Chi square test; $p > 0.05$, $n = 120$).

Figure 7: Provision for sewerage tanks in area of study.

Figure 8: Leakage of sewerage pipes in the vicinity of households.

Figure 9: Leakage of water pipes.

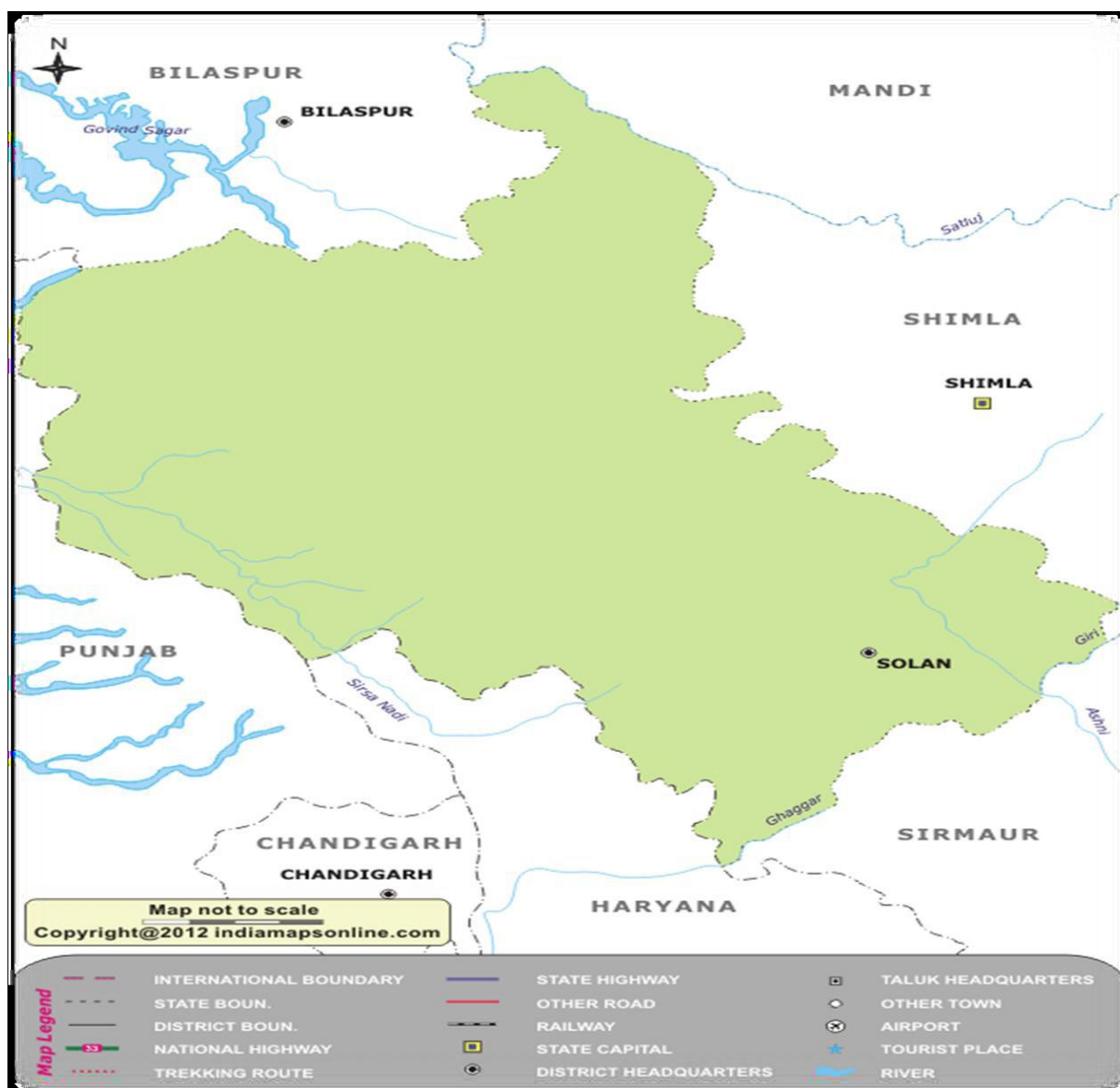


Figure 1: (Courtesy: <http://www.mapsofindia.com/maps/himachalpradesh/solan-city-map.html>)^[11]

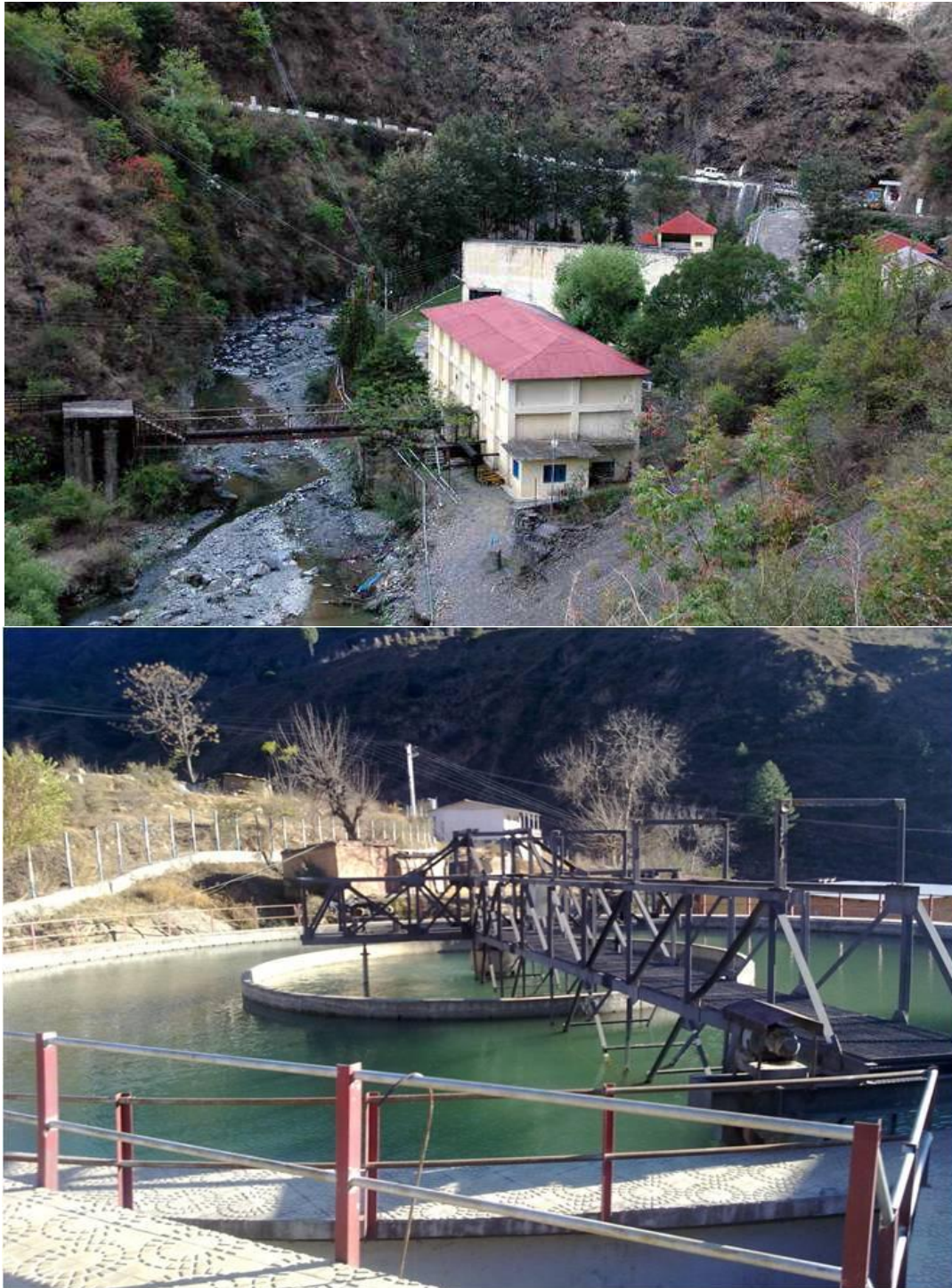
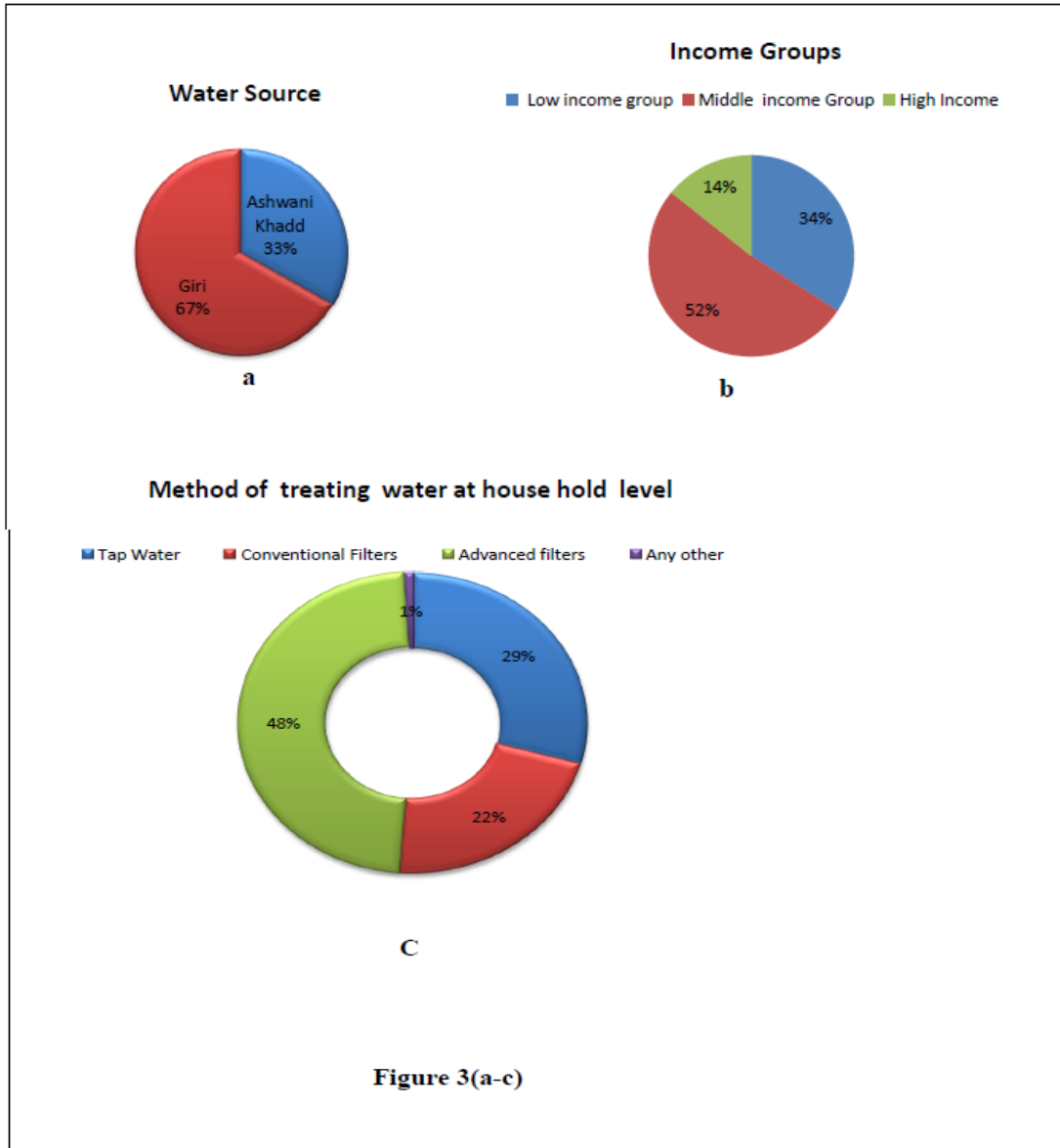
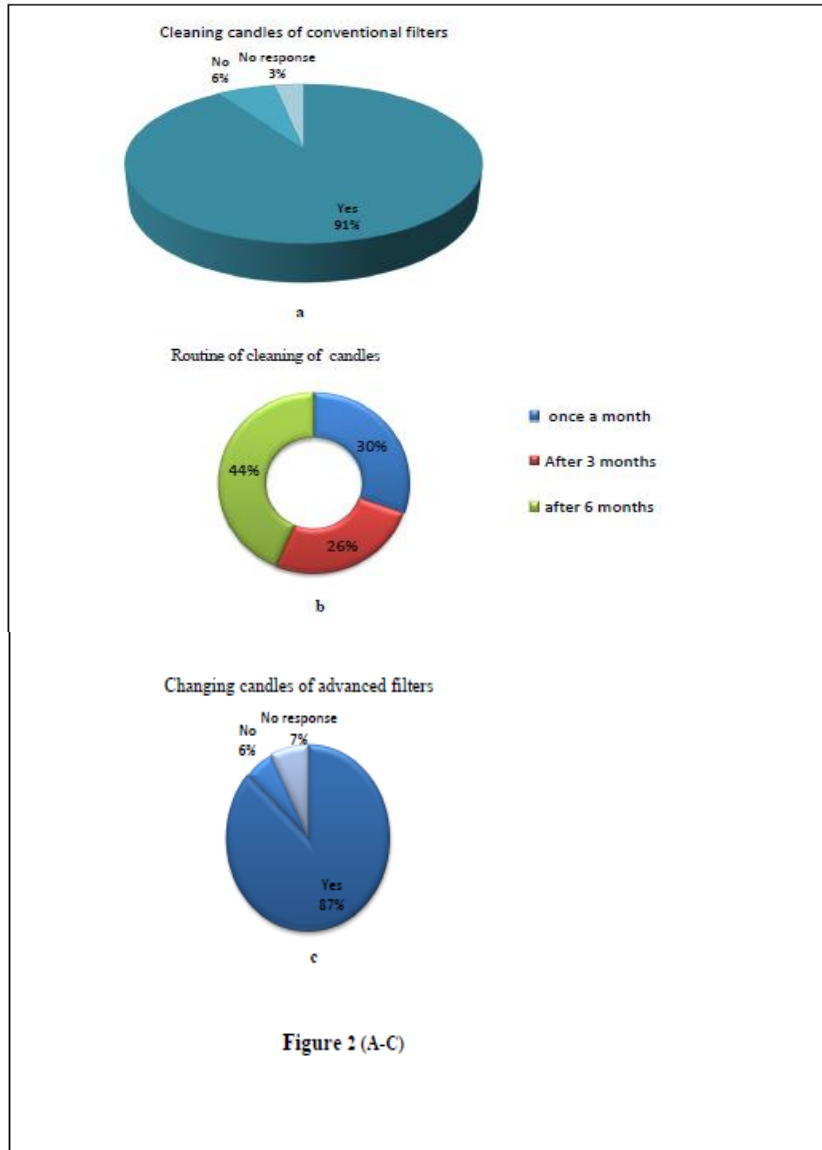
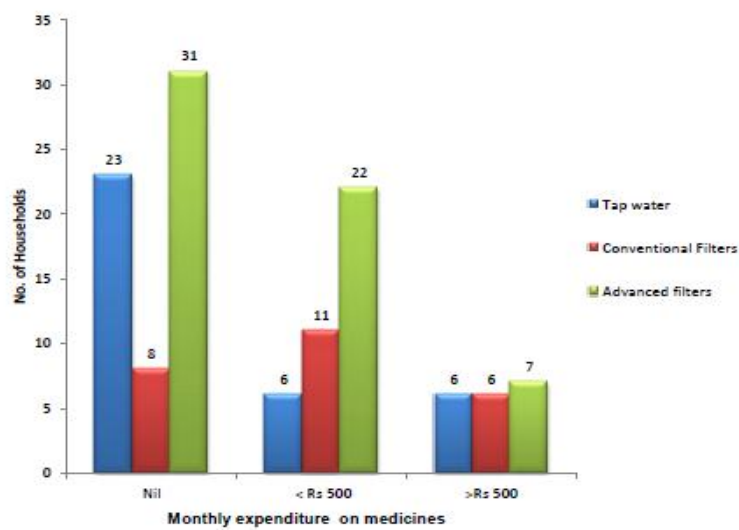
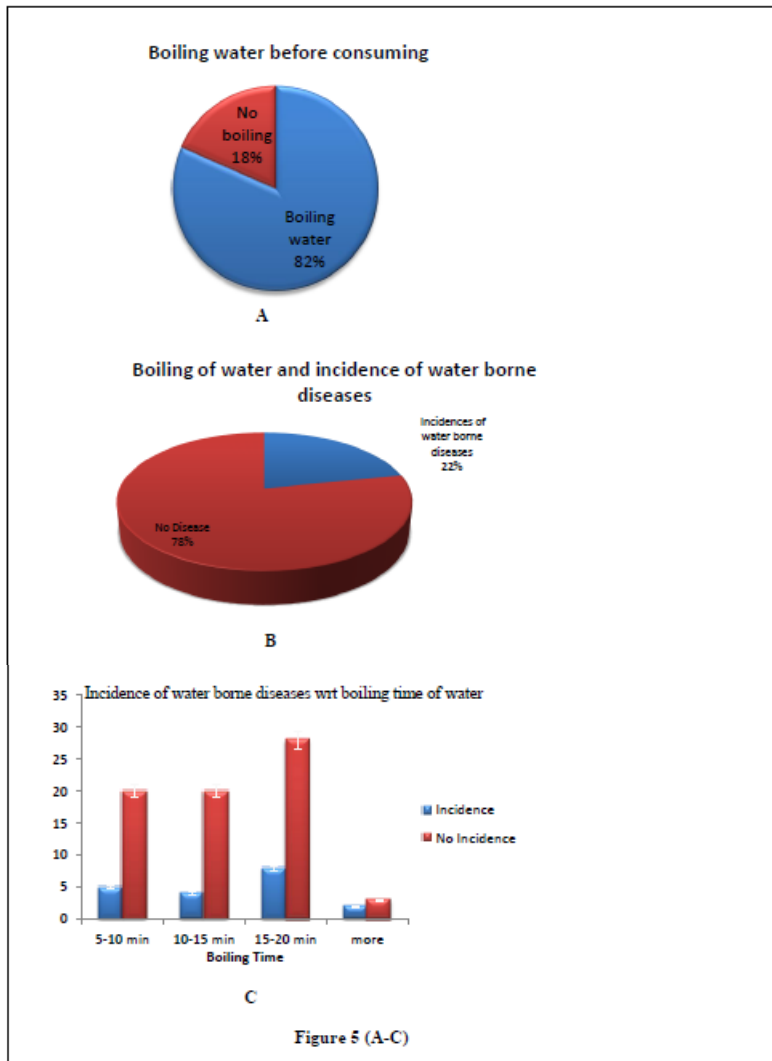


Figure 2 (a-b): (Courtesy: <https://himachalwatcher.com>)^[12]







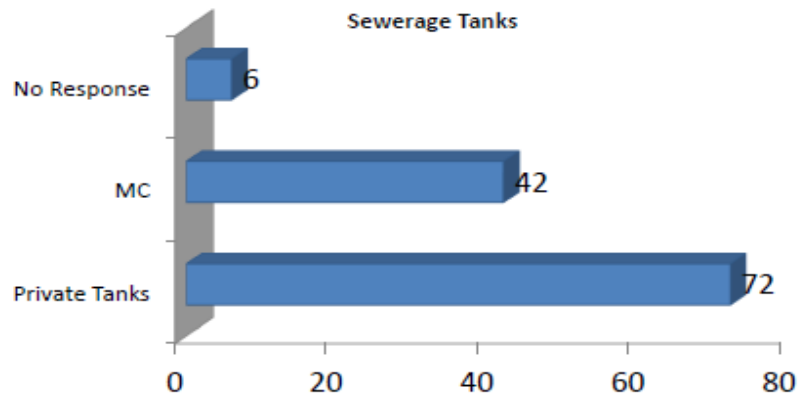


Figure 7



Figure 8

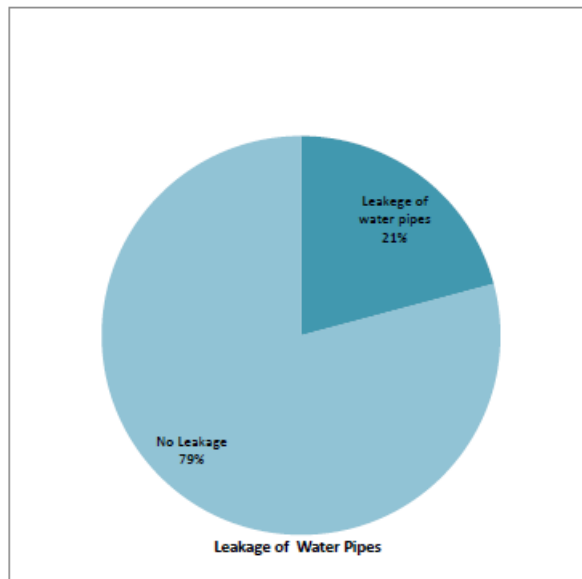


Figure 9

DISCUSSION

In India, the primary responsibility of providing clean water and sanitation facilities lies with the State Governments where the Central Government allocates funds for various schemes and for developing human resources through trainings to ensure the implementations of the water supply programmes and proper sanitation facility. Every citizen must be made aware of the demand for clean drinking water as a right and one must be aware of the fact that bottled water is not the solution for the problem of a common man. Further, citizens of India besides enjoying the rights are ought to perform some duties also. Article 51A (g) directs a fundamental duty on every citizen of India to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures.^[4] Global changes such as human development, increase in population, migration and climate change exert pressure on quality and quantity of water resources that may increase the threat of water borne diseases. The user should be made aware of the importance of preventing contamination of water and also of the importance of clean and healthy surroundings near water sources.

During this study, it was found out that there was 100% piped water supply which is rather on higher side than state data (94.4%) as well as National data 70% according to 2011 Census (Ministry of Statistics, Government of India). Furthermore, about 60% tap water is treated water which means all the piped water may not be treated at least to tertiary level in a developing country like India. Henceforth, users need to treat water at household level as the water that looks clean may not be safe. Therefore, one of the biggest concerns at household level remains that of contamination and its consequent effect on health. Cleaning of the storage tanks was also taken into account as the practice of covering and cleaning of the tanks used for storage is also linked to health issues. The study revealed that 76% of households stored water in containers of which 97.82% covered the storage containers. Further, the water tanks were cleaned by 57.5% households twice and by 32.5% cleaned once a year, rest did not respond. As per a report, 54.4% households treat water prior to consumption.^[5] The survey revealed that 48% households treated water using ROs, Aquaguard, and UV filters whereas 22% used conventional filters while 29% used tap water. Those who treated water using advanced filters changed the candles (87%) which is indicative of the mandatory requisite for purification of water, however, others were either careless or were unaware of the fact. One of the interesting outcomes of this study was that 88% of the household boiled water irrespective of the fact whether using direct tap water or using filters of any kind as boiling of water reduced the incidences of water borne diseases. Furthermore, boiling time of water and incidences of water borne disease were independent hinting that most of causative agents are killed between 60-100°C as per WHO report.^[6,7]

From this study, we have come to the conclusion that in the sample of study in Solan urban, majority of the people were aware about hygiene practices and they were more alert about consuming safe drinking water after having faced the spread of jaundice. We reported that more than eighty five percent of households treated drinking water by boiling and stayed safe instead of contaminated water supply in the town.^[8] It was reported during the study that there were leakage of water pipes in the vicinity of 21% of the households. According to a report by Central Pollution Control Board, water, through leakage and wastage in Indian cities ranges between about 20-40% while 80% of it occurs during distribution and at user's end.^[9] Furthermore, if 10% of the leakage losses are conserved, then it would be possible to save about Rs. 550 crores per year by way of reduction in production cost. Thus, there is an urgent need for periodic leak detection and control measures to conserve the valuable treated water. Although improved water supplies should be provided not only with effective technology but with a proper monitoring system. However, several problems remain, such as poor operation and maintenance, inappropriate choice of technology, inadequate revenue collection, failure to sustain community participation, and high rates of water leakage and wastage. As per a WHO report, effective use of household water treatment can provide better quality drinking-water than either improved point sources or basic piped water, but is still below systematically managed piped water.^[10] The state must ensure that the accountability of managing and monitoring bodies must be fixed. Awareness about clean potable water, hygiene practices, monitoring agencies, proper implication of the technologies and above all community involvement is a need of the hour to have a healthy and economically prosperous society.

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