WATER SUPPLY AND SANITATION AND THEIR IMPACT ON HEALTH IN KURSEONG TOWN

AMRITA BISWAS

Department of Geography

School of Human Science

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Declaration

I hereby declare that this dissertation entitled **"Water Supply and Sanitation and their Impact on Health in Kurseong Town"** was carried out by me. The work that I am submitting has not been awarded any degree prior to this, by any other university or institute.

This is submitted in partial fulfillment of the requirement for the award of the **Degree of Master of Philosophy**, to the Department of Geography, School of Human Sciences, Sikkim University.

(Amrito Biswas)

Roll No.: 14MPGP01

Regd. No.: 14SU15543

The dissertation is recommended to be placed before the examiners for evaluation.

(Dr. Uttam Lal)

Head of the Department

(Dr. E. Ishwarjit Singh)

Supervisor

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Amrita Biswas

LIST OF TABLES

LIST OF FIGURES

LIST OF BOX

LIST OF ACRONYMS

- **BPL** Below Poverty Line
- **DDP** Draft Development Plan
- **DJB** Delhi Jal Board
- **DRDO** Defense Research and Development Organization
- **FGD** Focus Group Discussion
- **GI** Galvanized Iron
- **GTA** Gorkhaland Territorial Administration
- **HHWs** Honorary Health Workers
- **HIG** High Income Group
- **ICS** Indian Civil Service
- **LPCD** Liters Per Capita Per Day
- **MIG** Middle Income Group
- **MSL** Mean Sea Level
- **NGO** Non-governmental Organization
- **PPP** Public Private Partnership
- **PHE Dept.** Public Health Engineering Department
- **RCC** Reinforced Cement Concreate
- **SANA** Social Awareness Newer Alternative
- **T.B.** Tuberculosis
- **UHRC** Urban Health Research Centre
- **ULB** Urban Local Bodies
- **UN** United Nations
- **UNESCO** United Nations Educational Scientific and Cultural Organization
- **WASH** Water Sanitation and Hygiene
- **WHO** World Health Organization

CONTENTS

Page No.

"So many people that I've seen can't get clean water. It's a crime."

…..Z. Jay

Water and sanitation is one of the key drivers for achieving public health. But in recent year due to an unabated population growth, changes in global landscape and rapid urbanization, the world faces a biggest challenge for adequate clean water and safe sanitation which restrain public health efforts. Poor quality of water and unsafe sanitation practices is a great threat for human health. Unsafe drinking water, sanitation and hygiene practices claim the lives of 1.5 million people each year (WHO, 2012).

In 2000, the United Nations created a global action plan to address the worldwide issues of poverty, disease, food security, and human rights in the form of Millennium Development Goals (MDGs). Under this framework the United Nations set a goal to achieve the target of 50% population of the world to access with improved sanitation and improved drinking water sources by the year 2015. According to WHO progress report on water and sanitation 2015, the target for drinking water was met 5 years ahead of the schedule but the target for sanitation was missed by nearly 700 million (10% of the world population). Still access to safe water and sanitation facility is a big challenge for developing world where population is also increased rapidly. The main factors responsible for this situation are lack of priority given to these sectors, inadequate financial resources, inadequate water supply and sanitation services and poor hygienic behaviours.

India has also been facing water and sanitation related problems, though the country is blessed with good rainfall over 5-6 months in a year. The average annual rainfall in the country is 1170 mm. which appears to be sufficient for drinking water. This scenario is somewhat different in spatio-temporal variation. For instance, in Delhi 13% of the citizens do not get water every day, 40% of households of Madhya Pradesh are not supplied even 40 liters per person per day (D' Monte, 2015). Apart from this, the quality of water is also a serious concern for the people of the country. 8% of the India's population today does not have the provision of improved water supply (Census of India, 2011). The World Bank estimates that 21% of communicable diseases in India are related to unsafe water (Jadhav & Gopinath, 2010). In term of sanitation 65% population of the country have no improved sanitation facilities (Census of India, 2011). Latrine facility is extremely poor in India. 33% of the country's population depends on traditional sanitation which is the major causes of water contamination (Snyder, 2007). 2.5 billion people in the world that defecate openly, among them about 665 million live in India that is the highest number of people who defecate in the open (Sharma, 2010). Hand wash after toilet is also practiced very low, that is also one of the factors which spread diseases. In India, diarrhoea alone causes 1600 deaths daily (Jadhav at al., 2009).

11% of total rural populations do not access to safe drinking water and 76% populations do not have improved sanitation facilities (Census of India, 2011). It is reported that over 70% of the water consumed by rural population in India does not meet the WHO standards (WHO, 1993). It has been reported that 80% of rural illnesses, 21% of transmissible diseases and 20% of deaths among children in the age group of 5 years, are directly linked to unsafe water and poor sanitation (Hegde, 2012).

Along with rural area, water crisis is also a big problem in almost all urban centers. Only two cities in India i.e. Thiruvananthapuram and Kota have continuous water supply. And in term of sanitation, 40% population of urban has no improved sanitation facilities (Census of India, 2011). Most of people who have improper sanitation are in slum and among poor economic background. As per the UHRC, India, one in every ten children in slums does not live to see their fifth birthday. Child mortality of less than five years is higher in urban area than rural area in India. Diarrhoea is the important factor contributing to high mortality and morbidity among under nutrition children in urban area of India. 47.1% of children in urban area are suffered by under nutrition is higher than rural area i.e. 45.6%. About 19% of urban households do not have toilets (Census of India 2011) and also nearly 40 % do not have piped water supply at home (Kantharia, 2010). Lack of maintenance of sewerage system is the common problem for Indian urban centers. Overflow of sewage in open drain is a common scenario which resulted deterioration of drinking water quality.

The growth of urban population was 32% which out placed rural population growth i.e. 12% during 2001- 2011. The urban population is about 31% in 2011 and expected to cross 40% by 2030 with another 200 million people getting added to urban population (Ghosh, 2015). This rapid expansion of towns and cities leads to the deterioration of urban environment and services. This causes several urban problems like health, squatter settlement, poor sanitation, unsafe drinking water etc. The scenario of urban areas in mountainous region is quite different. Horizontal expansion in this region is not possible which leads to the problems of congestion. Along with this, inadequate water supply and sanitation services and poor hygienic conditions stand as major emerging problem.

1.1. Literature Review

Hutton and Haller (2004) studied on *"Evaluation of cost and benefit of water and sanitation at global level"*. The aim of this study was to estimate the economic costs and benefits of water and sanitation in 17 sub-regions and at the global level. The study tries to address the issue of sanitation which affects local economies as poor health results lost in working days and reduced school attendance, increased number of days under sick and reduced productivity at work or school. It also showed that by promoting the daily health of the workers would add 3.2 billion annual working days worldwide. It was suggested that universal sanitation would help to increase the productivity of work of every individual. The study addressed the issue of water born and water based diseases and reflects that the developing regions and under developed regions are more affected by all water born and water based diseases. It was also suggested that the improved water and sanitation would be beneficial for those regions which are suffering in water related health issues.

Montgomery and Elimelech (2007) have studied on the work entitled "*Water and Sanitation in Developing Countries: Including Health in the Equation*". The study highlighted the impact of poor accessing of drinking water and sanitation on health. The need of improved water and sanitation to reduce the mortality and morbidity rates was reflected in the study. The study in sub-Saharan Africa was conducted and it was found that nearly 60% of infant mortality is linked to water-sanitation related infectious diseases.

Von Sperling (2003) has conducted a study about the constraints of improving water and sanitation services in developing countries. The main focus of the study was the constraints and consequences of water supply and sanitation. It highlights the

issues of African countries and compares with Asian countries. In term of sanitation coverage, African countries have better situation than Asian countries. The study also showed that Asia has the highest population with poor water supply and sanitation coverage. The study identified some major intervening factors which cause deficit of water supply and poor sanitation coverage though the degree of significance of these factors varies from country to country. Economic and financial, institutional, political, bureaucratic, public health and environmental legislation, technology, cultural, social, educational, information and data availability and physical factors are the most prominent factors. Lastly, it has been suggested that with an in-depth knowledge of constraints, implementation of proper policy for water supply and sanitation service should vary regionally in order to overcome the problems related to water and sanitation.

McMichael (2002) has studied on "*The urban environment and health in a world of increasing globalization: issues for developing countries."* The study reveals that crowding and unsanitary conditions are the major causes for the transmission of infectious diseases. It is stated that many infectious diseases are prevailed in the area where the conditions of water shortage, inadequate drainage, poor sanitation and piling of solid waste.

Effects of environmental hygiene on public health were studied by Wolfgang et al., (2013) in Yopougon town of South Africa. The study was conducted in precarious living quarters of Doukoure, the village of Niangon-Adjame and the viable living quarters of millionaires. The work included sanitation services, water sources, and hygiene and people health. It was estimated that most of households are getting water from SODECI (Supply Company in Côte d'Ivoire) and rest of the households

are getting water from public taps and wells. It was found that 125446 cases of morbidity caused by malaria, diarrhoea and acute respiratory infection. Children, who are below five years of age, are mostly affected. The study also showed 43% of infant mortality is due to diarrhoea. It was suggested that initiation should be taken base on the findings, carried out by them in order to understand properly present situation only when problem can be removed effectively.

*"Water supply, sanitation and health risks in Yaounde, Cameroon"*was studied by Dorice at al., (2008). The study has been conducted at 1397 households in 7 quarters of informal settlements in Yaounde city. The main focus of the study was how water supply, sanitation services exert on health in the town. Due to poor sanitation system, points of discharge of excreta and urine and latrine located near water sources, the town of Yaounde is under the threat of an endemic pollution. The study found that all the households had already suffered from malaria, diarrhoea, dysentery, typhoid, and skin disease and also recommended some suggestions to overcome the potential threat to the city.

Utsev and Aho (2012) have undertaken a study in Benue state of Nigeria on water shortage and health problems. They took three communities (Tse-Agberagba, Akpagher and Abbilaalukpo) as the sample of their study. The study focused on water sources, water uses, effects of water shortage and water quality assessment and found that Tse-Agberagba, Akpagher and Abbilaalukpo communities are mainly depend on well, borehole, stream and rainwater for their basic water needs and among these well and borehole are more dominant sources. On the basis of the effects of water shortage in the region, four categories have been identified such as diseases, low yield of crops, communal conflict and depletion of wildlife. The study highlighted that water quality

of well and stream are very low as compare to borehole and rainwater because well and stream have high *ph* value, colour (Hazen), turbidity, temperature alkalinity, hardness, iron, chloride, shulphate, suspended solids, e-coli and total coliform. Lastly, it has been recommended some measures to tackle these problems.

Water crisis in the city of Mutare in Manicaland province, Zimbabwe was studied by Offard Kanjand and Getrudi Vongai Chiparange (2014). The main focus of their study was water crisis, cultural deprivation and water management system of the city. The sample size of the study was 100 households from 10000 household of the city through stratified, systematic and purposive sampling techniques and mainly analysed the perception of citizen on water crisis, causes of water shortage, effect of water shortage on human life in terms of economy and health effects and how these problems cope by the residents. It has been concluded that inefficient management system and old infrastructure is the main cause of water crisis and also recommended few suggestions to overcome this water crisis.

Krishna Raj (2013) has conducted a work on "*Sustainable Urban Habitats and Urban Water Supply: Accounting for Unaccounted for Water in Bangalore City, India."* The main objective of this study was to assess the efficiency of water supply in terms of water pricing, reliability, accessibility etc. The study highlights the current status of water supply, causes for growing inefficiency, economic efficiency and institutional capability and strategies for improving economic efficiency through institutional reforms. The price of water in Bangalore city is higher than any other cities of India due to drying up the upper catchment area of Cauvery, Kabini and Hemavati River which drain the city, lack of institutional economic capability, unaccounted water consumption etc. It has been recommended that some strategic

measures for reducing gap between water demand and water supply, such as – harness rainwater, reduce non revenue water, metering taps, reduction of unaccounted water, rejuvenation of lakes etc.

"*Urban water crisis in Delhi: Stakeholders responses and potential scenario of evaluation*" studied by Augustin Maria (2008). The main focus of the study is to assess water crisis, paradigm of water management and role of alternative system for long term dynamic for water supply. The author mentioned different mode of supply of water and estimates values of DJB. It is also highlighted that there is a high level of discrepancy in the water distribution system. Poor households don't have individual connection. The study shows that there is a trend of shifting water resources management in Delhi toward rainwater harvesting.

Mangizvo V. Remigios and Kapungu Never (2010) conducted a study on urban domestic water crisis in Kadoma city of Zimbabwe. The aims of this study were to identify the cause of the water shortage, its impact and mitigation measures. The authors mentioned about the two sources of water for Kadoma city - Claw Dam and Pasi Dam. Claw Dam is the main supply source of Kadoma city. Ageing infrastructure, population increase, power shortage, loss of skilled manpower, lack of political will and shortage of foreign currency were being identified as the major challenges of water supply in the town. The study reveals that Kadoma city has been suffering in water born disease like cholera and diarrhoea due to water shortage and poor sanitation. The authors recommended some strategies such as refurbishment of water system, political will to tackle the problems etc.

Water consumption pattern was the main focus of the study of Jethoo and Poonia (2011). They have conducted their study in Jaipur city, India. The main effort

of their study was to assess and analysis the behavior of water users. They analyzed different income group and consumers' behavior with respect to their household water supply. The authors highlight that maximum water consumption is observed in high income and medium income members. They described that due to lack of awareness, people are using much more water than its need. The authors suggested that this need should be addressed immediately by changing people perception towards water use.

"*Economic inequality and urban environment: The case of water and sanitation*" was the topic of the study of Nick Johnstone (1997). The author highlights the dual system in the urban area of developing countries. Where one side is served by subsidized water and sanitation facilities and other side, government forced the people to develop water and sanitation through their own effort. He compared result of five previous studies and showed that Nigeria has the highest ratio of unit water costs for households. In conclusion, the author made three arguments - (1) poor households are generally worstly affected due to low level of provision of water and sanitation, (2) equal level of costs and access and treatment is more efficient and (3) water supply and sanitation service can be significant means of distributing resource in the urban context.

Swati Hota (2014) has undertaken a study entitled "*Utilization and Consumption Pattern of Water in Urban Areas: A Study in Sambalpur City of Odisha*". The main aims of this study were to explore the problems related to water resources and to understand consumption pattern of water. In this study, the author has divided the households of the town in two categories as slum and non-slum and compared water supply and sanitation services among them. She highlighted that non slum dwellers are consuming more water than slum dwellers as a result their

satisfaction rate is more than slum dwellers. The study also showed that women are consuming more water than men and age wise water consumption rate amongst adult and old population are consuming more water than child and middle age people. The study also highlighted the responses of complains from local authorities is higher for non-slum dwellers. In conclusion the author said that level of water consumption is more in middle and higher income group of people due to change in life style.

"*Micro Environment in Urban Planning: Access of Poor to Water Supply and Sanitation"* was the study of A. Kundu (1991). In his study, Kundu focused on water supply and sanitation of urban poor and urban environment. He argued that richer sections of the people are more beneficiary than poorer in urban area in terms of formal water supply system. The study carried out that water supplies to the top fractile people are from government subsidized system (taps) and poor households have to depend on alternative sources instead of depending govt. supply system. It is mentioned that most of the urban poor does not connect with pipe water and also found that in most of cities, per capita water supply to the poorer section of population is much below the recommended minimum. The study mentioned that poor sections have to wait long time in the queues for their turn in the public stand points. It is a big problem because the pressure of water in the tap is generally very low and is being served only for short duration. It is also highlighted that there is a variation in availability of latrine facility in different income group as such higher income group maintain proper latrine whereas lower income group hardly maintain and the condition is little better in middle income group. Those people, who do not have latrine facilities, depend on service latrines which are unhygienic. It is concluded that disparities of water and sanitation service would pose a threat to micro urban environment.

Sheridan Bartlett (2003) conducted a study on water and sanitation for children's health and general development especially in urban areas. The author took few informal settlement of Nairobi as case study. He argued that child mortality and morbidity rates in poor urban settlement are equal or higher than rural area. The study revealed that high rate of children morbidity is because of sanitation-related illness. He mentioned that an insanitary condition has a great effect on malnutrition as well as mental and social development.

Joshi et al., (2011) have undertaken a study entitled "*Health, hygiene and appropriate sanitation: experiences and perceptions of the urban poor*". They analyzed an ethnographic study in 10 slums settlements of Chittagong, Dhaka, Nairobi and Hyderabad. They focused about gender and sanitation and mentioned that poor women are more suffering. The study showed that sanitation service does not match with the needs of the diverse group of men, women and children in these urban areas. They also raised some issues as why some poor settlement is considered as illegal and some are legal. The study suggested that major causes of poor sanitation for urban poor are lack of initiation taken by urban body and unaffordable for poor. This mismatch can be resolved after improving technical, financial and ethical discrepancy, otherwise there will be a little reason to celebrate the recent global declaration on the human right to water and sanitation and health for all.

In Kalimpong town, Deepa Joshi has conducted an ethnographic study in the year 2011-2012 entitled '*No right institution: water, politics and democracy in Kalimpong town in the Eastern Himalayas.'* Her main aim was to compare epistemic positioning of water governance with existing approaches (community-state-and market based) for managing both domestic and drinking water. The author highlighted

the role of local institution for maintaining the regular water supply and its lack of efficiency to the town people. She identified two causes for irregular and sporadic supply of water such as- 1) political conflict and inadequate supply of funds from higher authority and 2) vintage or old water supply network system date back to British colonization period. She also mentioned that some time there is no flow of water from tap as long as 100 hours but VIP areas of municipality have constant water supply. But others than VIPs can make water reliable for 3-4 times in a week by paying 5000 per month to the municipal plumbers for illegal connection. According to the author the town mainly runs on vendor water supply. It is concluded with against inequality or suppression in democracy, in spite of proper drinking water is indeed our right.

The study of water crisis of Darjeeling town has carried out by S. Das (2010) entitled '*Water Crisis in Darjeeling Town'*, where he mainly focused on water crisis and problems faced by the people. According to the author, the main causes of the water scarcity in Darjeeling town are deforestation, leakage in the water supply system, faulty distribution network, drying up natural springs or *jhoras*, and high population growth. Lastly, the author suggested that practicing roof top rainwater harvesting method is the best method for the town to cope with the water crisis.

Chettri and Tamang (2013) discussed about population growth and associated problems of Darjeeling town. The authors highlighted that the present water supply infrastructure was built and installed for the population in the first quarter of the 20th century. But at present the high population growth and rapid urbanization puts immense pressure upon the existing infrastructure of the town. Lastly, it is mentioned

that the policies, which has been adopted by municipality to mitigate the problem of water in the town are not implemented.

A detail study of urban management in Darjeeling Municipality has been conducted by Khawas, V. (2003). While discussing about urban management, he focused on the status of basic urban services like water supply, sewerage and sanitation and solid waste management. The author argued that Darjeeling municipality has been suffering from institutional and planning issues.

Ghatani, S. (2015) worked on sustainable management of water resources of Darjeeling town. She clearly elaborated the pattern of water demand and supply in the town, and identified potential sources of water in the town. The study showed that water resources in and around Darjeeling town has been pressurized by rapid urbanization and related environmental degradation. The author argued that it is only possible to access reliable water for the town through long term planning for management and maintenance of available water resources.

Maiti, M. M. (2006) has conducted a study about water crisis and water management in Kurseong town. Her study mainly focused on the influences of physical factors in stream water discharge. She used Hazen Williams Formula for measuring potential discharge of springs in dry season. She collected water sample from Kurseong P.H.E. Department. She also conducted a perception survey about the difference problems of municipality. Her study showed that thin soil profile on slope of the area influences water discharge in the streams. In conclusion she suggested that municipality and P.H.E. Department should construct more storage and prepare a plan to combat future water crisis.

In 2013, Neele K. C. Lepcha has undertaken a study entitled *"Problems and prospects of water resource of Kurseong municipality, Darjeeling district, West Bengal."* She highlighted the condition of water scarcity in Kurseong town in terms of amount of water supply by municipality and demand. The study highlighted water resource of the town which is blessed with a high amount of rainfall during rainy season. But unfortunately lack of proper management water scarcity is becoming severed day by day. The study showed that less than 15% of total water requirement of the town has been supplied by the municipality. It is found that main causes of this wide gap between water supply and demand are urbanization process, deforestation in the upper catchment area and poor water supply system. The author seeks for the proper management of water resources in and around Kurseong town and has suggested some mitigation measures for improvement of water supply to the municipal area.

Das et al (2011) have studied anthropogenic impacts on natural landscape of kurseong town. The authors showed that urbanization leads several environmental problems. The study highlighted that physical environmental problems, deterioration of living condition, inadequate and contaminated water, poor sanitation and drainage, absence of solid waste management, improper sanitation system, building congestion, deforestation etc. are responsible for health problems in the town. According to the authors, T.B., Hepatitis, Diarrhoea, liver diseases, heart diseases, Cirrhosis of liver, Anemia, stomach disease etc. are the main diseases in the town. It is also mentioned that in the rainy season, communicable diseases like T.B., Hepatitis and Diarrhoea are more prevalent than non communicable diseases.

Das, R. (2012) made an assessment of eco-fitness of the Kurseong town. The aim of the study was to assess the human impacts on the physical environment and social environment. The author mentioned that Kurseong town is facing several problems such as physical hazard like landslide, soil erosion, deforestation and social hazards like building congestion, traffic congestion, road accident, water scarcity, communicable and non-communicable diseases etc. due to rapid urbanization. According to author T.B. Hepatitis and Diarrhoea, liver diseases and stomach diseases are increasing day by day and deteriorating the health scenario of the town.

1.2. Rational of Study

Kurseong town is located in Darjeeling Himalaya and also one of high rainfall area. It has been experiencing rapid growth of urbanization in recent year. Its pressure on natural resources and urban basic amenities has increased manifold. Vertical expansion of town is more than horizontal expansion due to physical setting leads to congestion and increase squatter settlement. Water crisis is the common problems for all the people of urban area and become serious at present. Poor sections of urban people are more deprived in terms of water and sanitation. They have to live on inadequate unsafe water and poor sanitary condition. Poor sanitation and inadequate water supply pose a great threat to health of the population as a whole. So, a proper integrated management is very much necessary to handle this vicious cycle of urban poor amenities.

1.3. Research Question

The following are the research questions.

i. What are the problems of water, sanitation, hygiene and health of Kurseong town in different economic background?

ii. How water resources and sanitation services can be managed in a sustainable way?

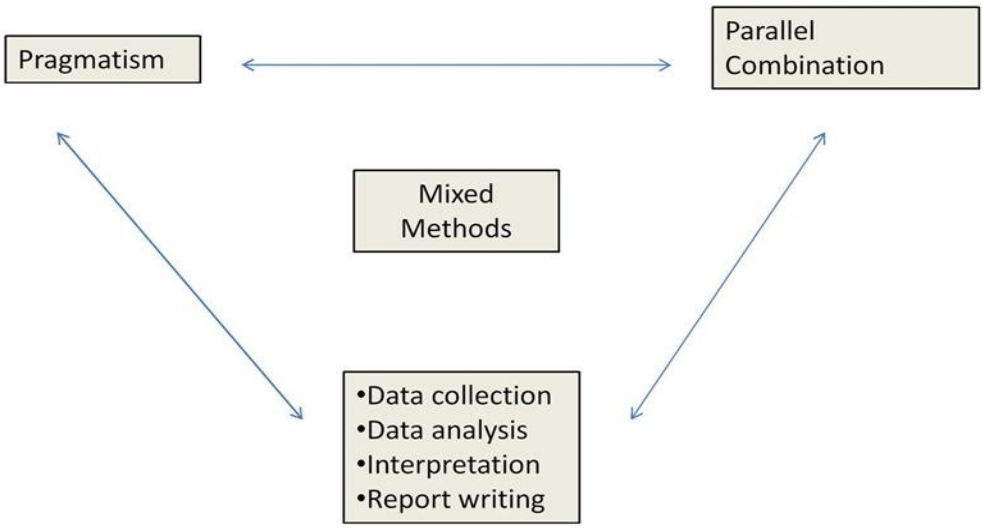
1.4. Research Objectives

Two objectives have been taken for this study.

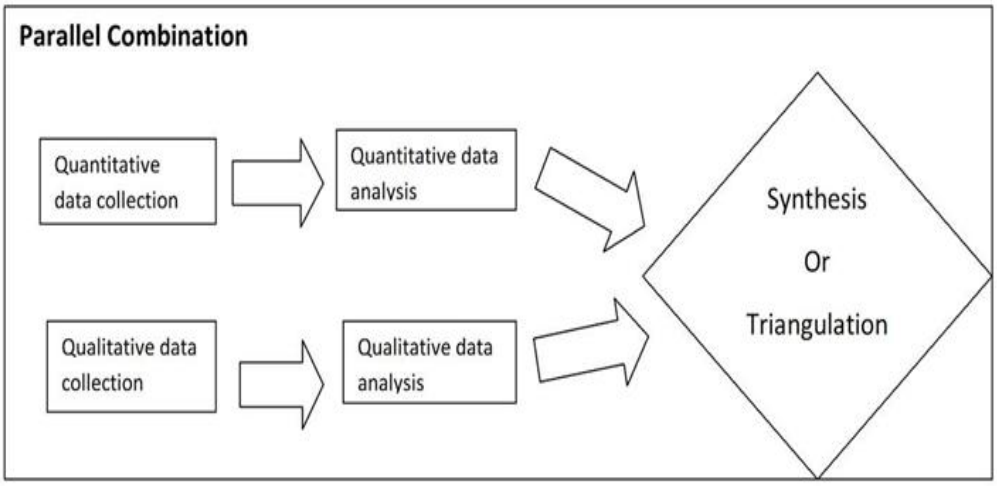
1. To assess the condition of water supply and sanitation and the role of institution and the local government in maintaining them in the town.
2. To study the impact of water supply and sanitary condition on health in the different economic background.

1.5. Methodology

To understand and address the research problems pragmatic approach which supports to mixed methods research has been used in this research. This research combines the aspects of qualitative research as well as quantitative research in terms of the data sources and analysis.



Parallel combination of mixed methods strategy has been used to analyze qualitative and quantitative study separately. After analysis, the results of both the approaches will be synthesized and triangulated.



1) Qualitative:

i. Semi-structured Interviews, ii. Group Discussion and iii. Field observation.

2) Quantitative:

i. Sample survey at household level, ii. Data from Census of India, iii. Data from Kurseong Municipality Office, and iv. Data from the office of the Kurseong PHE department

Primary data for both qualitative and quantitative analysis were collected at the same time during field work. Schedule survey was being used to obtain the perception of water crisis, causes of water crisis, efficiency of the water supply system, accessibility of water based on income level, how the people of the town cope up with the water crisis, understanding of sanitation condition of the town, and prevalence of water, sanitation and hygiene related diseases. Interview, group discussion and observation

methods were used to understand and assess the policy perspective of water, sanitation, hygiene and health and to formulate sustainable strategies to overcome water and sanitation related problems.

Schedule was prepared with combination of open and closed end questions. For schedule 115 sample households from town were chosen base on stratified, quota and purposive sampling techniques. There are 20 (twenty) wards in the town which was categorized into four. These categories had been prepared on the basis of their activities, characteristics and function of the wards. One ward was selected for household survey from each categories area. These four categories are -

1) **Commercial - Residential area:** this is the CBD area of the town. This area comprises 5 ward i.e. ward no. 11, 12, 13, 14 and 15. 30 sample households were taken from ward no. 15.
2) **Agricultural - Ecological area:** this is the high elevated area located near to the water reservoirs. 8 wards are there in this area. They are ward no. 1, 2, 3, 7, 9, 10, 16 and 17. 20 sample households were selected from ward no. 1.
3) **Industrial - Commercial area:** this is the lower elevated area of the town. It has 2 wards i.e. ward no. 20 and 19. 20 sample households were chosen from ward no. 20.
4) **Residential area:** this is located just below the Agricultural-Ecological area. The area comprises with 5 wards which includes ward no. 4, 5, 6, 8 and 18. 30 sample households were selected from ward no. 4.

Sample size for household survey varies from one category to another because of the variation of population in each category. Larger the size of population, higher the number of sample size.

15 sample households were chosen from different wards which have slums population ranges from 400 to 800. Wards were categorized into three broad categories on the basis of population size to understand the problems of water, sanitation and related health condition. The categories are -

1. **High slum population area (>700 populations):** there are four wards which come into this category are ward no. 1, 7, 9 and 10.Ward no. 7 (Lower Sherpa Busty) was selected for household survey. Lower Sherpa Busty is located near natural spring.
2. **Medium slum population area (550-700 populations):** comprises five wards i.e. ward no. 6, 7, 2, 13 and 16. Ward no. 6, Upper Sherpa Busty, which is also located near natural spring, was selected for household survey.
3. **Low slum population area (below 550 populations):** six wards come under this category i.e. ward no. 3, 4, 5, 14, 17, and 20. Ward no. 20, Naya Busty, which is located at lower elevated area of the town and just below industrial commercial area, was selected for household survey.

For semi structured interview, 20 interviews were conducted. The target people were from the staff of municipal water supply, sanitation inspectors and planning staffs, municipal elected members, PHE department staffs, health center staffs; private stakeholders and public toilets care taker and users. This was conducted to get idea of management, problem and response of public, initiatives of governments and alternative way to solve the problems and suggestions for future plan and efficiency.

Five group discussions also were conducted to find their perceptions relating to these problems. The target groups were businessmen, students, teachers, NGOs and non-formal workers.

Field observations was also done in order to understand and examine the existing situation of water, and sanitation, water purification, water preservation at home and municipality, collection of water, sanitation services and sewage treatment condition.

Secondary data was collected from the various journals, articles, books, annual reports, draft development project report of municipal body, statistical handbook, gazetteers, internet etc.

Finally, field study data were coded, summarized and analyzed with the help of percentage methods, average methods etc. to come up with the appropriate results and data are represented through simple diagram such as bar, pie, line diagram etc.

1.6. Organization of Chapters

The study has been divided into five chapters and the organization of chapters has been done on the following sequence:

Chapter one is introductory part which includes background of study, literature review on previous works at global, national and local in the same field, rationales of the study, objectives of the study and methodology.

Chapter two is dealt with Kurseong town in which brief about geographical and historical background of Darjeeling district, general profile of the Kurseong town and growth and spatial expansion of the Kurseong municipality in colonial and post colonial periods and finally factors for the development of Kurseong town.

Chapter three presents urban basic services and amenities and institutional role and governance of the town.

Chapter four is data analysis which includes household water supply, household sanitation condition, incidence and prevalence of water and sanitation related diseases and impact of water and sanitation on health issues in different economic background.

Chapter five includes conclusion of the study along with recommendations for sustainable management of water and sanitation.

Darjeeling, the northernmost district of West Bengal, India, is located in the lap of Eastern Himalaya with its majestic natural beauty and monumental imprints of colonial history. The district is famous for dense forest, lush green valley, wavy tea garden in the hill slope, exiting scene of snowcapped mountain and swollen waterfalls. Darjeeling, Kalimpong, Kurseong and Mirik are the famous hill stations of the district. A general overview of the district is described in the first half of this chapter. The description of Kurseong town (the study area), its geographical profile, history of growth and expansion and the factors for urban development are being highlighted in the letter half of this chapter.

2.1.Darjeeling District: A General Overview

The name of Darjeeling is most likely derived from the Tibetan words 'dorje' which is the scepter of Indra, the God of thunderbolt and 'ling' means the place. Therefore, Darjeeling means the place of thunderbolt (Mor, 2013).

Darjeeling is located between 26^{o} 31' - 27^{o} 13' North Latitude and 87^{o} 59' - 88^{o} 53' East Longitude. The length and breadth are 35 and 18 miles respectively (Dozey, 1922). Total area of Darjeeling district is 3,149 sq. kms (1,216 sq. miles) with a shaped like an irregular triangle. The district is bounded by Nepal on the west where the Singalila range and the Mechi river demarcated the boundary between Darjeeling and Nepal; on the north (commencing from west) the Ramman river, the Rangeet rivers, the Teesta river, the Rongpo Chu and the Resi Chu intervene between Darjeeling and Sikkim; on the east the Ni chu and the Jaldhaka river separate Darjeeling from Bhutan, on the south-east by Bangladesh and Jalpaiguri district of West Bengal and on the south by Purnea district of Bihar and Uttar Dinajpur district of West Bengal. The course of the Mahananda river makes partition between

Darjeeling and Bangladesh and also Darjeeling and Uttar Dinajpur district of West Bengal.

Darjeeling district has four sub-divisions namely Darjeeling Sadar, Kalimpong, Kurseong and Siliguri. Among these four sub-divisions, Darjeeling sadar, Kalimpong and Kurseong are characterized by hilly terrain while Siliguri comprises of plain area. The hilly part of the districts is under the administration of GTA (Gorkhaland Territorial Administration), a distinct administration body under the state government of West Bengal, was formed under the GTA Act 2011. Darjeeling town is the administrative headquarter of the district.

Geographically, Darjeeling district can be divided into two broad divisions, the Terai and the hills. The southern region contains the Terai[1], a marshy low-lying area at an average height of 100 meters MSL. And the apex is formed by Sandakphu (11,929 ft. or 3,636 meters) in Sigalila range where Nepal meets Darjeeling, from where incredible view of Mt. Everest, Mt. Kanchenjunga, Mt. Makalu and Mt. Lhotse can be seen. The foothill region of the district is characterized by plain, dissected by different hilly rivers. Just above the Terai region, the entire hill is characterized by the scenic purity of rushing streams, gasping gorges, shimmering lakes, eye-soothing sights of the flora-brilliant red rhododendrons, charming white magnolias, majestic pines and lush green tea. Due to its majestic natural beauty, Darjeeling hill is known as 'Queen of Hills' (Chakraborti, 1989).

In this regard of eye-soothing beauty Mark Twain said-

[1] The Terai is a plain landscape south of the outer foothills of the Himalaya, the Siwalik Hills, and north of the Indo-Gangetic Plain.

"The one land that all men desire to see, and having seen once- by even a glimpse- would not give that glimpse for the shows of the rest of the world combined" (Roy, 2003).

The main river of the district is the Teesta, which rises from a glacier on north Sikkim which is located at an altitude of 21,000 ft. above sea level and drains the whole Sikkim, after receiving the Rongpo Chu forms the boundary between Darjeeling and Sikkim. At Malli, the Great Rangit confluences to the Teesta then enters Darjeeling district and finally join to the Brahmaputra in Rangpur district of Bangladesh. The main tributaries of the Teesta in Darjeeling district are the Rongpo Chu and the Rilli Chu on its left bank and the Great Rangit, the Riyang, and the Sevok on the right bank. Along with the Teesta, the Great Rangit also forms half of the boundary between Darjeeling and Sikkim in the north with receiving the Rammam on the right bank. And at Malli, it makes tri-junction with the Teesta (Dash, 1947). The Little Rangit, the Rangnu, the Mechi, the Balason, the Mahananda (the Mahananda is called the Mahanadi in hilly parts of the district), the Lish, the Gish, the Chel, the Murti, the Resi Chu, the Ni Chu and the Jaldhaka are the important rivers of the district.

Owing to the tropical location Darjeeling district are dominated by tropical climate. In the summer there is a warm condition prevails in the Terai region of the district whereas cool pleasant condition is prevailed in hilly and mountainous tracts of the district. In winter Terai region experience cool pleasant climate and the temperature in hilly and mountainous tracts often drops to freezing point. After rainy season, mild condition prevails in the entire area of the district. The maximum temperature in summer month hardly exceeds 25^{o} C. In winter, average temperature ranges between 5^{o}C to 7^{o} C but lowest temperature often drops down -2^{o}C to -3^{o}C in

hilly and mountainous tracts. The district receives average annually 3,037 mm. rainfalls which is mostly from south west monsoon. The maximum rainfall occurs in the month of July i.e. 798 mm and lowest rainfall occurs in December i.e. 8 mm. The region receives orographic rainfall in rainy season and cyclonic rainfall in winter season.

Darjeeling is famous for six T's -Tea, Teak, Tourism, Toy Train, Tiger Hill and Trekkers. Among these tourism and tea are the major sources of economy of Darjeeling. Darjeeling is the one of the famous tourist destination of eastern India. A large number of foreign tourists as well as domestic tourists visit Darjeeling throughout the year. Darjeeling is also famous for its muscatel flavor green tea in the world. Toy Train or Darjeeling Himalayan Railway is a UNESCO's World Heritage miniature steam engine of well maintained and providing pleasure to the tourist at present too (Mor, 2013).

2.1.1. Historical Background of Darjeeling District

The history of Darjeeling district is very complicated. Therefore, in order to understand the history of Darjeeling district, it is important to look into the history of the relationship among Sikkim, Bhutan, Nepal and British East India Company. Although the present Darjeeling district was historically part of Sikkim Empire, the present Kalimpong sub-division was under Bhutanese empire from early 1700 to till 1865 and rest of the area (Darjeeling, Kurseong and Siliguri sub-division) was under Nepal's Gorkha dynasty from 1789 to 1815.

In the year 1700 Maharaja of Sikkim, Tensung Namgye died leaving behind four children. On the death of Maharaja, a tussle broke out between his two eldest children about the claim of thrown. These two children were Pende Amo (Maharaja's

daughter and eldest child among four children) and Chakdor Namgye (Maharaja's eldest son and second child among four children). At last Chakdor Namgye was crowned as the king of Sikkim at age of 14. Pendo Amo was against her brother, Chakdor Namgye and facilitated Bhutanese army to attack her brother. As a result, Bhutanese army occupied Sikkim in 1706 and Chakdor Namgye run away to Tibet. After two years Chakdor Namgye re-entered Sikkim with small group of army and restored almost all the land from Bhutanese army except the territory of the east of the Teesta river, Kalimpong.

In the last half of 18th century to the first half of the 19th century, Darjeeling, Kurseong and Siliguri sub-division had gained its strategic importance. In early 19th century, the Nepalese conquered Terai, Darjeeling and Kurseong. Then in between 1814 to 1816 the 'Gurkha War' was fought between Kingdom of Gurkha (Present Nepal) and British East India Company. In the war, Nepalese were defeated by British. In the conclusion of Anglo- Gorkha War, in 1816 Gorkha kingdom ceded the territory, which was conquered from Sikkim, to British East India Company by the Treaty of Segoulie. In the year 1817, the British government handed over the territory to King of Sikkim by the Treaty of Titalya "with the apparent object of hedging in Nepal with the kingdom of an ally, and preventing all possibility of further aggrandisement by the Gurkhas" (Dozey, 1922).

After 10 years again, there was a dispute in the boundary between Nepal and Sikkim. In the year 1828, British East India Company deputed two officers, Lt-General G.A. Lloyd and Mr. J.W. Grant, I.C.S., to deal with the disputes of border. And for that purpose both the officers penetrated into the hills as far north of Rinchinpong (in the Kulkait valley of west Sikkim) and they were much impressed

with the possibilities for sanitorium. Subsequently Mr. J.W. Grant reported to the then Governor General Lord William Bentinck and made a proposal for making sanitorium and summer residence for their military, civil officers and their families. The British Governor General had shown interest on the project and appointed G.A. Lloyd to negotiate with the Tshudpud Namgyal, then Raja of Sikkim. Finally on 1st February, 1835, on the request of the Governor General of British India, the Raja of Sikkim ceded a strip of hill territory of 24 miles long and 5-6 miles wide, stretching from the northern frontier of the district to Pankabari in the plains, with an annual compensation of Rs 3,000/- which was subsequently raised to 6,000/- and finally 12,000/- per annum to then king of Sikkim (O'Malley, 1907). The land included villages of Darjeeling and Kurseong as well as a strip of land stretching a few miles on the either side of it (O'Malley, 1907). "This exchange, however, considered at that time from a financial point of view was entirely in favour of the giver as the revenue derived from the hill never exceeded Rs. 20/- the year" (Dozey, 1922,).

The development of Darjeeling town was started since 1835. A road connecting Darjeeling with the plains was constructed in 1839. Along with Darjeeling Kurseong town also grew up as a halting station for military and civil personnel due to its pleasant climate (O'Malley, 1909).

In the year 1839 Dr. Campbell, a civil surgeon of Indian Medical Service, was appointed as the superintendent of Darjeeling. Dr. Campbell brought Chinese tea seeds from Kumaun region in the year 1841 and started growing tea as an experiment in his residence at Beechwood, Darjeeling. The experiment was successful and subsequently several tea estates started commercially in Darjeeling. The famous Makaibari tea estate in Kurseong was started by British army Captain Samler. After

plantation of tea in Darjeeling and Kurseong area the development of infrastructure and transport were got significance importance (O'Malley, 1909).

This rapid development and changes of Darjeeling made jealousy to the Chogyal of Sikkim. As a result, in the November 1849 when Sir (Dr.) Joseph D. Hooker and Dr. Campbell were travelling in Sikkim with the permission of Raja of Sikkim and British Indian government and were imprisoned by the order of the Namgoway, *Dewan*[2] of Sikkim and released after few weeks. This matter of insult was taken seriously by British Indian government. Consequently, annual grant of Rs 12000/- was stopped. An expeditionary force was also sent against Sikkim by Company and the hilly tract (previously leased area between the Teesta river and the the Mechi river) and the entire Terai region (present Siliguri sub-division) was permanently annexed to British in 1850 (Dozey, 1922).

In the year 1861 a new route, Hill Cart Road (now Tenzing Norgay Road), was opened from Siliguri to Darjeeling via Kurseong. Although there was already a road (Military Road) which was constructed in the 1770s and 1780s, they found it very difficult to travel there from the plains of Bengal due to unmaintained and poor condition (O'Malley, 1909).

In the meantime the problem arose with the neighbouring state of Bhutan. 1n the winter 1864, a military force was sent against Bhutan by the Company and annexation of whole Duars and Kalimpong was made with British raj in course of the Sinchula Treaty signed in 1865 in the conclusion of a war between the East India Company and the army of Bhutan. After annexation of Kalimpong to the British, it was formed a sub-division in the name of Dalinmkote and attached to the western

[2] *Dewan* means prime minister.

Duars[3] district. But after a year in 1866, Kalimpong was added with Darjeeling district (Dash, 1947).

In the year 1880, the Terai region (present Siliguri sub-division) was included in Darjeeling district. Hence, the district got full present shape (Dash, 1947). In the year 1890, Kurseong sub-division was formed including southern part of Darjeeling hill and Terai region. The area of Darjeeling Sadar sub-division was recognized in 1891. In 1907 Siliguri was declared as a separate sub-division of Darjeeling district after splitting Kurseong sub-division. Thus, present four sub-division of Darjeeling district came into exist (Jain, 2013).

The Darjeeling Himalayan Railway (Toy Train) line was laid in the year in 1880. The head quarter of Darjeeling Himalayan Railway was established in Kurseong town (O'Malley, 1907). With the introduction of Toy Train Darjeeling district got significant importance for flourishing economy and tourism.

Eventually, the district was included to Bengal Presidency under Rajshahi Division (now Bangladesh) but as a result of partition of Bengal, in October 1905, the district was transferred to Bhagalpur Division (present day Bihar) under same Presidency. In March 1912 the district was once again attached to Rajshahi Division as a result of rearrangement of the province (Jain, 2013).

The confusion regarding the ownership status of Darjeeling led to the hoisting of Pakistani flag in Darjeeling, Kurseong and Kalimpong town in 14th August 1947 and distribution of sweet was made by confused soul. The flag was remained there for four days. This probably was because the district was the part of Rajshahi Division

[3] Duars is the flood plain and foothills of in the eastern Himalaya in north east India around Bhutan.

(Bangladesh or then East Pakistan) (Jain, 2013). But after independence of India, the district was included to the state of West Bengal, consisting four subdivision namely Darjeeling, Kalimpong, Kurseong and Siliguri sub-division (Dashgupta, 1999).

At present the Darjeeling district consists of different ethnic groups, language and religion. Nepalis, Bengalis, Bhutias, Tibetians Lepchas, Limboos, Biharis and Marwaris are main ethnic group of district. Although Lepchas are the indigenous inhabitant of Darjeeling hills, majority of the people in the hilly part of the district is Nepali speaking. However, Bengali speaking people are found in dominated number in the Terai region. Since the colonial period, due to the economic and infrastructural development, pleasant climate and natural beauty, Darjeeling district has been the central attraction for the people of different neighboring states and countries.

2.2.Geographical Profile of Kurseong Town

Kurseong is called as "The Land of White Orchids" because it is commonly believed that the name of the town is derived from the Lepcha word "Kurson-rip" means small white orchid (*Coelogyne Cristata*) which grows abundantly in and around Kurseong (O'Malley, 1999).

Kurseong is located on the halfway to Darjeeling from Siliguri along the left valley side of Balason river and adjoining spur of the Senchal -Mahaldiram range in the Lesser Himalaya at an altitude of 4783 feet (1458 Metres) above the mean sea level. Kurseong is a popular tourist spot of Darjeeling hill with glimpses of glistening Mt. Kanchenjunga, Mt. Jaun and Mt. Kabru. It is also known for the place of peace, serenity and the healthy climate. The geographical extension of Kurseong town is 26° 51' 42" N to 26° 53' 36" N latitude and 88° 15'12" E to 88° 17'32" E longitudes (Das, 2014).

Figure No. 1: Location Map of Kurseong Town

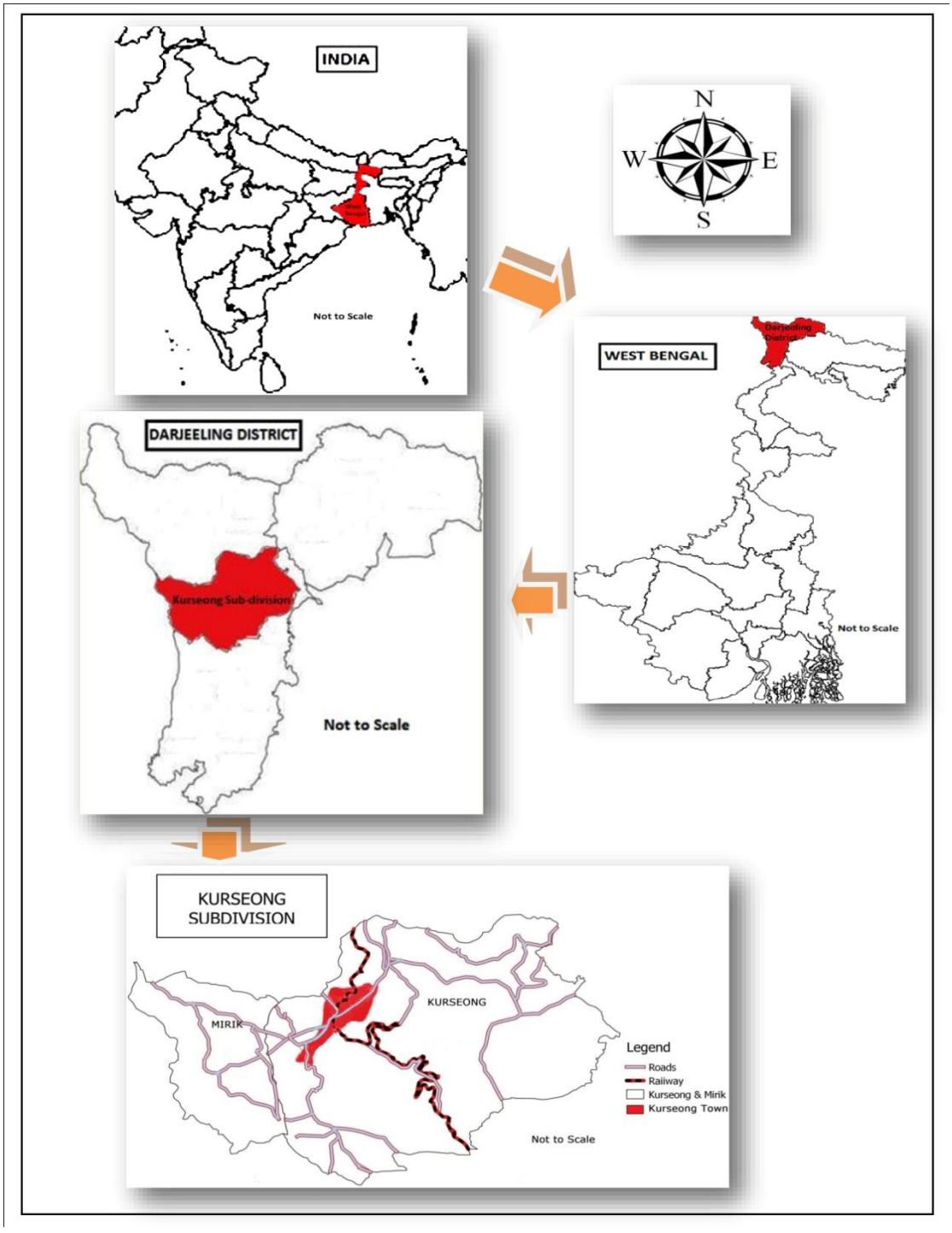


Figure No. 2: Ward Wise Map of Kurseong Municipality

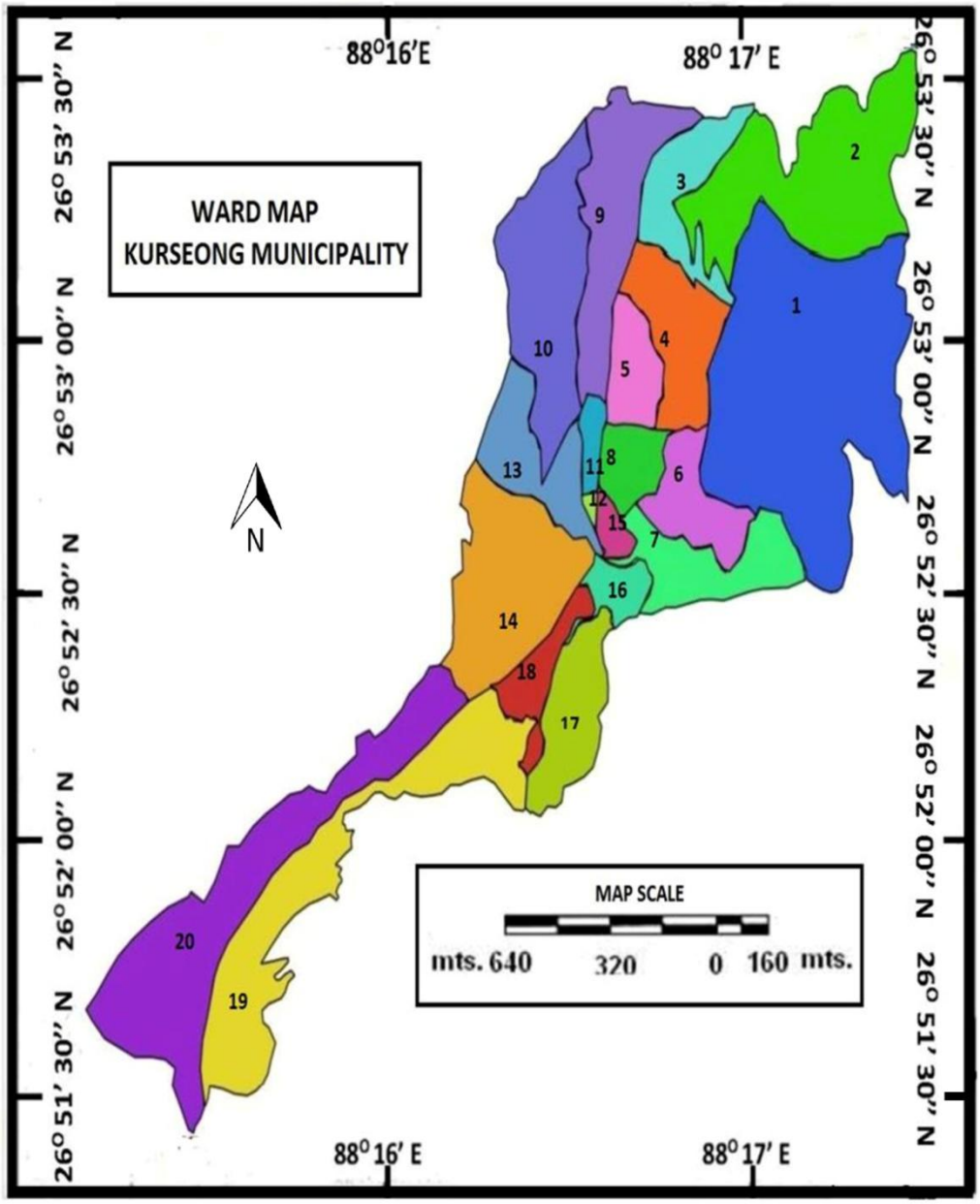
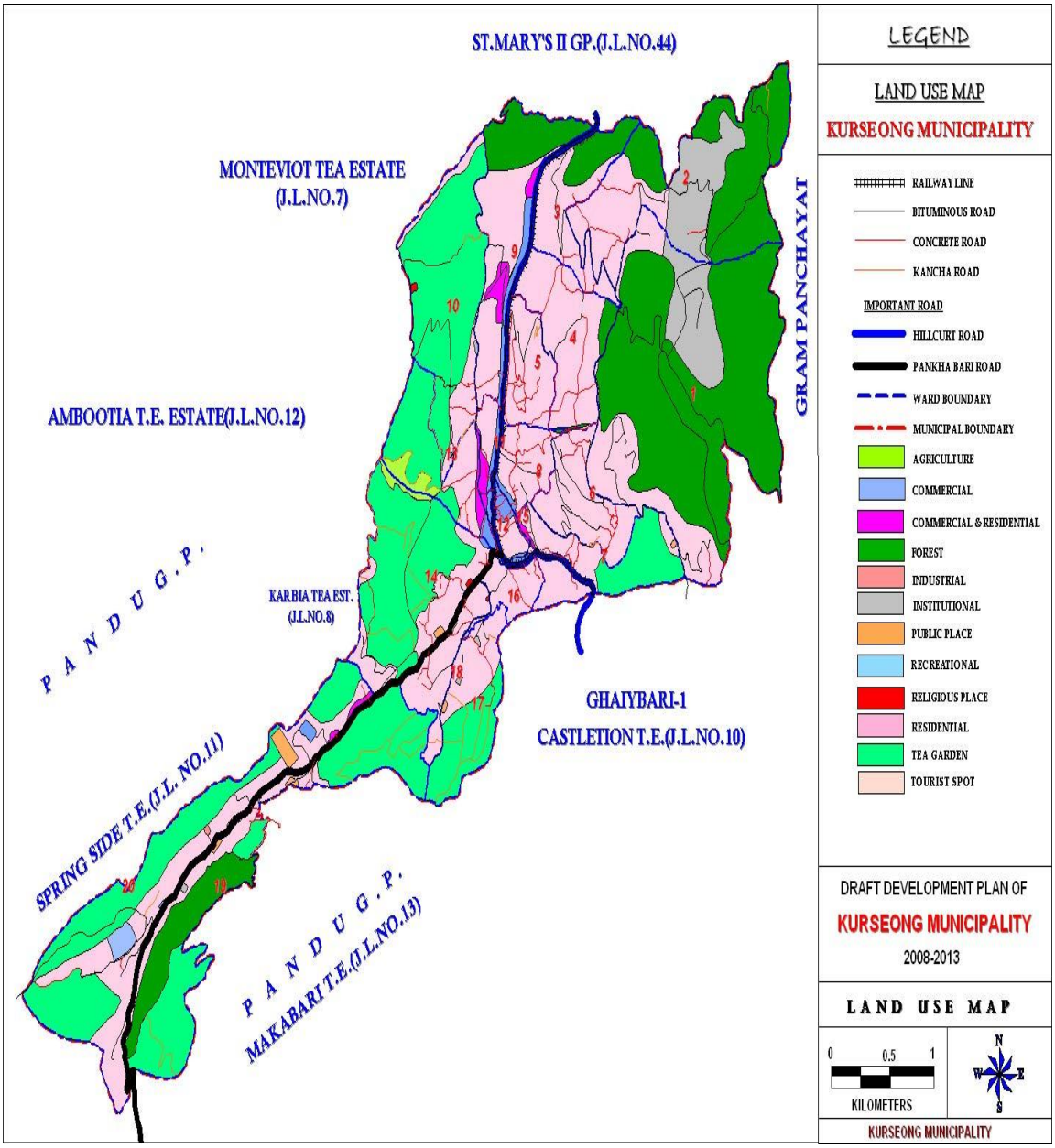


Figure No. 3: Land Used Map Kurseong Town



Source: Kurseong Municipality, May 2015

Kurseong is a historical town having rich heritage. It is one of the oldest towns of undivided Bengal dated back to 1835 (Das, 2012). At present Kurseong town has an area of 7.5 sq. Km., out of which 30.76 percent land is under agriculture, tea garden and reserved forest. The town has 20 municipal wards and each ward has a ward commissioner who is in-charge of the individual ward. Kurseong has its own magistrate court and has the police station and town outpost at Pankhabari road. The Sub-divisional officer is the head of the administration for the town (Kurseong Municipality, 2012-13).

The topography of Kurseong town represents high relative relief of more than 500 metres. The highest altitude of about 1800 metres is found around Dow Hill and the lowest elevation of about 1300 metres is found in the south western area of the town along the road near Makaibari. Highest relative relief is found in the central parts of the town while lowest relative relief exists on the eastern part of the town. And the steep slope of more than 20^{o} is found in the central and the southern part of the town. Moderate slope of less than 20^{o} exhibits in rest of the area. But there has a very few small patches of land, which have the slope of less than 10^{o} (Das, 2012).

The regional morphometric setup of Kurseong comprises ridge that runs in a north south fashion and flanked in both sides by a number of glimmering silvery natural streams flowing into the forest in the high altitude area and separate from the adjoining basin by a spur that radiates from the aforesaid ridge. The important perennial streams of Kurseong town are Babu Khola, Pagla Jhora, Jeeta Jhora Hussain Khola etc. These entire first order streams have contributed to the formation of major rivers at the base of hills (Das, 2012).

Kurseong has five different seasons prevail in a year, such as summer, rainy, autumn, winter and spring. However, due to lower altitude, Kurseong enjoy mild and very healthy climate throughout the year is more congenial than that of Darjeeling, Kalimpong and Siliguri Sub-Divisions (Kurseong Municipality, 2012-13). Maximum temperature in the summer rises up to 25^{o} C and the lowest temperature in the winter comes down to 5^{o} C to 10^{o} C (Table no. 1). The highest temperature is found in the month of July and lowest temperature prevails in the month of January. Out of the four Sub-Divisions of Darjeeling District, Kurseong records the highest rainfall of almost 500 cm. annually. But due to hilly topography most of the rainwater immediately goes down as surface run off. However, highest rainfall occurs in the month of August (Table No. 1) and minimum rainfall occurs in December (Lepcha, 2013). Kurseong receives the highest amount of rainfall after Cherrapunjee, Meghalaya. Such heavy rainfall is ideal for white orchids that adorn the hill-slopes of Kurseong in abundance. The natural beauty of Kurseong thrives because of the generosity of the rain-gods (Das, 2012).

Table No. 1: Rainfall and Temperature of Kurseong Town (2010 - 2011)

Months	**Rainfall (in mm.)**	**Temperature (in ^{O}C.)**	**Months**	**Rainfall (in mm.)**	**Temperature (in ^{O}C.)**
January	5.2	7.9	**July**	1208.2	20.3
February	9.0	10.98	**August**	1280.5	19.35
March	17.8	12.85	**September**	536.8	18.25
April	49.1	14.8	**October**	74.3	16.85
May	15.6	16.65	**November**	0.0	14.5
June	1021.2	18.65	**December**	0.0	11.9

Source: Darjeeling Tea Research Centre, 2015

Figure No. 4: Rainfall of Kurseong Town (2010 2011)

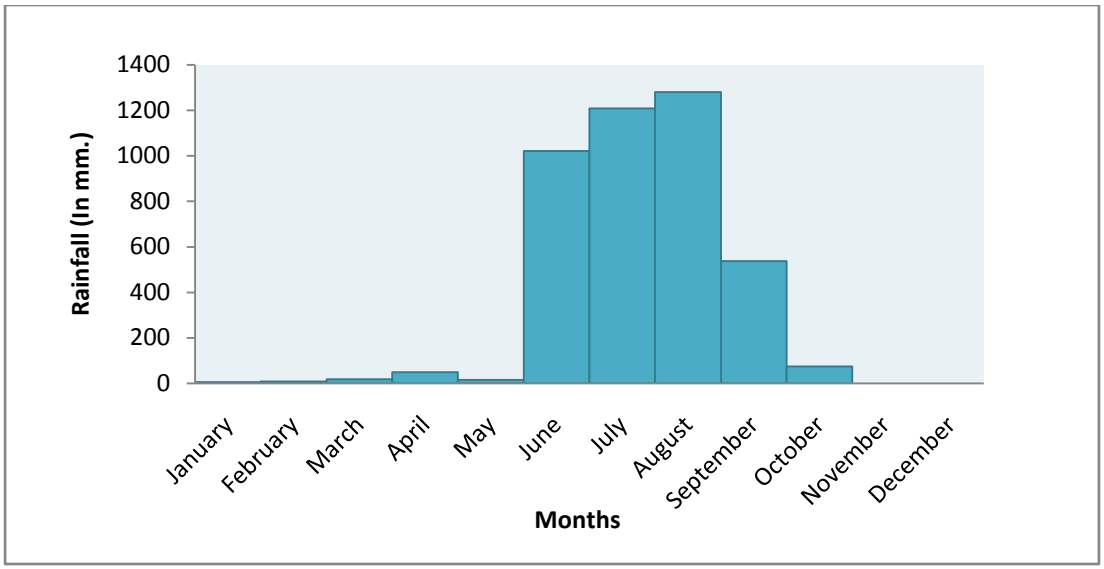
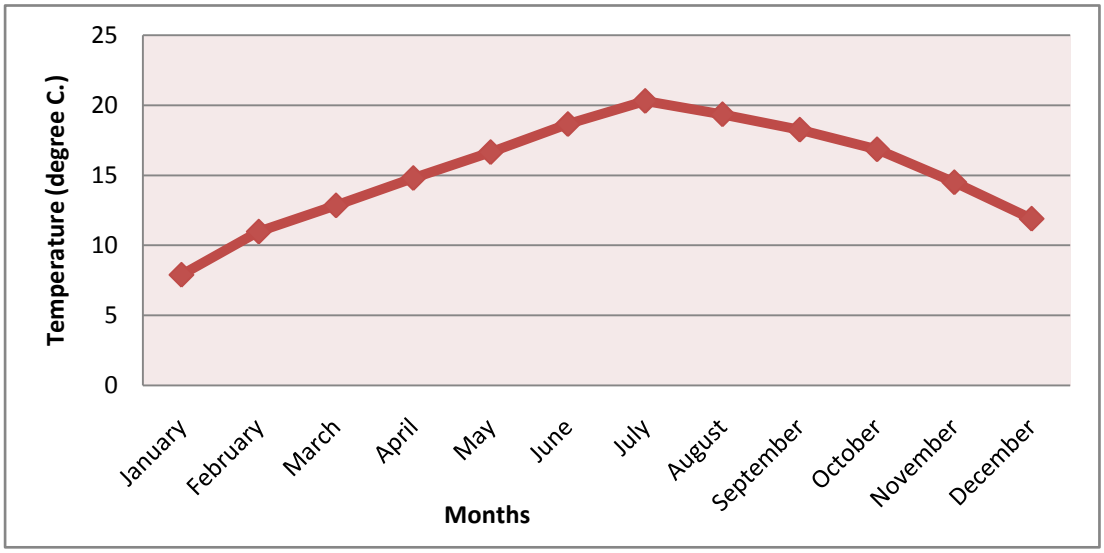


Figure No. 5: Temperature of Kurseong Town (2010 - 2011)



The rich flora of Kurseong and its surroundings is fascinating, and it has aptly been described as a 'Botanists Paradise' (Bir, 1997). The south and south-western parts (altitude of 1300 m. – 1500 m. from MSL) of Kurseong town is covered with tropical wet evergreen forest while north and north-eastern parts (altitude of above 1700 m. from MSL) of the town is found a distinct forest covered of temperate in nature with thick reserved forest of coniferous. The important species found in coniferous part are

alder, cryptomenia, walnut poplar, pine, oak and rhododendron. Other than trees different kind of herbs, shrubs and orchids are also there in this part (Das, 2014).

Soil of Kurseong is characterized by the underlying geological structure. But in general they have been developed by both fluvial action and lithological disintegration. The soils that have been developed in the Kurseong are predominantly reddish in colour. Although northern part of the Kurseong is covered with brown forest soil originated from the brown phyllite and schist parent rocks. Soil of southern and south-western parts is reddish in colour. The soil of Kurseong is poor in lime, phosphorus and nitrogen (Mor, 2013). Due to presence of reddish soil, tea plantation is dominant in the south and south western parts of the town. The tea estates in which reddish soil are found are Castletion, Makaibari, Spring Side, Karbia, Ambootia and Monteviot. Among the aforementioned tea estates Makaibari produces finest and flavoured Darjeeling tea which is world famous. Beside tea plantation, corn, ginger and orange are the other agricultural products of the town (Mohammad, 1992).

Economy of Kurseong town mainly revolves around tourism, schools and tea. Kurseong was one of important tourist destinations of Darjeeling district since British Raj due to its location, climate, and the construction of T.B. sanatorium and introduction of toy train. As a result tourism has played one of the central contributing roles in economic prosperity of the town (Kurseong Municipality, 2012-13).

Another important contributor of town economy is schools. There is about 50 schools in the town. Kurseong is known as "The School Town" due to the emergence of many reputed schools in the town. These schools attract not only local students but also national and overseas students and contribute a huge in the economy of the town (Kurseong Municipality, 2012-13).

The town is surrounded by the famous tea garden like Castleton, Makaibari and Ambootia Tea Estate which has international recognition for producing muscatel flavour Darjeeling tea. Exporting tea is one of the biggest revenue of Kurseong. Most of the family's household income is mainly depend on tea gardens. But now a day's labour dispute and competition in international market with other producers have affected in investment and production. As a result the tea garden labourers are converted from tea garden work to daily wage labaourers or marginal workers. Increase migration in the town from the neighboring states/towns affects adversely the available job or works in the town too. Competition increases amongst workers specially tourism sector. Therefore, non- formal workers male employees who were engaged in this sector have shifted to other activities like construction, masons, carpentry, taxi driving etc. and also large number of female worker shifted to other activities mainly as manual labour (Biswas, 2013).

Total population of Kurseong town is 42,446 which comprise 21,423 male and 21,023 female. The density of the town is 5659 person per square kilometer. The sex ratio is 981 female per thousand male. Population of children belongs to age group of 0 – 6 year is 3607 which is 8.50% of total population of Kurseong. Literacy rate of Kurseong town is 85.76% higher than the state average of 76.26% (Census of India, 2011).

The languages which are being spoken by the people of Kurseong belong to two major language families: (a) Indo-European: Nepali, Hindi, Bengali and English. The languages of Indo-European language or Aryan language family are spoken by the many people of Kurseong town. These languages were added in this town from the neighboring region throughout the process of growth of the town. Amongst them

Nepali is the most spoken language of Kurseong town. (b) Sino-Tibetan: it is the dominant language family of Indian Himalayan due to geographical affinity of the town. The Sino-Tibetan language spoken people in Kurseong are Bhutia, lepcha, Groma, Gurung, Limbu, Magar, Nepal Bhasa, Rai, Sherpa, Sunuwar, Tamang, Thulung, Tibetan, and Yakha**.** Rong or Lepcha language is considered as the oldest language of this town as Lepcha is the original inhabitants of Kurseong (O'Malley, 1907). Nepali and Bengali are the official language of the town.

Hinduism is dominant religion in the town. 65.78% of population of the town is hindu. Many hindu temples exist in and around Kurseong town amongst them Giddapahar Durga Mata Mandir, Jagdish Mandir and the Ambhotia Shiva Temple are very popular temples in Kurseong. After Hinduism, Buddhism is the second largest religion which shares population 20.53%. Gompas in Montieviot and Dowhill Road are the chief sacred religious structures of Buddhism in Kurseong. Christianity is the third major religion which has 5.96% population in the town. St. Paulseak Church on Hill Cart Road, near St. Josephs School is the famous place of religious gathering for Christians in town. Islam is the 4^{th} largest religion in Kurseong town with 5.66% population. Juma Mosque in Hat Bazaar is the central structure for religious rituals place. Jainism and others have the population of 0.07% and 0.58% respectively in the town (Census of India, 2011).

Festivals are the real manifestation of culture and tradition of the people of Kurseong. They celebrate many festivals. *Dashain* is the longest and the most auspicious festival in the Nepalese calendar celebrated in the month of October. Nepali hindus worship goddess Durga and celebrate this festival for ten days. Soon after *Dashain*, *Tihar* festival is celebrated. It is the five day long festival. All Nepali

hindu are celebrated this festival. Among Newars community it is popularly known as '*Swanti*'. During five days *Tihar*, Nepali Hindu community celebrates five *Tihar* – *Kaag* (Crow) *Tihar* (on the first day), *Kukur* (Dog) *Tihar* (on second day), *Gai* (cow) *Tihar* and *Laxmi puja* (on 3rd day), *Gobardhan puja* and *Mha puja* (on 4th day), and *Bhai Tika* (on fifth day). '*Deusi*' and '*Bhailini*' are songs performed by men and women, respectively, during the festival of *Tihar*. Along with these festivals *Maghe Sankranti* and *Bhimsen puja* are also popular among Nepali Hindus. *Maghe Sankranti* is celebrated annually at the peak of winter season usually celebrated in the mid of January. During this festival people visit holy places and worship god. Kirati Rai community celebrates their annual *Sakewa* festival of *Ubhauli* and *Udhauli*. Other Hindu communities of town celebrate *Diwali* and *Dussera* and *Makar Sankranti* during the same time of local festivals - *Dashain, Tihar* and *Maghe Sankranti*. Buddhist in the town celebrates *Losar, Loosong, Saga Dawa, Lhabad Duechen, Dukpa Teshi*, and *Bhumchu*. Among these festivals *Losar* is the most important festivals of Buddhist community. *Losar* is celebrated for 15 days with the main celebration on first three days. *Losar* is the celebration of New Year. Sherpa, Tamang, Gurung, Bhutia and Tibetan Buddhist community of the town celebrate this festival. Another important festival of Buddhist of Kurseong is *Saga Dawa*, the birth day celebration of Buddha. It is also known as *Buddha Purnima*. Muslims of Kurseong celebrates *Eid ul-Fitr* and *Muharram.* Main festival of Christian people in Kurseong like other region of the world is Christmas, Good Friday etc.

Indigenous Lepcha's music and Nepali Rock are very popular in Kurseong town. But now a day western music and India rock are also gaining popularity. Nepali, Bhutia, Lepcha and Tamang dances are very much popular among the people of Kurseong. Most popular sport of Kurseong town is football.

People of Kurseong have a diverse variety of cuisines. Each ethnic group has its own distinct traditional foods. Noodle-based dishes such as *thukpa*[4], chowmein etc. are common in the town. Another popular food in Kurseong is *momos*, a steamed dumpling containing meat or vegetables which is served with soup and spicy tomato sauce or *chutney*. Indigenous fermented food products such as *gundruk* (fermented and dried leafy vegetable), *kinema* (fermented soyabean), and *sinki* (fermented and dried raddish) are consumed by the people. *Chhurpi*, a type of traditional cheese is widely consumed by the people of the town. *Chhang*, a millet or maize or rice based alcoholic beverage is very popular in Kurseong. People of Kurseong also consume a variety of Indian and continental foods.

2.3. Historical Background of the Kurseong Town

Kurseong town was set up by British East India Company and since its birth, growth and expansion has been rapidly continuing. Therefore, it is better to discuss a history on urban growth and expansion of Kurseong town.

i. Colonial period (British Period)

The year 1835 is considered as the birth year of the Kurseong town. Before 1835, Kurseong was a small village of Sikkim. The period between 1835 and 1947, Kurseong witnessed the stronghold of colonial power. Initially, Kurseong grew up as a halting station for military and civil personnel. But after the construction of Cart Road (1861-1869), Kurseong had got important transit point. Kurseong town became a separate administrative unit in the year 1878. In 1879, it was declared as municipality with the population of 2836. It began to develop as a resort town and

[4] *Thukpa* is a common Tibetan cuisine noodle soup that includes small noodles. This dish is a very popular in Nepal, Sikkim and Darjeeling.

became centre of attraction after the construction of Siliguri – Darjeeling Road in the year 1880 and Darjeeling Himalayan Railway (Toy Train). Along with extension of transport facilities and its connectivity with the plains, economic potentiality began to sprawl. And multifaceted commercial activities like tea gardening, trade and tourism began to flourish which attracted people towards it. Migrants from the neighbouring districts, states and countries converged upon this hilly urban centre causing population to grow (Das, 2012). The population of Kurseong was 4033 in 1881. In 1890, Kurseong was constituted a sub-division and Kurseong town became headquarter of the subdivision. And after this, gradually, the town started to take off towards fully fledged municipality. According to census of India report 1901, total population of the town has 4469. From 1939 to 1942, Kurseong started growing rapidly. Club, Sanatorium, Guest House, Hotels, Cinema Hall, Railway head quarter etc. were also developed gradually. Small flow of Tourists in summer was reported to visit the town. The total population of Kurseong was 8417 in 1941. In 1941 town had the total area of 3.88 sq. Km. (1.5 sq Miles) and a density of 2189 per sq Km. (Dash, 1947).

ii. Post Colonial Period (After Independence)

After independence, town had started with growing of hotels, restaurants, markets and educational institute. In the year 1962, All India Radio commissioned its relay station. In 1951, the total area of the town was increased from 3.88 sq Km. (1941) to 5.05 sq. Km. It had been increased to 7.5 sq. Km. in 2011. The number of wards in municipality had also been increased from 12 wards (1957) to 20 wards in 1999. In 1951, population of the town was 11719 persons and reached to 42446 in 2011. There was rapid growth of population in between 1981 to 2001. The growth rate of population was 48.59% in 1991 and 49.55 percent in 2001 (Table No. 2). Population

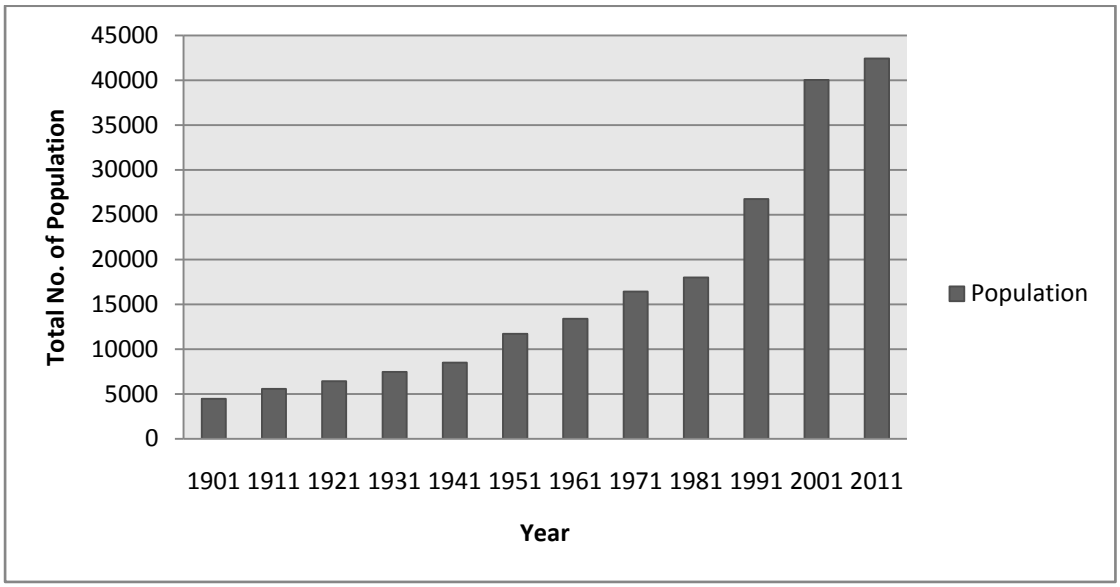
density has increased by 107.82% in this period. This was because of peace had been restored in the region after the first Gorkhaland agitation that led to the movement of the people from the surrounding region for better economic prospects and better life. However, a negative growth of -28.59% in density and 6.06% in decadal growth of population has recorded in 2001-2011. This is characterized by outmigration and settling down in the nearby Siliguri city (a class 1 town) for better infrastructure, prosperity and standard of living (Lepcha, 2015).

Table 2: Decadal Population Growth and Density in Kurseong Municipality

Year	**Population**	**Growth rate (%)**	**Population density (Per Sq. Km.)--**
1901	4469	-	1042
1911	5574	24.7	1299
1921	6445	15.62	1502
1931	7451	15.60	1920
1941	8497	14.03	2189
1951	11719	37.91	3020
1961	13410	14.43	2655
1971	16424	22.48	3252
1981	18008	9.64	3566
1991	26758	48.59	5299
2001	40019	49.55	7925
2011	42446	6.06	5659

Source: Compiled from Bengal District Gazetteer: Darjeeling 1947.

Figure 6: Decadal Population Growth in Kurseong Municipality (1901 – 2011)



2.4.**Factors for the Development of Kurseong Town**

The historical analysis of Darjeeling district reveals various factors that have led to the development of Kurseong town. One of the major factors for the development of the town was the attraction of British East India Company because of its location and cold climate which influenced them to form a halting station for the soldiers and travelers moving towards Darjeeling from Siliguri. They used to believe that the climate of Kurseong would recuperate diseases.

Tea plantation in Kurseong area is another important factor. Around 1841, a British army officer, Captain Samler had planted tea saplings and established Makaibari tea estate. Tea plantation led to flourish economic potentiality which attracted a mass of population from the neighboring districts, states and countries upon this hilly urban centre (Das, 2012).

Development of transport network (in the form of road and railway) is another important factor which encourages all the form of development such as hotel, club,

sanatorium, guest house etc. The opening of Cart Road in 1861-1869 between Kurseong to Siliguri, construction of Siliguri – Darjeeling Road and starting Darjeeling Himalayan Railway (Toy Train) in 1880, had changed the small hamlet to a tourist destination for the British colonial authorities.

The town is known for good school. There are many schools which were established by Britishers attract students from both national and foreign countries. The growth of the town is also largely influenced by the schools in the town.

The administrative function occupied an important place in the process of growth of Kurseong town during British period and after independence. In the year 1835, Kurseong had come under the administrative control of British company. And in 1890, Kurseong town was declared as the administrative head quarter of Kurseong sub-division. Since then the town has been playing the role of administrative headquarter of Kurseong subdivision. It was also a center of movement of the people from the surrounding region for Gorkhaland agitation (Lepcha, 2015).

Another important factor is the convergence of multi ethnic, languages and religious group in Kurseong helps in the process of development for the town. Although, Lepchas are the first native people of Kurseong, Britishers and other communities were settled in Kurseong in order to search of gainful occupation and for administrative purpose. Nepali community was migrated to this hill urban area for working as a labour in tea plantation. Tibetan and Chinese people had arrived for trade purpose. Bengalis arrived as managerial and clerical workers in the tea gardens, governmental jobs, lawyers, doctors, teachers etc.. Many communities of plains like the Marwari, Bihari and Punjabi were migrated to find suitable jobs. As a result with

the concentration of multi ethnic and languages groups in one place help the transformation of urban centers and society.

Conclusion

Kurseong is one of hilly towns of Darjeeling district on the way of Darjeeling-Siliguri roads. The town had been developed through the involvement of British East India Company. The development had started since 1835 when a village named Kurseong along with Darjeeling was ceded by the king of Sikkim to the British East India Company. After that, through construction of roads and railways, plantation of tea etc. the village Kurseong gradually started to take off towards municipality. The pleasant climate, infrastructural facilities and economic prosperity have attracted people from the neighboring areas. As a result population in the Kurseong town started to grow. Initially, the rate of population growth was slow. But after independence, there was an increasing rate of population growth. The town population has grown more than double during 1981 - 2011.

The rapid growth of population during last few decades have become the main constrain of the town. Urban expansion since last few decades the town has reached its extreme limits at presents. It is highly congested due to limited space and land locked character of the town. It also affects economic activities in the town. People are moving from tourism to various other activities such as construction labourers, masons, carpenters. Also, too much reliance on tea garden, which provides most of the job to women labourers, has forced the people of the town to marginal activities like menials, cooks, drivers etc. Sometime, political instability of the area and Gurkhaland agitation are also major problems which affect normal life, economic activities, social process and development in the town.

Urban amenities are the specific urban facilities that contribute to the urban living experience of residents. They are linked to the daily needs of residents in an urban area. T. Randall has given some examples of urban amenities which include: “grocers, convenience stores, access to public transit, schools and professional services (doctor or dentist)” (Randall, 2008). Gottlieb describes that “residential amenities may be defined as place-specific goods or services that enter the utility functions of residents directly” (Gottlieb, 1995). Both Mathur and Stein and McNulty et al., refer to urban amenities as “quality of life factors” and Howie et al., confirm that “urban amenities are generally accepted as being important to a household’s sense of place” (Howie, 2010). Therefore, urban amenities and services are those which are very importance in day to day life of urban dwellers. These are both public sector amenities provided by councils as well as private, such as water supply facilities, sanitation and sewerage facilities, solid wastes management, health facilities, education facilities, parks, public squares, recreational facilities, cafés, restaurants, retail and other goods or services.

Kurseong town is a hilly urban center of Darjeeling district, West Bengal. The urban history of the town reveals that it started in 1835 and became full-fledged urban area in 1879 when urban local body was formed. The existing urban amenities and services of the Kurseong municipality area are provided by urban local authorities as well as private vendors. Recent years due to rapid population growth in the municipality area, the demand of civic amenities and services has been increased several fold.

3.1. Amenities and Basic Services in Kurseong Town

3.1.1. Water Supply

After Cherrapunjee in Meghalaya, Kurseong receives the highest amount of rainfall which has given birth of quite number of perennial and semi perennial sources of water in the form of natural streams. These streams are the primary sources of water in the town. Water supply in the town involves tapping of 12 natural streams in the catchment region located in the dense forest area of distances ranging from 02 to 20 Kms. The tapping water is impounded with small setting tanks. After storing in small tanks, the water is directed to the Central Reservoirs through G.I. pipe lines of various sizes for preliminary from sedimentation filtration (Plate No. 7). Then the water is supplied through the feeder conduit lines to the Service Reservoirs located at different convenient places of the municipality (Kurseong Municipality, 2012-13) (Plate No. 4 & 5).

There are six central reservoirs with a total capacity of 4,838,000 gallons[1]. These reservoirs are for both urban and rural area of Kurseong. Among these central water reservoir at Durpin (Dow Hill forest area) has the highest capacity of about 45, 00,000 gallons (Table No. 4). The water of this reservoir is always kept in reserve for maintaining supply during emergencies. Four central reservoirs have filter and chlorination device with them. These central reservoirs are central reservoir at Dow Hill near post office, Central reservoir near Victoria school, Central reservoir at Eagle Craig and Central reservoir near St. Helen's convent. Central reservoir near municipality office does not have filtration system (Table No.3 & Figure No. 7). This reservoir is used for washing, lavindering toilets and fire hydrants.

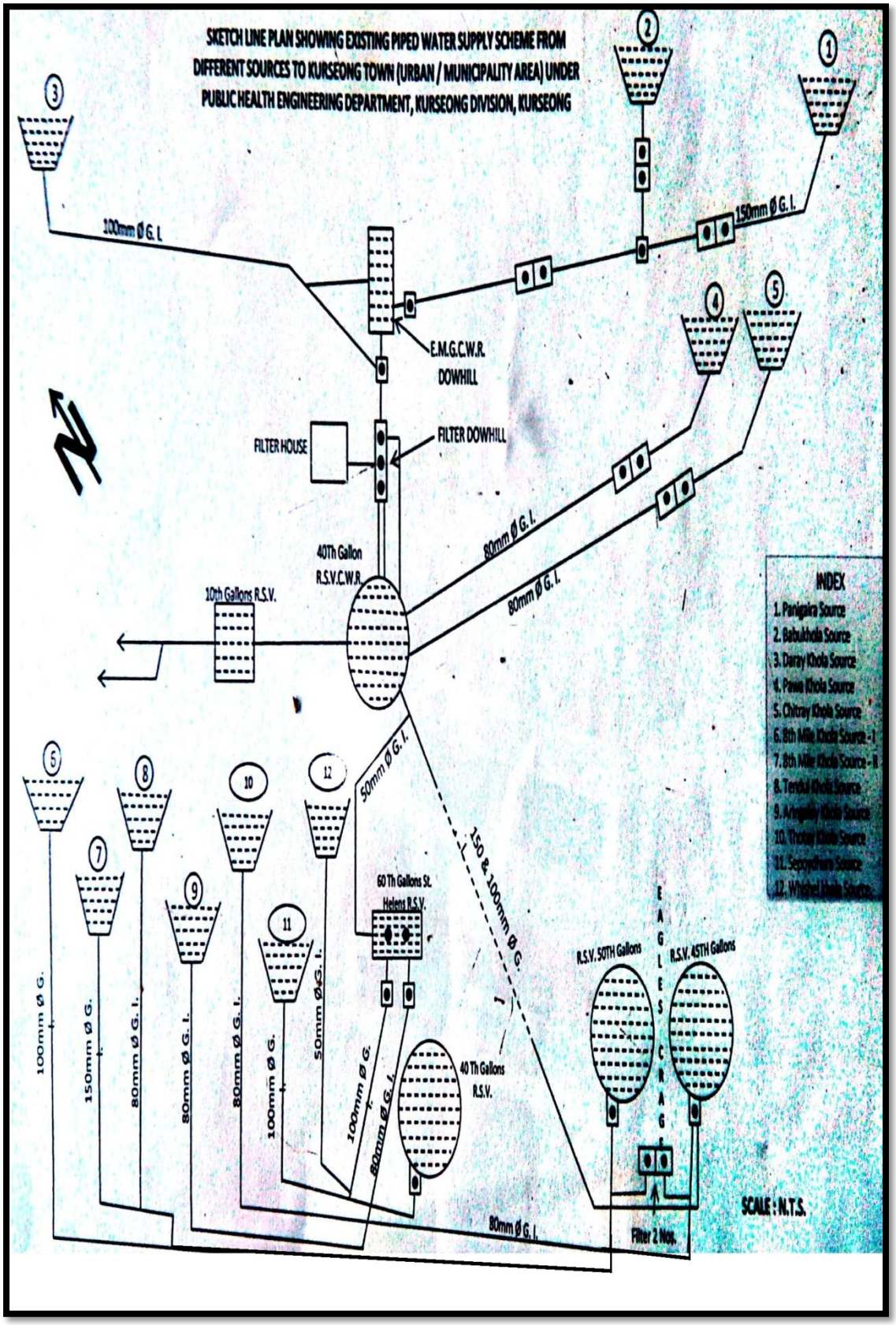
[1] Gallon is a unit for measuring liquid. 1 gallon is equal to 3.78541 liters.

Table No. 3: Sources of Water for Feeding Central Water Reservoir

Sl. No.	Name of the Perennial Sources	Location	Diameter of Feeder Line	Name of the Feeding Reservoirs	Distance from Reservoir
01.	Dharay Khola	Near Bagora	80 mm/100mm	Central Water Reservoir at Durpin (Dowhill Forest Area)	12 KM
02.	Babu Khola	Near Khundrukey Busty	150mm	Central Water Reservoir at Durpin (Dowhill Forest Area)	12 KM
03.	Panigaira Khola	Near Khundrukey Busty	150mm	Central Water Reservoir at Durpin (Dowhill Forest Area)	-------
04.	Pahwa Khola	Near Deorali Busty	80mm	Central & Service Water Reservoir at Victoria	7.50 KM
05.	Chitray Khola	Near Chitray Busty	80mm	Central & Service Water Reservoir at Victoria	5 KM
06.	Aringalay Khola	Near Dilram	80mm	St. Helens Central & Service Reservoir	6.5 KM
07.	Sepoydhura Khola	Near Sepoydhura	100mm	St. Helens Central & Service Reservoir	4.50 KM
08.	8th Mile Khola Source- I	8th Mile near Sonada	100mm	Eagles Craig Central & Service Reservoir	16.10 KM
09.	8th Mile Khola Source- II	8th Mile near Sonada	100mm/150mm	Eagles Craig Central & Service Reservoir	16.10 KM
10.	Thotay Khola	Near Tung	80mm	Eagles Craig Central & Service Reservoir	10.40 KM
11.	Tendul Khola	8th Mile near Sonada	80mm/100mm	Eagles Craig Central & Service Reservoir	--------
12.	Whistle Khola	Near St. Mary Hills	50mm	Service Reservoir near Church(St. Helen Area)	1.50 KM

Source: Kurseong Municipality and Kurseong P.H.E. Department, 2015.

Figure No. 7: Water Supply Arrangement for Kurseong Town



Source: P.H.E Dept., Kurseong Sub-division, Kurseong May 2015

Table No. 4: Storage Facilities and Capacities of the Storage Tanks

Sl. No.	Reservoir	Capacity	Type
1.	R.C. storage tank at Dow Hill forest area (Durpin).	45,00,000 Gallon	Rectangular
2.	Central Water Reservoir near Victoria School.	R.C.C. Tank 45,000 Gallon 20,000 Gallon	Circular Rectangular
3.	Central Water Reservoir near St. Helen's Convent.	R.C.C. Tank 88,000 Gallon 20,000 Gallon	Rectangular Circular
4.	Central Water Reservoir at Eagles Craig.	R.C.C. Circular 45,000 Gallon 50,000 Gallon	Circular Circular
5.	Central Reservoir near Municipality Office.	R.C.C. Tank 20,000 Gallon 20,000 Gallon 20,000 Gallon	Rectangular Rectangular Rectangular
6.	Central Water Reservoir at Dow Hill near Post Office.	R.C.C. Tank 10,000 Gallon	Rectangular

Source: Kurseong Municipality DDP: 2008-09 to 2012-13.

The Kurseong water supply began operational in 1913. At present, the dual system of water management has been observed in Kurseong. The storage and augmentation of water is the responsibility of the P.H.E. Dept. which is under the control of G.T.A. The water supply to the Central Reservoirs and Service Reservoirs from the catchments situated at various locations is maintained by the P.H.E. Dept. and the entire distribution system from the service reservoir to the different parts of the municipality area is managed by the municipality. As Kurseong has the natural sloped areas the gravity flow system has been adopted for channeling and distribution of water to the residents of various wards with a network of pipes of approximately 2 inches diameters (Kurseong Municipality, 2012-13).

In spite of all these efforts by the P.H.E. Dept. and Municipality to enhance the water supply, a huge gap still exists between the demand and supply of water in the town. The daily requirement of the water is about 20 gallons per head according to U.N. recommendation standard (Lepcha, 2013). The U.N. recommended amount is only available to the residents of the town during the rainy, autumn and winter seasons. But the water shortage is strongly felt during the three lean months (March, April and May).

Table No. 5: Availability of Water during the Dry lean Months (March, April and May)

a.	**Total storage facility during the dry lean months**	3,05,000 Gal./Per Day
	Less 5% due to water (loss)	(-) 15,250 Gal. /Per Day
	Net available	2,89,750 Gal./Per Day
b.	**Present Population of Kurseong Town**	42446 person
c.	**Average Water supply per day**	2,89,750 Gal.
	Population served	42446 person
	For one unit of population	6.82 Gallons per day per head
d.	**Present demand per day (without floating population demand)**	8,48,920 Gallons (42,446 population @20Gal./per head/ per day)
e.	**Actual supply available Per day during the dry season.**	2,89,750 Gallons
f.	**Shortfall during dry Period**	559170 Gallons

Source: Kurseong Municipality 2015 and District Census Handbook 2011.

The estimated daily demand of the potable water is 8, 48,920 gallons (20 gallons per head per day) but in the lean driest months (March, April and May) the available water in the municipal reservoirs is 2, 89,700 gallons (Table No. 5). Thus, there is a horrifying shortage of 5, 59,170 gallons. During the three month, the available water for the population of Kurseong town is 6.82 gallons / head.

Table No. 6: Norms for Minimum Physical Standards of Urban Water Supply in India

Population/Area Target	Service Level Target
100% population to be covered	• Piped water supply with sewerage: 150/135 lpcd. • Piped water supply without sewerage: 70 lpcd. • Public stand posts in the low-income settlements with a minimum supply of 40 lpcd.

Source: Chandra et al., 2007

According to the norms for minimum physical standards of urban water supply in India, every resident of municipality should be covered by municipal water supply (Table No. 6). The minimum amount is 150/135 liters per capita per day for the municipal area where household pipe water supply with sewerage connection while minimum 70 liters per capita per day for the area where pipe water supply existed without sewerage connection. Minimum 40 liters per capita per day is recommended for the low income families which collect water from public stand post (Chandra et al., 2007). Therefore, by considering the above recommendation, it can be said that the daily per head water availability for the people of Kurseong in lean months is very less than the minimum physical standards.

The present water supply infrastructures in Kurseong Town were designed and installed during the British colonial period for a population of 2836 at that time but in recent years the same infrastructures are supporting a population of 42446 (Census of India, 2011). Therefore, existing capacities of all the above reservoirs are inadequate to meet the present water demand and more severe during three lean months. Before 1980 the situation of water crisis was not that much chronic (Prasad, 2011).

The water is being supplied in alternative days only for 2-3 hours in monsoon season and less than 1 hour in dry season. Kurseong municipality officials and local

people believe that the situation is the result of lack of maintenance in the water supply system, population growth, deforestation on the upper catchment area, decaying and bursting of old pipe line, uncontrolled tapping and illegal connection, climate change and reducing rainfall and increase of severe landslide (Prasad, 2011).

All the sources of water for the town are located outside the municipality area. There are a lot of illegal tapping practices from the main water supply network by rural people. The perception of the rural people is that no one seems to be responsible for the water supply to them and that is why the drinking water are being tapped from the pipe passing through village or from reservoir located near the village. The position of municipality is that the responsibility for the water supply to the rural people is under the jurisdiction of P.H.E. Dept. and the Rural Development Department. But the municipality does not have the procedure to take action against illegal water tapping from the main water network. The P.H.E. Dept. shows less interest to ponder on this issue. Therefore, uncontrolled tapping, illegal connection and leakage (Plate No. 8) aggravate the shortage of water supply (Prasad, 2011).

Pipe fitter in each ward is also responsible to check the illegal connection but it is commonly known fact that they are the main culprit who is making illegal connection by taking bribes. Immediate response will be taken in two cases when either some amount of money is given to the fitter or a group of more than five people make complain to him or municipality. Individual complain does not get any attention.

Kurseong receives an average amount of 1,065 mm. rainfall in the monsoon months (June- September). But due to absence of rainwater harvesting in the municipality, a large amount of water is wasted as surface run off. Even there are

several perennial *jhoras*[2] in the town. Moreover, due to absence of proper maintenance the water of these *jhoras* cannot be used for potable. The water storage of the town is old and significant amount of water gets wasted due to leakages in continuous manner from the storage. The waste water treatment plant of the town is not in operational condition now a day. A large volume of waste water is running through the local drains and sewerage line due to absence of operational waste water treatment plant in the town.

There is no meter system to monitor of water in entire water network (the supply and the distribution). The estimations are being done by means of measuring water level in the tanks or reservoirs. As a result, it is very difficult to maintain the required amount of water to the different municipal area (wards) as per their population size. Therefore, it is observed that most densely populated wards of the municipality are getting insufficient water.

The water is being served to the town after basic processing of filtration and chlorination. But there is no regular monitor for water quality either by the municipality or the P.H.E. Department (Plate No. 9). The water quality is deteriorated due to organic content like e-coli which are increasing downstream, and high contain of iron and lead, which are most likely originating from the piping itself. The high e-coli contains is also due to possible infiltration of sewage water (Prasad, 2011).

The majority of the household of the town do not pay fees for the use of water. According to municipality these situation is prevailing since last few years may be due to political unrest and dissatisfaction with the water services in terms of quantity, pressure, regularity and quality of water. Industries and hoteliers are paying regularly

[2] A stream/spring is known as *jhora* in local language.

required fees for water uses to the municipality but they are not happy with the quantity and services. Therefore, for scarce water the hoteliers and industries are depending on private vendors. Insufficient and irregular water supply in schools is very common situation in Kurseong town.

Private vendors are playing important role to fulfill the demand of the town. Especially, their existence is more common during the lean months (March to May). They order to the private vendors by giving required amount of water and exact place of supply through mobile phone. Generally, the supply is made by the private vendors on the next day of order. Private vendors charge of Rs. 400 per 1500 liters. The distribution of water is made by the private vendors to the public through tankers and trucks. They collect the water from different perennial streams around municipality area and supply to residents without any basic treatment.

3.1.2. **Sanitation and Sewerage**

The sewerage system for Kurseong town had been developed during British regime. In 1918, the sewerage system of Kurseong town was installed to remove night soil from 10 public community latrines and more than 736 household low cost sanitary latrines in market area. Recently, one centralized septic tank had been constructed in ward no. 14. A few numbers of wards in and around the market area have been covered with this central septic tank. There are about 508 sewer connections. The night soil removals from almost all the houses outside the coverage of central septic tank are going into the open *jhoras* (streams). The present Board of Councilors has prepared a detailed plan and estimated for construction of three more central septic tanks and covering the entire Kurseong town with sewerage line (Kurseong Municipality, 2012-13).

There is no sewerage treatment plant in the municipal area. Even there is no permanent place allotted for disposal of night soil. As such, night soil is disposed regularly in different places outside the municipal area. Although, recently, one temporary dumping ground near tea garden is taken on lease by municipality (Kurseong Municipality, 2012-13).

The town has a total numbers of 69 insanitary latrines (Table No. 7). Ward no. 2 has the highest number of insanitary latrine i.e. 24 and is followed by ward no. 16 i.e. 16 insanitary latrines and ward number 7 has 15 insanitary latrines. The night soil of insanitary latrines either disposes into open drain or removed by human and carried away by animals. Out of the total 6117 households of the town, 719 households do not have latrine facilities within their premises. Therefore as an alternative 615 households are depending on public toilets and 104 households defect in the open. The households which are depending on public toilet among them highest number of household is found in ward number 1, 11, 16, and 6. Ward no. 20 has the highest number of people who are defecting in the open and ward no. 1 has the highest number of households do not have latrine within their premises (Table no. 8 and Figure No. 8).

Table No. 7: Ward wise Existence of Insanitary Latrine in Kurseong Town

Ward No.	Total number of households	Night soil disposed into open drain	Night soil removed by human	Night soil serviced by animal	Total No. of Insanitary Latrine
1	280	0	0	0	0
2	378	0	0	24	24
3	271	0	0	0	0
4	422	2	0	0	2
5	387	0	0	0	0
6	250	1	0	0	1
7	512	15	0	0	15
8	373	2	0	0	2
9	443	0	0	0	0
10	392	0	0	0	0
11	234	5	0	0	5
12	172	0	0	0	0
13	381	0	0	1	1
14	353	0	0	1	1
15	160	0	0	0	0
16	229	16	0	0	16
17	503	0	0	0	0
18	319	0	0	0	0
19	220	0	0	0	0
20	337	2	0	0	2
Total	**6616**	43	0	26	69

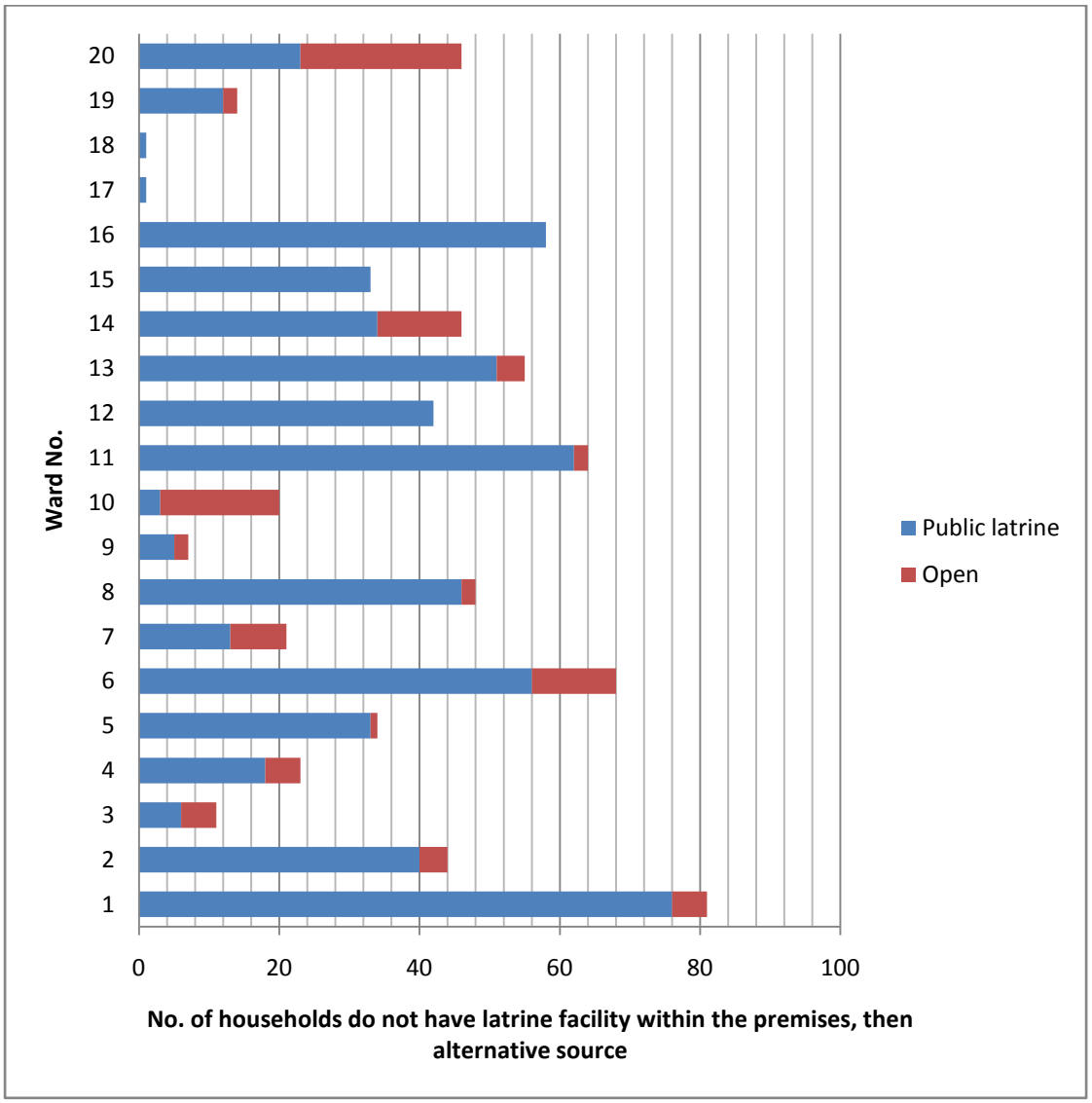
Source: Department of Municipal Affairs, Govt. of West Bengal, 2011.

Table No. 8: Ward Wise Not Having Latrine Facility within the Premises

Ward No.	Total number of households	No Latrine Facility within the Premises, then alternative ways		Number of Households not having Latrine Facility within the Premises
		Public latrine	Open	
1	280	76	5	81
2	378	40	4	44
3	271	6	5	11
4	422	18	5	23
5	387	33	1	36
6	250	56	12	68
7	512	13	8	21
8	373	46	2	48
9	443	5	2	7
10	392	3	17	20
11	234	62	2	64
12	172	42	0	42
13	381	51	4	55
14	353	34	12	46
15	160	33	0	33
16	229	58	0	58
17	503	1	0	1
18	319	1	0	1
19	220	12	2	14
20	337	23	23	46
Total	**6616**	**615**	**104**	**719**

Source: Department of Municipal Affairs, Govt. of West Bengal, 2011.

Figure No. 8: No. of Households Depends on Alternative ways for Latrine



The public latrines and community latrines of the town are not maintained in a proper hygienic condition. The users of these two types of toilets are not satisfied with their services. The main issues of public latrine are cleaning and water supply issue. The public latrines caretakers are not cleaning latrines regularly (Plate No. 10). For maintaining cleanliness of public toilets municipality or Sulabh International[3] gives

[3] Sulabh International is an India-based social service organization that works to promote human rights, environmental sanitation, non-conventional sources of energy, waste management and social reforms through education.

bleaching powder to the caretakers occasionally. Even the existing number of staffs or caretakers for maintaining the public and community latrines is quite inadequate. The municipality cannot appoint new staffs either in place of the staffs who have retired and died and also no approval from the State Government to the proposals submitted by the Municipality.

3.1.3. Health

The history of Kurseong town reveals that one of the important factors behind the growth of Kurseong town was sanatorium. Kurseong was the medical town during the British days. It was believed that climate of Kurseong would recuperate the diseases, especially tuberculosis. In the year 1936, S.B. Dey, a notable Bengali philanthropist and social worker established a T.B. Sanatorium at Kurseong with 301 beds and 12 doctors and 66 paramedical staffs. The sanatorium was handed over to the state government in 1975. Presently, this historical T.B. Sanatorium is in extinct condition because only a very few handful of patients are coming to seek treatment for tuberculosis now a days. At present, there are only 30 paramedical staffs and 2 doctors in the sanatorium. Beside this sanatorium, there is a government hospital (Sub Divisional Hospital) which has a capacity of 100 beds and 28 doctors (presently 24 doctors in position) and 13 paramedical staffs, located in the heart of the town. The town has one veterinary hospital with 1 bed, 1 doctor and 2 paramedical staffs (Table No.9).

Out of total 6616 families of the municipality, only about 23% (1561) families are covered through various health schemes run in the ULB[4]. Health wing of the municipality consists of 4 dispensaries or Healthcare Sub Centers and one

[4] ULB means Urban Local Body

administrative office which is located at the municipality itself. There are 20 HHWs, 4 Supervisors, 1 Health Assistant, 1 Medical officer, 1 Accountant, 1 Store-Keeper, 1 Computer assistant and 1 Sanitary Inspector working in the municipality health wings. The HHWs provide door-to-door basic health services to the urban poor and enable the poor community to get services such as institutional delivery, contraceptive services, immunization, emergency care for maternal mother and child care services. This service has been almost universally established, even in the poor areas and among the most marginalized sections of the society. Drugs for common ailments from the Sub Centers are distributed to the families in free of cost. Antenatal treatments are also provided by supplying of iron and folic tablets to the expectant mothers. The infant mortality rate is 17 per cent and the ratio of hospital delivery is 775 per 1000 in the town. One health worker covers approximately 78 families. These HHWs along with the Supervisors form a concrete network at three levels viz. Ward level, Sub- Centre level and Health Administrative Unit level (Table No. 9).

There are another hospital of alternative medicine with 1 doctor and 1 paramedical staff. Moreover, the town has 3 non-governmental outpatients Clinics and 13 non-governmental medical shops.

Kurseong town has no mobile health clinic and private hospital or nursing home. Even there is no maternity home, family welfare centre and maternity and child welfare center. All these are generally handled by healthcare sub centers of the municipality. Ambulance services in the town are provided by Red Cross, Bita and Reuki. State government recently has decided to establish a medical college and multi speciality hospital in the campus of S.B. Dey’s T.B. sanatorium.

Table No. 9: Health Facilities in Kurseong Town

Type of Hospital/Healthcare Centre/Clinic/Outpatients/Medical Stores	Total No.	Capacity				
		No. of Beds	Doctors		Paramedical Staffs	
			Total Strength	Total in Position	Total Strength	Total in Position
Allopathic Hospital (Sub-divisional Hospital)	1	100	28	24	13	13
Hospital of Alternative Medicine	1	0	1	1	1	1
Dispensary/Healthcare centre	4	0	1	1	24	24
Family Welfare Centre	0	---	---	---	---	---
Maternity & Child Welfare Centre	0	---	---	---	---	---
Maternity Home	0	---	---	---	---	---
T.B. Hospital/Clinic (S.B. Dey T.B. Sanatorium)	1	301	12	2	66	30
Nursing home	0	---	---	---	---	---
Veterinary Hospital	1	1	1	1	2	2
Mobile Health Clinic	0	---	----	---	---	---
Non-Govt. Outpatients	3	---	----	---	---	---
Non-Govt. Medical Shops	13	---	---	---	---	---

Source: Census of India 2011.

3.1.4. Drainage

Kurseong is located along the valley side slope of Balason River. This sloppy topography of Kurseong helps in rapid drainage. There is about14 *jhoras* (natural streams) which are passing through the heart of the town to channelize the water during rainy season. There are also several man made drains that connect households. They are mostly open or surface drainage. The open drains in the municipality area are mainly of two types- *Kutcha* (20.77 km) and *Pucca* (36.50 km). Most of the *Pucca* drains were constructed in last 10 years (Kurseong Municipality, 2012-13). Being uncovered these drains need a regular cleaning or collection of sludge. But the

municipality takes up the work of cleaning of these drains once in a year (Plate No. 13).

At present, due to irregular cleaning and non-maintenance, the conditions of the drains within municipality are very bad. Wastes disposal into these drains is very usual in the town which leads to water pollution, smelling and blockage of streams. This blockage of drains by household waste creates difficulties in functioning for channelizing water in rainy season and causes landslides which are damaging the tea plantation and houses. Municipality is not in a position to maintain or repair these drains due to insufficiency of fund. Hence, the municipality has requested the Irrigation Department under GTA to keep all the *jhoras* (streams) of Kurseong town within their purview and so that maintenance work will be better because they have good amount of funds (Kurseong Municipality, 2012-13).

3.1.5. Solid Waste

Up to 1970's the solid wastes generated by the municipality were mainly organic i.e. easily degradable. Therefore the amounts of solid wastes generated by the town were simply thrown in the nearby places. However the population of the town has increased gradually and the amount of solid waste also increased at alarming rate. Since 1980s the non-biodegradable material like plastic has been added with these solid wastes. Along with this increasing rate of solid wastes generation, vats, dustbins, handcart etc. also came into exist in the municipality area for maintaining clean environment. The types of solid wastes generate from the municipality area can broadly be classified into four categories: (a) Municipal Solid Wastes (MSW)- includes organic and inorganic wastes are generated from households, shop keepers, hotels, restaurants, schools colleges, offices etc. and handling this is a duty of the Conservancy

Department of Municipality. (b) Biomedical Wastes- generated from hospitals and health clinics and West Bengal Pollution Control Board (WBPCB) is authorized to handle these wastes. iii) Industrial Wastes – there is no significant industrial waste being generated from the town. (c) Construction and Demolition Wastes - these wastes are mainly used for filling up of low-lying areas. Till now these wastes have not created any problem (Kurseong Municipality, 2012-13).

Presently, the wastes collection in the municipality is generally done by two methods: (a) waste collection from vats and (b) collection from drain sludge / jungle. There is also a partially existence of door to door collection method in the municipality area. There are 74 dustbins / vats in the town. The collected wastes are transported to the disposal ground. The per capita per day solid wastes generation in the municipality area is estimated about 75 grams and total amount of solid waste generation per day for the entire municipality is about 6 metric tons (Kurseong Municipality, 2012-13).

At present in the municipality, there are 65 conservancy staffs who look after the waste collection and disposal system. Municipality has two tractors, one truck and jeep to transport the garbage to the dumping ground (Table No. 10).

Table No. 10: The Infrastructure of Solid Wastes Management of Kurseong Town

Asset Category	Quantity/ Capacity			Year of Construction/ Commissioning, No. of Years in Use	Physical Condition/ State of Repairs
Collection vehicles, bins/ containers, Composting plant	**Type**	**Capacity/**	**No.**		
Conservancy Tractor with Trailor	Ford	1 MT	2	1960	One Working One in Poor Condition
Conservancy Truck	Tata	2 MT	1	1990	Good Condition
Jeep Trailer	Tata	0.5 MT	1	2004	Good Condition
Dustbins /Vats	Cemented	8 Tons	74	------	Good Condition
Central Septic Tank	Cemented		1	------	Good Condition
Public Latrines	Septic	200 Seats	18	------	Good Condition
Community latrines	Septic		32	------	Good Condition
land fill site Near Polytechnic College	Dumping ground	-------	1	24 years	Leased

Source: Kurseong Municipality, 2012-13.

Recent years the municipality is facing huge problems regarding the solid wastes management services. People of the municipality area are deeply unsatisfied with this system of vats as those created environmental nuisance in case of irregular clearance (Plate No. 12). There is no doorsteps waste collection system in all the municipality wards and irregular wastes collection in remote wards. The wastes are then disposed off into streams, causing blockage of streams during rainy season which trigger landslides (Kurseong Municipality, 2012-13). No treatment of waste has been attempted till now. Even there is no proper dumping ground in its desire size with latest technology of treatment. The dumping site located in tea garden which is 3 Km. away from town is the only site which has been used for more than 24 years.

3.1.6. Education

Kurseong is known as school town due to the emergence of many renowned schools namely St Helens Convent, Dow Hill Girls School, Goethals Memorial School, St. Alphonsus School, Pusparani Roy High School, Scottish Mission Girls School and Victoria Boys School. All these schools were established during British regime. Europeans are the pioneers of the schools in Kurseong. The oldest European school in Kurseong is Victoria School was opened by Sir Ashley Eden as a co-education and it was housed at Constantia (present residence of sub-divisional officer). The school was moved to Dow Hill in 1880. Later, in 1897, the present Victoria School was opened only for boys and the Dow Hill School for girls. In the year 1887, Pusparani Roy Memorial School came into exist. Initially the school was as a coaching school started by a few Bengali railway employees to educate the local children of Kurseong but later due to increase the number of students they could not find a room to run school. Gorkha Public Library provided its hall to the school. In course of time it converted to Middle English School and in 1943 it became Pusparani High School. St. Alphonsus School was established in the year 1888. In 1890, St. Helen Convent School was opened by Mother Marie (then Provincial). In the year 1907, the town got another school i.e. the Goethals Memorial School. Scottish Mission Girls School established in 1909 in Kurseong. The buildings and the century old furniture makes these schools as a Heritage of the town.

Other renowned schools of the town are Himali Boarding Schools Ram Krishna Higher Secondary School for Girls, Bethany School, Modern English School, St. Joseph Girls High school etc. At present there is 40 primary schools, 22 middle schools, 21 secondary schools, 6 higher secondary schools one general degree college, 1 polytechnic college and 10 non-formal education institution (Table No. 11).

Table 11: Educational Institutions in Kurseong Municipal Town.

Institutions	**Numbers**
Primary School	40 (23 Govt. Aided & 17 Private)
Middle School	22 (12Govt. Aided & 10 Private)
Secondary School	21 (9 Govt. Aided & 13 Private)
Higher /Senior Secondary School	6 (5 Govt. Aided & 1 Private)
General Degree College	1 (Govt. Aided)
Polytechnic College	1 (Govt.)
Non-formal Education Institute	10 (Govt.)

Source: Census of India, 2011.

On the basis of affiliation or reorganization by any education board, the schools of the town can be classified into 4 main groups.

a) **I.C.S.E./I.S.C. :** most of the English medium schools come under this group which are Modern Enlish School, Cambridge English School, Dawn boarding School, Daisies School, Sacred Heart School, Belle View Boarding School, Himali Boarding school, Janeshwar Memorial Academy, Bethany School, St. Helen's Secondary School, Victoria Boys School and Dow Hill Girls School etc.

b) **C.B.S.E.:** Godwin Modern School and Tiny Tots School are under C.B.S.E.

c) W**.B.B.S.E./W.B.C.H.S.E.:** the schools of this group are Nepali, Hindi and also English medium. St. Alphonsus School, Sri Ram Krishna H.S. School for Girls, Kurseong Adarsha Vidyalaya, Pusparani R.M. High school, St. Joseph Girls High school and Scott Mission Girls High school etc. are under W.B.B.S.E./W.B.C.H.S.E.

d) Municipal Primary Boys School and Municipal Primary Girls School are under municipality education board.

Amongst the schools in Kurseong Sub-division, the infrastructures of government aided schools are in dilapidated condition as compare to private schools. Private schools in the town have better condition and facilities then government aided schools. Safe drinking water facility is absent in some of the government aided school. Extracurricular activities are not encouraged in most of the school due to lack of space or play ground. Mid-day meal food provided to the students in government aided school is very poor quality and quantity and also sometime not properly cooked.

Kurseong municipality has English, Hindi and Nepali medium school. According to municipality draft development report (2008-13), Kurseong municipality has 4% of special category students but there is no school for special care students. Therefore, these special care students are compelled to go to the school of normal students.

Kurseong College is the only general degree college in the town which is affiliated to the University of North Bengal. It provides undergraduate studies - Bachelor of Arts (General and Honours), Bachelor of Science and Bachelor of Commerce (General). Darjeeling Polytechnic College offers technical courses like Civil, Computer, Electrical and Mechanical Engineering. West Bengal Forest School near Deer Park and Victoria Boys School, Dow Hill provide training for foresters. Eastern Forest Ranger College near St. Merry Hill provides training courses to Forest Rangers.

Kurseong town has two libraries for public with separate reading rooms in each. They are Gorkha Public Library and Bloomfield Library. Gorkha Public Library or Gorkha Jana Pustakalay was established in the year 1913, as an initiative of the

Indian Gorkhas to develop their culture, language and literature. Bloomfield sub divisional Library is a well stocked library of town located just opposite of the post office.

Recently state government has taken an initiative to establish Himalayan Center of the Presidency University in the campus of Dow Hill School. The center will focus on astrophysics and space sciences as well as Himalayan ecology and geology.

3.1.7. Roads and Street Lights

Road is also one of a vital civic amenities. It plays important role for providing other civic amenities to the public in any urban area and helps for good governance. The condition and capacity of carrying loads of roads express the urban status. Only 5 % of the total municipal area is covered by roads. It is considered as very low for any medium size town around 50,000 populations. At present the municipality has about 12 km black top, 20 km concrete, 5 km macadam[5] and 8 km length of *kutcha* roads (Table No. 12). The important roads of the town are Hill Cart Road, M.V. Road, P.V. Road, Dow Hill Road, Pankhabari Road, Hospital Road and By-Pass Road. Among these, Hill Cart Road is the busiest road which passes the heart of the town. The Darjeeling Himalayan Railway lies along this road. This road is very narrow and not up to the mark. In fact there is a very little scope for widening of this road due to unplanned construction of buildings on both sides. Other roads are also very narrow that's why traffic jam is common in the town.

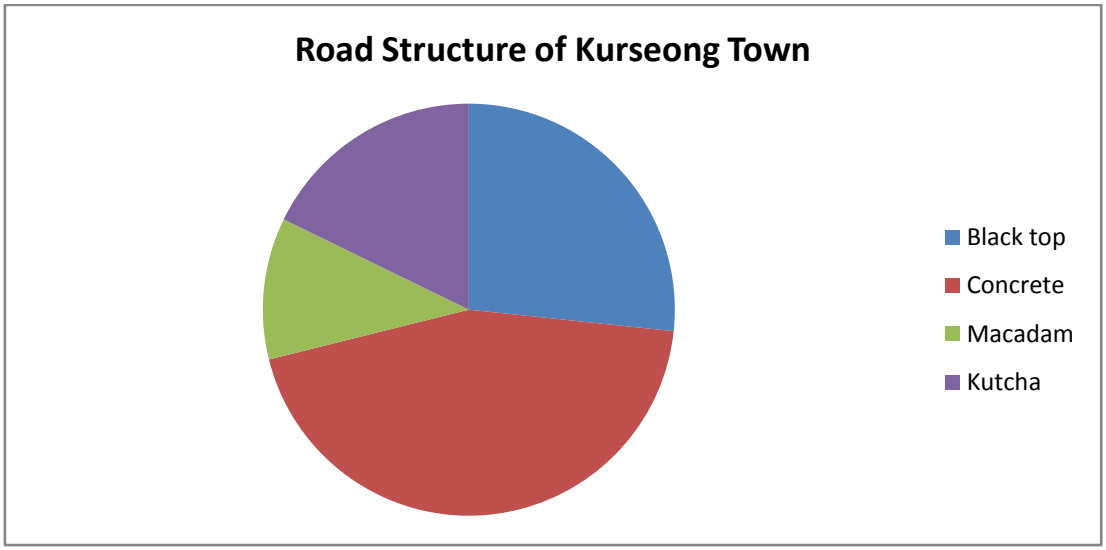
[5] Macadem is a type of road construction pioneered by Scotties engineer John London MaCadam around 1820.

Table No. 12: Roads Network within Kurseong Municipality Area

Type of Roads	Length (km)
Black top	12
Concrete	20
Macadam	5
Kutcha	8

Source: Kurseong Municipality Office, May 2015.

Figure No. 9: Roads Structure of Kurseong Town



With the increasing population and changing economic welfare, private vehicles are also increasing in the town. No terminal parking area is available for private vehicle in the town. Parking along road-street is becoming a very common phenomenon. Such parking develops acute congestions during rush hours in the town. Inadequate space for pedestrian is one of the causes for traffic congestions on the roads. The condition of traffic congestions in near future would be very worse if widen, diversified and strengthened roads are not made immediately.

Water logging on the roads is very common situation in the rainy season. Due to improper level in roads and absence of necessary foot path, water cannot get

drained out naturally. The current standard of roads within municipality is not suitable for heavy vehicle and also highly congested.

The roads within municipality are maintained by different agencies and they are not under the control of municipality. As such the municipality is at the mercy of these agencies regarding the maintenance of the roads (Kurseong Municipality, 2012-13).

According to municipality draft development report (2008-13), Kurseong town has a total of 782 street lights. However, the service and illumination is not up to the satisfactory level and 50% light is not working throughout the year, particularly in slum area. Due to non functional street light people of town are feeling insecure at night as there have been many case of smuggling and anti social activities. The street light service does not cover all the municipal area.

3.1.8. Other Services and Amenities

There are four post offices in Kurseong town. The post offices are Kurseong Post Office (located in the heart of the town), Burdawan Road Post Office (located next to Coffee House), Dumram Busty Post Office (located in Dumram Busty) and Dowel Post Office (located in Dow Hill Road near Dow Hill). The town has also four private currier service. Two currier service centers are located on the side of Hill Cart Road (Blue Dart and DTDC), one at T.N. Road (Track On currier service) and one at M.V. Road (First Flight currier service).

Kurseong has a fire prevention station near St. Alphonsus Higher Secondary School. For supplying water to the fire brigade a reservoir was built by the town's

governing body. Another source is Whistle Khola from where 1 lakh liters can be sourced for fire engine.

Kurseong has 1 co-operative bank, 3 nationalized bank, 1 agricultural credit society and 1 non-agricultural credit society. The town has its own Munsif Magistrate Court and also has the Police Station and Town Outpost in P B Road. Kurseong Municipality has a Guest House which needs upgradation and renovation. There is one auditorium/community hall. Kurseong town has also one museum named Netaji Subhas Chandra Bose Museum established in the house of his elder brother, Sarat Chandra Bose.

Municipality has two crematoria but there is no burial ground in municipality area. There is a couple of burial ground on the land own and maintained by religious society or trust. One Slaughter house is there in the town. There are two markets of 20-25 years old and are ill maintained. Kurseong also has 13 lodging hotels and several restaurants. The important hotels are Amarjeet Hotel, Hotel White Orchid, Kokhrain Place, Delhi Durbar, Hotel Park etc. And important restaurants are Tripti Restaurant, White Orchid, Amarjeet, Kokhrain which avail variety of foods like continental, Manchurian, Indian etc.

3.2. Institutional Role and Governance of Urban Basic Services

Governance has a wider application rather than government. In fact, governance in a newly defined perspective is a concept involving mutually interdependent actors from the society in deliberative policymaking process (Cars et al., 2002). The term of governance extends the system of traditional actors in policymaking to include not only the government officials but also civil society and private sectors. As a concept, governance also widens beyond the actors and articulates informal and formal

organizations and institutions such as laws and regulations, as well as values and norms that mediate behavior (Williamson, 2000).

Institutions, public, private players, NGOs and stakeholders have been playing important role in the governance of urban amenities and basic services in Kurseong since British colonial periods. Therefore, the analysis of institutional role and governance are briefly done into distinctive period i.e. colonial and post colonial periods.

i. Colonial Period

The water supply service in the town during colonial time was maintained by the Municipality. The municipality developed the water supply infrastructure by spending the cost of 1, 29,000 in 1913. They supplied about 153000 gallons of filtered water. The water used to collect from Dow Hill spring near Dow Hill area and Sepoy Dhura spring 4 miles from the town. Both the water conveyed to an 80000 gallons reservoir near St. Hellen's School and filtered through rapid pressure filters. The filtered water was distributed by gravity connection to 400 houses and 60 hydrants. And unfiltered water was used for 10 public / community latrines of town. The Municipality spent Rs 3700 annually for maintenance the infrastructure (Dash, 1947).

The Kurseong Municipality also maintained the sewerage and sanitation of the town during British days too. A sewerage system was developed by the Municipality in the year 1918. 10 public toilets in the market area and a few houses of bazaar area were constructed. The total length of piping was 8000 feet and sewage was discharged into *jhora* (streams) outside the town after treatment in a septic tank (Kurseong Municipality, 2012-13).

The health service was provided during British period through Town Hospital (present Sub Divisional Hospital), Victoria Boys School's central hospital, Dow Hill Girls School's central hospital and T.B. Sanatorium. The Town Hospital during British time was maintained by the Municipality and from June 1944 it was taken over by the government. The Civil Medical Officer of Kurseong was the superintendent of the hospital. Under him, there were a Sub-Assistant Surgeon and some subordinate staffs. Moreover, he was taking charge of the central hospitals of Victoria Boys School and Dow Hill Girls School. The T.B. Sanatorium was under Private authority (Dash, 1947).

There was no solid wastes management system during British days in the town. Because most of the wastes materials produced at that time were organic and easily degradable (Kurseong Municipality, 2012-13).

ii. Post Colonial Period

After independence, the people of Kurseong town have been observing a unique system of water supply. There have two distinct types of institutions which are controling over water supply system. One is Municipality, which is responsible to supply water to the public in the town. Another one is P.H.E. Dept. which is under the control of G.T.A., not officially responsible for water supply to the municipality area. But most of development programs related water sector of the town e.g. new storage construction, construction of new pipe line from the source to reservoir etc. are taken by P.H.E. Dept. because the entire water supply system is controlled under this department. P.H.E. Dept. is related with the construction work and implementation activities whereas Municipality today is responsible to control the supply of water in the town.

To overcome from the problems of water shortage in the town, Municipality with local stakeholders have brought a water management project i.e. Indo-Swedish IWM project. The leading partners of their project are ARTAMUS, the International Institute of Industrial Environmental Economics at Lund University (IIIEE), Kurseong municipality and local NGOs who are working for the promotion of the poor (Kurseong Muncipiality, 2011-12).

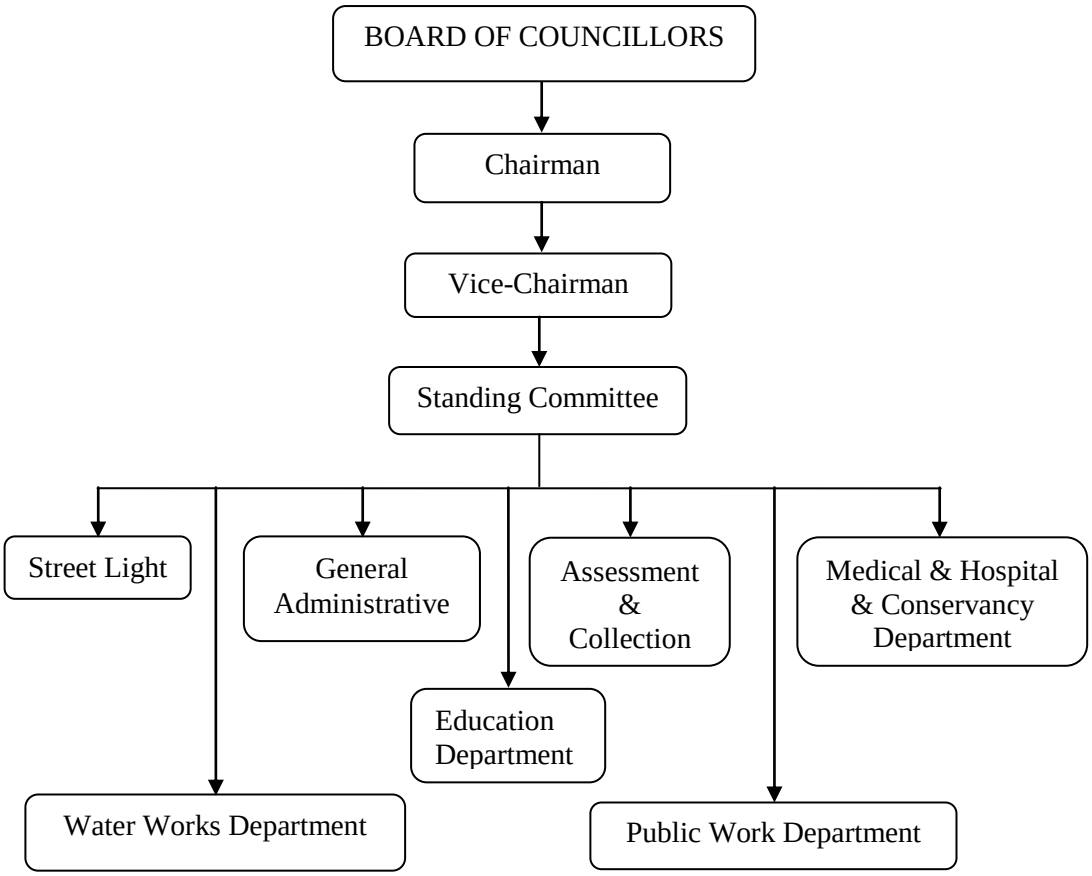
After independence, sanitation and sewerage services are under Municipality Conservation Department. The Department has commissioned a central septic tank at a cost of Rs. 12 crores but only a few wards of Kurseong town have been covered by this central septic tank. Board of Councillors has prepared a detailed plan and estimated for construction of three more central septic tanks for covering the entire Kurseong town with sewerage line. The plans and estimation have already been submitted to Govt. of India through State Government. The tender has been opened for Liquid Waste Management. Municipal Conservancy Department is also taking care of solid waste of the town (Kurseong Municipality, 2012-13).

Sub-divisional Hospital, Victoria Boys School's Central Hospital, Dow Hill Girls School's Central Hospital and T.B. Sanatorium were giving the health services during the British period. But both the Central Hospitals are not functional. Only Town Hospital (presently Sub-divisional Hospital) and T.B. Sanatorium are functional under government. T. B. Sanatorium was under private during colonial time is now under government since 1975. Municipality is also providing health service through a health wings which include Healthcare Sub-Centers, Medical Officer etc. Municipal health administrative unit looks after all health related issues.

To understand the Planning, implication and management of urban services and amenities in the town, it is very important to have an idea of hierarchical and functional mechanism of the Municipality. At present there are total 20 wards in the municipality. Each ward has a Ward Committee headed by Ward Councilor. In municipal level, the Ward Councilors formed a board which is headed by the Chairman. Therefore, overall decisions regarding all urban amenities and services are made by the Chairman along with Board of Councilor and are forwarded to respective departments within municipality (Figure No. 10 & 11).

Figure No. 10: Organizational Structure of Kurseong Municipality

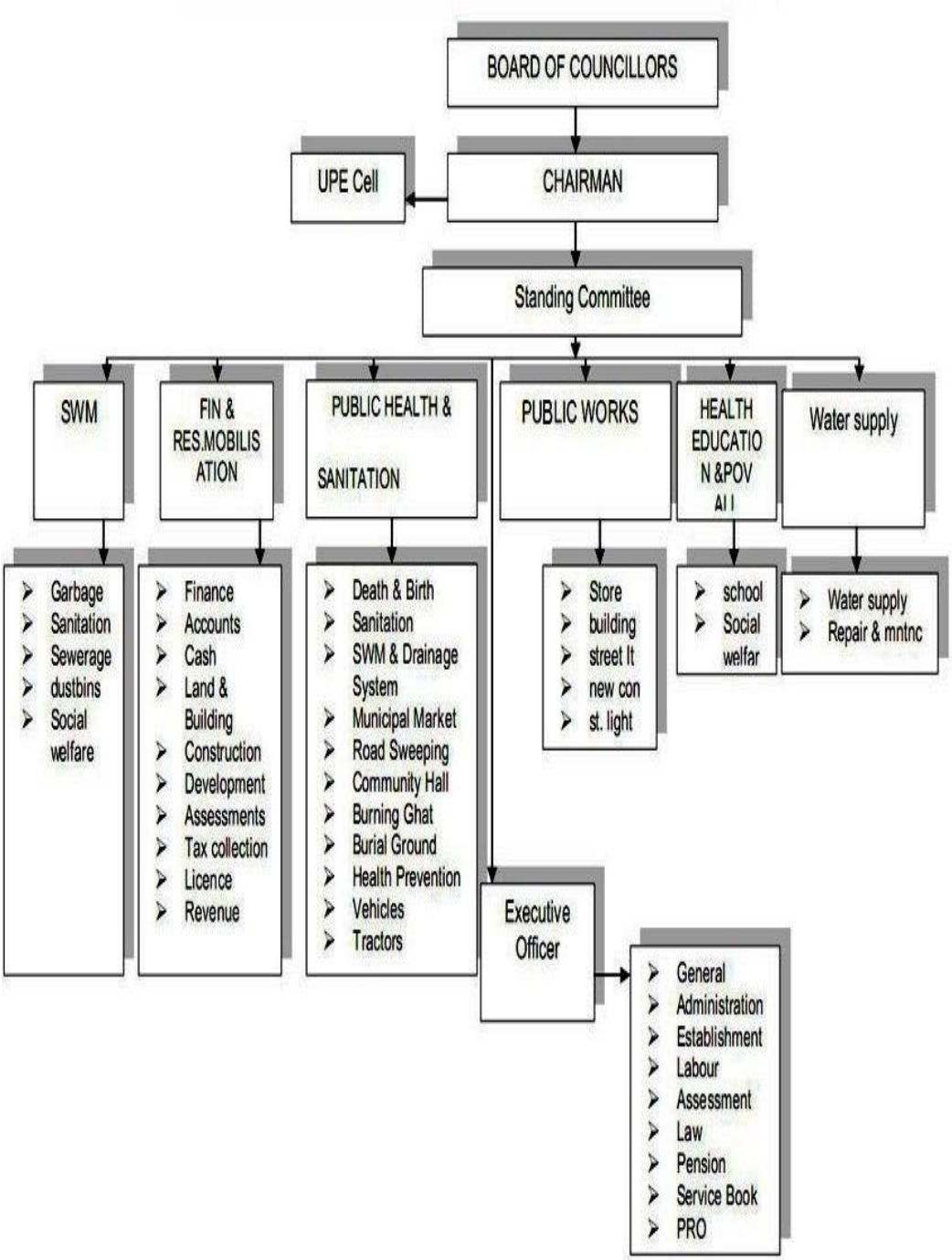
ORGANIZATION STRUCTURE OF KURSEONG MUNICIPALITY



Source: Kurseong Municipality, 2015

Figure No. 11: Functional Structure of Municipality

FUNCTIONAL STRUCTURE OF MUNICIPALITY



Source: Kurseong Municipality, 2015

Conclusion

Kurseong Municipality, one of the oldest municipalities of undivided Bengal, is primarily responsible for urban amenities and services in the Kurseong town since British times. Water supply is one of the most important service among the basic services provide by the municipality in the town. Water supply in the town involves tapping of 12 natural springs from different distant sources and stores in the 6 central reservoirs and then transfer to service reservoirs. The distribution of water is made from service reservoirs to 20 municipal wards in the town. In the lean months (March, April and May), the town faces a horrifying shortage of water. In spite of blessing of good rainfall in the monsoon season (June –September), there is no proper management of rainwater in the town. On other hand, population growth, old decaying infrastructure, deforestation in the catchment area and absence of waste water treatment pose a great threat for water supply in the town.

The municipality has developed a partial sewerage network in the town. The network covers only a few wards especially in market area. Three types of defection practices are found in the town – in house toilet, share toilet, and open. Health is another basic service. There is two hospitals in the town. One is Sub-divisional hospital and another is T.B. Sanatorium both were developed during British period. Municipality has also four Healthcare Sub-Centres which provides door to door service to the people.

Kurseong is called school town for its renowned schools which has good reputation at national as well as at international level.

The door to door household waste collection is only available in the market area. In other area waste are collected through vats. There is no regular interval of cleaning municipal drains.

Institutions, private players, NGOs, societies, Stokeholds have been playing an important role in the governance of urban services. During British periods water supply system of the town was fully under the control of municipality but after independence P.H.E. Dept. is responsible to control over water supply system of the town and Municipality is just to play as distributor. The plan, implication and management of urban services in the town are based on hierarchical system. The overall decisions regarding urban services and amenities in the town are made by Municipality Chairman along with the Board of Councilors.

Water supply and sanitation are very important for dignity and human health. Access to sufficient clean and safe water supply and adequate sanitation are the fundamental needs and basic human rights. Although the importance of water supply and sanitation for human health and survival has been widely recognized, most of the developing countries are struggling today to cope with chronic water shortages and the inadequacies of sanitation infrastructure. The human right to safe water and adequate sanitation remains a promise unfulfilled for billions of people in the world. As a result, billions of people of the world are living under a great threat of diseases cause by pathogen of unsafe water, inadequate sanitation and improper hygiene. In this regard Dr LEE Jong-wook said-

"Water and Sanitation is one of the primary drivers of public health. I often refer to it as "Health 101", which means that once we can secure access to clean water and to adequate sanitation facilities for all people, irrespective of the difference in their living conditions, a huge battle against all kinds of diseases will be won." (http://www.who.int/water_sanitation_health/)

Adequate water supply and sanitation are very crucial for proper sustaining life and maintaining healthy environment in urban area. But recently increasing population and rapid rate of urbanization have posed a great challenge in the availability of basic urban services of safe water and adequate sanitation for urban population.

Kurseong town, a small hilly urban center of Darjeeling district, was started in 1835. Kurseong town's local administrative body was formed in 1879 with a population of 2,836. The civic amenities and the infrastructural facilities were planned and installed to fulfill the needs of the population only (Lepcha, 2013). But after more than a century of population growth and urbanization, today the same infrastructure

and civic amenities are supporting 42,446 populations (Census, 2011) of the town. Therefore, before making an effort to estimate the impact of water supply and sanitation on health like prevalence of water-sanitation related diseases in household level of Kurseong town, it may be very useful to have an idea about the present condition of water supply, sanitation.

In order to analyse the water supply and sanitation condition and their impact on health, a survey at household level was done in the month of September to November 2015. 115 households were surveyed from different categories of wards and three categories of slum in the 20 wards of Kurseong municipality.

All the sample households are the permanent residents of Kurseong town. The ages of the entire respondent were above 17 years. Among them 68 (59.13 percent) respondents were female and 47 (40.87 percent) were male.

115 sample households comprise 526 population of the town among which 266 are male and 260 are female. 30 household sample which was taken from Commercial-Residential wards includes 143 population consisting 75 male and 68 female, 20 household sample from Agricultural-Ecological wards comprises a population of 94 (male 45 and female 49), 20 household sample from Industrial-Commercial wards includes a population of 97 among which 50 are male and 47 are female, 30 household sample from Residential wards is having a population of 129 consisting 66 female and 63 male and 15 sample households from Slum area has 63 populations consisting 30 female and 33 male.

Out of the total population i.e. 526 in 115 household sample, 3.23 percent of population are belongs to the age group of 0 – 5 years, 10.07 percent in the age group

of 6 - 14 years, 75.28 percent belongs to the age group of 15 – 60 years and 11.42 percent belongs to above 60 years old.

The survey reveals that in Commercial-Residential area 60 percent of the sample household belongs to small size (1 - 4 members) family, 36.67 percent of the sample household belongs to the category of medium size (5 – 9 members) family, 3.33 percent of the sample household belongs to the group of big size (above 10) family. Whereas in Agricultural-Ecological area 55 percent of the sample household belongs to medium size of family and 45 percent of the sample household belong to the category of small size family. In Industrial-commercial area 40 percent of the household belongs to small size family and 60 percent belong to medium size family. In Residential area, sample household size is more-less same as Commercial-Residential area. In Slum area 60 percent of the sample household belongs to the small size family i.e. 1 – 4 household members group and 40 percent of the sample households belongs to medium size family i.e. 5 – 9 household members group.

The survey reveals that out of the total 115 sample households 10.43 percent of household heads are uneducated whereas 15.65 percent of the household heads had primary level of education and 73.39 percent of the household heads had education qualification of secondary and above.

Regarding the income of the total sample households, the study reveals that 20.86 percent of household belongs to high income group whose income are above Rs 40,000 per month, 39.13 percent of household belongs to middle income group and their income ranges from Rs 15, 000 – 40,000 per month and 40 percent of household belongs to the low income group whose income is below Rs 15,000 per month.

4.1. Water Supply Condition at Household Level

This section presents the analysis of water supply at household level in the town. The study was conducted on water sources, household pipe water connection, gender wise household water management, frequency of water supply, duration of water supply, households per capita water availability and water storage capacity.

4.1.1. Household Water Sources

Table number 13 indicates that the people of Kurseong town primarily access water from two sources - municipality water supply network and natural springs/streams. Out of these primary sources, 93.91 percent of household depends on municipality supply and 6.09 percent household depends on springs/streams. Households which are getting water from springs/streams are located in Sherpa Busty (Slum area) and Word number 1 (Agricultural-Ecological area), are getting 24 hours water in day. The households which depend on municipality (93.91 percent) feel that they are not getting sufficient water from municipality supply (Table No. 14). Therefore, for additional required water either they have to depend on different alternative sources like springs, river, private vendors, forest department and neighbours or they have to manage with the available water (Table No. 15).

Table No. 13: Primary Sources of Water in Different Area of the Town

Primary sources	Commercial-Residential Area	Agricultural-Ecological Area	Industrial-Commercial Area	Residential Area	Slum Area	Total
Municipality	100% (30)	90% (18)	100% (20)	100% (30)	66.67% (10)	93.91% (108)
Natural Springs	0% (0)	10% (2)	0% (0)	0% (0)	33.33% (5)	6.09% (7)
Total	100% (30)	100% (20)	100% (20)	100% (30)	100% (15)	100% (115)

Source: Household Survey, September – November, 2015.

Figure No. 12: Primary Sources of Water in Different Area of the Town

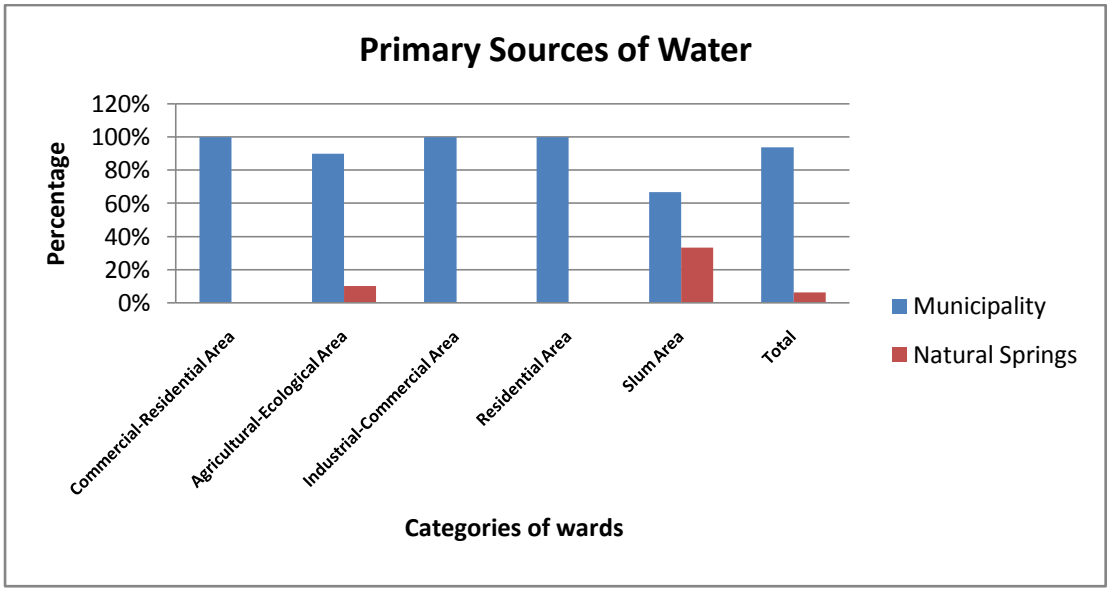
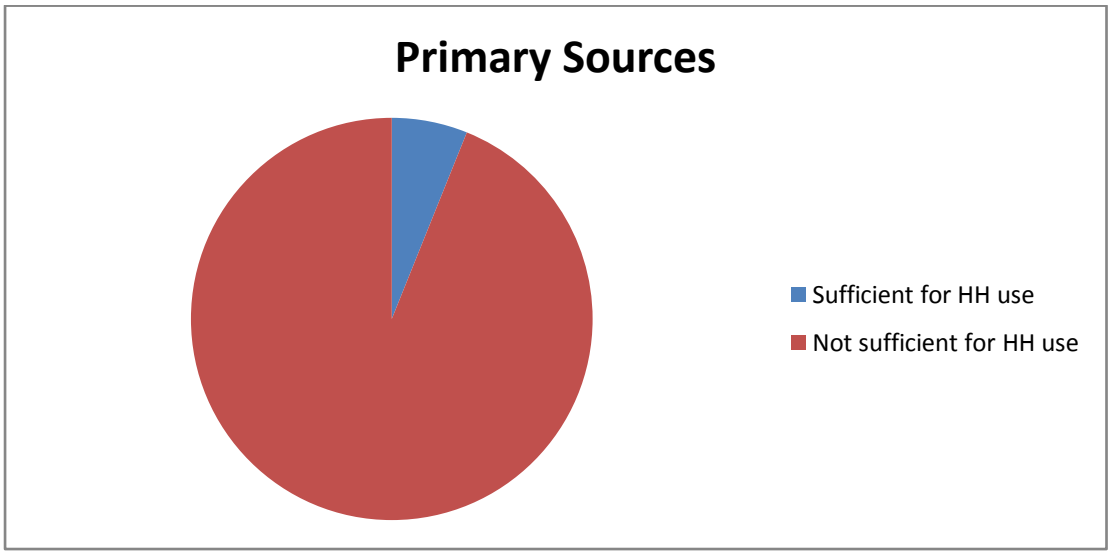


Table No. 14: Household Water from Primary Sources

Aspects	No. of Household	Percentage of Household
Sufficient for HH use	7	6.09%
Not sufficient for HH use	108	93.91%
Total	115	100%

Source: Household Survey, September – November, 2015.

Figure No. 13: Household Water from Primary Sources



Households which depend on municipality water supply, are getting shortage of water in lean months. Out of total household, 14.81 percent have access water from natural

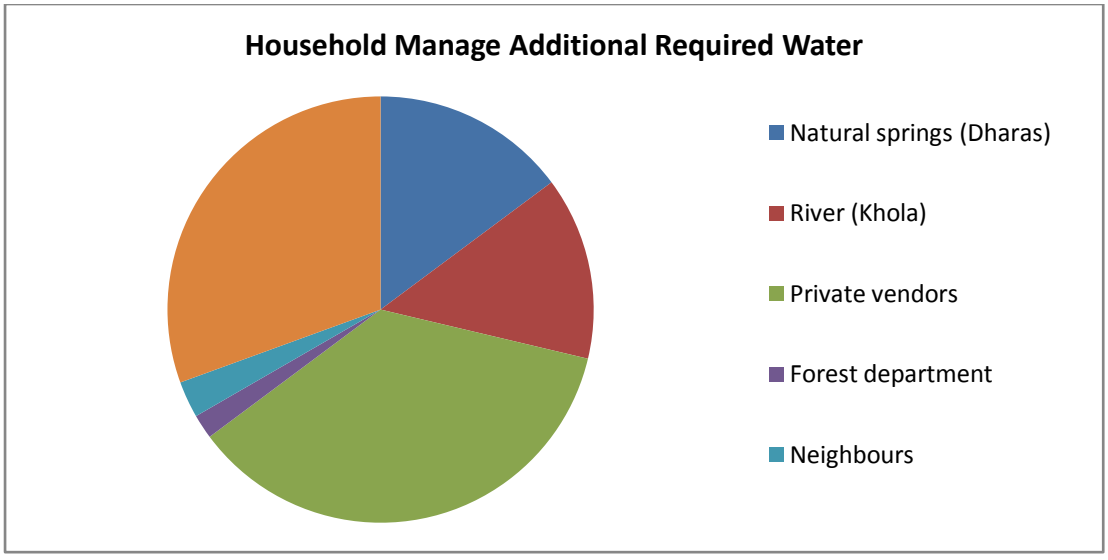
springs, 13.89 percent collect from river, 36.11 percent patronizing private tank services, 2.78 percent manage from neighbors, 1.08 percent access from Forest Department and 30.56 percent manage with available water. For spring water people mostly cover a distance of less than 200 metres daily. But springs are not available in all areas. The people who depend on river in the lean months have to cover more than a kilometer to fetch water (Table No. 15). Water has been carried on the back by putting several bottle or jars in a *doko*[1].

Table No. 15: Household Manage Additional Required Water in Lean Months

Sl. No.	Household manage additional required water	No. of Household	Percentage of Household
1.	**Natural springs (Dharas)**	16	14.81%
2.	**River (Khola)**	15	13.89%
3.	**Private vendors**	39	36.11%
4.	**Forest department**	2	1.85%
5.	**Neighbours**	3	2.78%
6.	**Manage with the available water**	33	30.56%
Total		108	100%

Source: Household Survey, September – November, 2015.

Figure No. 14: Household Manage Additional Required Water in Lean Months



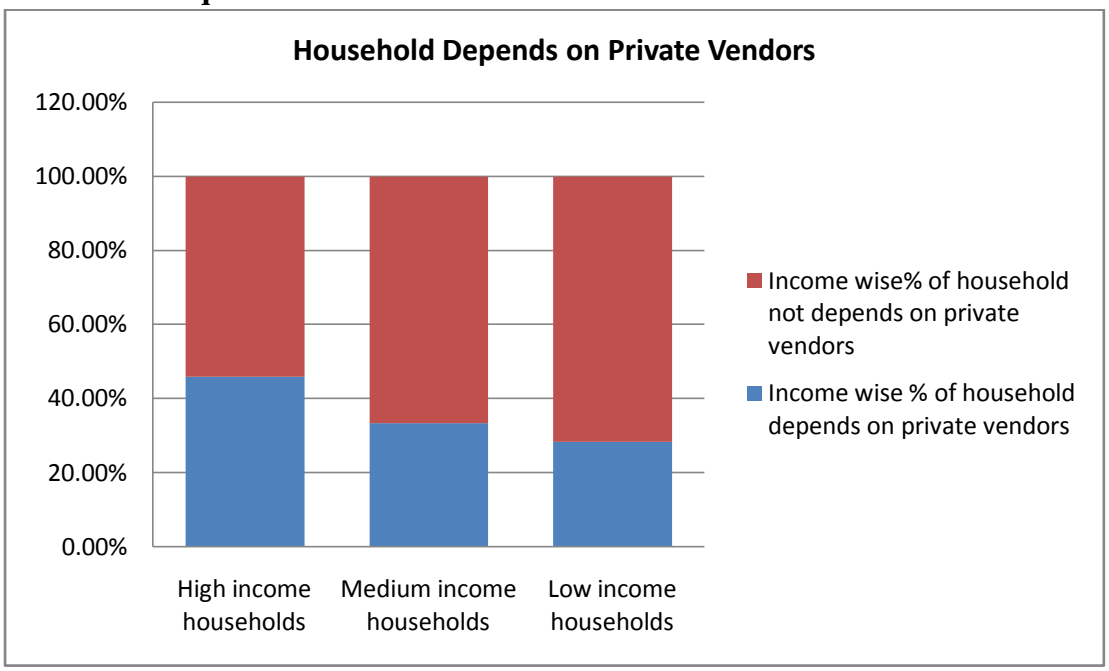
[1] Doko, a bucket shape basket, is mainly used during tea plunking in the garden.

Table No. 16: Income Wise Household Depends on Private Sources for Additional Requirement of Water

Income wise Households group	% of household depends on private vendors for additional required water	
	Depends	Not depends
High income households	45.83% (11)	54.17% (13)
Medium income households	33.33% (15)	66.67% (30)
Low income households	28.26% (13)	71.74% (33)

Source: Household Survey, September – November, 2015.

Figure No15: Income Wise Household Depends on Private Sources for Additional Requirement of Water



Water purchasing procedure from the private vendors has been made through phone calls by saying exact amount of water and location. An amount of Rs. 400 per 1500 liters is charged by the vendors (Plate No. 2). Therefore, private vendors do not give at cheaper rate for the poor income family. Hence, most of the lower income households are not able to buy water from private vendor. The table no.16 reveals that households which are depending on private vendors for additional required water in

lean season, are higher (45.83 percent) in high income group whereas in middle income group is 33.33 percent and in low income group is 28.26 percent.

People of Agricultural-Ecological area of the town collect their additional required water from the forest department officer's bungalow tap. Because the area is located near to the Forest Department. The tap is being allowed to use for local people in dry season only.

Table No. 17: Household Depends on Water Sources

Sl. No.	Quality of water Sources	Household depends on water sources			
		Rainy Season		Dry Season	
		No. HH	**%**	No. HH	%
1.	**Improved sources**	108	93.91%	38	33.04%
2.	**Unimproved sources**	7	6.09%	7	6.09%
3.	**Both improved and unimproved sources**	0	0.00%	70	60.87%
Total		115	100%	115	100%

Source: Household Survey, September – November, 2015.

Figure No. 16: Household Depends on Water Sources (Rainy Season)

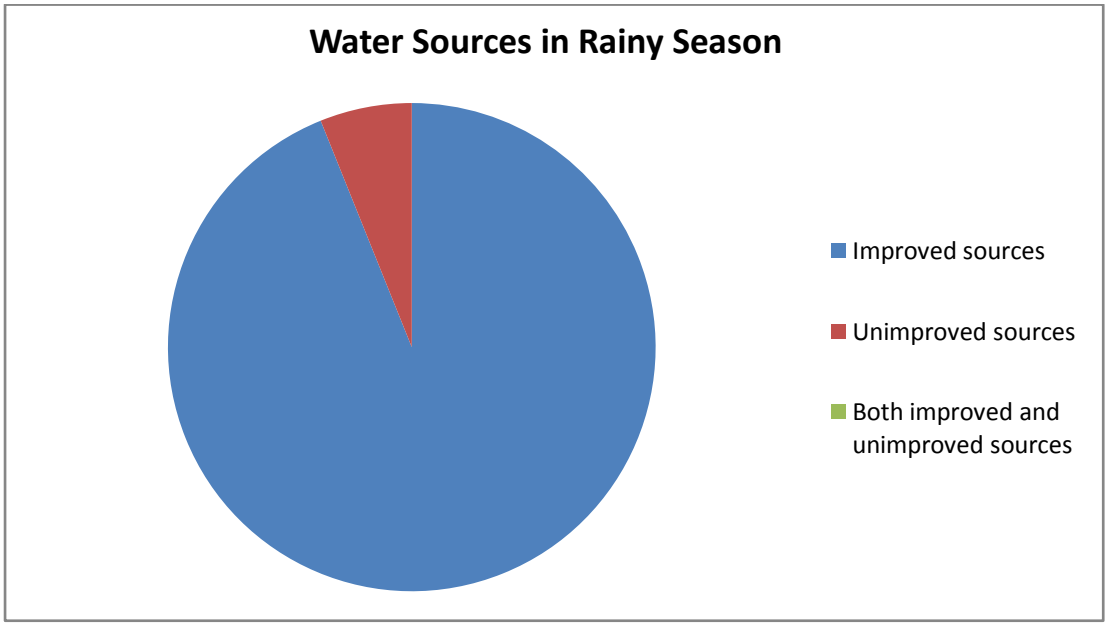
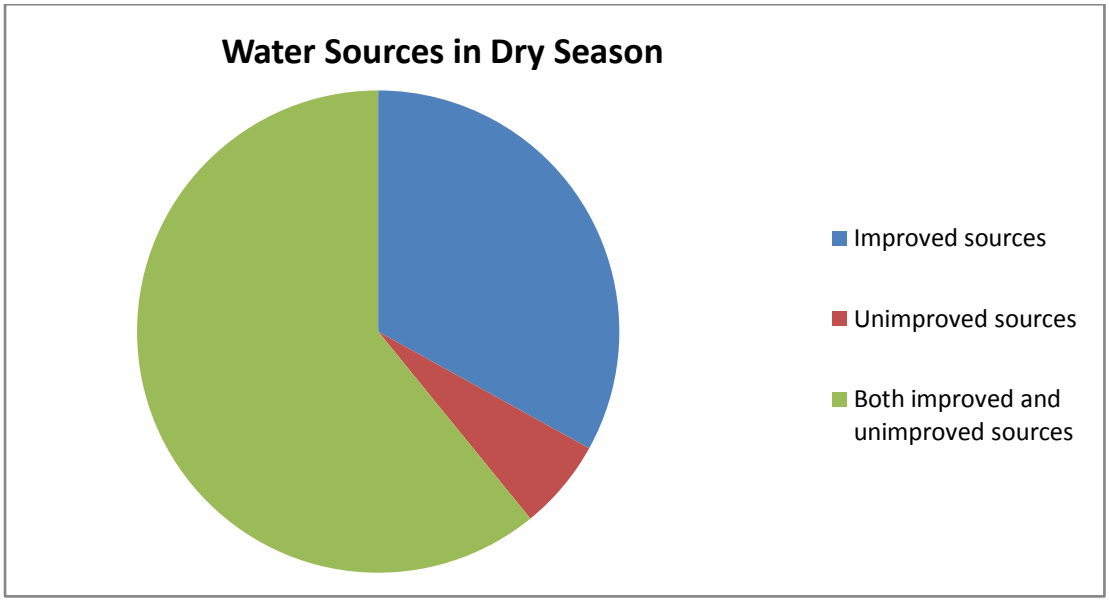


Figure No.17: Household Depends on Water Sources (Dry Season)



The table 17 indicates that in rainy season 6.09 percent of household obtain water from unimproved source (spring/streams and others) and 93.91 percent households depend on improved water source (Municipality). And in dry season 6.09 percent household depends on unimproved sources, 60.87 percent household access water from both improved and unimproved sources and only 33.04 percent household access water from improved sources.

Table No. 18: Household Pipe Water Connection in Kurseong Town

Water supply characteristics		**Percentage of household**	
Household with Pipe water connection	From Municipality	95.35% (82)	74.78% (86)
	from springs	4.65% (4)	
Household without pipe water connection			25.22% (29)
Total			100% (115)

Source: Household Survey, September – November, 2015.

4.1.2. Household Pipe Water Connection

Table 18 shows that household with pipe water connection is 74.78 percent in which 95.35% percent of household is connected with municipality water supply network

(Plate No. 15) and 4.65% percent with spring. And remaining 25.22 percent of households do not have in-house water connection.

Highest percentage of household with pipe water connection is found in Industrial-Commercial area where 90 percent of household has pipe water connection followed by Residential area (86.66 percent), Agricultural-Ecological area (85 percent) and Commercial-Residential area (63.33 percent). In Slum area only 40 percent of household has pipe water connection (Table No. 19).

Table No. 19: Household Pipe Water Connection in Different Area of Kurseong Town

Water supply Characteristics	Categories of municipality area					
	Commercial and Residential	Agricultural and Ecological	Industrial and Commercial	Residential	Slum Area	Total
Household with pipe water connection	63.33% (19)	85.0% (17)	90.0% (18)	86.67% (26)	40.0% (6)	74.78% (86)
Household without pipe water connection	36.67% (11)	15.0% (3)	10.0% (2)	13.33% (4)	60.00 % (9)	25.22% (29)
Total	100.0% (30)	100% (30)	100.0% (20)	100.0% (30)	100.0 % (15)	100.0% (115)

Source: Household Survey, September – November, 2015.

Figure No. 18: Household Pipe Water Connection in Different Area of Kurseong Town

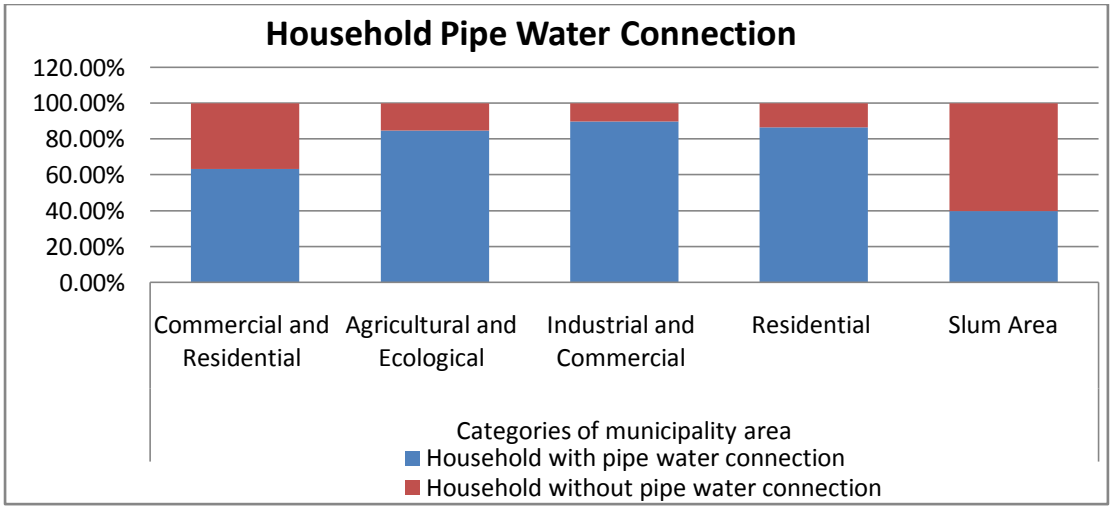
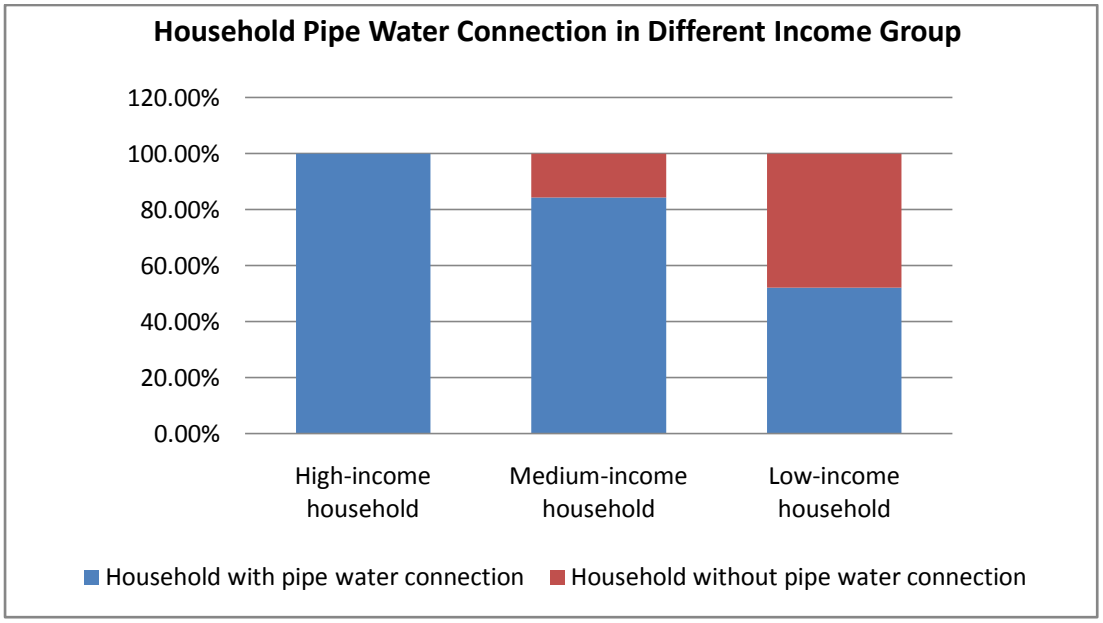


Table No. 20: Household Pipe Water Connection in Different Income Background of Kurseong Town

Water supply Characteristics	Percentage of household			
	High-income household	Medium-income household	Low-income household	Total
Household with pipe water connection	100.0% (24)	84.44% (38)	52.17% (24)	74.78% (86)
Household without pipe water connection	0.0 % (0)	15.56% (7)	47.82% (22)	25.22% (29)
Total	100.0% (24)	100.0% (45)	100.0% (46)	100.0% (115)

Source: Household Survey, September – November, 2015.

Figure No. 19: Income Wise Household Pipe Water Connection



After analyzing from different economic background of the sample households, it is cleared that all (100 percent) high income households are having pipe water connection while 84.44 percent in middle income and only 52.17 percent in low income. Therefore, highest number of lower income household i.e. 47.83 percent does

not have pipe water connection (Table No. 20). As compare to low income households, middle income households are far better position. Only 15.56 percent middle income household is without pipe water connection. Therefore, it is cleared that pipe water connection is largely influenced by income. To get pipe water connection from municipality initially the customer has to pay Rs 6000 which is substantially expensive for low income households. As a result most of the lower income households of the town are remained out of pipe connection from municipality.

4.1.3. Gender Wise Household Water Management

Accessibility of water does not mean that it should always easily available near the premises. This was what Miss Rekha chettri said in response to the question of managing additional requirement of water for household use:

"During dry season, in every alternative day I have to travel a long distance with my mother and younger brother for collecting water from river in the early morning before going my college and I feel tired and sleepy during class."

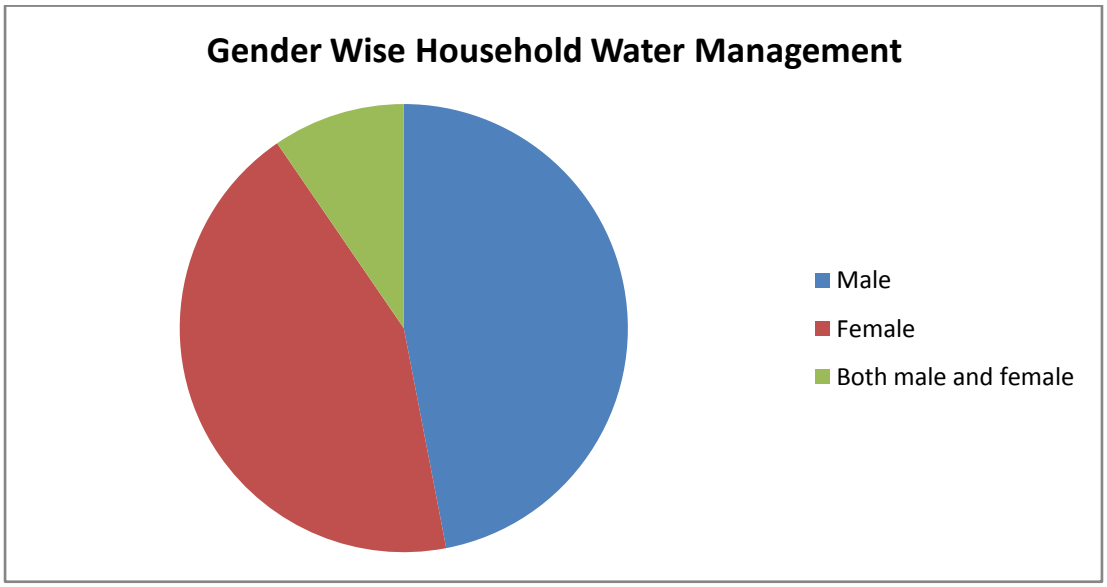
The responsibility of managing water in household is taken by both men and women in the town. Table 21 shows that, there are 46.96 percent of household in which men take responsibility to mange water while in 43.47 percent of the household women take responsibility for managing water and in 9.56 percent of the household both men and women engage for managing water. Men are engaged to manage household water for those areas where men power is primarily needed to fetch water. Households in which only women take responsibility for managing water, men are either not cultured to household water management or engaged in job or other activities.

Table No. 21: Gender Wise Management of Water for Household Use

Gender wise household water management	Percentage
Male	46.96% (54)
Female	43.47% (50)
Both male and female	9.56% (11)

Source: Household Survey, September – November, 2015.

Figure No. 20: Gender Wise Management of Water for Household use



4.1.4. Frequency of Municipal Water Supply at the Household Level

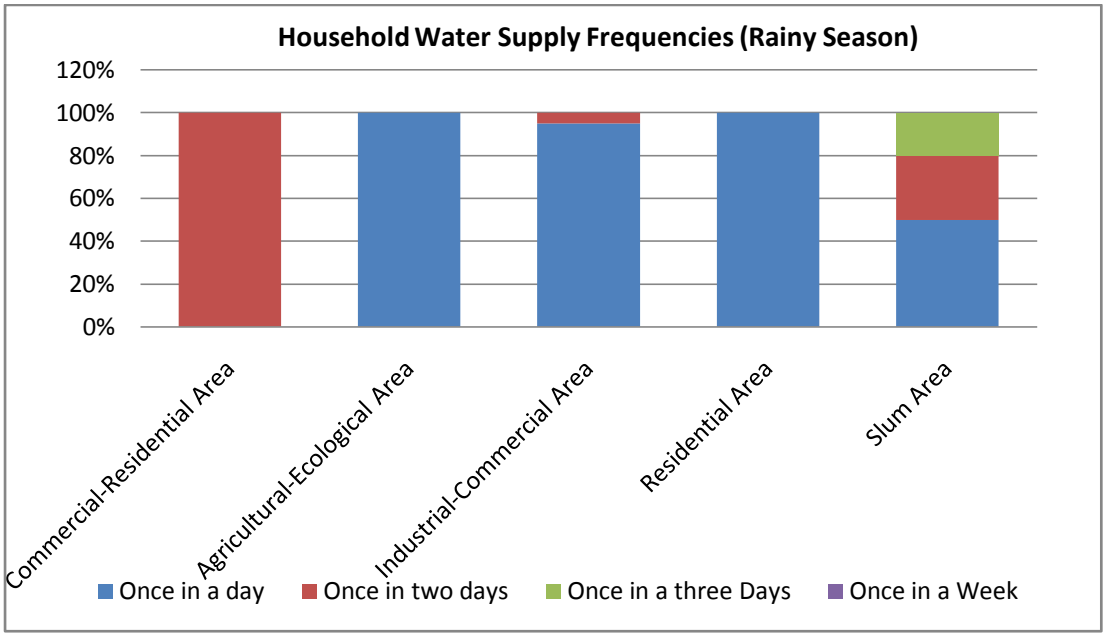
The table 22 indicates that in rainy season there is no such acute shortage of water as compare to dry season. Out of the total households, which depend on municipal sources, 66.67 percent of the household gets water once in a day from municipality. Whereas 31.48 percent gets water once in an alternative days and 1.85 percent of the household gets once in a three day. The survey also indicates that most of the households which are getting regular water in rainy season are located in Agricultural-Ecological area and Residential area.

Table No. 22: Household Water Supply Frequencies in Different Areas of the Town from Municipal Sources (in Rainy Season)

Frequency of water Supply	Commercial-Residential Area	Agricultural-Ecological Area	Industrial-Commercial Area	Residential Area	Slum Area	Total
Once in a day	0% (0)	100% (18)	95% (19)	100% (30)	50% (5)	66.67 % (72)
Once in two days	100% (30)	0% (0)	5% (1)	0% (0)	30% (3)	31.48 % (34)
Once in a three Days	0% (0)	0% (0)	0% (0)	0% (0)	20% (2)	1.85% (2)
Once in a Week	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Total	100% (30)	100% (18)	100% (20)	100% (30)	100 % (10)	100% (108)

Source: Household Survey, September – November, 2015.

Figure No. 21: Household Water Supply Frequencies in Different Areas of the Town from Municipal Sources (in Rainy Season)



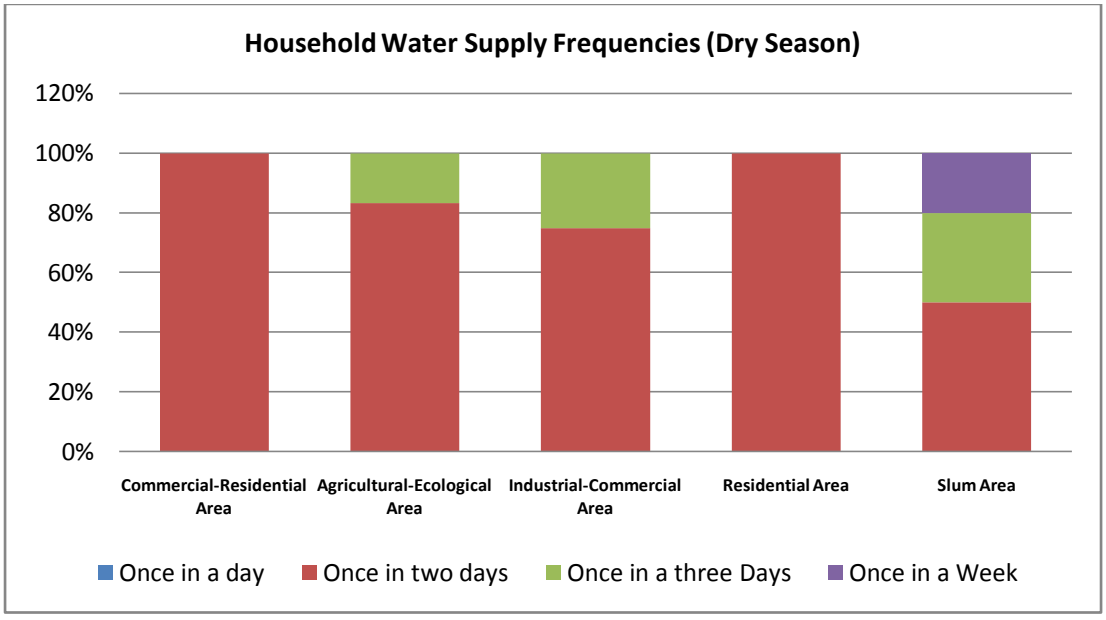
In dry season, there is no household which gets daily water from municipality. Most of the households of the town (87.97 percent) get water once in two days. 10.2 percent of the household gets water once in three days and 1.85 percent of the household gets once in a week (Table No. 23).

Table No. 23: Household Water Supply Frequencies in Different Areas of the Town from Municipal Sources (in Dry Season)

Frequency of water Supply	Commercial-Residential Area	Agricultural-Ecological Area	Industrial-Commercial Area	Residential Area	Slum Area	Total
Once in a day	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Once in two days	100% (30)	83.33% (15)	75% (15)	100% (30)	50% (5)	87.97 % (95)
Once in a three Days	0% (0)	16.66% (3)	25% (5)	0% (0)	30% (3)	10.2 % (11)
Once in a Week	0% (0)	0% (0)	0% (0)	0% (0)	20% (2)	1.85 % (2)
Total	100% (30)	100% (18)	100% (20)	100% (30)	100% (10)	100% (108)

Source: Household Survey, September – November, 2015.

Figure No 22: Household Water Supply Frequencies in Different Areas of the Town from Municipal Sources (in Dry Season)



Households which are getting water once in a week are from Industrial- Commercial area and slum area. Such variation of water supply in different areas is mainly because of the location of the area and distance of the service reservoirs from the central reservoirs. The more the distance between central and service reservoir has more malpractices and losses in the feeder conduit line (through feeder conduit line

water has been supplied from central to services reservoir). Therefore, distant service reservoirs take longer duration to be full with water. Hence, the areas which are located near to the central reservoir get mostly regular basis of water supply because there are a less distance between central and service reservoir.

4.1.5. Duration of Municipal Water Supply at the Households Level

The table 24 indicates that in rainy season 76.86 percent of the household gets water for less than 1 hour. And 14.81 percent of household gets water for 1 to 2 hours, whereas, 1.85 percent of household gets 2- 3 hours of water supply and 6.48% household gets more than 4 hours water supply. Households which are getting more duration of water from municipality are mainly located near to the reservoir. Households which are getting more than 1 hour to 2 hours are high income and medium income households which have pipe connection and these households are from pure residential area. The households, which are getting more than two hours of water, are in Agricultural-Ecological area with pipe connection. Therefore, it is cleared that Agricultural-Ecological area which gets highest duration of water supply in the town is located near to reservoir as a locational advantage. Whereas, Industrial-Commercial area and Slum area get less duration of water because of their location away from reservoir. Above all the duration of water supply is also largely influence by the number of connection in the ward. The wards which have more number of water connection, have comparatively shorter duration of water supply than the wards which have less number of water connection.

Water supply in dry season (Table 25) is found almost same. Most of the household (85.18 percent) gets water less than 1 hour. Whereas 6.48 percent households get one to two hours, 4.62 percent households get 2-3 hours and 3.70

percent households get more than four hours. And those households which are getting maximum duration of water are from Agricultural –Ecological area and Residential area.

Table No. 24: Duration of Water Supply in the Town from Municipal Network (Rainy Season)

duration of water Supply	Commercial-Residential Area	Agricultural-Ecological Area	Industrial-Commercial Area	Residential Area	Slum Area	Total
< 1 hour	100% (30)	38.89% (7)	65.0% (13)	93.33% (28)	50.0% (5)	76.85% (83)
1 -2 hours	0% (0)	22.22% (4)	35.0% (7)	0% (0)	50.0% (5)	14.81% (16)
2 – 3 hours	0% (0)	11.11% (2)	0% (0)	0% (0)	0% (0)	1.85% (2)
3 – 4 hours	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
> 4 hours	0% (0)	27.78% (5)	0% (0)	6.67% (2)	0% (0)	6.48% (7)
Total	100% (30)	100% (18)	100% (20)	100% (30)	100% (10)	100% (108)

Source: Household Survey, September – November, 2015.

Figure No. 23: Duration of Water Supply in the Town from Municipal Network (Rainy Season)

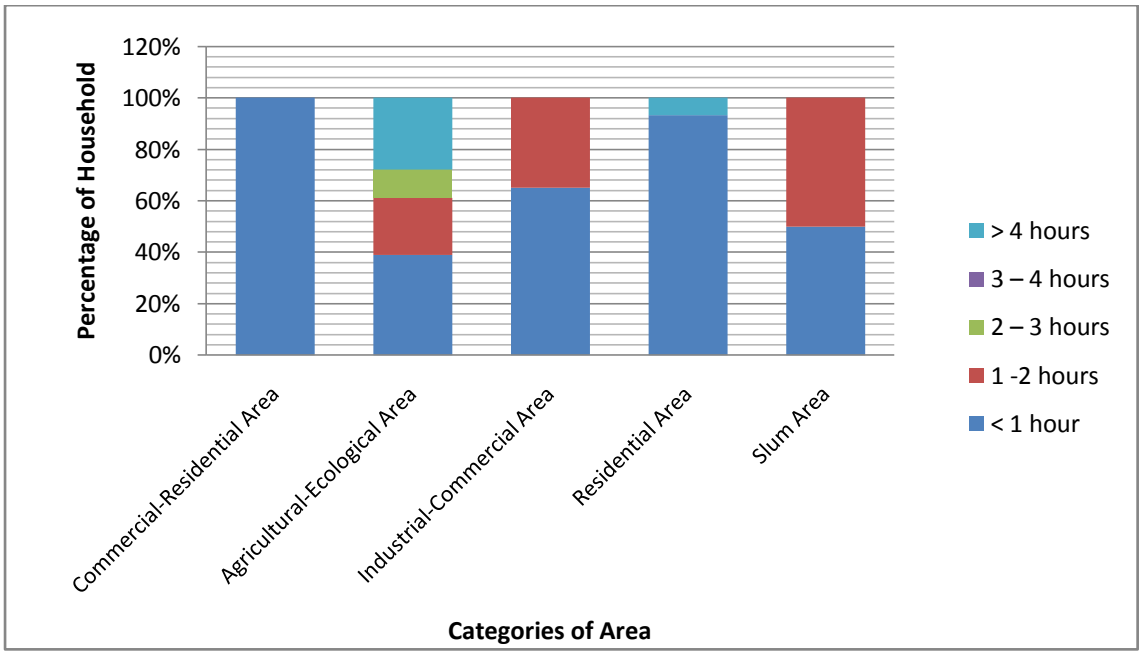
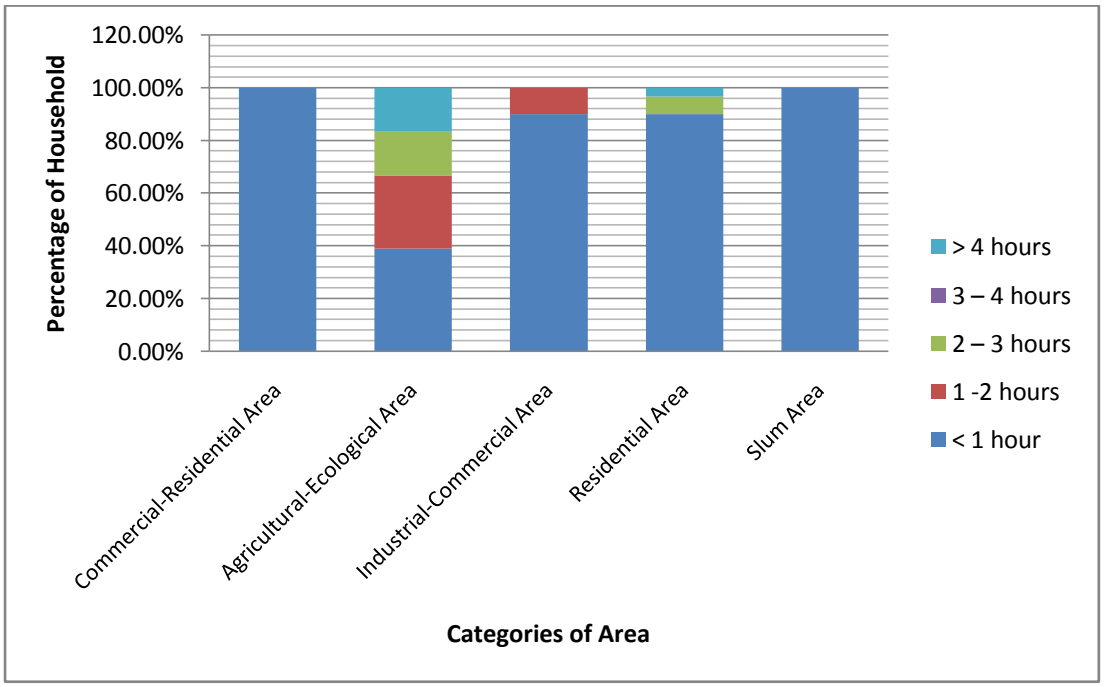


Table No. 25: Duration of Water Supply in the Town from Municipal Network (Dry Season)

Duration of water Supply	Commercial-Residential Area	Agricultural-Ecological Area	Industrial-Commercial Area	Residential Area	Slum Area	Total
< 1 hour	100.0% (30)	38.89% (7)	90.0% (18)	90.0% (27)	100% (10)	85.18% (92)
1 -2 hours	0% (0)	27.78% (5)	10% (2)	0% (0)	0% (0)	6.48% (7)
2 – 3 hours	0% (0)	16.67% (3)	0.0%	6.67% (2)	0% (0)	4.62% (5)
3 – 4 hours	0% (0)	0.0%	0% (0)	0% (0)	0% (0)	0% (0)
> 4 hours	0% (0)	16.67% (3)	0% (0)	3.33% (1)	0% (0)	3.70% (4)
Total	100% (30)	100% 18)	100% (20)	100% (30)	100% (10)	100% (108)

Source: Household Survey, September – November, 2015.

Figure No. 24: Duration of Water Supply in the Town from Municipal Network (Dry Season)



4.1.6. Water Availability in the Household

Table no. 25 shows that in lean months most of the households get less duration of water. Even the supplied amount is not sufficient. Therefore, additional requirement of water is collected from different alternative sources. Per capita per day water availability for each household is calculated between the amounts of water collected from both primary and alternative sources and size of the household (number of family members). It is estimated for both in rainy and dry season (Table No. 26 &27). The table shows that in rainy season most of the households (70 percent) in Commercial-Residential area has per capita water availability of <40 lpcd (litres per capita per day) which is substantially low. This lowest amount of water availability is due to the shorter duration of water supply and high concentration of population in the area. The households which have per capita water availability of 40-<70 liters, among them highest percentage (50 percent) of household is found in Agricultural-Ecological area. Agricultural-Ecological area is located in the higher altitude of the town and also located near to the reservoirs. Among those households which have per capita availability of 70-<135lpcd, highest percentage of households is found in pure residential area (43.33 percent). This is because of the size of the households and also located nearer to the reservoirs after Agricultural- Ecological area. The household which have water availability of 135 lpcd and more among them highest percentage i.e. 33.33 percent of household is found in slum area. From the field observation and questionnaire bases survey it is discovered that the households in slum area which are obtaining more than 135 lpcd are located near "*Devi Than*"[2] (natural spring), have temporary shared pipe water connection and also influenced by small size family. In

[2] "Devi Than" means place of worship for Hindu. But, in eastern Himalaya (Nepal, Sikkim and Darjeeling Himalaya), along with the temple, it is a traditional method for protecting spring from anthropogenic pollution.

shared pipe water connection, one connection has been made through synthetic pipe and shared by a small number of 6 to 7 families. These households are from Upper Sherpa busty and Lower Sherpa Busty. In dry season, most of households in all areas (83.34 percent households in Commercial-Residential area, 65 percent households in Agricultural-Ecological area, 75 percent households in industrial-commercial area, 66.67 percent households in Residential area and 53.33 percent households in slum area) have the water availability of less than 40 liters per capita per day. Only a very few percentage household have the water availability of more than 40 lpcd (Table no. 29). After analyzing from economic background of households, it is also known that per capita per day water availability is higher among the high income households. Except very few lower income households are having more lpcd due to locational advantage. In rainy season 73.91 percent of the low income households have per capita water availability of <40 lpcd and in dry season 93.98 percent of the low income households live with <40 lpcd. Therefore, it can be said that most of the high income households of the town obtains more water than middle income households and most of the medium income households access more water than lower income households (Table no. 28 & 29).

There may be four causes for the higher amount of per capita water availability in high and middle income households than low income households- (1) most of the high and medium income households have in house water connection; (2) most of the high and medium income households spend more money to purchase water from private vendors; (3) most of the lower income households access water from municipal water supply outpoints where they have to wait in long queues for their turn and get lower quantity because of short duration of supply and (4) even sometime people from low income households have to cover a distance of 200 meters

to more than a kilometers to fetch water. Therefore, people from lower income background have to spend more time to collect water.

Table No. 26: Household per Capita Water Availability in Kurseong Town (Rainy Season)

Average per capita water availability	Percentage of household per capita water availability in Kurseong town (Rainy season)					
	Commercial and Residential	**Agricultural and Ecological**	**Industrial and Commercial**	**Residential**	**Slum**	**Total**
<40 lpcd	21 70%	3 15%	8 40%	6 20%	6 40%	44 38.26%
40 -<70 lpcd	7 23.34%	10 50%	5 25%	7 23.34%	2 13.33%	31 26.96%
70 -< 135 lpcd	1 3.33%	3 15%	4 20%	13 43.33%	5 33.34%	26 22.61%
135 lpcd and above	1 3.33%	4 20%	3 15%	4 13.33%	2 13.33%	14 12.17%
Total	30 100%	20 100%	20 100%	30 100%	15 100%	115 100%

Source: Household Survey, September – November, 2015.

Figure No. 25: Household per Capita Water Availability in Kurseong Town (Rainy Season)

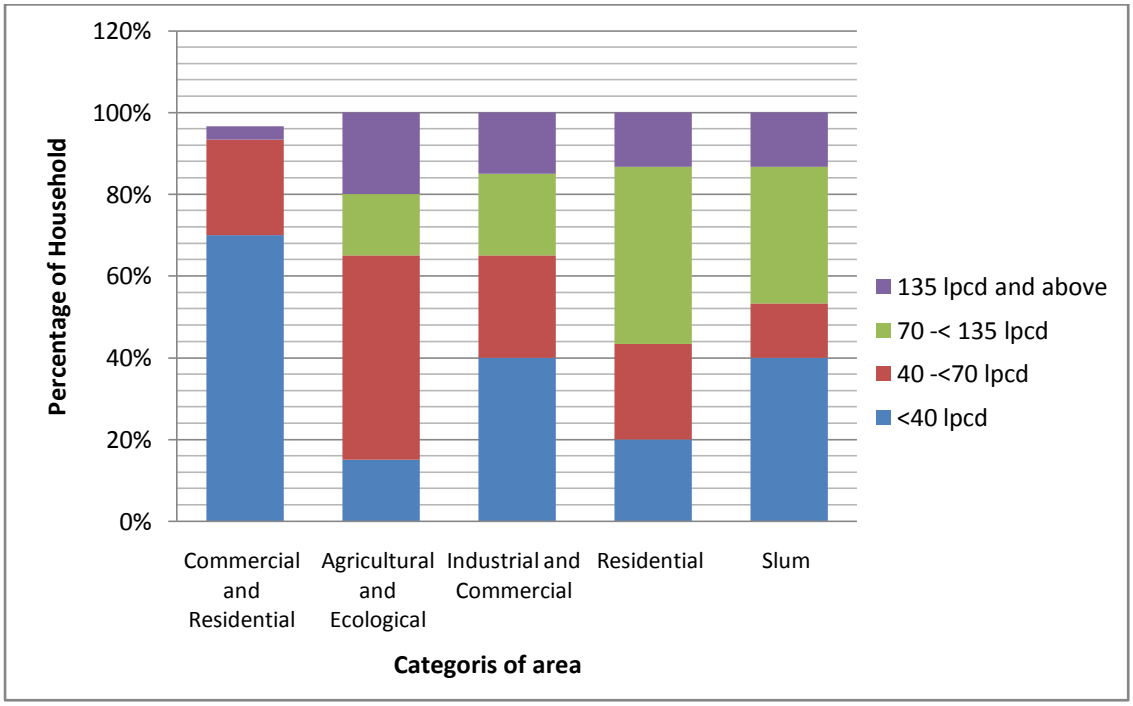


Table No. 27: Household per Capita Water Availability in Kurseong Town (Dry Season)

Average per capita per day water availability	Percentage of household per capita water availability in Kurseong town (Dry season)					
	Commercial and Residential	Agricultural and Ecological	Industrial and Commercial	Residential	Slum	Total
<40 lpcd	25 83.34%	13 65%	15 75%	20 66.67%	8 53.33%	81 70.43%
40 -<70 lpcd	4 13.33%	3 15%	2 10%	9 30%	4 26.67%	22 19.13%
70 -< 135 lpcd	1 3.33%	2 10%	3 15%	1 3.33%	2 13.33%	9 7.83%
135 lpcd and above	0 0%	2 10%	0 0%	0 0%	1 6.67%	3 2.61%
Total	30 100%	20 100%	20 100%	30 100%	15 100%	115 100%

Source: Household Survey, September – November, 2015.

Figure No. 26: Household per Capita Water Availability in Kurseong Town (Dry Season)

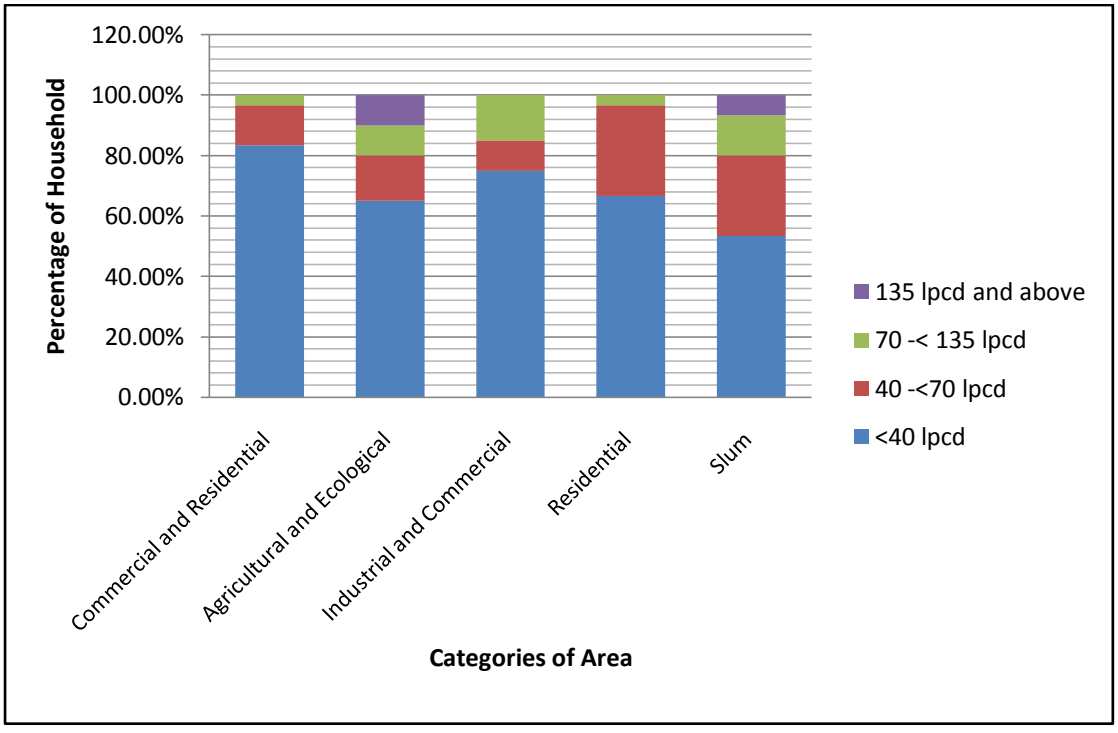


Table No. 28: Household per Capita Water Availability in Different Income Group (Rainy Season)

Different income group of households	Percentage of households per capita water availability in Kurseong town (Rainy season)				
	<40 lpcd	40-<70 lpcd	70-<135 lpcd	135 lpcd and above	Total
High Income Households	3 12.5%	4 16.67%	11 45.83%	6 25%	24 100%
Medium Income Households	7 15.56%	19 42.22%	14 31.11%	5 11.11%	45 100%
Low Income Households	34 73.91%	8 17.39%	1 2.17%	3 6.52%	46 100%
Total	44 38.26%	31 26.96%	26 22.61%	14 12.17%	115 100%

Source: Household Survey, September – November, 2015.

Figure No. 27: Household per Capita Water Availability in Different Income Group (Rainy Season)

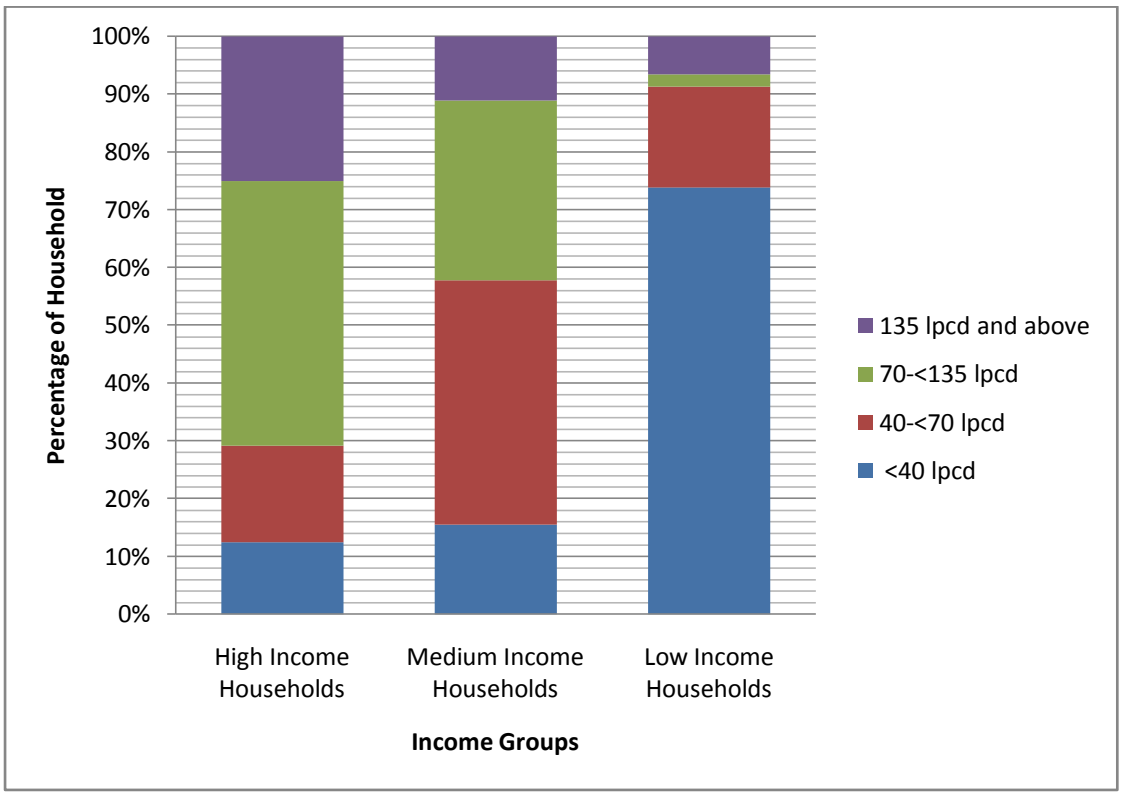
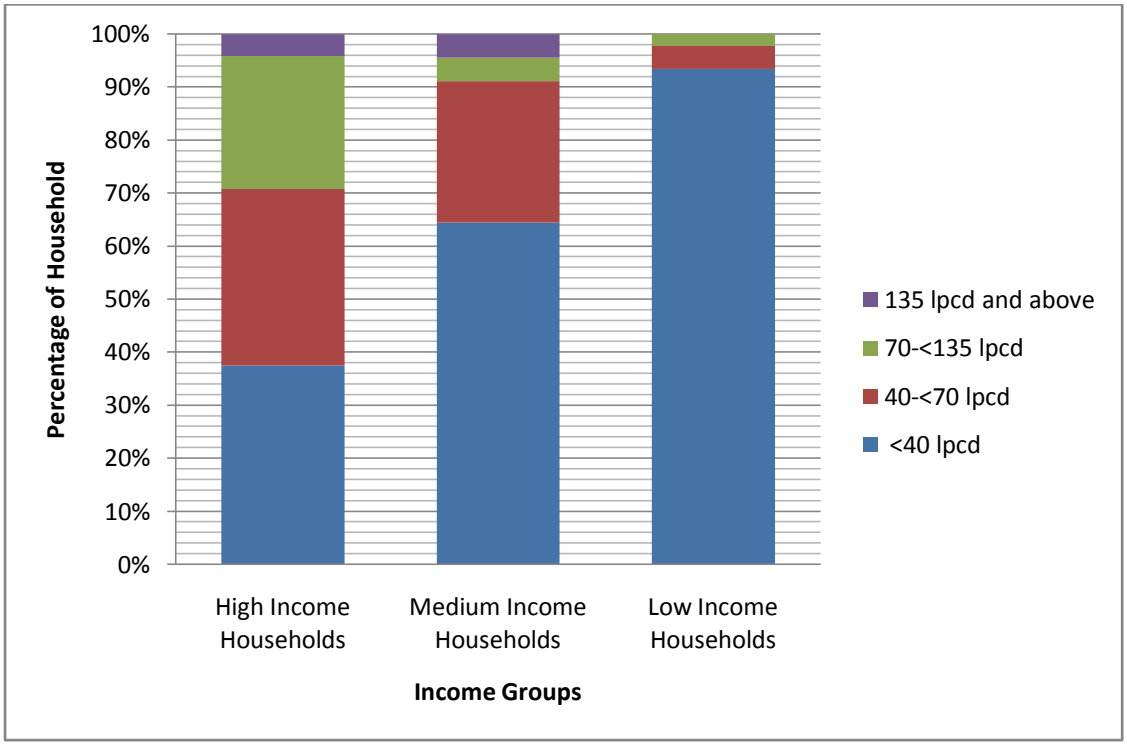


Table No. 29: Household per Capita Water Availability in Different Income Group (Dry Season)

Different income group of households	Percentage of household per capita water availability in Kurseong town (Dry season)				
	<40 lpcd	40-<70 lpcd	70-<135 lpcd	135 lpcd and above	Total
High Income Households	9 37.5%	8 33.33%	6 25%	1 4.17%	24 100%
Medium Income Households	29 64.45%	12 26.67%	2 4.44%	2 4.44%	45 100%
Low Income Household	43 93.48%	2 4.35%	1 2.17%	0 0%	46 100%
Total	81 70.43%	22 19.13%	9 7.83%	3 2.61%	115 100%

Source: Household Survey, September – November, 2015.

Figure No. 28: Household per Capita Water Availability in Different Income Group (Dry Season)



Box 1: Water supply situation of Kurseong town: insight from FGD

It is known from the FGD that almost all households are primarily depending on municipal water supply system as in the form of household connection and public outpoints users. But in dry season, they have to access water from different unimproved sources like private vendors, streams and river. And for purchasing water from private vendors a substantial amount of money i.e. Rs 400 per 1500 liters have to spend. Therefore, poor people fetch water from a distance of more than a kilometer. They have to pay around Rs 6000 to municipality to get new connection. Therefore, most of the poor family cannot afford the household pipe water connection and have to rely on municipal public outpoints.

Water is basically use for drinking and other household purposes. Most of the people of the town are aware of the presence of e-coli in the water due to possibly infiltration of sewage water. Therefore, they boiled water before use. But due to inadequate access of water at home some time household members especially the children drinks from unsafe sources.

There is a variation of water supply between higher and lower part of the town. The families located higher part of the town is getting more water than lower part. Because the water is supplied in the town from higher to lower part through gravity connection system and there is several leakage in the main supply pipe in between also.

Collections of water from public outpoint start from early morning around 5:30 AM and wait for his/her own turn (Plate No. 1). The pressure of the water supply in public outpoints is very low in dry season and so the collecting amount is very low. Sometime, in dry season quarrel take place among the people in the queues.

Complains are made to the municipality to increase duration of water supply in public outpoints. But the allotted duration of water supply of about 30 minutes in dry season and 30-45 minutes in rainy season keep unchanged.

Some time, in the rainy season water comes more than 45 minutes then outpoints users feels themselves lucky for day.

Although, in rainy seasons people of Kurseong town gets more water than dry season but most of the day dirty water comes through the tap. After bathing in the dirty water people are affected by scabies. And drinking the water without proper treatment most of people affected by diarrhoea, jaundice and typhoid.

In dry season, the situation of water supply becomes worst due to decrease volume of the water in the reservoirs. Then most of high income family depends on private suppliers and lower income families cover a distance of more than a kilometer to collect water from river. The inadequate amount of water in dry season affects in the personal hygiene.

Table No. 30: Water Storage Capacity of the Household in Different Area of Kurseong Town

Categories of municipality area	Water storage capacity of the households in Kurseong town									
	<500 Liters		500-<1500 Liters		1500-<3000 Liters		3000 Liters and above		Total	
	N	%	N	%	N	%	N	%	N	%
Commercial and Residential	9	30%	11	36.67 %	4	13.33 %	6	20%	30	100%
Agricultural and Ecological	1	5%	14	70%	5	25%	0	0%	20	100%
Industrial and Commercial	5	25%	14	70%	1	5%	0	0%	20	100%
Residential	7	23.33 %	19	63.34 %	3	10%	1	3.33%	30	100%
Slum	5	33.33 %	10	66.67 %	0	0%	0	0%	15	100%
Total	27	23.48 %	68	59.13 %	13	11.30 %	7	6.09%	115	100%

Source: Household Survey, September – November, 2015.

Figure No. 29: Water Storage Capacity of the Household in Different Area of Kurseong Town

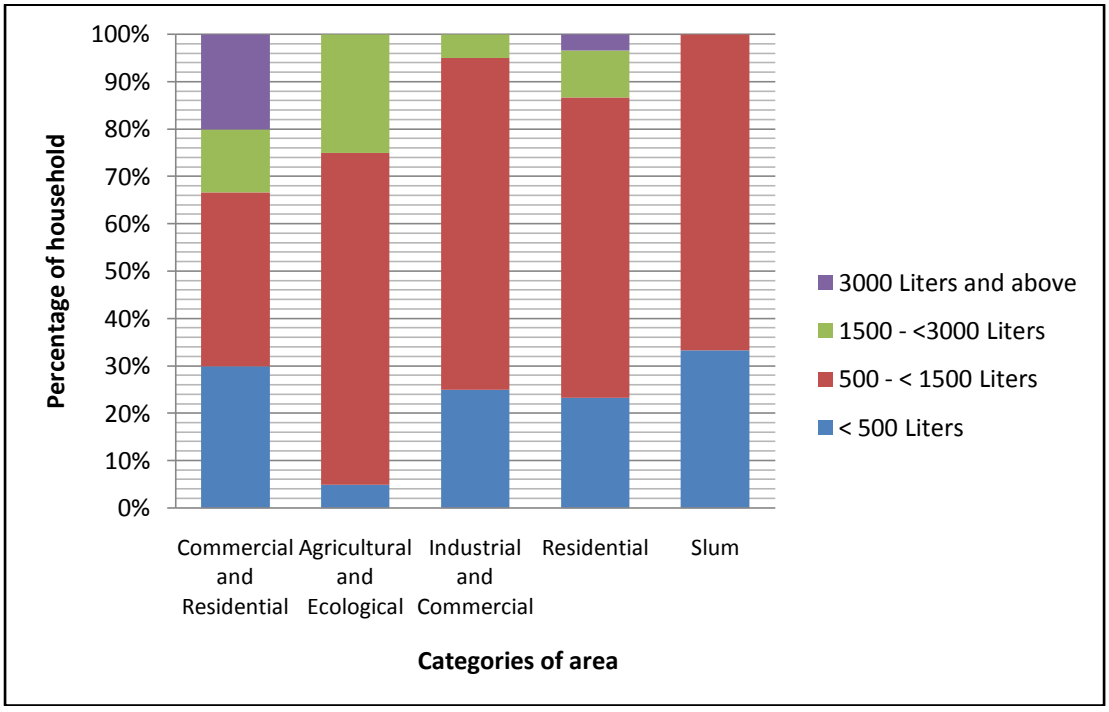
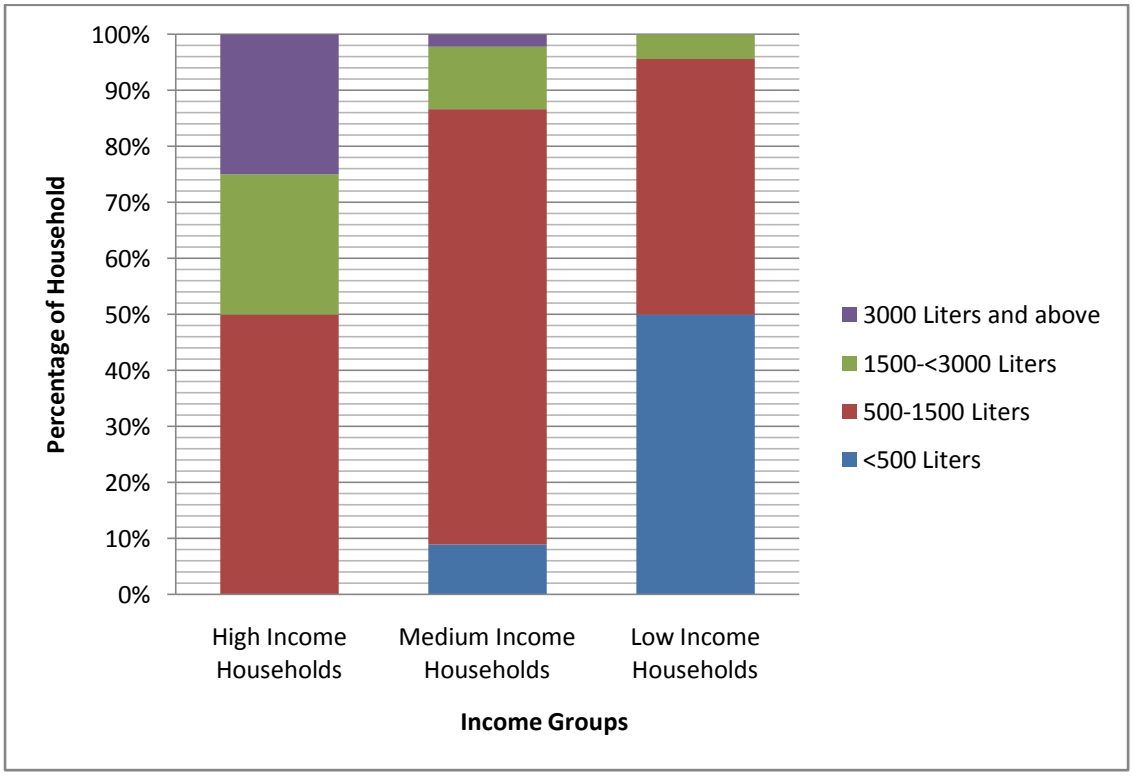


Table No. 31: Income Wise Household Water Storage Capacity in Kurseong Town

Different income group of households	Water storage capacity of the household in Kurseong town									
	<500 Liters		500-<1500 Liters		1500-<3000 Liters		3000 Liters and above		Total	
	N	%	N	%	N	%	N	%	N	%
High Income Households	0	0%	12	50%	6	25%	6	25%	24	100%
Medium Income Households	4	8.89%	35	77.78 %	5	11.11 %	1	2.22%	45	100%
Low Income Household	23	50%	21	45.65 %	2	4.35%	0	0%	46	100%
Total	27	23.48 %	68	59.13 %	13	11.30 %	7	6.09%	115	100%

Source: Household Survey, September – November, 2015.

Figure No. 30: Income Wise Household Water Storage Capacity in Kurseong Town



4.1.7. Household Water Storage Capacity

Table 30 indicates that the storage capacity of 20 percent household of Commercial-Residential area, and 3.33 percent household of Residential area comes in the category of 3000 liters and above. Rest of the areas in the town has the storage capacity of below 3000 liters. Most of the households in the town have storage capacity of 500 - <1500 liters. In slum area the household storage capacity are found in the category of <500.

The water storage capacity is higher in high income group than middle and lower income households. The table 31 shows that 25 percent of high income household has water storage capacity of above 3000 liters while only 2.22 percent of middle income households has water storage capacity of above 3000 liters. There is no household in low income group whose storage capacity is more than 3000 liters. 50 percent of high income household of the town has water storage capacity of below 1500 liters. But in high income group, there is no household which has storage capacity of below 500 liters. Whereas, in the medium income households, the dominated water storage are in between 500 liters and 1500 liters. Half of the households of low income has been sustaining with the storage capacity of 500 liters (Figure No. 30).

Therefore, it can be concluded that households of Agricultural-Ecological area and Residential area access more water than other area of the town. Beside, high income household access more water than medium and lower income household.

4.2. Households Sanitation Condition

In order to have an idea about the sanitation condition of the town this study was conducted under the following heads –

4.2.1. Households Latrine Facility and Mode of Defection

Three modes of defection practice have been identified in Kurseong town. They are in their own household toilet, public toilet/share toilet and open/free area. Table 32 shows that 85.22 percent of household has in house toilet facility and 14.78 percent of households do not have in house toilet facilities. Table number 33 shows that 26.53 percent of in house latrine has connected with pipe sewerage line and remaining 73.47 percent of in house latrine has excreta disposal facilities. Only Commercial-Residential area of the town has subsidized sewerage connection network which is maintained by local administration of the town. In comparison to all five areas of the town, Residential area and Agricultural and Ecological area have 100 percentage in-house latrine facilities. Whereas Commercial-Residential has 86.67 percent, Industrial-Commercial area has 80 percent and slum area stands 40 percent (Figure No. 31).

6.66 percent of households in Commercial-Residential area and 20 percent of household of slum area defects open/ free area. Whereas 40 percent household in slum area, 20 percent household in Industrial-Commercial area and 6.67 percent household in Commercial-Residential area are using public/community/share latrine. Most of the households (60 percent) of Slum area do not have in house latrine. Household which use open/free area is highest in Slum Area i.e. 20 percent (Table No.33).

Table No. 32: Household Latrine Facilities in Different Area of Kurseong Town

Categories of municipality area	Household latrine facilities in Kurseong town							
	Households having latrine in house		Households not having latrine in house than alternatives sources				Total	
			Public/Share Toilet		Open			
	N	%	N	%	N	%	N	%
Commercial and Residential	26	86.67%	2	6.67%	2	6.66%	30	100%
Agricultural and Ecological	20	100%	0	0%	0	0%	20	100%
Industrial and Commercial	16	80%	4	20%	0	0%	20	100%
Residential	30	100%	0	0%	0	0%	30	100%
Slum	6	40%	6	40%	3	20%	15	100%
Total	98	85.22%	12	10.43%	5	4.35%	115	100%

Source: Household Survey, September – November, 2015.

Figure No. 31: Household Latrine Facilities in Different Area of Kurseong Town

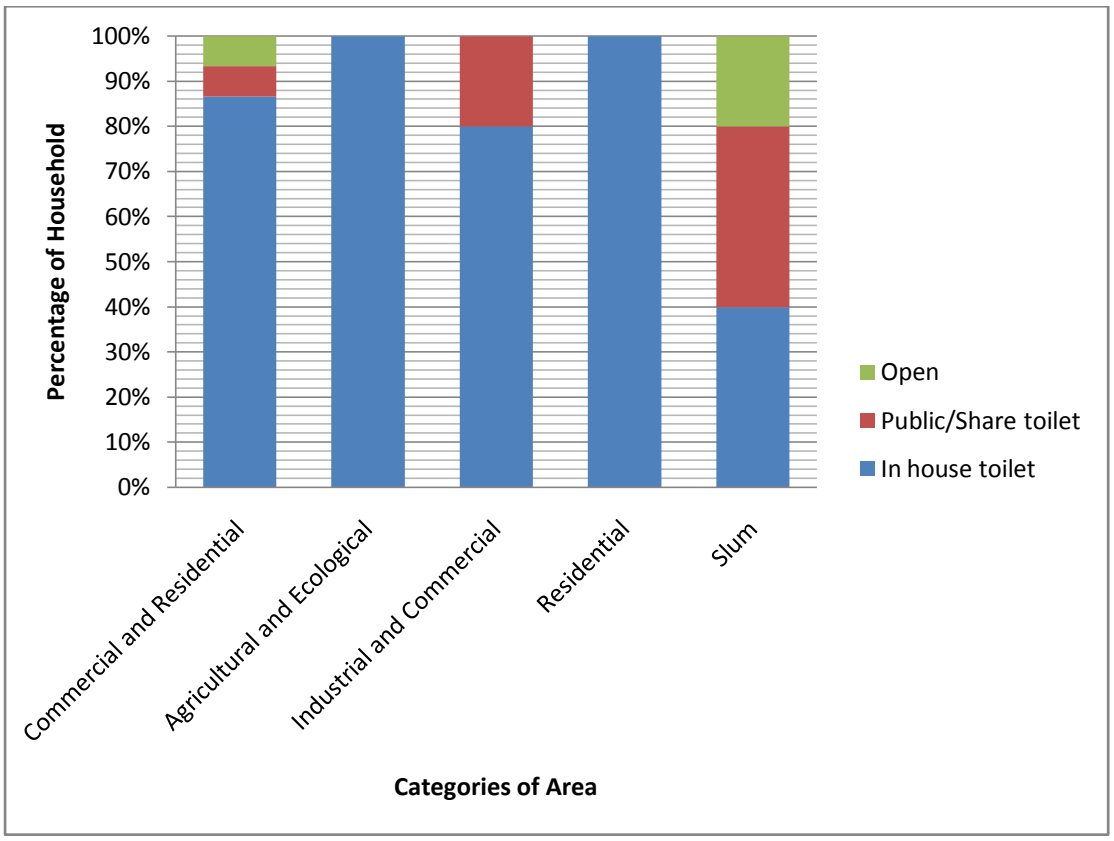
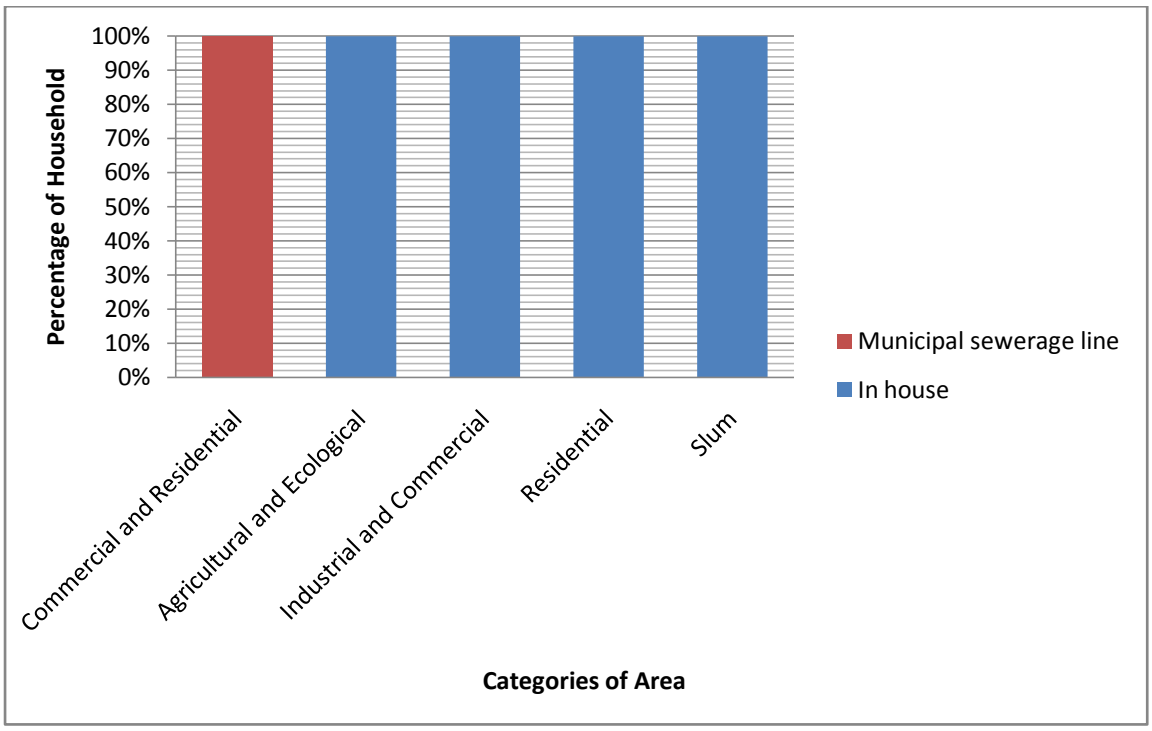


Table No. 33: Household Excreta Disposal in the Town

Categories of municipality area	Household excreta disposal					
	In house		Municipal sewerage line		Total	
	N	%	N	%	N	%
Commercial and Residential	0	0%	26	100%	26	100%
Agricultural and Ecological	20	100%	0	0%	20	100%
Industrial and Commercial	16	100%	0	0%	16	100%
Residential	30	100%	0	0%	30	100%
Slum	6	40%	0	0%	6	100%
Total	72	73.47%	26	26.53%	98	100%

Source: Household Survey, September – November, 2015.

Figure No. 32: Household Excreta Disposal in the Town



Box 2: Sanitation condition in Kurseong town: Insight from FGD and Observation

There is a significance improvement of sanitation in the town area since previous years. Because the local administrative body, Municipality, has constructed several share toilets for the families which were practicing open defection. Therefore, there is a decrease in the number of population who practices defection in the open. In the slum area the distance of the share latrine seems the matter for open defection in the night time. Because, in the late night, women feel insecure to go distant share toilet especially in rainy night and the negligence of using share latrine is very high among the children. The women, who are using share toilets, believe that due to regular use of share latrine they could get infected by several types of virus.

Most of the children of agricultural-ecological area, industrial-commercial area and slum area are not using latrine. They mostly defect in the open and their stool is thrown away in the surrounding bushes and streams. There is absence of regular cleaning of local drainage in the town. Most of the households of the town pour their waste water in the drains near to the house, except the households of commercial-residential area. All local drainages are connected with the streams which flow within the town. Only commercial-residential area of the municipality has the household connection with municipal sewage system.

For collection of household waste, municipality has constructed several numbers of vats in different area of the town except commercial-residential area but there is absence of regular waste collection from the vats which creating nuisance and unhygienic condition in town especially in rainy season. Therefore, most of the people in municipality are either burning their household waste or throwing into nearest stream.

It is found that there is a leakage of sewage materials from the underground of sewerage line near the municipal taxi stand in commercial-residential area. And it spreads bad smell in the area since last six month.

The table 34 indicates that, 100 percent of high income households, 95.55 percent of medium income households and 67.39 percent lower income households have in house latrine facility. Therefore, higher numbers of household without having in-house latrine are found in lower income group.

Table no 35 shows that households of different income group which do not have toilet facilities in their house among them 70.59 percent of households use share/public/community toilet and 29.41 percent of households use open/free area.

Table No. 34: Income Wise Household Sanitation Condition in Town

Household sanitation characteristics	Percentage of households							
	High-income households		Medium-income household		Low-income household		Total	
	N	%	N	%	N	%	N	%
Households with in house latrine	24	100 %	43	95.55 %	31	67.39 %	98	85.22 %
Households do not have in house latrine	0	0%	2	4.44%	15	32.61 %	17	14.78 %
Total	24	100 %	45	100%	46	100%	115	100%

Source: Household Survey, September – November, 2015.

Figure 33: Income Wise Household Sanitation Condition in Town

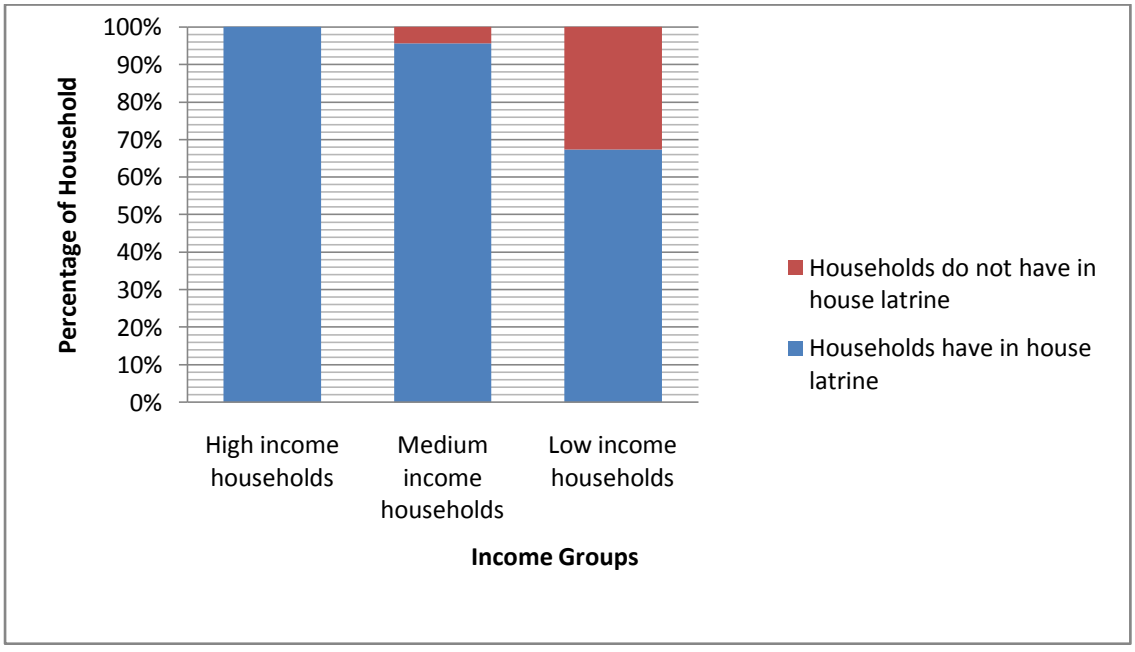


Table No. 35: Household Uses Alternative Way of Defection Practices

Households do not have in house latrine then alternative way of use	Percentage of household							
	High-income households		Medium-income households		Low-income household		Total	
	N	%	N	%	N	%	N	%
Public/Share Toilet	0	0%	2	100 %	10	66.67 %	12	70.59 %
Open	0	0%	0	0%	5	33.33 %	5	29.41 %
Total	0	--	2	100 %	15	100%	17	100%

Source: Household Survey, September – November, 2015.

4.2.2. Pipe Water Connection in Household Latrines

Out of total households which have in house latrine facility among those 63.27 percent of household has direct water supply to latrine and 36.73 percent of households do not have direct water supply to the latrine (Table, 36 & Figure 34).

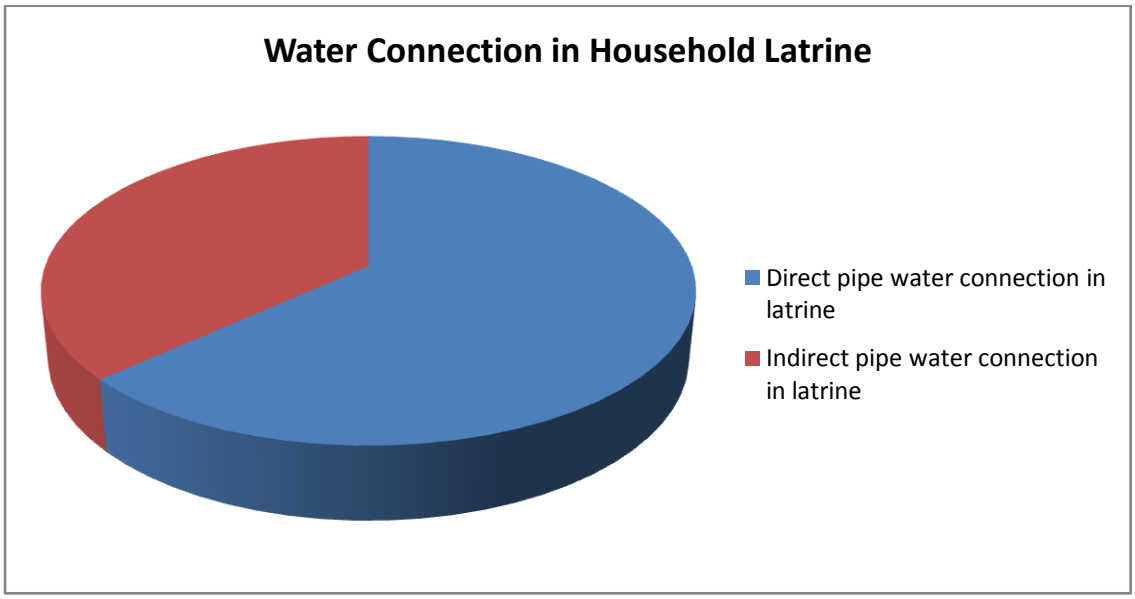
Water supply to the latrine has largely influenced the cleanliness of latrines. 6.12 percent of households clean their latrine once in a week (Table 37 & Figure 35), 30.61 percent of households clean their latrine twice a week and 63.27 percent of households clean their latrine more than thrice a week.

Table No. 36: Water Connection in Household Latrines

Household latrines with water connection	Percentages of household
Direct	63.27% (62)
Indirect	36.73% (36)
Total	100% (98)

Source: Household Survey, September – November, 2015.

Figure No. 34: Water Connection in Household Latrines



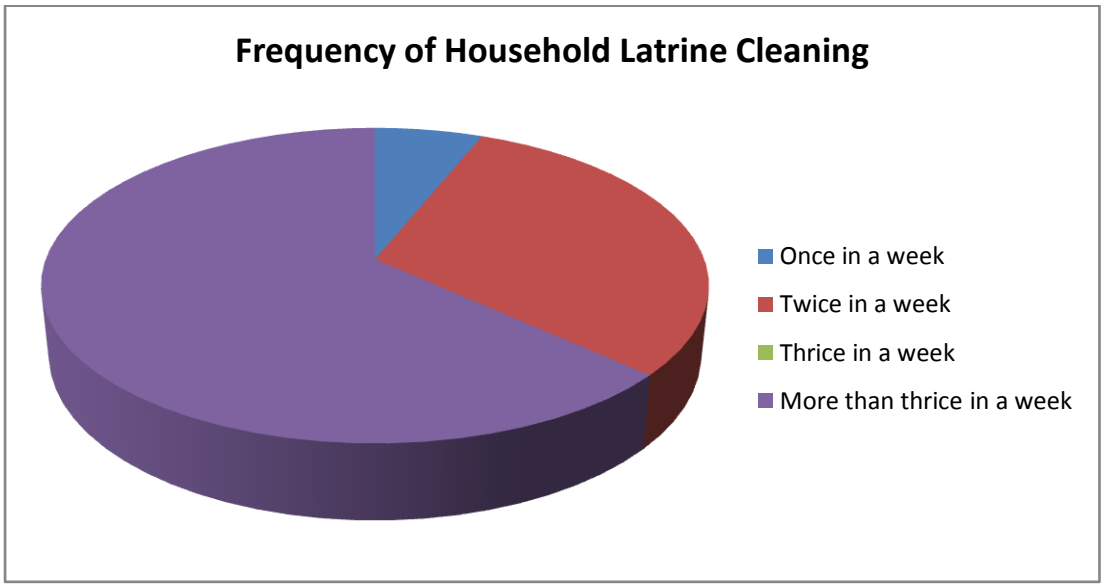
The survey reveals that water supply to the latrines not only affects in maintaining cleanliness of latrines but also became one of the important cause for negligence of proper hygienic wash of hands after using toilet. The negligence of proper hygienic practices like hand wash after toilet is also more in those households which do not have in-house latrine facilities.

Table No. 37: Frequencies of Household Latrine Cleaning

Frequencies of cleaning of latrines	**Percentages of households**
Once in a week	6.12% (6)
Twice in a week	30.61% (30)
Thrice in a week	0% (0)
More than thrice in a week	63.27% (62)
Total	100% (98)

Source: Household Survey, September – November, 2015.

Figure No. 35: Frequencies of Household Latrine Cleaning



4.2.3. Households Waste Management

The survey reveals that there is door to door household waste collection system only in commercial-residential area. And households of remaining areas in the town choose other alternative ways to get escape from the nuisance of their households waste. In pure residential area 46.67 percent households burn their household waste and remaining 53.33 percent households use municipal vat. It is also known from the respondent that in Agricultural-Ecological area, 55 percent of the household burn their household waste and 45 percent households throw their household waste into local streams. In Industrial-Commercial area all the household burn their household waste. In slum area 60 percent households burn their household waste and 33.33 percent of households throw into the river and 6.67 percent of households throw their homestead bushes (Table 38 & Figure 36).

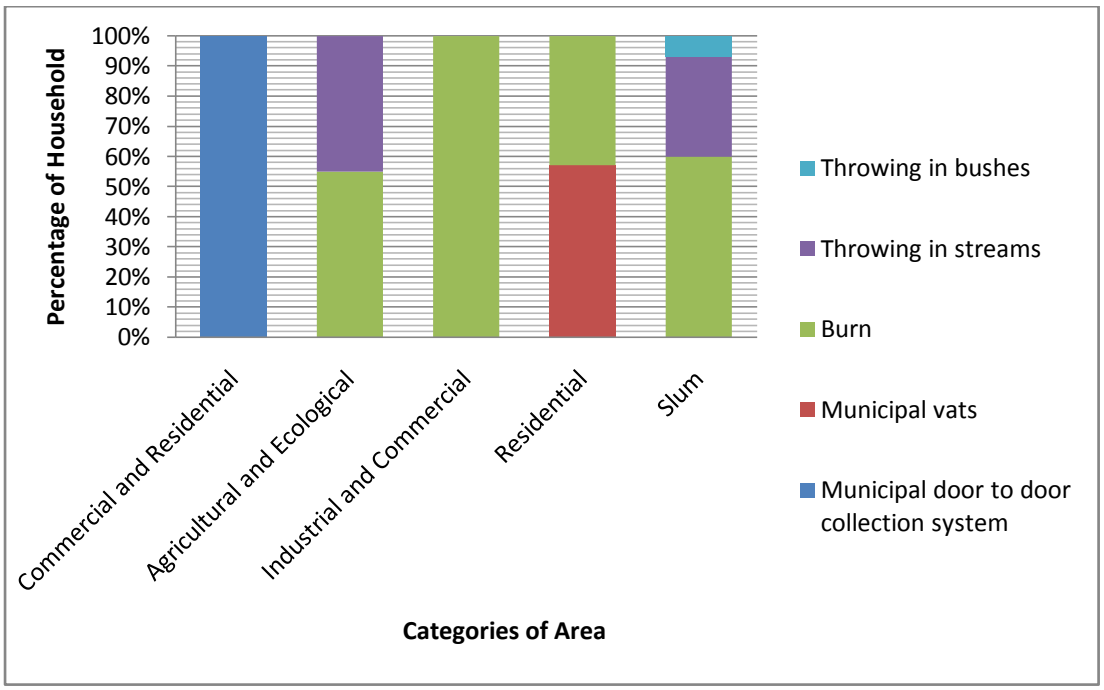
It has been found that there is no particular schedule for cleaning of local drainage by municipality. It shows the municipal body is not serious enough to maintain hygienic condition in the town.

Table No. 38: Household Waste Management

Categories of municipal area	Percentage of household					
	Municipal door to door collection system	No municipal door to door collection system then alternative ways				Total
		Municipality Vats	Burn	Throwing in streams	Throwing in bushes	
Commercial and Residential	100.0% (30)	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (30)
Agricultural and Ecological	0.0% (0)	0.0% (0)	55.0% (11)	45.0% (9)	0.0% (0)	100.0% (20)
Industrial and Commercial	0.0% (0)	0.0% (0)	100.0%(20)	0.0% (0)	0.0% (0)	100.0% (20)
Residential	0.0% (0)	53.33% (16)	46.67% (14)	0.0% (0)	0.0% (0)	100.0% (30)
Slum	0.0%	0.0% (0)	60.0% (9)	33.33 (5)	6.67% (1)	100.0% (15)
Total	26.09% (30)	13.91 (16)	46.96% (54)	12.17% (14)	0.87% (1)	100%

Source: Household Survey, September – November, 2015.

Figure No. 36: Household Waste Management



4.2.4. Types of Household Toilet Pan

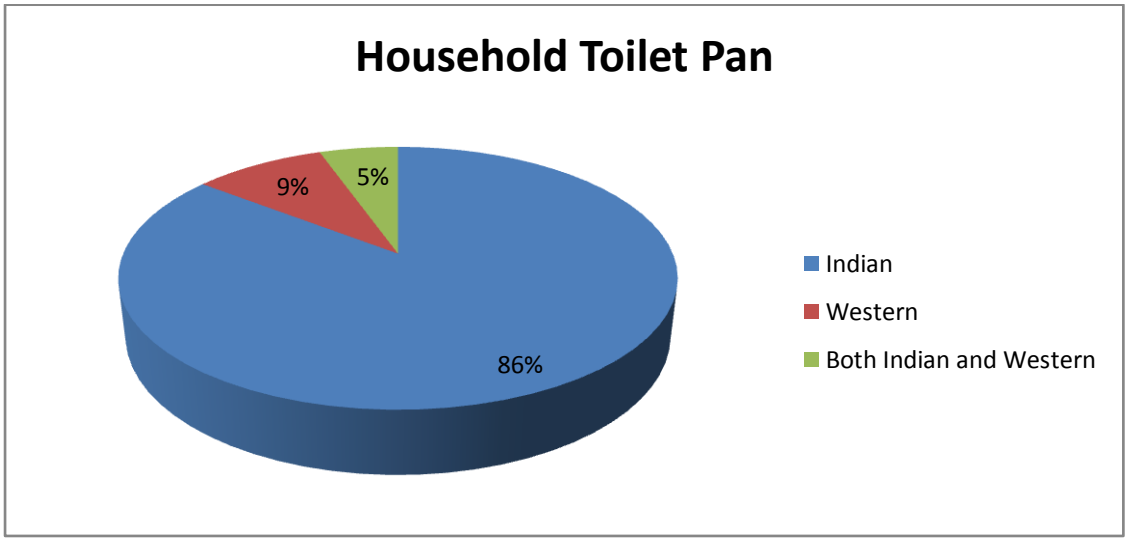
The Study also reveals that there is both tradition (Indian style) and western type of toilet pan. Out of total respondents households 4.35 percent households use free range or open (Table 32). Therefore they are not using any kind of toilet pan. Among the remaining households, 85.45 percent households use traditional Indian style of toilet pan (Plate No. 11). Both in-house toilet and public toilet users are using this type of toilet. Western type toilet pan is being used by 9.10 percent of household. 5.45 percent households are using both traditional Indian style and modern type of toilet pan (Table No. 39 & Figure No. 37). The western type of toilet pan consumes about 10 liters in every flush to flow-out waste materials. Therefore, it is a problem when there is scarcity of water.

Table No. 39: Household Using Different Types of Toilet Pan

Types of toilet pan	**Percentage of Household**
Indian	85.45% (94)
Western	9.10% (10)
Both Indian and Western	5. 45% (6)
Total	100% (110)

Source: Household Survey, September – November, 2015.

Figure No. 37: Household Using Different Types of Toilet Pan



4.2.5. Household Bathroom and Hand Wash Basin in Kitchen

Table 40 shows 58.26 percent of households has bathroom facility in their house also has tap water in kitchen (Plate No. 6). And remaining 41.74 percent of households do not have bathroom facility in their house. They bath in the open. However the study also indicates that the household which have no bathroom facility in their house also have no hand wash basin in their kitchen. Therefore, the chance of negligence of proper hand wash before preparing and serving food is more in those households. Even there is also more chance of negligence for proper washing hand before having food which may cause many illnesses.

Table No. 40: Household Bathroom and Hand Wash Basin in Kitchen

Household Bathroom and hand wash basin in kitchen	**Yes**	**No**	**Total**
Bathroom	58.26% (67)	41.74% (48)	100% (115)
Hand wash basin in the kitchen	58.26% (67)	41.74% (48)	100% (115)

Source: Household Survey, September – November, 2015.

Hand wash before food and after using latrine is very indispensible to protect from pathogen of water and hygiene related disease. Even regular cleanliness of latrine saves people from unhygienic infection. Share toilets/public toilets/community toilets are neither safe nor comfortable because it is not that much hygienic or clean and also it is the storehouse of different diseases. The open/free range system is the worst in terms of safety. Because the fecal maters ultimately get mixed with water of stream, river and other unprotected sources through surface runoff and pollute them.

4.3. Incidence and Prevalence of Water and Sanitation Related Diseases in the Town

The survey reveals that out of the total 526 surveyed population 274 population of the Kurseong town were affected in water-sanitation related diseases in the last one year out of the total 526 surveyed population. The main water sanitation related diseases which affect the population of Kurseong town in the last one year, has been categorized into five such as diarrhoea, jaundice, typhoid, skin disease and other disease (Table, 43). To get clear idea about the prevalence of water and sanitation related diseases in Kurseong town the incidence of above disease are described as below -

4.3.1. Diarrhoea

Diarrhoea is the most common disease which affected most of the people of the town in last year. 40.11 percent population in the town was affected by diarrhoea. 50.79 percent of slum population was affected by diarrhoea in the last year whereas among the population of Industrial-Commercial area the diarrhoea affected cases were 43.30 percent. 40.56 percent of Commercial-Residential area's population was affected by diarrhoea. Diarrhoea affected cases among the population of Residential area and among the population of Agricultural-Ecological area were 40.56 percent and 36.43 percent respectively. Therefore, the population of slum area is more prone in diarrhoea than the population of other area. However, the total cases of diarrhoea among the population of below 5 years age group were 64.70 percent. Whereas 60 percent of diarrhoeal cases was among the people in the age group of above 60 years, 56.60 percent cases was in the age group of 5 to 14 years and 33.33 percent in the age group of 15 to 60years. Therefore, it is clear from above analysis that the age groups

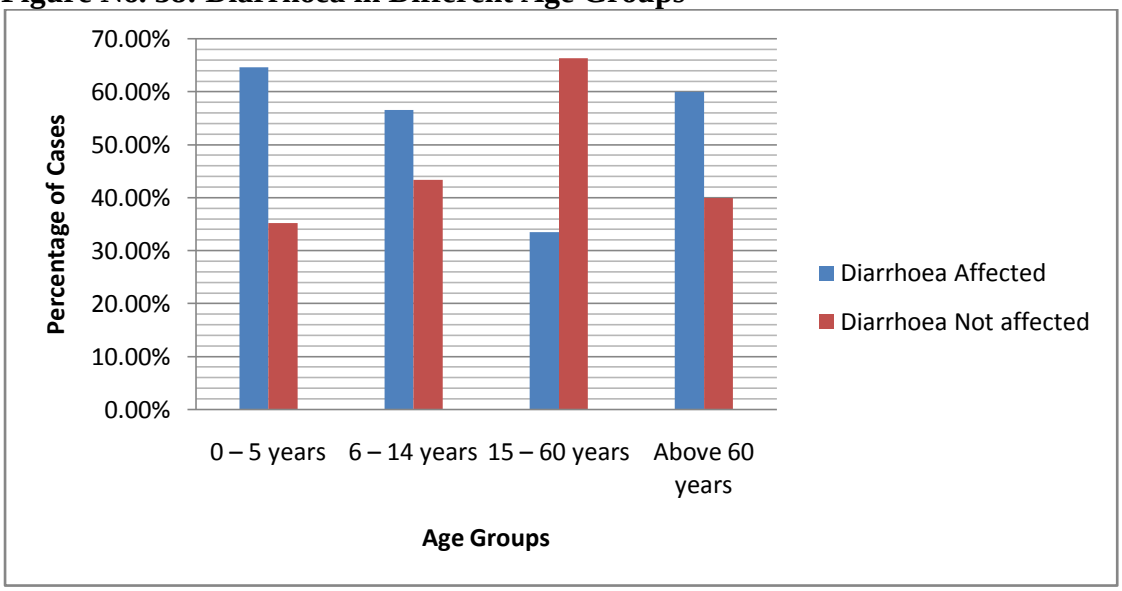
of 0 to 14 years and above 60 years are likely affected by diarrhoea than middle aged population of the town (Table, 41 & Figure 38).

Table No. 41: Diarrhoea in Different Age Groups

Age group	Diarrhoea		Total
	Affected	Not affected	
0 – 5 years	64.70% (12)	35.30% (6)	100% (17)
6 – 14 years	56.60% (30)	43.40% (23)	100% (53)
15 – 60 years	33.58% (133)	66.42% (263)	100% (396)
Above 60 years	60% (36)	40% (24)	100% (60)

Source: Household Survey, September – November, 2015.

Figure No. 38: Diarrhoea in Different Age Groups



4.3.2. Jaundice

Jaundice is another water sanitation related disease which affected all five categories of area in the town. But as compare to diarrhoea, jaundice cases were substantially less in number. The table number 43 indicates that in the town there were total 10 cases of jaundice in last year. In Slum area 4.76 percent population was affected whereas 1.06 percent of jaundice cases were among the population of Agricultural-Ecological area. In Industrial-Commercial area the cases was 2.06 percent. 1.40

percent population of Commercial-Residential area and 1.56 percent population of Residential area were affected by jaundice in last year. Therefore, along with diarrhoea slum area is more prone in jaundice. Table 42 shows that jaundice cases among the population in the age group of 6 to 14 years was 3.77 percent. 3.33 percent of jaundice cases were among the population of the age group of above 60 year. And lowest proportion (1.51 percent) of jaundice was found in the age group of 15 to 60 years. There were no cases of jaundice in the age group of below 5 years (Figure, 39).

Table No. 42: Jaundice in Different Age Groups

Age group	Jaundice		Total
	Affected	Not affected	
0 – 5 years	0% (0)	100% (17)	100% (17)
6 – 14 years	3.77% (2)	96.23% (51)	100% (53)
15 – 60 years	1.51% (6)	98.49% (390)	100% (396)
Above 60 years	3.33% (2)	96.67% (58)	100% (60)

Source: Household Survey, September – November, 2015.

Figure No. 39: Jaundice in Different Age Groups

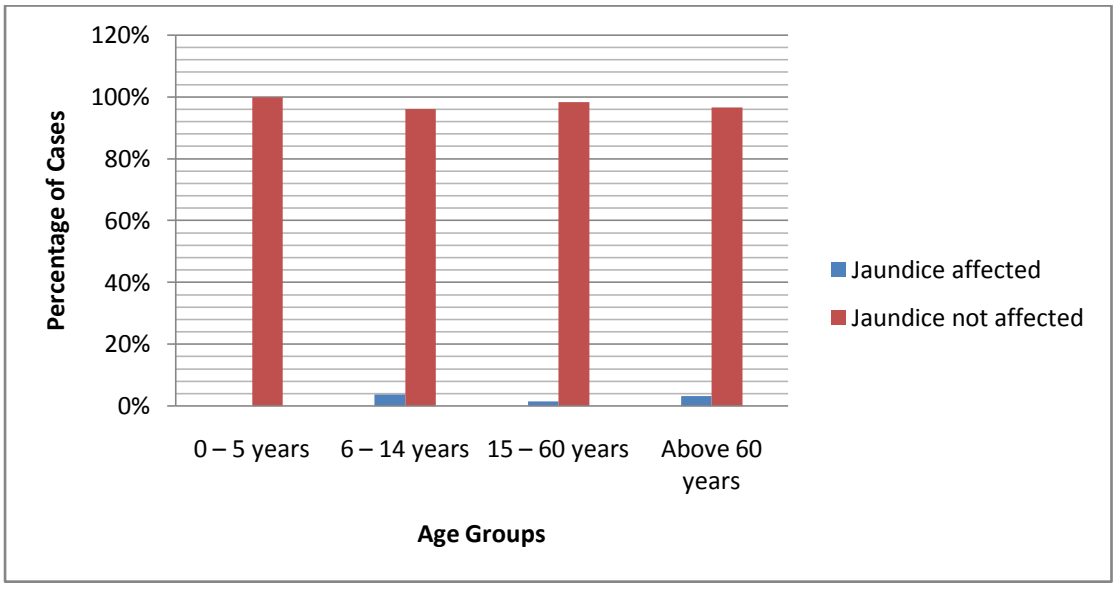


Table No. 43: No. of Cases of Disease in Different Categories of Area in Kurseong Town

Water sanitation related disease	No. of cases of disease in different Categories of area in Kurseong town					Total
	Commercial-Residential	Agricultural-Ecological	Industrial-Commercial	Residential	Slum	Total
No disease	70 (48.95%)	54 (57.45%)	43 (44.33%)	70 (54.26%)	15 (23.81%)	252 (47.91%)
Diarrhoea	58 (40.55%)	32 (34.05%)	42 (43.30%)	47 (36.43%)	32 (50.79%)	211 40.11%)
Jaundice	2 (1.40%)	1 (1.06%)	2 (2.06%)	2 (1.56%)	3 (4.76%)	10 1.91%)
Typhoid	1 (0.70%)	1 (1.06%)	2 (2.06%)	1 (0.77%)	3 (4.76%)	8 (1.52%)
Skin disease	6 (4.20%)	3 (3.19%)	3 (3.09%)	4 (3.10%)	5 (7.94%)	21 (3.99%)
Other water sanitation related disease*	6 (4.20%)	3 (3.19%)	5 (5.16%)	5 (3.88%)	5 (7.94%)	24 (4.56%)
Total	143 (100.0%)	94 (100.0%)	97 (100.0%)	129 (100.0%)	63 (100.0%)	526 (100.0%)

*Gastrointestinal illness, Kidney infection, and liver problems.

Source: Household Survey, September – November, 2015.

4.3.3. **Typhoid**

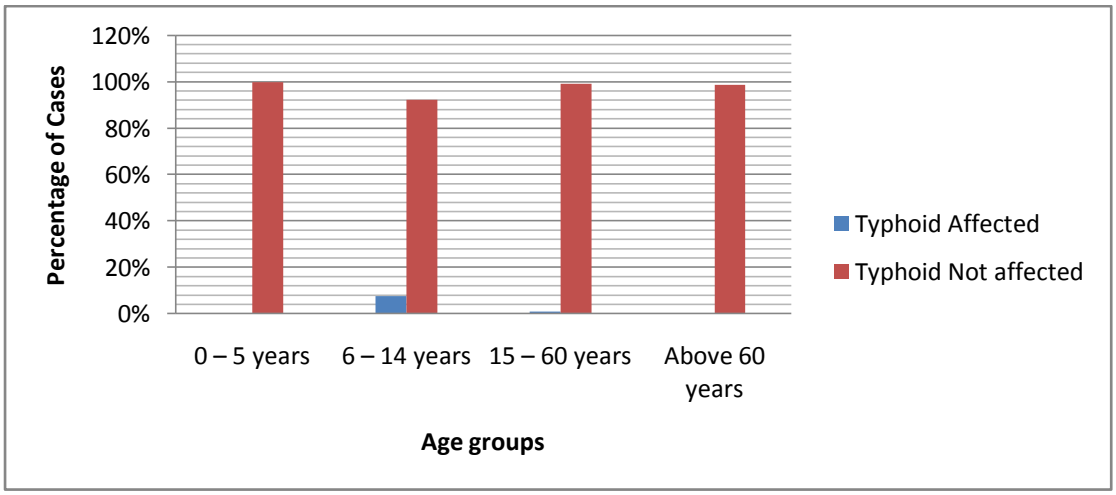
The cases of typhoid in Kurseong town are lower than jaundice. In total 8 cases of typhoid were there in the town in last year. Population of Slums was more (4.76 percent) affected by typhoid than any other areas. After Slum area Industrial-Commercial area has second highest typhoid cases i.e. 2.06 percent. And the lowest cases (0.70 percent) of typhoid were among the population of Commercial-Residential area. Typhoid cases in the age group of 6 to 14 years were 7.54 percent. 0.17 percent of typhoid cases were in the age group of above 60. There were no typhoid cases among the population of below 5 years age (Table, 44 & Figure, 40).

Table No. 44: Typhoid in Different Age Groups

Age group	Typhoid		Total
	Affected	Not affected	
0 – 5 years	0% (0)	100% (17)	100% (17)
6 – 14 years	7.54% (4)	92.46% (49)	100% (53)
15 – 60 years	0.76% (3)	99.24% (394)	100% (396)
Above 60 years	0.17% (1)	98.83% (59)	100% (60)

Source: Household Survey, September – November, 2015.

Figure No. 40: Typhoid in Different Age Groups



4.3.4. **Skin Disease**

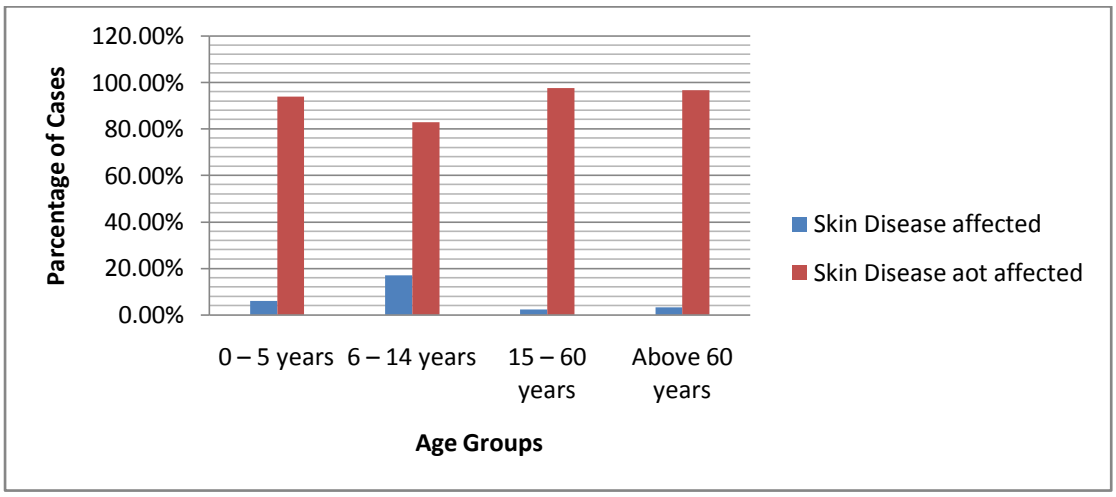
Most common skin disease of the town is scabies but a very few cases of ring warm affected people were also found. Table number 43 shows that 3.99 percent of people were affected by skin disease in last year. However, the slum population was more affected (11.11 percent) by skin disease and the population of Industrial-Commercial area was least affected i.e. 3.09 percent. The population in the age group of 6 to 14 years was affected more by skin disease i.e. 16.98 percent whereas, 5.88 percent of population in the age group of 0 to 5 years, 3.33 percent population in the age group of above 60 years and 2.27 percent population in the age group of 15 to 60 years were affected (Table, 45 & Figure, 41).

Table No. 45: Skin Disease in Different Age Groups

Age group	Skin Disease		Total
	Affected	Not affected	
0 – 5 years	5.88% (1)	94.12% (16)	100% (17)
6 – 14 years	16.98% (9)	83.02% (44)	100% (53)
15 – 60 years	2.27% (9)	97.73 (387)	100% (396)
Above 60 years	3.33% (2)	96.67% (58)	100% (60)

Source: Household Survey, September – November, 2015.

Figure 41: Skin Disease in Different Age Groups



4.3.5. Other Water and Sanitation Related Diseases

Other water-sanitation related diseases of the town are gastrointestinal illness, kidney infection and liver related diseases other than jaundice. Out of 526 population 4.56 percent of population was affected in other water sanitation related diseases in different area in the town. Other water-sanitation related disease was found highest among the people of Slum area (7.97 percent) followed by Industrial-Residential area (5.15 percent), Commercial-Residential area (4.20 percent), Residential area (3.88 percent) and Agricultural-Ecological area (3.19 percent).

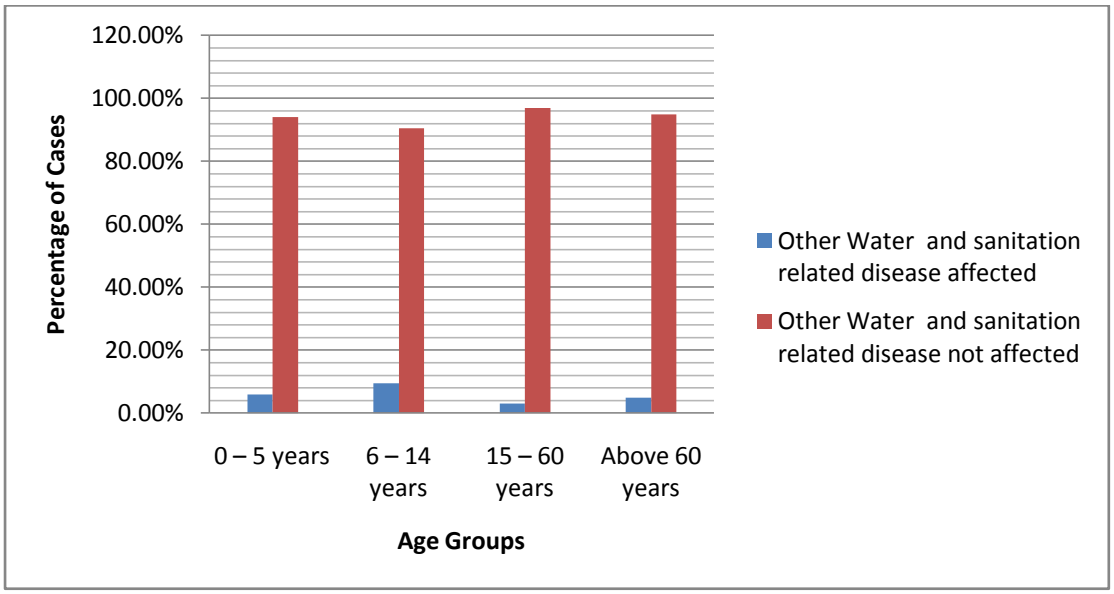
However, the highest percentage (9.43 percent) of such cases was found in the age group of 6 and 14 years and the lowest i.e.3.03 percent cases was in 15 to 60 years age group (Table, 46 & Figure, 42).

Table No. 46: Other Water and Sanitation Related Diseases in Different Age Groups

Age group	Other Water and sanitation related disease		Total
	Affected	Not affected	
0 – 5 years	5.88% (1)	94.12 (16)	100% (17)
6 – 14 years	9.43% (5)	90.57% (48)	100% (53)
15 – 60 years	3.03% (12)	96.97% (384)	100% (396)
Above 60 years	5.0% (3)	95.0% (57)	100% (60)

Source: Household Survey, September – November, 2015.

Figure No. 42: Other Water and Sanitation Related Diseases in Different Age Groups



Therefore, from the above analysis of diseases it is clear that prevalence of diarrhoea is very high in Kurseong town as compare to other water sanitation related disease. The study reveals that more than 40% population of the town was suffered by diarrhoea in last year. And the incidence is high within the age groups of 0 to 5 years and above 60 years. However, study also reveals that there is a variation in the town for water and sanitation related diseases. Slum areas of the town are more prone than any other area. After that Industrial-Residential area in water and sanitation related diseases prone area is followed by Commercial-Residential area, pure residential area and Agricultural-Ecological area.

4.4. Impact of Water Supply and Sanitation on Health in Kurseong Town

Table 47 shows that highest percentage of (67 percent) affected population by water and sanitation related diseases were in those households which depend on unimproved sources of water. Lowest cases (38.17 percent) were among those household members who consumed water from improved sources.

Households which have pipe water connection, among them the cases of water sanitation related diseases were substantially lower (45.22 percent) than those households (71.22 percent) which do not have pipe water connection. Because, households with pipe water connection get more water than those households which do not have pipe water connection. Households which have in house water connection have better sanitation characteristics.

Table No. 47: No. of Cases of Water and Sanitation Related Diseases with Water and Sanitation Characteristics in Different Household of Kurseong Town

Water and sanitation characteristics	Affected	Not Affected
Household water sources		
Improved sources	38.17% (71)	62.03% (116)
Unimproved sources	67.65% (23)	32.35% (11)
Both improved and unimproved sources	59.02% (180)	40.98% (125)
In house water connection		
Household with pipe water connection	45.22% (175)	54.78% (212)
Household without pipe water connection	71.22% (99)	28.77% (40)
Household sanitation characteristics-		
Households have own toilet	49.89% (226)	50.11% (227)
Households using public/share toilet	64.71% (33)	35.29% (18)
Households using open	68.18% (15)	31.82% (7)

Source: Household Survey, September – November, 2015.

There is a variation in cases of water sanitation related diseases between the households which have in house latrine facility and the households do not have in-house latrine facilities. The highest percentage of affected people are in the households which do not have in house latrine facility i.e. 68.18 percent of households which practices open defection and 64.71 percent of households which depends on public/share toilets.

In order to get the clear idea about the impact of water and sanitation related diseases in Kurseong town a tabular analysis is done on the basis of basic water and sanitation characteristics in the table no. 47.

4.4.1. Characteristics of Household Water and Water-Sanitation Related Diseases in Kurseong Town

The table 47 shows that there is an inverse relation between improved water and diseases. If number of household with improved water sources increase, cases of water-sanitation related diseases decrease and vice versa. Even a similar kind of relationship is found between unimproved water sources and water-sanitation related diseases too. Therefore, there is a cause effect relationship exists between household with improved water sources and cases of water- sanitation related diseases and similar relationship is found in household with unimproved water where cases is high.

It is also shown in table 47 that indicates that household with pipe water connection is less affected by water-sanitation related diseases and household without pipe water connection, cases of water-sanitation related disease are more. It is because of the households which have pipe water connection get more water than the household which do not have pipe water connection. Thus, a cause and effect relationship exists between water-sanitation related diseases and household with pipe water connection.

4.4.2. Household Sanitation Condition and Health

Household sanitation characteristics and water-sanitation related diseases have a cause and effect relationship. As the table 47 shows that where the household with toilets is more, water-sanitation related diseases is less and vice versa. It is also highlighted in the table that when dependent on public/share toilet is high, cases of water-sanitation related diseases is also high and vice versa. A similar pattern of

relationship is also found for open users. Therefore, the households which have toilet within the premises are having less number of cases of water and sanitation related diseases.

Hence, quality and quantity of water as well as sanitation condition are very indispensible components for maintaining healthy life. Those, who depend on either unimproved water or inadequate water or without latrine within the premises or both, are likely to expose greater to water sanitation related diseases.

4.5. Impact of Water Supply and Sanitation on Health in Different Economic Background of Household

It is already known from the incidence and prevalence analysis of water sanitation related diseases in Kurseong town that there are five main health issues related to water supply and sanitation. Here, the main focus of the analysis is to understand the ultimate impact of water-sanitation related health issues in different economic background of town.

4.5.1. Diarrhoea in Different Economic Background of the Household

Table 48 reveals that the highest percentage (51.27 percent) of diarrhoeal cases in last year is in lower income group. While within the population of medium income households the percentage of diarrhoea affected members is 40.70 percent and among high income households the percentage is 22.30. Therefore, increase the cases in percentage of diarrhoea from higher income households to lower income households and declining in cases from lower income households to higher income households explain that a cause and effect relationship exists between diarrhoea and economic background of the household. So, those who belong to lower income households are suffered more in diarrhoea (Figure No. 43).

Figure No. 43: Diarrhoea in Different Economic Background of the Household

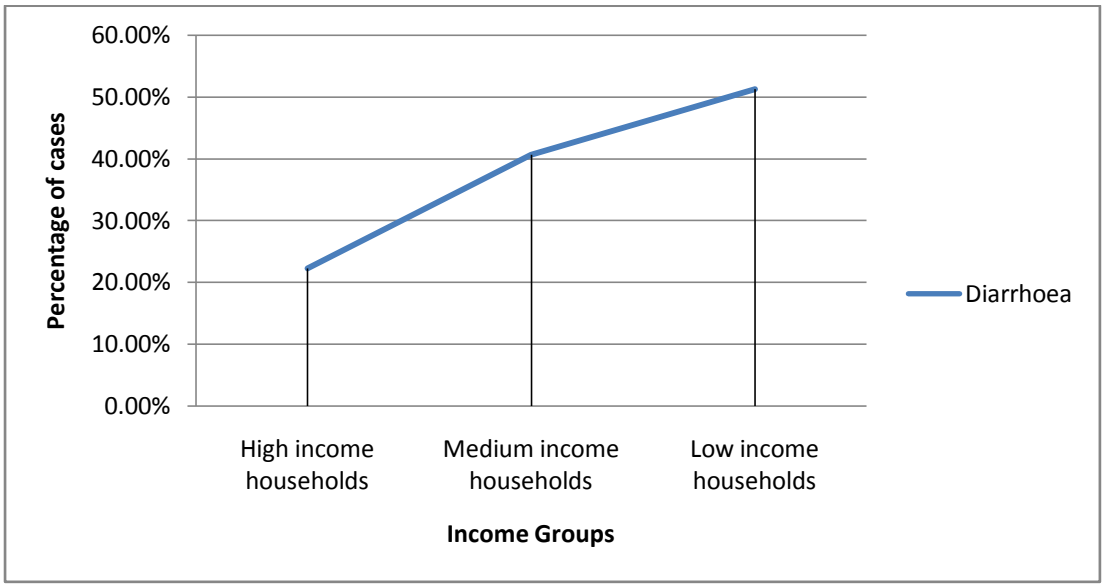


Table No. 48: Different Economic Background of the Household and Water Sanitation Related Diseases

	Water sanitation related disease		
Households of different economic background	**High income households**	**Medium income households**	**Low income households**
No disease	69.23%	47.74%	34.01%
Diarrhoea	22.31%	40.70%	51.27%
Jaundice	0.77%	1.51%	3.05%
Typhoid	0.77%	1.51%	2.03%
Skin disease	3.07%	4.02%	4.57%
Other water sanitation related disease*	3.85%	4.52%	5.08%
Total	100.0%	100.0%	100.0%

*Gastrointestinal illness, Kidney infection, and liver problems.

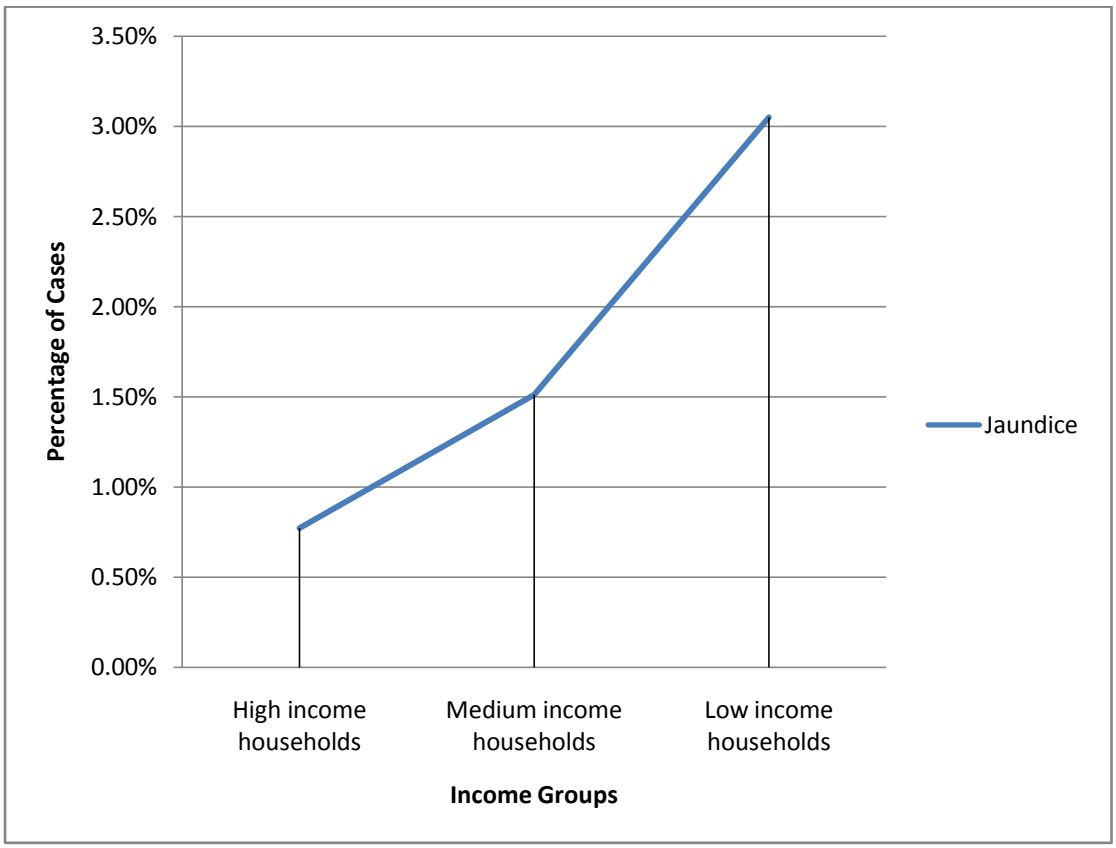
Source: Household Survey, September – November, 2015.

4.5.2. Jaundice in Different Economic Background of the Household

Table 48 indicates that cases of Jaundice is 3.05 percent among low income households in the town whereas 1.51 percent of jaundice in medium income

households. Only 0.77 percent of jaundice cases are in high income households. Therefore, low income households are the highest percentage in cases of jaundice than medium and higher income group. Therefore, the growing trends in the percentage of jaundice cases is from high income households to low income households and decline trends is from low income households to high income households (Figure No. 44). Thus, there is a cause and effect relation between jaundice and economic background of households. Hence, lower income household of Kurseong town is suffered more in jaundice than higher income households.

Figure No. 44: Jaundice in Different Economic Background of the Household

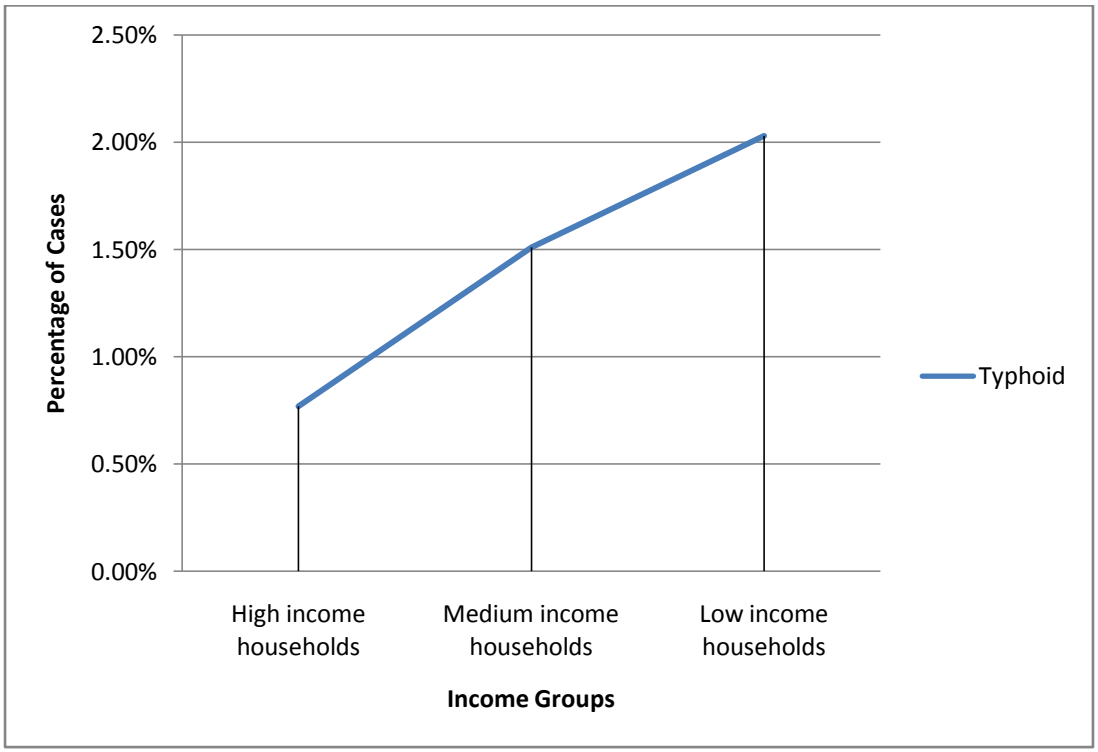


4.5.3. Typhoid in Different Economic Background of the Household

Table 48 indicates that like diarrhoea and jaundice, highest percentage i.e. 2.03 percent of typhoid cases is found in low income households, 1.51 percent in medium

income household and the population of high income households is only 0.77 percent. Therefore, figure 45 shows that, there is a trend of growing typhoid cases from higher income households to lower income households and declining trend toward higher income households. Thus, there is a cause and effect relation exists between typhoid and economic background of the households.

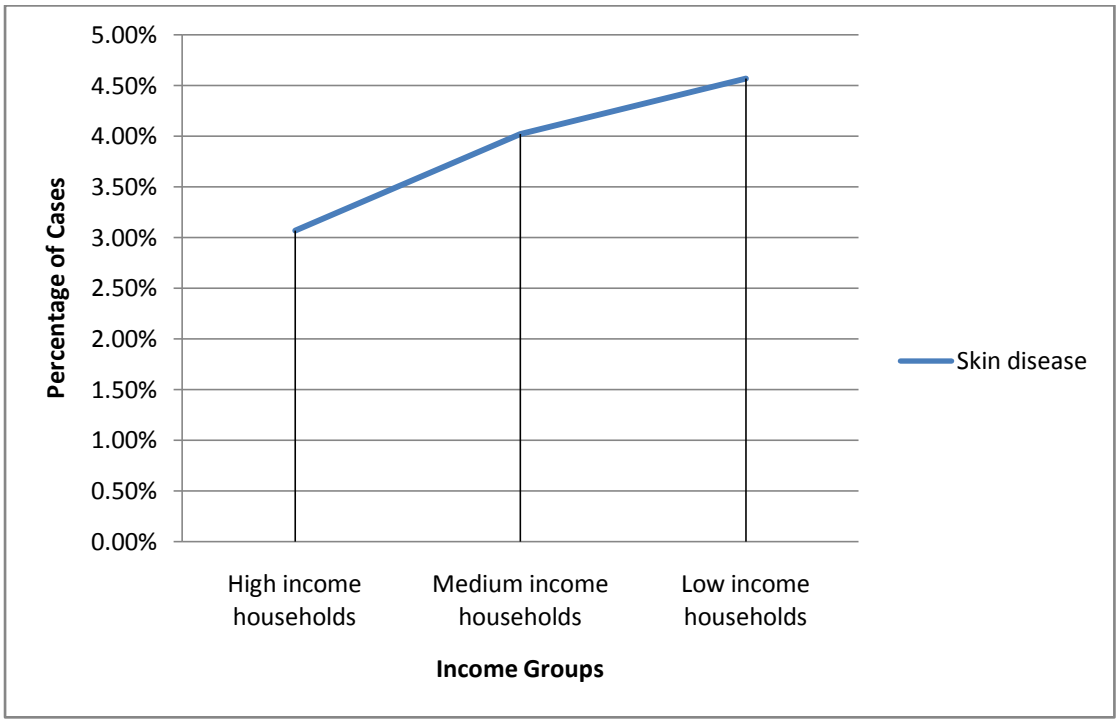
Figure No. 45: Typhoid in Different Economic Background of the Household



4.5.4. Skin Disease in Different Economic Background of the Household

The cases of skin disease i.e. 4.56 percent, 4.02 percent and 3.07 percent were in low income, medium income and high income households respectively (Table, 48). Therefore, there is a growth of percentage from high income households to low income household and vice versa. Thus, skin disease and economic background of households are cause and effect related (Figure, 46).

Figure No. 46: Skin Disease in Different Economic Background of the Household



4.5.5. Other Water and Sanitation Related Diseases in Different Economic Background of the Household

Out of the total population of low income households, 5.08percent population was affected in other water and sanitation related diseases. The cases of other water and sanitation related diseases in medium income households were lesser (4.52 percent) than the low income households. And 3.85 percent of people in high income households were affected in other water sanitation related disease. Table no.48 shows that, there is a growing trend in the percentage of affected cases in other water sanitation related diseases from higher income households to lower income households and declining trends from lower income to higher income households. Thus, there is a cause and effect relation exists in between other water- sanitation related diseases and economic background of the households. Hence people from low income households were more affected in other water-sanitation related diseases.

Figure No. 47: Other Water and Sanitation Related Diseases in Different Economic Background of the Household

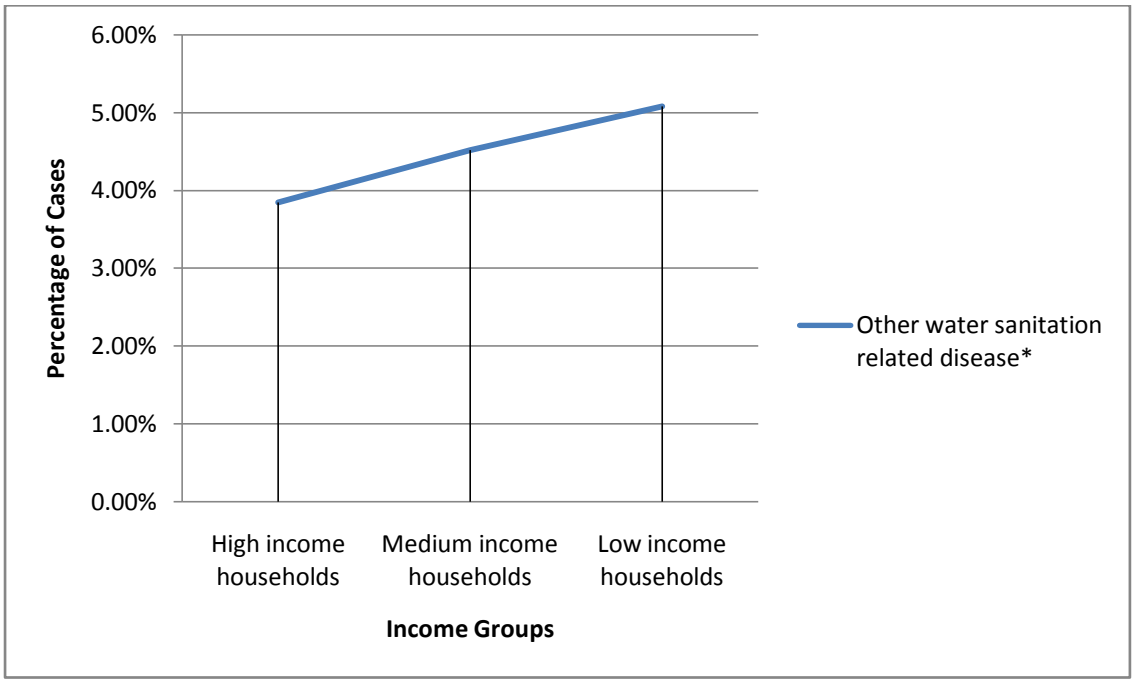
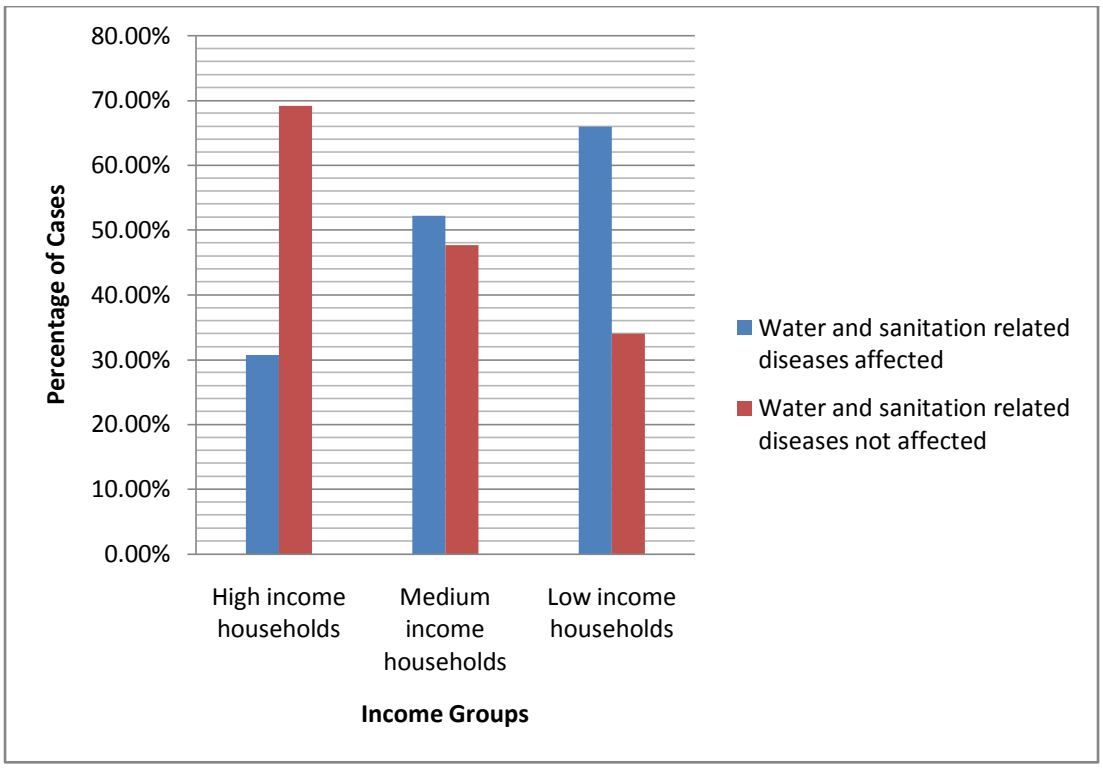


Table No. 49: Water and Sanitation Related Diseases in Different Economic Background of the Household.

Economic background of the household	Water and sanitation related diseases		Total
	Affected	Not affected	
High income households	40 (30.77%)	90 (69.23%)	130 (100.0%)
Medium income households	104 (52.26%)	95 (47.74%)	199 (100.0%)
Low income households	130 (65.99%)	67 (34.01%)	197 (100.0%)
Total	274 (52.09%)	252 (47.91%)	526 (100.0%)

Source: Household Survey, September – November, 2015.

Figure No. 48: Water and Sanitation Related Diseases in Different Economic Background of the Household.



It is cleared from the above analysis, that there is a variation among the high, medium and lower income households in terms water and sanitation related diseases. All the water and sanitation related diseases (Table, 49) were high (65.99 percent) among the low income group and lowest i.e. 30.77 percent among high income group. Whereas the medium income households (52.26 percent) were higher numbers of cases of water and sanitation related diseases than high income households and lower than low income households.

Therefore, it can be said that higher the income lesser the water sanitation related diseases and lower the income greater cases of the water and sanitation related diseases.

Conclusion

The majority of households in the town which depend on both improved and unimproved sources rely on very less amount of water, especially in lean months. There is an irregular water supply system in municipality area. Most of the lower income households use share/public toilets. There is presence of open or free range of defection in the bushes makes environment unhygienic. Throwing of children's stool in streams and bushes are common phenomena. Drainages are not cleared regularly. Unimproved and inadequate water access and improper maintenance of hygiene in low income group, there is prevalence of several water-sanitation related diseases in Kurseong town. Among them prevalence of diarrhoea is high. Slum area and industrial-commercial area is the major affected area in water sanitation related diseases. The water sanitation related diseases largely affect the low income households because the members of low income households are deprived from adequate safe water and proper sanitation. Although the condition of medium income households is not that much good as high income households, they are in better position than lower income households. In Kurseong, there is a significant relationship between water and sanitation related diseases and economic background of the households. Hence, those who belong to lower income group are greater chance to expose in water and sanitation related diseases.

5.1. RECOMMENDATIONS

1. Forest is very important for health of streams and spring. Because forest intervenes to the surface run off and helps to infiltration of rain water into the rocks layer as well as preserve water quality. Thus forest revives the springs and protects the streams from being complete dying in the dry season through its ecosystem services. Therefore, immediate restoration of greeneries in the catchment area is needed through afforestation program and decrease deforestation.
2. Replacing of the outdated and obsolete pipe with the new one, introducing leakage monitoring system and water audit would help to minimizing the losses of water from the water collection and distribution system and will increase the efficiency of the water supply system. Besides, it will help to maintain pressure in the water distribution pipe which will not allow forming bacteria into the pipe.
3. Access of safe water is one of the basic human rights. Therefore, to maintain quality of water supply in the municipality area, Municipality can prepare a calendar for quality testing of water in a regular interval. The maintenance of quality of water supply would help people to keep away from different waterborne diseases and illness.
4. There are several perennial streams flowing across the town. But due to throwing of household waste into the streams, the water of those streams has become impotable. Therefore, steps should be taken to renovate the streams and to formulate strict rule for restriction of throwing household waste and fecal matter into the streams. Thus fresh water of those streams could be used for household as well as drinking purpose. Identification and protection of new

water sources is also very much necessary for sustaining in the future and to cope with the uncontrolled population growth.

5. A large volume of waste water is running through local drain and sewage line due to absence of waste water treatment plant in the town. Therefore, establishment of waste water treatment plant for treating waste water is very much necessary. Because the treated waste water could be used in other domestic purposes such as for toilet flush, kitchen gardening etc. Thus maximum water utilization is only possible through multiple and optimum use of water.
6. Majority of the reservoirs and storage tanks of the town are very old. A lot of water gets waste from these reservoirs and storage tanks. Therefore, immediate renovating of those old reservoirs and storages are very indispensible. Several new storage and reservoir can be constructed in the suitable location for increasing water reserving capacity in dry season.
7. Kurseong receives highest amount of rainfall after Cherrapunjee, Meghalaya, but due to lack of water harvesting system a large volume of water (especially in rainy season) is draining as surface run off and end up in the river which flowing below the town. Therefore, implementation of rainwater harvesting system in an extensive scale is very much needed. Terrain of the area is not suitable for collecting of rain water but top of the house, schools, residence buildings and government office building could be used for the purpose. Water could be reserved in different storage for dry season only. The households could be encouraged to collect water through RainSaucer[1] for their own

[1] RainSaucer is a portable rain water harvesting tool was developed by Tom Spargo. It is like a saucer or like an inverted umbrella.

households use. Thus rainwater harvesting would provide sufficient water for the town in such manner only.

8. A government plan is only possible to get succeeded when there is an effective implementation. Under the Swachh Bharat Mission program government of India is giving an incentive to the beneficiaries to help them to construct individual household toilet. This scheme is only for those who have either no toilet or insanitary toilet. Municipality can help poor people to apply online for the incentive for construction of toilet from government. And through construction of that toilets municipality can create earning source for poor people by employing them in construction activities.

   A request could be done to state govt. to consider the town for National Urban Livelihood Mission (NULM). Although, the scheme is for the urban centers of above 1 lakh population, there is a provision that, if state government wants, in special case other towns whose population is less that 1 lakh could also be included under this mission. The scheme covers a lot for the urban poor such as capacity building and training, employment through skills training and placement, self employment programme, support to urban street vendors, finding pattern of financial process etc.

   Municipality in collaboration with NGOs can introduce vocational and skill development training for poor to step up for their livelihood.

9. Municipality should allow the beneficiaries to construct bio digester toilet for their households. The bio digester toilet[2] has been developed by DRDO of India around 20 years ago. And this bio digester toilet has been well applied in

[2] Bio digester toilet is a type of toilet in which pathogen is used to convert human waste material into water and methane. The pathogen which is used for this type of toilet can survive in the temperature from below freezing point to 55 degree Celsius temperature. And the pathogen automatically multiplies within the bio tank.

the tribal region of Andhra Pradesh by SANA[3]. This toilet is known as zero waste toilets. Therefore, there is no need to connect the toilet with sewerage line or no need to construct large central septic tank in the municipal area for this type of toilet. Construction cost of bio digester toilet is cheaper than normal toilet. Methane gas from the toilet can be used for both cooking and light up to the toilet.

10. From the study it is cleared that, there is a variation in accessing water in different household. The households which have in house pipe water connection are getting more water than the households which do not have in house water connection. Therefore, every house needs to connect with municipal pipe water system. The connection to the poor families should be allowed in a subsidiary rate. Water metering system in the water distribution network should be introduced for maintaining equitable, optimal and fare supply.
11. Access to sufficient water supply, adequate sanitation, proper hygiene, improved health and alleviation poverty are the most important factors for maintaining urban life more prosperous and healthy. Therefore, it is exigent to create a forum with all actors of urban society (richer section, middle class, poor section, officers, administrators, male, female, youth, senior citizen, upper cast, lower cast, educated, uneducated, people from different religion, businessman, private vendors, local NGOs and politicians) to assemble the gap and finding solution for water supply, sanitation, hygiene health and poverty related issues. An effort can be put to formulate PPP design for sustainability

[3] SANA is a Delhi-based NGO, founded by Sanchaita Gajapati Raju. The main focus of the NGO is to improve in the sector of water and sanitation.

and integrated development in the sector of water and sanitation with involving different stakeholders.

12. Efficient management of water and sanitation services can only be possible through effective implementation of regulation. Therefore, strict rules and regulations should be exercised against misuse of water, illegal connection and throwing households waste outside or streams. For these guilty a penalty can be taken by imposing fine which would help people to understand the important of water and environmental hygiene. Municipality can issue a household waste disposal card for every part of the town with a minimum charge from the households for their household waste management. Municipality can introduce fine for the late payments.
13. In order to make healthy urban environment, improve sanitation and environmental hygiene is imperative. Therefore, a calendar can be prepared for cleaning local drains and roads in a regular interval. Along with this, households waste collection system needs to be introduced in every part of town.
14. Municipality should organize different sensitization programme with a collaboration of local NGOs to generate awareness among people related to water, sanitation, hygiene and the miseries resulted from water sanitation related diseases in the town. The sensitization programmes can be either quiz, rallies seminar, workshops or the celebration of World Water Day (22nd march), World Toilet Day (19th November) and Global Handwashing Day (15th October) in different schools as well as different parts of the town.

    Municipality should also organize WASH (Water Sanitation and Hygiene) training for the people with the help of NGOs to make them understand about

what are the water, sanitation and hygiene related diseases, what are the simple household level interventions that could reduce the risk of WASH related diseases, how those interventions can be exploited, how to test water, what are the cheapest processes of water treatment in household level, water harvesting techniques, bio digester toilet, septic tank and bio tank etc.

CONCLUSION

In recent year unabated population growth, changes in global landscape and rapid urbanization have increased pressure on water and sanitation which are the key drivers for achieving public health. Poor quality of water and unsafe sanitation practices is a great threat for human health. Unsafe drinking water, sanitation and hygiene practices claim the lives of 1.5 million people each year around the world.

Kurseong town is one of the hilly station of Darjeeling district of West Bengal. The town is also the head quarter of the Kurseong subdivision. Kurseong town is located in the eastern Himalaya at an altitude of 1458 metres above the mean sea level. The geographical extension is 26^{o} 51'42''N to 26^{o} 53' 36'' N latitude and 88^{o} 15' 12'' E to 88^{o} 17' 32'' E longitudes. The town has the total area of 7.5 sq. km., among which 30.76 percent land is under agriculture, tea garden and reserved forest area. The town has 20 municipality wards. The total population of the town is 42,446 with 21,423 male and 21,023 female. Economy of the town are primarily depends on tea, tourism and schools.

Since 1835 when East India Company developed sanatorium at Kurseong, Kurseong town had started to grow. Initially, Kurseong town grew up as a halting

station for British military and civil personnel who were moving toward Darjeeling. The development of transport network such as roads and railways and growth of tea estates led to flourish economic potentiality of the town. The developmental activities and economic prosperity along with pleasant climate had encouraged people of the neighboring areas to migrate in Kurseong for gainful occupation. After becoming the head quarter of Kurseong sub-division, the town had become the place of central choice for the people of surrounding areas. Gorkhaland agitation also led to move the people from surrounding areas in the town.

Kurseong Municipality, was formed in the year 1879, is primarily responsible for the civic amenities and basic services in Kurseong town. Water supply is one of the basic services among the various services provided by municipality in Kurseong town. The municipal water supply is the principal sources of water for most of the family in the town. The water supply infrastructures and amenities of the town is more than a century old and were planned and developed for the total population of 2836 in the year 1879. Now a day, same infrastructures and civic amenities are supporting the total population of 42446. At present the whole water supply infrastructure of the town is under P.H.E. department and the distribution of water in different parts of the town is under the responsibility of municipality. The water is being collected from 12 natural springs located outside of the town. The collected water is being stored in 6 central reservoirs. And from the reservoir the water is being supplied to the town in alternative days.

In spite of all these efforts by P.H.E. department and Municipality, majority of the population of Kurseong town do not get the minimum requirement of water (minimum Indian urban standard is 40 liters per head/day) in lean months (March, April and May). Thus, there is acute shortage of water especially in lean months. The

water crisis situation has become more chronic after 1980; because of rapid population growth, deforestation in the catchment area, old pipe bursting, inadequate maintenance of water supply system etc.

Therefore, apart from the municipality water supply, households of the town depend on alternative sources such as private vendors, springs and river. Even the access of water is unequal among the households of the town. The households which have in house water connection are getting more water than the households that depend on municipal out points. Because the pressure and duration of water supply are higher in the household connection.

About 75 percent of the household of Kurseong town have in house pipe water connection. Majority of the households which have in house water connection is from the high and middle income background. Lower income households of the town are mostly depends on municipal public outpoints. Among the different municipal area, households of slum area and industrial-commercial area are getting less amount of water whereas agricultural-pure residential area are accessing high amount of water. This variation on the access of water among different parts of the town is because of either population density (industrial-commercial area) or most of the households do not have in house water connection (slum area) or located near the water sources (pure residential and agricultural-ecological area).

The present sanitation service in the town is not that much satisfactory. Most of the areas in the town are not covered by municipal sewerage system. Municipal household sewerage connection is only available in the few wards of the town especially in market area. Out of total 6616 household of the town, 719 (10.87%)

households do not have in house latrine facility and 69 households have insanitary latrine.

The highest numbers of households in Kurseong town which have in house latrine facility are located in the pure residential area and agricultural-ecological area. Slum area has the lowest number of households which have in house latrine facility. The households which do not have in house latrine facility, mainly defects either in the open or use public toilets. Most of the lower income households use share/public toilets and practice open or free range of defection in the bushes. Open defection practice makes environment unhygienic. Along with this, there is practicing of throwing of children's stool in homestead bushes and streams are common phenomena. Even, drainages are not being cleared in regular basis.

The households have in house latrine facility among them almost 40 percent households do not have direct water connection in their toilets. Water supply in the latrine largely influences in the cleaning and maintaining of hygienic condition of latrine. Even most of the low income households do not have hand wash basin in the kitchen.

There is absence of regular household waste collection in most of the area in the town. Therefore, household wastes are either thrown in the streams or burnt. The throwing of households waste caused blockage of streams and landslides in the rainy season. Kurseong town receives highest amount of rainfall after Cherrapunjee, Meghalaya but due to absence of rainwater harvesting system large amount of water is wasted as surface run off.

Health is another basic service among the all services provided by the municipality to the town. Sub-divisional Hospital, S. B. Dey T.B. Sanatorium and Municipal Healthcare Sub-centers are providing health service to the town. Health schemes of Municipality only cover about 23 percent of town population. There is no mobile health clinic, private hospital or nursing home, maternity home, family welfare centre and maternity and child welfare center in the town. Ambulance services in the municipal area are provided by Red Cross, Bita and Reuki.

Owing to the lack of latrine in most of the low income households, unimproved, inadequate water access and improper maintenance of hygiene, there is prevalence of several water sanitation related diseases in Kurseong town. Among them, prevalence of diarrhea is high. Slum area and industrial-commercial area are the major affected area relating to water sanitation borne diseases. The water sanitation related diseases largely affect the low income households because the members of low income households are deprived in term of adequate safe water and proper sanitation. Although the condition of medium income households is not that much good as high income households but they are in better position than lower income households. In Kurseong, there is a significant relationship between water and sanitation related diseases and economic background of the households. Hence, those who belong to lower income group, supposed to have greater chance to expose in water and sanitation related diseases.

Inadequate and unsafe water supply as well as improper sanitation is really a serious issue of public health. Underprivileged section of the society is more deprived in term of basic services. A chronic health related issues pull them back to step up in the society. The vicious cycle of underprivileged, deprivation of basic needs and poor

health seeks an integrated management of urban services and amenities. Therefore, first and foremost, to maintain better urban services, the authority, local body and public are needed to be synchronized. As an immediate step - monitoring of leakage, water audit, water quality testing in regular interval, cleaning of local drainage, sensitization programme and WASH training should be taken effectively. Strict rule and regulation should be formulated against throwing of household waste and fecal matter into the streams and nearby bushes. Municipality and local authorities should organized various vocational and skill development programme to empower poor section of the society. Government policy and programme related to sanitation, public health and livelihoods should properly be implemented. Municipality should come up with a sustainable management plan for water supply and sanitation. They should also be prepared with stakeholders to resolve future health problems related to water-sanitation.

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Schedule for Household Survey

SECTION A

1. Name:
2. Age:

3. Ward No.:

4. Religion:
5. Caste:
6. Number of family members:

SECTION B

7. Household Composition:

Sl. No	Relation	Age	Sex	Marital Status	Education	Nature of Employment	Monthly Income
1	Self						
2							
3							
4							
5							
6							
7							

.

SECTION C

8. Primary Source of water

□ Municipality

□ Stream (Jhora)

□ Spring (Dhara)

□ Private Water Vendors

□ others (Pleasespecify): ……...

9. What is the total storage capacity for water in your house?

……

10. How much water does your household utilize in a day for?

Drinking and Cooking	
Domestic Use	
Others	

11. Is the water sufficient for HH use? **YES** □ **/ NO** □

11.1. If **No** then how do you manage the additional requirement?

Natural Springs (Dhara)	
Streams (Jhora)	
Buy from private vendors	
Manage with the available water	
Any Other (Please specify)	

11.2. What is your perception about water crisis in Kurseong?

□a state of failure by the municipality to supply its residents with sufficient water

□natural shortage of water supply

11.3. What is main cause of water shortage from your prospective?

□inefficient planning and management system

□high urban migration

□old pipe bursting

□natural shortage of water

□ any other (please specify)……

12. Who is managing water for your house? Men/Women.

Municipal Water Supply

13. How much do you pay as Municipality water tax monthly □ / annual □

14. What is the Frequency and Quantity of Municipal water supply?

Rainy Season			Dry season		
Frequency	Time	Quantity	Frequency	Time	Quanti ty
Once in a day			Once in a day		
Once in two days			Once in two days		
Once in three days			Once in three days		
Once in a week			Once in a week		

15. On the day of water supply for how many hours do you get water?

□ Less than 1 hour
□ 1 to 2 hour
□ 2 to 3 hours
□ 3 to 4 hours
□ Above4 hours

16. Is the frequency/quantity/time sufficient for your HH? **YES** □ **/ NO** □**.**

16.1. If no, what are the suggested frequency/quantity/ time?
…….
17. Are you satisfied with the existing municipal water supply system?
YES □ **/ NO** □**.**
17.1. If **No** then can you suggest some remedial measures to improve the water supply situation?
……
……
……
18. How do you rate the existing municipal water supply situation in your ward?
a. Bad □ b. Satisfactory □ c. Good □ d. Excellent □
19. If the Municipality improves its water supply service, would you be willing to pay more for water? **Yes** □ **/ No** □.
Explain……
……
…….
20. What aspects of water service do you think needs improvement in future?
a. Quality □ b. quantity □ c. Maintenance □ d. Frequency □ e. Service □ f. Pressure □ g. Others □

Private Water Supply
21. Do you buy water from private vendors?
YES □**/ NO** □ . If **YES** specify the quantity per day/Week/Month……Ltrs.
22. What is the rate per Tank/Jar/Bucket?
…….
23. How do you rate the quality of privately purchased water?
a. Bad □ b. Satisfactory □ c. Good □ d. Excellent □

24. Is the private vendors available all the time? How many of them are available in your area?

……
……

24.1.What is the Process of buying water from them?

……
……
……
…….....

24.2. How long time do they take to give services after getting purchase order?

……
……

25. What is the frequency of private water supply during the lean and non lean period?

Lean Period		Non Lean Period	
Frequency	Quantity	Frequency	Quantity
Once in a day		Once in a day	
Once in two days		Once in two days	
Once in three days		Once in three days	
Once in a week		Once in a week	

26. How much money in an average do you spent per month for buying water:

Dry season……..

Rainy season……

27. During which months do you buy maximum water from vendors? Why?

……
……
……

28. What problems are you facing regarding water for the domestic use?

……
……
……

29. Who is responsible for day to day management of water supply in your ward?

……

30. Were you ever invited by the government department or municipality to discuss about water management situation in Kurseong?

……
……

31. Are you satisfied with the management operation of water in your ward?

Yes □ **/ No** □**.**

31.1. If **No** then explain/ specify the reasons.

……
……
……

32. What is the process of complaining about the problems of water connection?

……
……

32.1. How first do you get response of your complain from the water supply authority?

……
……
……
……

32.2. Charges of repairing damages and new connection:

……
……
……

32.3. Is it compulsory to all households to be the municipal water user? Yes/No.

32.4. How much time does it take to get connection?……

SECTION D

33. Do you have latrine in your home?: Yes No

33.1 If yes: Types of latrines

33.1.1 Temporary (made up of)

 Bamboo

 Plastic/Paper

 Clothes

33.1.2 Permanent (made up of)

 Brick

 Wood

34. Septic tank

 Yes

 No

34.1. If yes

 Temporary (Pit/hole)

 Permanent (Cemented)

35. Is your latrine connected to pipe sewer system?

 Yes

 No

36. Water supply in latrines

□ Yes

□ No

37. What are you using for hand washing after toilet?

□ Nothing, only with water

□ Soap

□ Liquidhand wash

38. What type of toilet pan do you have in your home? Indian/Western.

38.1. Cleaning of toilet (frequency and use of harpik, phenyl etc)

……

……

39. Do you have bathroom in your home? Yes/No

39.1. Water supply in your bathroom: Yes/No

40. Do you have basin for hand washing in your kitchen? Yes/No

41. Is there any household waste collection system in your ward? Yes/No

41.1. If No then how you manage or where you refuse your household waste?

……

……

41.2. How do you rate the municipal waste collection service in your ward?

a. Bad □ b. Satisfactory □ c. Good □ d. Excellent □

42. What is the frequency of local drainage cleanness in your ward?

Periods	Times
In a day	
In a week	
In a moth	
uncertain	

42.1. How do you rate the municipal drainage cleanness service in your ward?

b. Bad □ b. Satisfactory □ c. Good □ d. Excellent □

SECTION E

43. Prevalence of water, sanitation and hygiene related disease

No Diseases□, Diarrhea/Dysentery □, Cholera □, Typhoid □, Jaundice□, Malaria□, Kidney Stone□ ,Gastric □, Skin diseases/ itching□, trachoma□ ,dracunculiasis□ .

43.1. Number of members who were affected by those diseases?

…….

43.2. How many times have they been affected by those diseases in the past year?

…….

Thank you for giving your valuable time and suggestions to complete the schedule and support this research.

Plate1: water collection from Municipality out point

Plate 2: Private Vendors

Plate 3: Spring water collection

Plate 4: Old Reservoir

Plate 5: Open Reservoir

Plate 6: Kitchen and Tap

Plate 7: Water Filter, Government (DowHill)

Plate 8: Water Leakage from Pipe

Plate 9: Repairing Pipe Municipal Officials

Plate 10: Public Toilet caretaker

Plate 11: Indian Pan

Plate 12: Vats, Municipal in Town

Plate 13: Sewerage Line in Town

Plate 14: Household Survey

Plate 15: Water Pipe Connection