

## Chapter-V

### Delivery of Water Supply and Sanitation in Slums of Guwahati City

#### 5.1. Introduction

In the preceding chapter (Chapter-IV), the analysis mainly concentrated on water supply and sanitation in the areas of Middle Income and Low Income households of three selected wards of Guwahati city. In the present study, the analysis mainly concentrates on water supply and sanitation in the areas of Notified Slum localities under the three selected wards. Notified Slums were selected purposely as it was considered that Notified Slums have better opportunities for accessing basic amenities as against Non-notified slums. In this chapter indicator taken into consideration for effective delivery of services include (i) accessibility (ii) reliability (iii) affordability and (iv) sustainability of services. This chapter presents empirical data with regard to efficiency in water supply and sanitation (WSS) facilities in the selected Notified Slum Areas at the ward level of Guwahati city.

**Accessibility:** The sub-indicators considered for accessibility of water are- access to municipal potable water, multiple sources of water supply, purpose of water consumed, storage measures, quality of the water and adequacy of water.

**Reliability:** The sub indicators taken into consideration for reliability of water services are- frequency of piped water supply, regularity of water supply, duration of supply, satisfaction of present timings of water, advance notification of stoppage of water supply, water quality impact on household health (public health issues), public complaints on water service delivery.

The sub-indicators used in the study to check reliability of sanitation facilities are- household toilet facility, toilet facility connected with sewer, well served drainage facility for home, collection of garbage regularly, frequency of garbage collection, and waste-water stagnation, health impact of poor sanitation facility.

**Affordability:** The sub-indicators used in the study to check affordability of services are- dependency on private sources for water, water storage measures, method of water purification.

## **5.2. Notified Slum Pockets in the Study Area**

In the city of Guwahati growth of slum pockets was a result of concentration of beggars, sweepers, cobblers, street vendors, rickshaw and cart-pullers and day-labourers in certain distinct areas of the city. There areas were river banks and areas along the railway lines. In 2006, Guwahati Municipal Corporation (GMC) had identified 26 settlements as slum (CDP, 2006); they had a total population of 1.6 lakh people. Later, the Guwahati City Slum Policy 2009 identified 90 slums having 167,769 populations (GMC 2009). The recent GMC's Rajiv Awas Yojana (RAY) survey of 2012 identified 217 slum pockets with a population of 1.39 lakh. The drastic change in number of slums is due to the change in definition of slums. In 2009, a pocket with 25-30 households and lacking basic amenities was considered as slum while for the survey of 2012, a pocket with 10-15 households and without basic amenities was considered as slum. However, it may note that according to this data, while the number of slums has increased, the slum population has decreased. According to the survey of 2012, there are 217 slum pockets with a slum population of 1, 39,296 and number of households are 26,090. Out of 217 slum pockets, 112 are Non-Notified Slums and 105 are Notified Slums pockets at present in the Guwahati city. The present analysis concentrates on water supply and sanitation in the services areas of Notified Slum localities under the three selected wards of the Guwahati Municipal Corporation. Ward No. 10 falls on the core of the city which included Notified Slum pockets like Lakhtokia Railway Side, Harijan Colony (Police Reserve), Uzan Bazar Harijan Colony and Uzanbazar Islam Patty. Ward No. 20 is an Intermediate location of the city and it covers Notified Slum Pockets like Pub Bhaskar Nagar Basti, Krishna Nagar Basti, Hengrabari L.P. School Area and Anil Nagar Basti. On the other hand ward no. 25 is a peripheral ward which included Notified Slum Pockets like Sarumataria Masjid Basti, Dwarranda-III, Babu Basti and Lala Basti. The primary data on issues associated with drinking water supply and sanitation facilities has been generated from

this Notified Slum pockets under the three selected wards targeted for the study. The present study was conducted in the Twelve Notified Slums of the three selected wards of Guwahati City. From each ward Four Notified Slums were selected purposively. Details of Twelve Notified Slum Pockets in the study is as follows in Table No. 5.1

**Table No.-5.1: Details of Notified Slum Pockets in the Study Area**

Sl. No	Location (Ward No)	Name of Notified Slum	Area	Slum Population	No. of HHs*
1	10	Lakhtokia Railway Side	12,400 sq. ft.	200	30
2	10	Harijan Colony (Police Reserve)	14,000sq.ft.	300	50
3	10	Uzanbazar Harijan Colony	14,800 sq .ft.	280	60
4	10	Uzanbazar Islam Patty	21,660 sq. ft.	600	130
5	20	Pub Bhaskar Nagar Basti	22,444 sq. ft.	700	142
6	20	Krishna Nagar Basti	7,600 sq. ft.	250	25
7	20	Hengrabari L.P. School Area	14,400 sq. ft.	250	50
8	20	Anil Nagar Basti	13,900 sq. ft.	278	48
9	25	Sarumataria Masjid Basti	14,200 sq. ft.	200	50
10	25	Dwarandha-III	5,600 sq. ft.	100	25
11	25	Babu Basti	15,700 sq. ft.	240	60
12	25	Lala Basti	16,300 sq. ft.	300	60

\*HHs= Households, *Source: GMC RAY Survey, 2012*

**Picture VIII: View of Slum Household in the Notified Slum Area**



The above view (picture VIII) shows the housing condition of slum dwellers in the Notified slum pocket of city.

### 5.2.1. Notified Slum Wise Age Profile

The age of the Twelve Notified Slum Pockets targeted for the present study under the three selected wards is shown in the following table 5.2.

**Table No. 5.2: Age of the Notified Slums under the Study Area**

Age	Ward No. 10 (Core Area)	Ward No. 20 (Intermediate Area)	Ward No. 25 (Periphery Area)
25	1	1	2
30	1	1	2
35	0	2	0
40	1	0	0
45	1	0	0

*Source: Field Survey*

**Core City Area:** Ward No.10 falls on the core of the Guwahati city which included Notified Slum Pockets targeted for the present study are- Lakhtokia Railway Side, Harijan Colony (Police Reserve), Uzan Bazar Harijan Colony and Uzan Bazar Islam

Patty. The data regarding the age (**in years**) of the notified slum pockets in ward no. 10 reflects that Lakhtokia Railway Slum is 25 years old, Harijan Colony at police reserve ground is 30 years old, Uzan Bazar Harijan Colony is 45 years old and the age of the Uzan Bazar Islam Patty is about 40 years.

**Intermediate Area:** Ward No. 20 is an Intermediate location of the city and it covers Notified Slum Pockets selected for the present study are-Pub Bhaskar Nagar Basti which is 25 years old, Hengrabari L.P. School Area (30 years), Krishna Nagar Basti (35 years), and Anil Nagar Basti is (35 years) old.

**Periphery Area:** On the other hand ward no. 25 is a peripheral ward which included Notified Slum Pockets targeted for the analysis are- Sarumataria Masjid Basti (25 years), Dwarandha-III (30 years), Babu Basti (30 years) and Lala Basti (25 years) old.

### **5.2.2. Notified Slum-Wise Occupation Profile in the Study Area**

Majority of the slum dwellers in the study area comprise daily wage earners (construction workers, domestic help, rickshaw pullers and vegetable and fruit vendor). But it is found from the field study that in 15 to 20 households; the male members are working as Guwahati Municipal Corporation worker (Road Sweeper, Drain Labour, Hand Carter and Safaiwala) at the three wards level in the city. The occupation of slum dwellers in the three wards can be analyzed as under-

**Core City Area:** In the core city area, the male members of the slum dwellers engaged as foot path vendors, vegetable sellers, press-man, Thela and Rickshaw puller. The female members are involved in home based work. But some of them are engaged as domestic workers in various families in the city.

**Intermediate Area:** Slum dwellers of this locality engaged in waste materials collection. Some of them are involved in temporary shops e.g. Pan Shop, country liquor, Mobile Vendors (fruit and sabji sellers). Most of the slum dwellers both male and female are involved in non-residential activities in the settlement like- wage labourer and house maid.

**Periphery Area:** Ward no. 25 is a Peripheral Ward and the livelihood activities of the slum dwellers of the slum pockets under this settlement are Rag picking and waste collection, drugs peddler, Shop Assistant, Tailoring workshop and Masons.

### 5.2.3. Socio-Economic Profile of Notified Slum Respondents in the Study Area

In this section an attempt has been made to give the socio-economic profile of notified slum respondents. The socio-economic profile includes their education, and annual income. Educational qualification and the annual income of slum respondents in the study are shown in the following table 5.3.

**Table No. 5.3: Education-Income Profile of Notified Slum Respondents**

Educational Qualification and Annual Income of Slum Respondents		Ward No. 10 (Core Area)	Ward No. 20 (Intermediate Area)	Ward No. 25 (Periphery Area)	Total
Educational Qualification of the Respondents	Primary	6	1	0	7
	No Schooling	26	31	32	89
	Total: 96	32	32	32	96
Annual Income of the Slum Household (In Rs.)	35,000-40,000	0	0	12	12
	40,000-45,000	2	5	7	14
	45,000-50,000	13	9	5	27
	50,000-55,000	6	7	4	17
	55,000-60,000	2	0	2	04
	60,000-65,000	0	1	0	01
	70,000-75,000	9	10	2	11
	Total: 96	32	32	32	96

*Source: Field Study*

### Educational Qualifications of Slum Respondents in the Study area

The data regarding educational qualifications of slum respondents of core, intermediate and periphery region of the city as shown in table 5.3 are analyzed as follows.

**Ward No. 10 (Core City Area):** The data regarding the educational qualification of the slum dwellers in the core city area reveals that only 6 respondents have primary education and 26 respondents have no formal education.

**Ward No. 20 (Intermediate Area):** In the intermediate area out of 32 respondents, only one respondent have primary education and rest of the other have no school background.

**Ward No. 25 (Periphery Area):** In the periphery area, the educational qualification of the slum dwellers under the study area is quite grim. Because out of 32 respondents, no one has formal education.

### **Annual Income of the Slum Households in the Study Area**

The Annual incomes of the selected 96 households of 12 Notified Slum Pockets as shown in the table 5.3 are analyzed as under.

**Ward No. 10 (Core City Area):** Annual Income level of the slum households living in the core city Notified Slum Pockets is low. Doing questionnaire survey it is obtained that Two (2) households are getting approximately Rs. 40,000-45,000 (Table No. 5.2) per year and Thirteen (13) households are getting around Rs. 45,000-50,000 per year. Throughout the survey Six (6) says around Rs. 50,000-55,000. Similarly, Two (2) households of Notified Slum Pockets of core city area are of the view that they are getting around Rs. 55,000-60,000 per year. But Nine (9) households of these Slum Pockets are happy to say that their annual income is around Rs. 70,000-75,000. This is because male members of these households are working as Safaiwala, Road Sweeper under the Guwahati Municipal Corporation. From this survey it is found that people living in this Notified Slum pockets under core city area are generally poor, their annual income cannot fulfill their fundamental needs.

**Ward No.20 (Intermediate Area):** Data on annual income in the notified slum pockets of intermediate location of the city reveals that there is a difference among the slum households in the locality. Five (5) households are of the view that they earn Rs. 40,000-45,000 per year. Nine (9) households say that their annual income is around Rs. 45,000-50,000. Similarly, Seven (7) responded that they are getting Rs. 50,000-55,000 per year.

But One (1) respondent of the intermediate location is of the view that his annual income is around Rs. 60,000-65,000. Like core city area, in intermediate location also Ten (10) households are satisfied to say that they are getting approximately Rs. 70,000-75,000 per year as their family members are working as casual workers under the Municipal Corporation. As compared to ward no. 10, the annual income of the slum dwellers in the intermediate location is high. But still, their annual income cannot fulfill their basic necessities as they deserve.

**Ward No. 25 (Periphery Area):** Annual Income levels of the slum households living in the periphery area are very low as compared to other two wards. From the field survey, it is obtained that Twelve (12) households in this locality are earning around Rs. 35,000-40,000 per year. Seven (7) households are getting Rs. 40,000-45,000 per year. Similarly Five (5) slum dwellers are earning Rs. 45,000-50,000 annually, while Four (4) slum household's annual income is around Rs. 50,000-55,000. On the other hand Two (2) households are of the view that their annual income is between Rs. 55,000-60,000 per annum. Like core and intermediate area, in the intermediate region also Two (2) households earns around Rs. 70,000-75,000 per year as their family head serves as Road Sweeper of Municipal Corporation. So, like slum dwellers of the previous two wards, people of the periphery Slum Pockets are also generally poor and their annual income cannot fulfill their fundamental demands.

It is revealed from the socio-economic profile of the notified slum respondents that educational infrastructures are quite missing in the slum pockets. It is observed that government educational system has failed to impart formal education to the urban poor in the city. With regard to income of the slum respondents, it is disclosed that people living in the slum pockets are very poor and their annual income cannot fulfill their basic needs.

### **5.3. Delivery of Water Supply for Notified Slum Dwellers in the Study Area**

The public water supply system in the Notified Slum Pockets selected for the study depends on water from the river Brahmaputra as well as ground water. The delivery of drinking water supplies in the study area is under the management of two different



Organizations (as mentioned in Chapter-IV) are Guwahati Municipal Corporation (GMC) and Assam Urban Water Supply and Sewerage Board (AUWSSB). But GMC is the sole authority for sanitation as well as collection and disposal of the garbage in the Slum Pockets including the city. The primary data on issues associated with water supply and sanitation facilities has been generated from this Notified Slum Pockets under the three selected wards targeted for the study.

### **Accessibility of drinking water**

Accessibility is assessed in terms of access to improved water source which implies to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpost, borehole, protected well or spring, and rain water collection. Unimproved sources include vendors, private tanker, kuccha well and unprotected wells and springs. Like household survey, similar field survey was conducted with regard to drinking water supply facilities in the selected notified slums under the core, intermediate and peripheral location of the Guwahati city. Since, notified slum dwellers have no individual piped water connection, they have to rely on other sources of water for their daily use. It is observed that slum dwellers collect water from road side public taps, public hand pumps and tube wells<sup>71</sup> installed by the GMC. But in some locations under the study area, these sources of water are not available. So, they have to rely on other sources like kuchha well and ring well. The data regarding the other sources of water in the study area (ward-wise) can be shown in the following figure 5.1.

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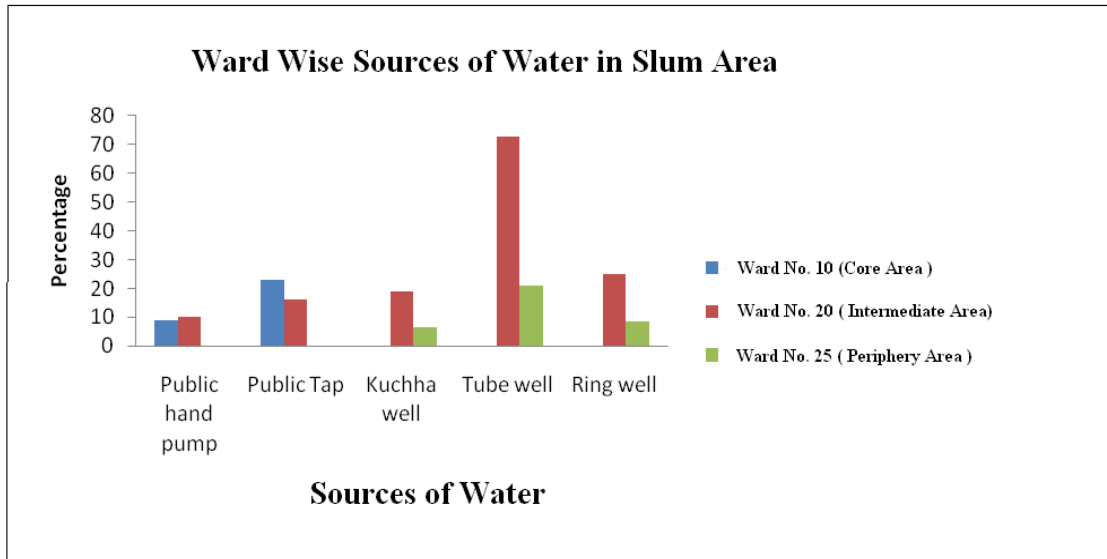
<sup>71</sup> Public Taps: Public taps is the common sight in the urban slums to fetch water also referred as public stand post.

Hand Pumps: Hand pumps are water-lifting devices that can be operated manually to withdraw water from surface water sources, ground water sources.

Tube Well: A tube well is a type of water well in which a long 100-200 milimetres (3.9-7.9) wide iron pipe is bored into an underground aquifer. The required depth of the well depends on the depth of the water table.

Ring Well: A ring well is constructed by excavating a shaft, generally manually and installing a casing where needed. Ring wells are used extensively for domestic water supplies.

**Figure-5.1: Ward Wise Sources Water in Slum Area**



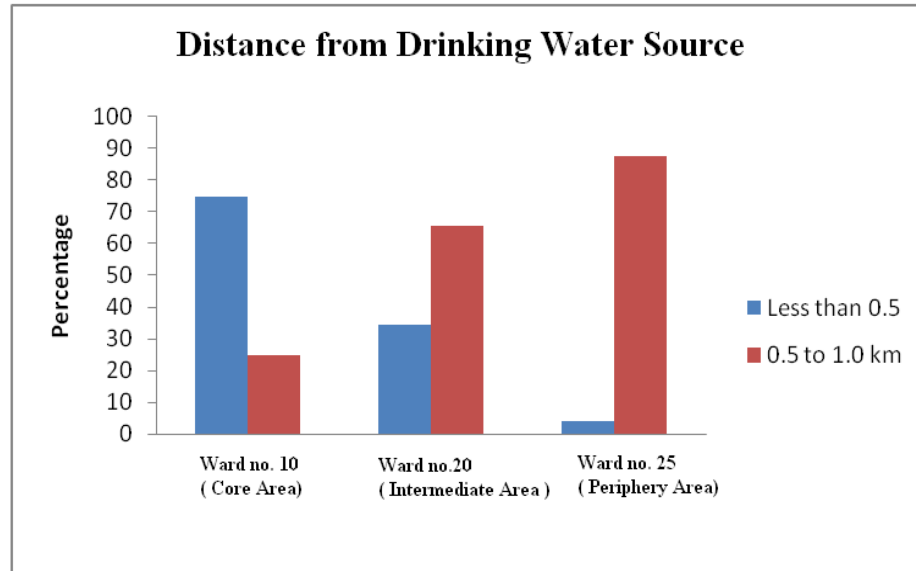
*Source: Field Survey*

**Ward no. 10 (Core City Area):** The study was conducted in Four Notified Slum Pockets under this ward. These slum pockets are Lakhtokia Railwayside, Harijan Colony (Police Reserve), Uzan Bazar Harijan Colony and Uzan Bazar Islam Patty. It is revealed from the survey (Figure-5.1) that in core area 9 percent relies on Public hand pump and 23 per cent on Public Tap (Public Stand Post). There is one Public Tape in Lakhtokia Railwayside slum pocket from where they fetch water. In Harijan Colony (Police Reserve) there are two Public Taps installed by the City Corporation for slum dwellers for daily use. But there is no Public Hand Pump in these two slum pockets. On the other hand, in Uzan Bazar Harijan Colony, there are two Public taps and two Hand Pumps is installed for their daily need. In Uzan Bazar Islampatty, the slum dweller fetches water from two Public Taps and one Hand Pump. The study reveals that there are 7 Public Tapes and 3 Hand Pumps in this Four Notified Slums under the core city area. The study shows that among the Four Slum Pockets Uzan Bazar Harijan Colony and Uzan Bazar Islam Patty have in a better position as compared to previous slum pockets so far as sources of water are concerned in the core city area.

**Ward No. 20 (Intermediate Area):** In Intermediate location of the city, almost all the sources of drinking water are available for slum dwellers. The data regarding sources of water were collected from Four Notified Slum Pockets are Pub Bhaskar Nagar Basti, Krishna Nagar Basti, Hengrabari L.P. School Area and Anil Nagar Basti. Here, 10 per cent rely on Public Hand Pump, 16 per cent on Public Tap, 18.8 per cent on Kuchha Well and 75 per cent Tube Well and 25 per cent rely on Ring Well. In Pub Bhaskar Nagar Basti there are two Public Taps (Public Stand Post) and one hand pump is installed by the Assam Urban Water Supply and Sewerage Board (AUWSSB) for the slum dwellers. In Krishna Nagar Basti slum pocket, there is no municipality tap. Here the sources of water are two kuchha Well, one Tube Well and one Ring Well. But in Hengrabari L.P. school area sources of water are good as compared to above mentioned slum pockets. In this slum pocket, one Public Tap, Two Hand Pump, two Tube well and one Ring Well are installed for daily need. In Anil Nagar Basti slum dwellers fetches water from tube well and one Ring well. The study reveals that amongst four slum pockets, the sources of water is quite sound in the Hengrabari L.P. School area.

**Ward No. 25 (Periphery Area):** The data regarding the sources of water in periphery area (ward no. 25) collected from the Four Notified Slum Pockets were Sarumataria Masjid Basti, Dwarandha-III, Babu Basti and Lala Basti. The data in the study area reflects (Figure: 5.1) that there is no Public Hand Pump and Public Tap. In this location 6.3 per cent rely on Kuchha Well, 21 per cent on tube well and 8.3 per cent on Ring Well. In Sarumataria Masjid Basti, there are two tube well and one ring well from where the slum dweller fetches water. The slum dwellers of Dwarandha-III collect water from two tube wells for their drinking and other purposes, while slum households of Babu Basti fetches water from Kuchha well and one Ring Well. The household of Lala Basti Pockets fetches water from Two Kuchha Well and Two Tube well. The municipality water is not covering this slum pockets till now, though government has adopted several measures for these urban poor.

**Figure-5.2: Distance of Household from Drinking Water Source**



*Source: Field Survey*

Slum dwellers have to carry water from outside premises since water sources are not available within their residential campus. Distance of slum household from drinking water sources at ward levels are as follows.

**Ward No. 10 (Core Area):** In core area (figure-5.2) 75 per cent respondents collect water within the less than 0.5 km. and 25 per cent between 0.5 to 1.0 km. from their premises. It is revealed that the participation of female members in water fetching is more than that of male members. Male members are slightly involved in it. The women get problem in fetching. The top problem that female member of households told us about water collection in long queue. It is indicate that fetching water from outside sources is stressful, cumbersome and unpleasant. Moreover, fights with neighbours over water are common in their locality.

**Ward No. 20 (Intermediate Area):** In intermediate location of the city, 34.4 per cent respondents fetch water within less than 0.5 km. and 65.5 per cent collects water between 0.5 to 1.0 km. from their premises. In this ward also women are shouldering the burden of

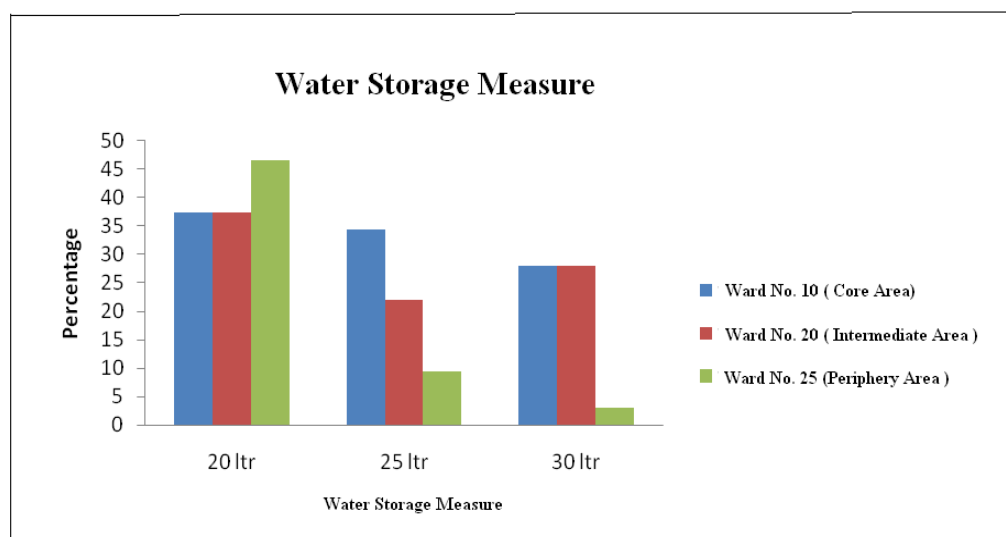
water collection, and this is exacting a high price in terms of time spent. It is revealed that they spent more than half an hour in fetching water. Moreover, with the tension generated over time wasted in standing in long queues, there are frequent fights over water with neighbours. They complain that there is a lot of chaos when everyone wants to fill water at the same time. Some people get water, some do not. If they do not get water from public tap, then they have to fill from hand pump and well.

**Ward No. 25 (Periphery Area):** Since there is no public Hand Pump and Public Tap in the periphery region of the city, the slum dwellers of this locality have to fetch water from Tube Well, Ring Well and Kuchha well for their drinking and other purposes. In periphery area 4 per cent respondents collect water at a distance of less than 0.5 km., while 87.5 per cent fetches water within the distance of 0.5 to 1.0 km. from their premises. Female members are the active participant of these slum localities so far as water fetching is concerned. During focus group discussion, female members of slum households told that in winter season (November to March) the water level of well (both kuchha and ring) become reduced and they have to depend largely on Tube Well by standing in long queues. And during water fetching from Tube well, there are frequent fights over water with neighbor. So, they skip taking bath and wash clothes on alternate days.

### **Water Storage Measure**

Slum dwellers have no modern means of water storage like overhead or underground tank. Different types of container are used by the slum households for storing water. They store water in Drum, Bucket, cooking Pot, Pitcher, and Jug. Water storage measures of the slum households under the study area (ward-wise) are shown in figure no. 5.3.

**Figure-5.3: Ward-Wise Water Storage Measure**



*Source: Field Survey*

**Ward No. 10 (Core Area):** It is revealed from the figure no. 5.3 that in core city area 37.3 per cent respondents store 20 liter water in pitcher and bucket, 34.4 per cent respondents reserves 25 liter water in gallon and drum and 28.1 per cent store up to 30 liter in bucket, and drum.

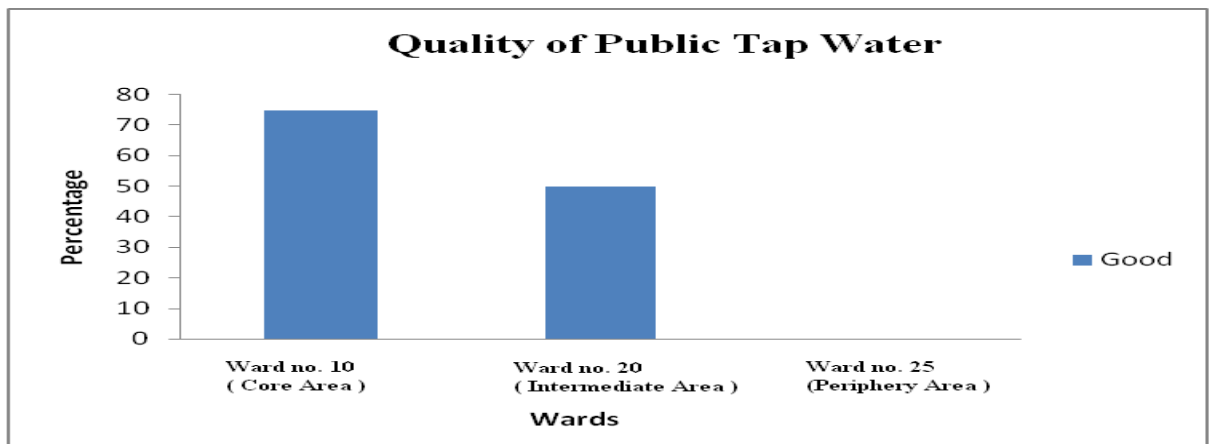
**Ward No. 20 (Intermediate Area):** Data on water storage measure in intermediate area of the city revealed that 37.5 per cent slum respondents store 20 liter water in gallon and bucket. 21.9 per cent stores water up to 25 liter in bucket and cooking pot and 28.1 per cent reserves water up to 30 liters in drum and bucket.

**Ward No. 25 (Periphery Area):** In response to the question relating to the water storage measure in periphery slum pockets, it is revealed that 46.6 per cent slum respondents store 20 liter water in pitcher and bucket, while 9.4 per cent respondents store 25 liter water in bucket and cooking pot. And only 3.1 per cent slum respondents store water up to 30 liters in drum and pitcher per day for drinking and other purposes.

## Quality of Water (Municipal Public Tap)

On the question of quality of public tap water, the responses of the respondents of the slum pockets were positive. The data regarding the quality of pipe water in the study area (ward-wise) is shown in the figure 5.4.

**Figure No-5.4: Responses of Respondents with regard to Quality of Public Tap Water**



*Source: Field Survey*

**Ward No. 10 (Core Area):** The study reveals that according to 75 per cent slum respondents of the core city area, the quality of public tap water is good. They have no complaint regarding taste, smell and colour.

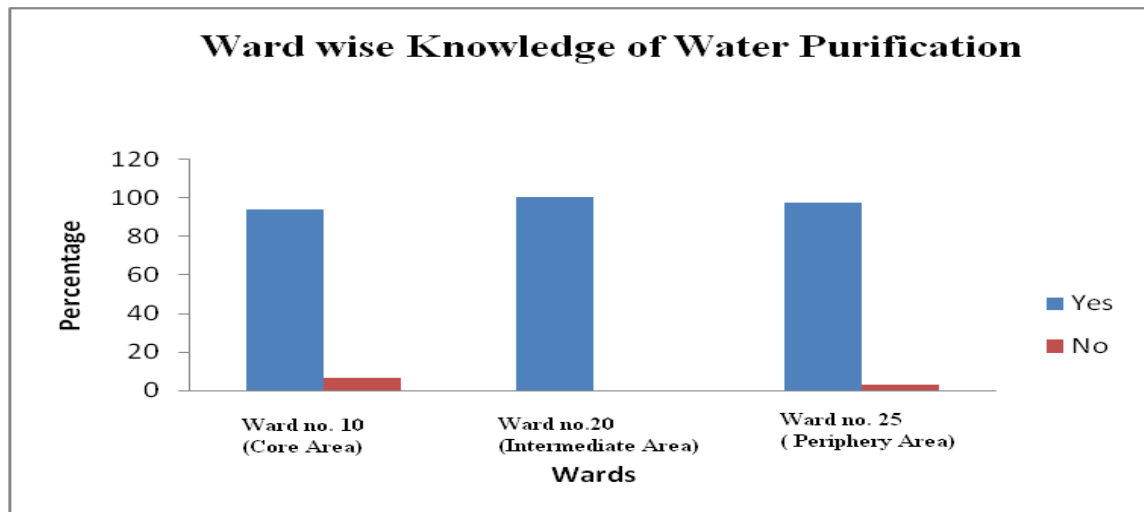
**Ward No. 20 (Intermediate Area):** Similarly in the intermediate location of the city, 50 per cent respondents are of the view that tap water quality is good.

**Ward No. 25 (Periphery Area):** But the picture is quite different in the periphery area of the city. In periphery area, there is no provision for public tap for slum dwellers. The respondents expressed their view that in spite of their strong demands municipal authorities are totally reluctant to install public tap in their areas.

## Water Quality impact on Household Health

A question was asked to slum respondents regarding the knowledge of water treatment process since water quality has a great impact on health of every individual. The data regarding the knowledge of water treatment process of slum respondents in the study are shown in Figure-5.5

**Figure-5.5: Knowledge of Water Purification Process among the Respondents**



*Source: Field Survey*

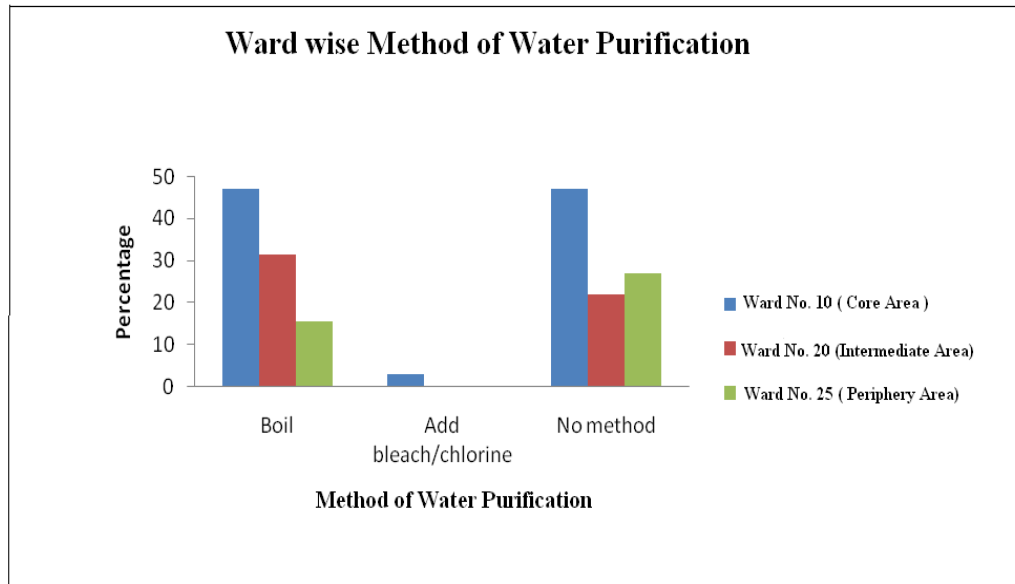
**Ward No. 10 (Core Area):** It is revealed from the above figure (5.5) that in core city area 93.8 slum respondents have knowledge of water treatment process, while 6.3 per cent have no idea regarding treatment process of water.

**Ward No. 20 (Intermediate Area):** But the slum respondents of intermediate location of the city are fully (100 per cent ) aware of water treatment process.

**Ward No. 25 (Periphery Area):** In periphery region 96.9 per cent slum respondents have knowledge of water treatment process, except 3.1 per cent respondents have no idea regarding water treatment process.



**Figure-5.6: Methods adopted by Slum Respondents for Purification of Drinking Water**



*Source: Field Survey*

Water purification methods adopted by the slum respondents of the three selected wards as shown in the above figure (5.6) are analysed as under.

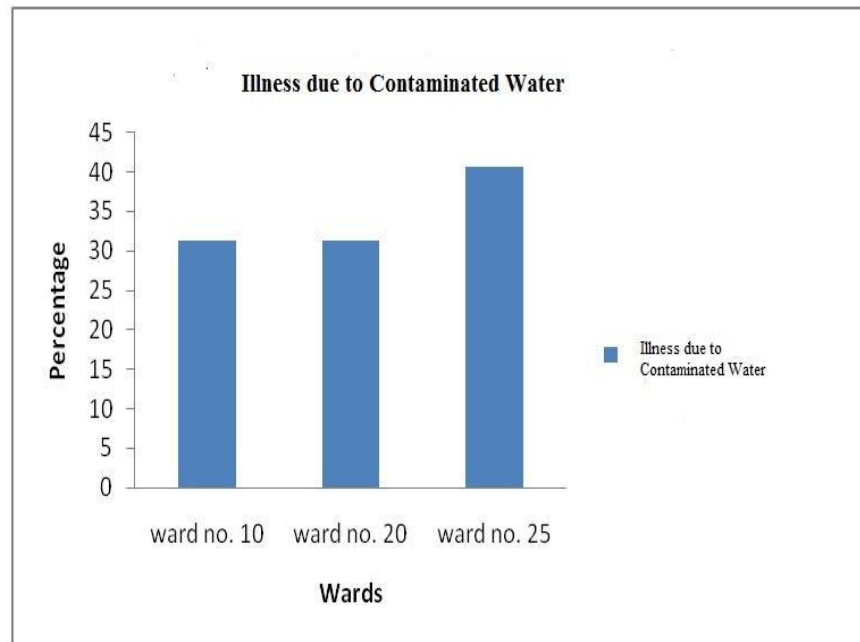
**Ward No. 10 (Core Area):** It is revealed from the above figure that slum dwellers in the study are acquainted with the method of water purification. In core area of the city 46.9 per cent respondents boils water to drink clean and safe water. But similarly 46.9 per cent drink untreated water as they applied no any method for water purification.

**Ward No. 20 (Intermediate Area):** In intermediate area, 31.3 per cent slum respondents uses boil method for water purification and 22 per cent respondents drink untreated water.

**Ward No. 25 (Periphery Area):** The slum respondents of periphery region have less awareness as compared to other two areas in terms of method of water purification. In ward 20, only 15.6 per cent respondents boil water to drink. Interestingly, ten to fifteen respondents out of thirty two respondents under this ward disclosed that they boil water during winter season (December to February) only to drink hot water in order to safe

from coldness. For them rest of the months of the year they use untreated water for drinking purpose.

**Figure-5.7: Responses of the Respondents with regard to Sickness caused by Contaminated Water**



*Source: Field Survey*

There is almost universal knowledge among adult women, adult man and you generation from all contexts that contaminated water can cause various water-borne diseases. Poor water quality often leads to widespread of water-borne diseases among the residents of slum area in the Guwahati City like-Diarrhea, Dysentery, Cholera, Jaundice and Typhoid..The data regarding sickness due to poor water quality as shown in figure no.5.7 are analysed as under.

**Ward No. 10 (Core Area):** It is revealed from above figure that in core city area, 31.3 per cent slum respondents have suffered from Dysentery and Typhoid for last four weeks due to poor water quality. The respondents reported that at least one sick person in their

households during last one month were asked about loss of working days. Maximum of the total medical expenses were spent on water related diseases.

**Ward NO. 20 (Intermediate Area):** In intermediate area of the city, 31.3 per cent respondents have suffered from Jaundice, Diarrhea due to poor water quality. Majority of the respondents of the slum pockets of this ward mentioned that Jaundice is the prime diseases caused by contaminated water. The second most frequently mentioned diseases were Diarrhea and dysentery in their areas.

**Ward No. 25 (Periphery Area):** In periphery region also poor water quality often leads to widespread of water-borne diseases among the residents of slum pockets like Cholera, Typhoid. Under this ward 40.6 per cent slum respondents have suffered from Cholera, Dysentery and Typhoid for last one month due to poor drinking water. Since there is no provision of Public Hand Pump and Public Tap for slum dwellers in this ward, they have to rely on Kuchha and Ring Well for their drinking water and other purposes. So, in this ward both Kuchha and Ring Well are accountable for slum dweller's sickness. Most of the respondents reporting to have at least one sick person in their households during last two months. Besides these, the slum pockets areas under this ward is hilly and many slum households living in the upper slopes and their residential areas are very prone to other diseases like Malaria, Japanese Encephalitis.

#### **5.4. Sanitation Facilities in Notified Slums of Guwahati City**

Sanitation has a close and direct link with the environment, water supply, health and hygiene. The Guwahati Municipal Corporation (GMC) is the sole authority for sanitation as well as collection and disposal of the garbage in the slum pockets of the Guwahati City. The present analysis with regard to sanitation facilities in the slum areas has been generated from Twelve Notified Slum Pockets under the three selected wards targeted for the present study. The sub-indicators used in the present analysis is to check reliability of sanitation facilities are- household toilet facility, toilet facility connected with sewer, well served drainage facility for home, collection of garbage regularly,

frequency of garbage collection, attending to the complaints about garbage and waste, waste-water stagnation, health impact of poor sanitation facility.

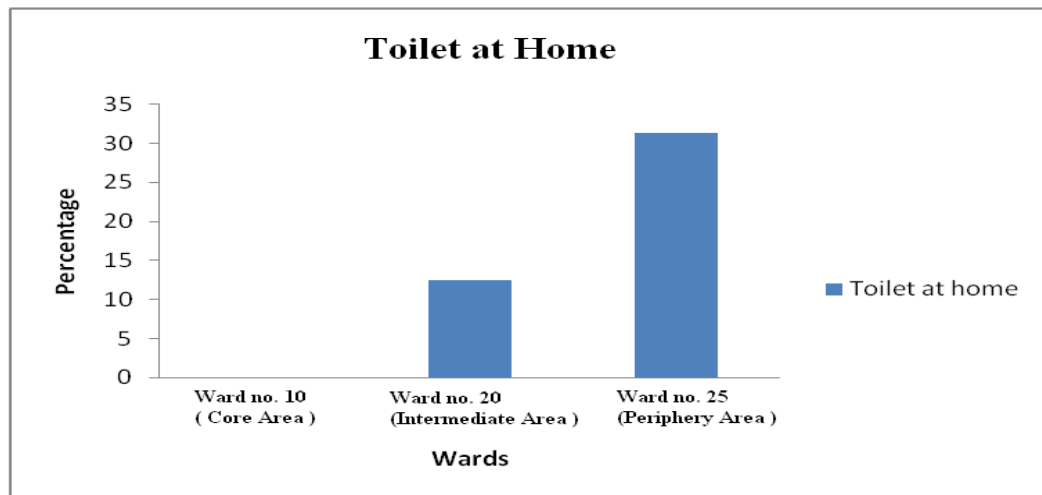
### **Sanitation terms used in this study**

- *Public Toilet:* toilet that can be used by everybody. Public toilets in the notified slum pockets are constructed by the GMC under E.I.U.S. programme.
- *Community Toilet:* community toilets are constructed by the city corporation in the slum pockets.
- *Pit or Kuchha Latrine:* dig a hole in the earth without slab. It is covered by bamboo wall or clothes.
- *Neighbour's Toilet:* toilets used jointly with different families often know to each other or inhabiting in the same building.
- *Open defecation:* defecation in the open.

### **Household Toilet Facility in the Notified Slums**

A question was asked to slum respondents regarding the household toilet facilities in their premises. The data regarding the household toilet facilities in the study area (ward-wise) is shown in figure 5.8.

**Figure-5.8: Responses of the Respondents with regard to Household Toilet Facility**



*Source: Field Survey*

**Ward No. 10 (Core Area):** It is observed from the study that in core city area, slum dwellers have not their own toilet facility. They use both free public toilet and community toilet constructed by the Guwahati Municipal Corporation.

**Ward No. 20 (Intermediate Area):** The data on household toilet facility in intermediate area of the city revealed that 12.5 per cent slum respondents have their own pit latrine (illustrated in picture IX). It is observed that pit latrines are not hygienic and environmental friendly.

**Ward No. 25 (Periphery Area):** In periphery region also 31.3 per cent household have their own pit latrine in their premises( Illustrated in picture X).

**Picture IX : View of Unhygienic Pit Latrine (Kuchha Latrine) in the Slum Area**



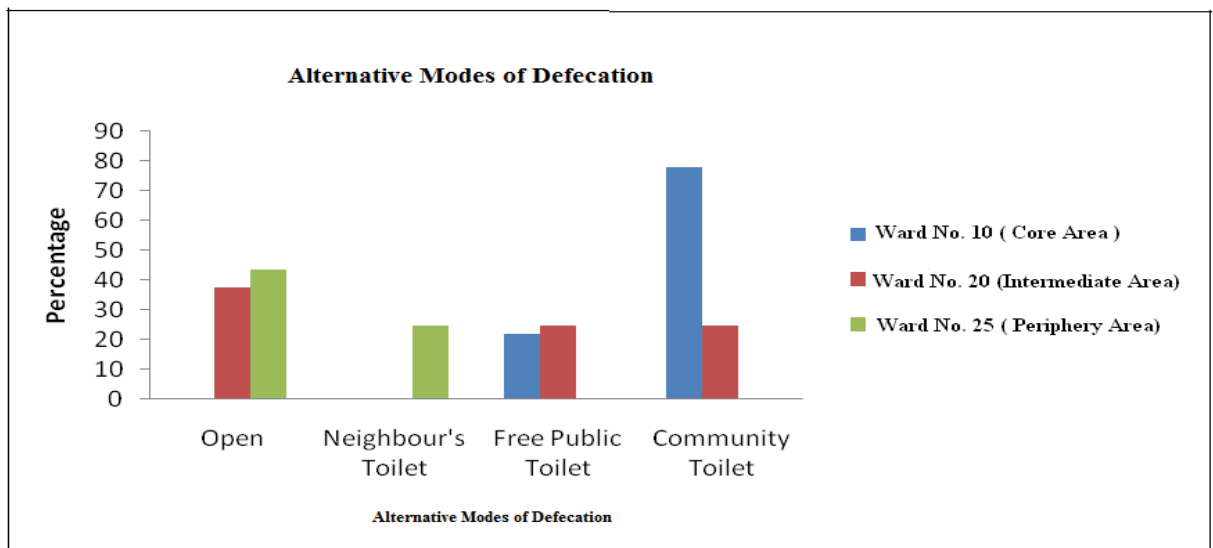
**Picture X: View of Unhygienic Pit Latrine (Kuchha Latrine) in the Slum Area**



### Alternative Modes of Defecation

In this section, the alternative modes of defecation of those slum respondents who have do not have toilet at home has been elaborated. The study reveals that those slum dwellers who do not have toilet facility at home, used alternative mode of defecation. The other mode of defecation used by the slum respondents in the three selected wards are shown in figure no. 5.9

**Figure-5.9: Responses of the Respondents with regard to Alternative Modes of Defecation**



Source: Field Survey

**Ward No. 10 (Core Area):** The data revealed that there is well organization of toilet facility in the core area of the city. Under this ward, 21.9 per cent uses free public toilet managed by the Guwahati Municipal Corporation, while 78.1 per cent uses community toilet constructed by the Corporation in the core city area. But no slumpockets(selected for the study) has separate sanitation locks for male and female users. Although there are provision for free public toilet and community toilet are available for slum dwellers but

sanitation facilities are not sufficient. But It is also observed that there is no practice open mode of defecation in the notified slum pockets of this ward.

**Ward No. 20 (Intermediate Area):** So far as intermediate location of the city with regard to toilet facility is concerned, 37.5 per cent respondents defecates in the open (Bahini and Bharalu river bank and Hengrabari hill side), while 25 per cent respondents uses free public toilet and also 25 per cent uses community toilet constructed by the Guwahati Municipal Corporation. Twenty Five to Thirty households have shared this toilet facility with other households.

**Ward No. 25 (Periphery Area):** In periphery area of the city the picture is quite different. Here, 43.8 per cent respondents defecates in the open ( railway line, hill side). It is revealed that during open defecation women have fear of reptiles, snake and scorpion. They can not go during rainy season because women are afraid of slipping from the hill. Moreover, they are also not safe because of men are loitering in the area of open defecation. On the other hand 25 per cent uses neighbour's toilet which are temporary in nature (pit latrine). There is no provision for community and free-public toilet facility in this area. It is also observed that children are generally used the yard and the places near the tube-wells for defecating.

So, from the above analysis, it is found that sanitation facilities in both intermediate and periphery slum pockets are compararatively unsatisfactory than core city area. Though there are provision for community toilet and free public toilet in the notified slum pockets of core and intermediate area of the city but this toilets does not have any integrated sewerage system at present. This toilets have only septic tanks without any collective disposal system for effluents. The sewage from the septic tanks goes directly into the open drain. This ultimately makes the surroundings unclean, unhygienic and conducive for the growth of disease carrying organisms. Moreover, the soak pits connected to septic tanks are becoming non-funcitonal due to high sub soil water table within a short span of time. Thus, toilet facilities in the notified slum pockets of the study area are not hygienic and environmental friendly.



## Waste Management

The Guwahati Municipal Corporation (GMC) is the sole authority for the sanitation as well as collection and disposal of the garbage in the city. Data as shown (Table No. 5.5) below on domestic waste management process of the slum households revealed that there is a difference among the three wards.

**Table No.5.4: Responses of Respondents with regard to Domestic Waste Management**

Ward	Waste pit in the yard	Gutter	Waste ground	House to house collection	GMC garbage bin
10 (Core)	0	0	32.2	0	68.8
20 (Intermediate)	0	0	28.7	0	0
25(Periphery)	9.4	37.5	46.9	0	0

*Source: Field Study*

**Ward No. 10 (Core Area):** It is revealed from the study that in core area 32.2 slum respondents use waste ground for their domestic waste and 68.8 respondents use GMC garbage bin installed in their area by the city corporation.

**Ward No. 20 (Intermediate Area):** In intermediate area of the city, 28.7 slum respondents use waste ground near their residential area for domestic waste. Guwahati Municipal Corporation has not installed any garbage bin in the notified slum pockets in this ward.

**Ward No. 25 (Periphery Area):** In the periphery area, 9.4 per cent respondents throw their waste in the waste pit in the yard and 37.5 per cent use gutter for their domestic waste. On the other hand, 46.9 per cent respondents use waste ground for their domestic waste.

**Table No.-5.5: Responses of the Respondents with regard to Frequency of Waste Collection**

<b>Ward</b>	<b>Once a day</b>	<b>Thrice a week</b>	<b>More than one week</b>
10	18.8	25	6.3
20	0	0	0
25	0	0	0

*Source: Field Study*

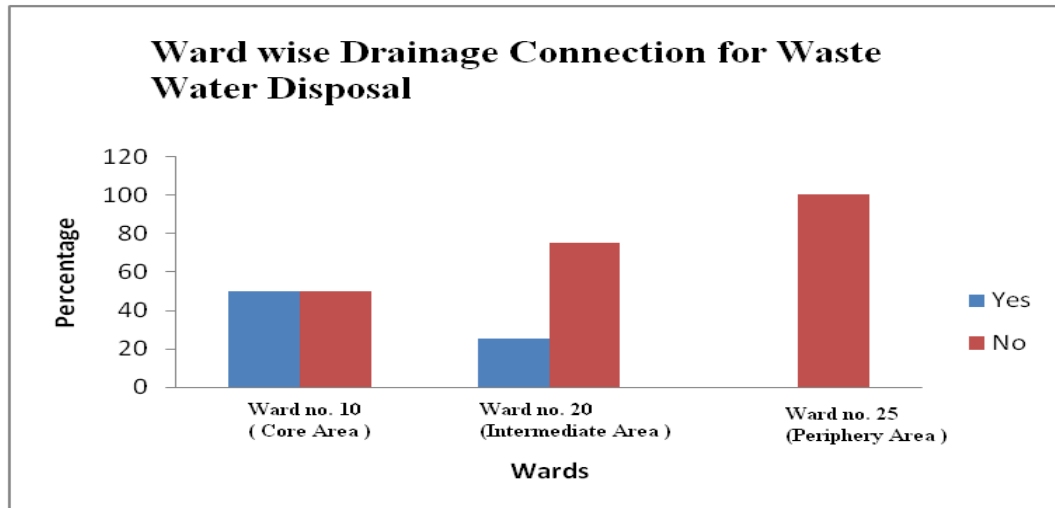
Data on frequency of waste collection in the notified slum pockets revealed that there is a vast difference among the slum pockets of the three selected wards. In core city area (ward no.10) 18.8 slum respondents opined that Corporation workers collect their domestic waste from the garbage bin every day in the morning or evening (Uzan Bazar Harijan Colony and Uzan Bazar Islam Patty), while 25 per cent respondents of Harijan Colony (Police Reserve) told that waste are collected from the bin by the Corporation thrice in a week. Though municipal bins are found in this slum pockets for waste disposal, but not sufficient and the inhabitants have to dispose solid waste in open ground and road sides that is vulnerable for the deterioration of environment. On the other hand 6.3 per cent respondents from Lakhtokia Railway Side opined that waste are collected from the waste ground by the Corporation worker once in a week. But in the slum pockets of intermediate and periphery area of the city, the waste collection system is totally absent. Slum dwellers of both wards (ward 20 and 25) have to throw their domestic waste in the gutter, yard and small waste ground in their residential area. Moreover, there are no provision for garbage bins in the slum pockets of these two wards. Solid waste disposing system of these slum areas are very low poor and as a result the environment is hazardous.

### **Waste Water**

On the question of drainage connection for waste water disposal, it is revealed that there is a difference in the slum pockets of the three selected wards. The data regarding

drainage connection for waste water disposal in the study area (ward-wise) is shown in the figure (5.10) below.

**Figure-5.10: Responses of the Respondents with regard to Waste Water Disposal**



*Source: Field Survey*

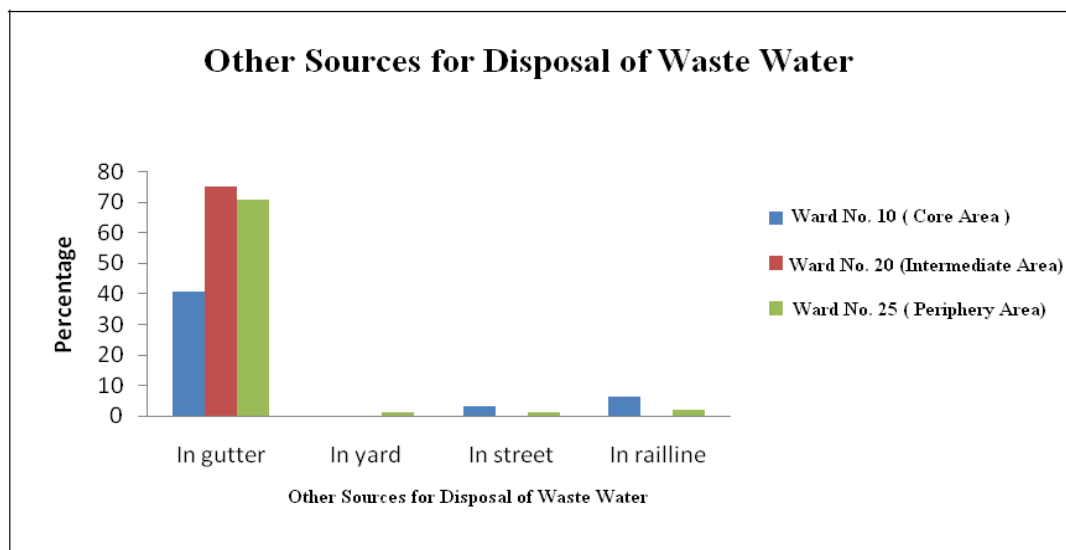
**Ward No.10 (Core Area):** It is revealed from the above figure that there is well drainage system with regard to waste water disposal in the slum pockets of core city area. The 50 per cent slum respondents of the slum pockets of Uzanbazar Harijan Colony and Uzanbazar Islam Patty are of the view that they have drainage facility for their domestic waste disposal. While 50 per cent respondents from Lakhtokia Railway Side and Harijan Colony (Police Reserve) opined that they have no such provision.

**Ward No. 20 (Intermediate Area):** In the intermediate location of the city, 25 per cent respondents from Anil Nagar Basti and Hengrabari L.P. School Area replied that there is drainage system in their area. But 75 per cent slum respondents of Pub Bhaskar Nagar Basti and Krishna Nagar Basti responded that there is no drainage provision for domestic waste disposal in their area.

**Ward No. 25 (Periphery Area):** But in the notified slum pockets of periphery region, the domestic waste water disposal picture is quite different as compared with other wards.

There is no drainage provision in the the slum pockets under this ward for domestic waste water disposal and it has pernicious impact on the environment.

**Figure-5.11: Other Sources for Disposal of Household Waste Water in the absence of drainage facility**



*Source: Field Survey*

Since there is no well drain facilities for domestic waste water disposal, the resident of the slum localities rely on other sources for the said purpose. The data regarding other sources for the disposal of household waste water are analysed ward-wise as under.

**Ward No. 10 (Core Area):** The study revealed that in the core area, 40.6 per cent slum respondents use gutter, 3.1 use the street, and 6.3 uses rail line for domestic waste disposal.

**Ward No. 20 (Intermediate Area):** In the intermediate area, 75 per cent respondents of the notified slum pockets use gutter as a source for disposal of waste water.

**Ward No.25 (Periphery Area):** In the periphery area of the slum locality 70.8 per cent use gutter, 1 per cent use yard, 1per cent use street and 2.1 per cent use rail line area for household waste.

## **5.5. Water Supply and Sanitation Services in the Non-Notified Slums of Guwahati City**

Apart from empirical study on the Notified Slum Pockets, three case studies were also conducted in the Non-notified Slums of the city in order to know the ground reality with regard to water supply and sanitation facilities in the entire slum areas of the Guwahati city. This three studies was conducted in three Non-notified Slum Pockets of core , intermediate and periphery areas of the city in order to assess their conditions of water supply and sanitation facilities.

### **5.5.1. Case Study I: Railway Side Basti of Core City Area**

In core city area (ward no. 10) one of the smallest non-notified slum pockets is Railway Side Basti. This slum pocket has an area of 7.00 sq. k.m. with 250 population and 30 households<sup>72</sup>. This slum pocket is around the main railwayline of the city. The dwelling units in this slum area, mostly unauthorised occupation of Railway land. The District Administration and the Railway Authority often carry out joint operation to prevent this slum encroachers from grabbing the land again and again It is found that people living in this slum pocket are generally poor, their occupation and monthly income cannot fulfils their fundamental needs. There is no provision for municipal tape in this locality. It is observed that slum dewllers of this pocket collect water from road side tube well. Pitcher and Plastic Bucket are the most common mode of transfer or storage of water within the house. Sanitation situation is worse than water supply in this area. Slum dwellers of this locality defecate at the railway track and at the bank of river Bharalu. It is also observed that children are generally used the places near the tube well for defecating. Moreover waste collection system is totally absent in this locality and people dispose their domestic waste in the small waste ground near their residential area and as a result the environmental is hazardous. Since there is no drainage system for domestic waste water disposal, the resident of this locality use railine and side of public road for domestic waste disposal.

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<sup>72</sup> GMC RAY Survey, 2012

### **5.5.2. Case Study II: Gandhi Mandap of Intermediate Area**

The second case study was conducted in the Gandhi Mandap slum pocket of intermediate location of the city (ward no. 20). This Non-notified slum pocket comprises of 30 households having 150 population<sup>73</sup>. Slum dwellers of this locality engaged in waste material collection. Some of them are involved in temporary shop like small pan shop, tea seller, mobile vendors (fruit and sabji sellers). The municipality water is not covering this slum pocket till now. The study reveals that slum dwellers of this locality fetch water from ring well and tube well. Female members are the active participant of this locality so far as water fetching is concerned. During focus group discussion, female members of slum households told that in winter season (November to March) the water level of ring well become reduced and they have to depend largely on Tube Well by standing in long queues. And during water fetching from Tube well, there are frequent fights over water with neighbor. So, they skip taking bath and wash clothes on alternate days. It is observed that sanitation facilities in this slum pocket are not hygienic. There is no provision of community toilet like Notified Slum pockets under this intermediate area of the city. Slum dwellers use pit latrine (kuchha toilet). Besides people of this slum pocket defecates in the open (Bahini river bank, illustrated in picture XI). Solid waste disposal system of this slum pocket is very poor. Though City Corporation has provided one garbage bin in this locality but it is not sufficient and the inhabitants have to dispose solid waste in open space and road sides that is vulnerable for the deterioration of environment. Moreover, Corporation's house-to-house solid waste collection scheme is not covering this locality till now. Solid waste disposing system of Gandhi Mandap slum area very low poor as a result the environment is hazardous.

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<sup>73</sup> Ibid

**Picture XI: View of a Non-Notified Slum Pocket in Guwahati**



### **5.5.3. Case Study III: Bortila Hill Area of Periphery Region**

A similar case study was also undertaken in Bortila Hill Non-notified slum pocket under the periphery area of the city (ward no.25) in order to assess their conditions of water supply, sanitation, garbage collection and disposal facilities. Bortila slum pocket has an area of 5.00 sq. k.m. with 240 population and 60 households<sup>74</sup>. Bortila slum area under ward no. 25 are hilly and many households living in the upper slopes. There is no provision of municipality piped water supply in this area. Slum dwellers of this locality have to rely on Kuchha well. It is observed that women spent more than half an hour in fetching water. Moreover, with the tension generated over time wasted in standing in longue queues, there are frequent fights over water with neighbours. It is noticed that there is no tube wells like other slum pockets and lot of chaos arises when everyone wants to fill water at the same time from the kuchha well. Moreover women have to cross above 100m (300 ft) distance to fetch water. It is found that toilet facility in Bortila slum is very grim. Slum dwellers of this locality defecate in the open (hill side). It is revealed from the Focus Group Discussion that during open defecation women have fear of reptiles, snake and scorpion. They can not go during rainy season because women are

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<sup>74</sup> Ibid

afraid of slipping from the hill. Moreover, they are also not safe because of men are loitering in the area of open defecation. Slum dwellers of this locality disposed the faeces of children (3 to 5 years) into open place adjacent to their houses. The reasons for this indifferent attitude of slum parents towards children come from the fact that many slum dwellers consider faeces of children as harmless. But children are the main victims of diarrhoea and other faeco-oral diseases as childrens faeces are also source of infection. Domestic waste disposal system is very poor in this locality as there is no Municipal Bins and door-to-door collection of domestic waste is totally absent. Slum dwellers of this slum pocket dispose their domestic waste in the gutter adjacent to their houses

#### **5.5.4. Key Findings on Case Studies**

It is found from the three case studies that water supply and sanitation facilities are very much unsatisfactory for the Non-notified slum pockets due to lack of proper water supply and sanitation system in their concerned areas. The studies has showed that majority of the slum households of both core and intermediate areas use tube well water for drinking and other purposes. But in periphery area since there is no tube well, slum households of this locality rely on kuchha well water which is contaminated with sewerage. With regard to household toilet facilities, Pit latrines (kuchha toilet) are found in the intermediate area which are partially hygienic. These may cause ground water contamination depending on the soil characteristics. Besides significant numbers of slum dwellers are found to be habituated to open defecation in the periphery area of the city. Moreover practices of disposing children's excreta into open places and road side area pollutes the general environment. It is observed that the drainage system is the most neglected sector in the Non-notified slum areas of the city. Besides solid waste management system is totally unsatisfactory in this slum areas. It is observed that houses, shops, roads etc have been constructed unplanned and solid wastes are stored on open places in Gandhi Mandap slum area under intermediate location of the city. Disposal of solid wastes and wastewater in open space and open drains also causes a severe hazarous condition. All these deteriorrated scenario causes severe environmental degradation affecting the environment of the entire Guwahati City.



## 5.6. Observations and Conclusion

On the basis of the above analysis of data, following observation and conclusion may be drawn with regard to the objective of the study.

Access to water supply and sanitation is a fundamental need and human right. It is vital for the dignity and health of all people. Slum dwellers is also a vital part of the society, we can not ignore them at well. At present, in the city of Guwahati, there are 217 slum pockets with a slum population of 1,39,296. Out of 217 slum pockets, 112 are Non-Notified Slums and 105 are Notified Slum pockets are existed in the city. The above analysis concentrated on water supply and sanitation in the services areas of Twelve Notified Slum localities under the three selected wards of the Guwahati city. The study in the Notified Slum Pockets of the Guwahati city showed that the water supply and sanitary condition are very poor. It is found that out of Twelve Notified Slum Pockets, only three slum pockets are better served by the City Corporation with regard to delivery of water supply and sanitation (WSS) are concerned in the study area. These Notified Slum Pockets are- Uzan Bazar Harijan Colony and Uzan Bazar Islam Patty ( ward no. 10, core city area) and Hengrabari L.P. School Area (ward no. 20, intermediate area). But it is observed that rest of the slum pockets are not well served so far as WSS facilities are concerned. In the Notified Slum Pockets of periphery region (ward no. 25), water supply and sanitation facilities are very pathetic. Municipality water is not covering this slum pockets till now. In the absence of proper reliable water sources, most of slum dwellers resort to have unsafe water souces like kuccha well which causes suffering from diseases. Moreover, significant amount of open defecation (43.8 per cent) is also found in the periphery region. Normally slum pockets under this region have pit latrines (25 per cent) which are kuccha and no fully hygienic. These may cause ground-water contamination depending on the soil characteristics and distance between the water sources and latrines. Garbage management and drainage sustom are totally unsatisfactory in the slum pockets of the periphery region. It is observed that houses, shops, drains, roads etc. have been constructed in an unplanned manner and domestic waste are stored on open ground in these slum pockets. Moreover, disposal of domestic wastes and waste water in open

space and open drains also causes a severe hazardous condition. The open disposal of human excreta pollutes the nearby canals and drains causing severe water pollution. Drainage system is most neglected sector in the slum pockets of periphery region. Thus the deteriorated scenario of the slum pockets of the study area causes severe environmental degradation affecting the environment of the Guwahati city.

Two Focus Group Discussions (FGDs) were conducted by the researcher to know the ground reality with regard to water supply and sanitation (WSS) facilities in the Notified Slum Pockets of the city. From the FGDs, it was clear that it is the women who bear the maximum responsibilities for water and sanitation needs of the household. During FGDs women have voiced how the WSS deficiencies have created problems of girls safety and their own problems of delay in going to work, loss of wages due to this delay because of time taken to collect and fetch water and most importantly embarrassment to them and to the girls with having to go to defecate in open grounds. The voices of women clearly indicated a lack of responsiveness and understanding of their needs by GMC and Assam State Government. It is therefore, Government and NGOs should come forward to take necessary steps and effective measures to offer the best facilities for taking more programs in slum area on water supply and sanitation. Moreover, specific rules and regulations need to be established to force the owners of household to provide the adequate water supply, sanitary facilities in their slums. In near future, some other parameters such as, practices of washing hand returning from latrine, loss of working days due to sickness etc. can be analyzed to measure the complete scenario of the slum that will be helpful to facilitate water supply and sanitation by the policy maker, Government and the NGOs in the Guwahati city.