

## Residents' Perception of Domestic Wastewater in Suleja, Nigeria

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**Abstract:** The paper assessed the residents' perception of domestic wastewater in Suleja, Nigeria with the objectives of examining the conditions of disposed wastewater; assessing the households risk associated with disposed wastewater and identifying methods of domestic wastewater disposal. Two hundred and sixty-three (263) questionnaires were administered to residents of Hashimi B ward of Suleja using systematic random sampling technique with an interval of every 10th houses. The results were presented in tables, charts and plates. The study revealed that the sources of water for domestic uses were majorly from water board and hand dug wells as indicated by the respondents (55%); and that the domestic uses of water included laundry and bathing (70% and 30% respectively). The indiscriminate discharge of wastewater was perceived to be the major factor influencing the quality of the environment. About 65% of respondents discharged their wastewater in the open space indicating lack of proper drainage and breeding disease vectors associated with wastewater. The study recommended provision of central collection wastewater system, education of the residents about health risk associated with the poor management of wastewater, enforcement of construction of soak away pits and recruitment of more environmental health inspectors to educate and ensure that residents comply with proper wastewater management.

**Keywords:** Wastewater, Risk, Environment, Diseases, Management

### Introduction

The urbanization process and the activities in urban areas are conditions that predispose the urban environment to environmental health hazards, which affects public health especially in developing countries. These hazards can be mitigated through articulation of policies, legislations and law that promote environmental health and safety; proper management of environmental hazards (Cajetan, 2008).

The environment in which people live has been perceived as a combination of physical, chemical, biological, social, cultural and economic conditions that differ according to geography and activities undertaken (Corvalan, *et.al* 1999). On the strength of this perception, two broad categories of environmental hazards namely; those occasioned by urbanism and the physical, microbiological and chemical hazards have been identified by McMichael

(2000). Urbanism concept has to do with changes in social relationship and individual behaviour or urban lifestyle, which potentiates many changes in human behaviour that increases the risk of diseases and injuries. One of such fallout of urbanism is lifestyle related health hazards. On the other hand, microbiological hazards are environmental hazards posed by the disease pathogens in the environment. These agents are the traditional causes of disease among the urban dwellers mostly enteric and respiratory diseases. The

Environment help to create conditions that encourage the proliferation of these pathogens especially when the environment is compromised by such conditions as poor sanitation, unsafe drinking water, poor quality housing and overcrowding. These poor environmental conditions create environmental and health hazards of microbiological nature particularly exposure to human waste,

Environmental Issues

solid waste and drinking contaminated water (Listorti, 1999; OECD-DAC, 2000).

Environmental health can be perceived as the taming of the environment so that it does not constitute a danger to public health. Consequently, WHO (1981), defined environmental health as the control of all those factors in man's environment which exercises or may exercise deleterious effect on man's physical development, health and survival, captures the essence of the need to prevent and control fallouts from the process of urbanization in the form of environmental hazards. In the same vein, Ene (2004) defined environmental safety as attempts to minimize the risk of injuries, illness or property damage from environmental hazards to which one may be exposed. It has been therefore, asserted by Hardoy, *et.al* (1992), that urban towns in the developing world bear the burden of a combination of the traditional and modern environmental health hazard due to industrialisation, globalization and poor environment sanitation.

In consideration of the public health effects of the environmental health hazards posed by urban environment and the safety issues that it portends for the developing countries, there is need to address these problems in order to attain the status of healthy cities. The attainment of a healthy urban environment is dependent on proper urban planning and management through the formulation of policies that are environmental friendly and strict implementation of such policies (GUO, 2000).

Wastes of different sources are generated in urban settlements and this includes liquid and solid waste. The domestic sewage is that part of community wastewater which arises from houses and it is derived from the following sources namely; bathroom, wash-hand basin and lavatory, kitchen and laundry activities

(Oluwande, 1983). Household wastewater and poor wastewater discharge frameworks endanger human settlements. A good sanitation has a tendency to enhance cleanliness and significantly enhance good wellbeing. The dominant parts of urban settlements still have no sound waste disposal facilities to checkmate excess waste discharge. There are a few motivations to re-examine the present urban water and wastewater strategy including restrictions of a traditional sterile framework, good comprehension of nature and the objective of society in managing waste disposal (Czemiel and Hyorew, 2002).

Disposal of sewage is a major problem in Nigeria particularly in Hashimi B of Suleja where the settlers do not have access to proper sanitary system and clean water. Open dumping of dirt and littering of street with blockage of drainage system with home garbage are common. This persistent practice by the natives has placed them in public health risk which is driven by poor sewage management. Health Challenges often related to poor sewage treatment include Pathogens and nitrates from sewage disposal which causes contamination of drinking water.

Sewage contamination can be created by: broken or spilling sewer mains, poor upkeep or inappropriate administration of on location sewage frameworks (e.g. septic tanks), flooding over-burdening the sewerage framework, Improper transfer of wastewater, (public, private and commercial), ill-advised disposal of solid waste and spills amid transportation and treatment. The aim of the study is to assess the risk of domestic wastewater management in Suleja. The objectives of the study are to examine the sources and nature of wastewater disposal, Identify methods of domestic wastewater disposal and examine households risk associated with disposed wastewater.

**Concept of Wastewater**

Sewage have been conceptualized by many authors (Oluwande, 1983, Satpathy and Jha, 2008). For example Oluwande (1983), defined sewage as the water-carried waste or the used water of any community. It consists of domestic, industrial or trade and storm water. The domestic sewage is that part of community waste-water which arises from houses and it is derived from the following sources namely faeces and wastewater from bathroom, wash-hand basin and lavatory, kitchen and laundry. Similarly, sewage can also be defined as a waterborne waste derived from home, animal, or food processing and includes human excreta, soaps, detergents, paper and cloth (Satpathy and Jha, 2008).

Sewerage on the other hand, is the physical base, including funnels, pumps, screens, and channels used in passing on sewage from its root to the point of possible treatment or transfer. In some urban territories, city wastewater is conveyed independently in sterile sewers and overflow from boulevards which is conveyed in tempest channels. Access to both of these is commonly through a sewer vent. Amid high precipitation periods, a consolidated sewer flood can happen, compelling untreated sewage to stream through natural drainage (Satpathy and Jha, 2008).

By and large, waste is either a benefit or risk contingent with respect to people perception. The best and the most compensating demeanour to fluid waste are to consider it to be of a benefit. With this sort of dispositions waste can be better made for man's advantages. In Nigeria, researchers have composed widely on ecological contamination and the world at large. The earth as vital assets for human survival makes us to trust that for man to survive unreservedly and easily more than a couple of eras, we should look at man and relationship to Sulyman, A.O and Izueke-Okolo, C

natural environment. Progress toward achieving a cleaner environment has depended on a degree of wastewater pollution control. This has included in some cases immoderate measure and questionable political choices. Therefore, less developed nations and poor groups have regularly contended that the earth is a costly extravagance that redirects assets from more profitable utilizations. This point of view has offered path to another worldview expressing that ignoring the earth can costs, while numerous natural advantages can in reality be accomplished requiring little to no effort (World Bank, 1992).

**Management of wastewater in Nigeria**

Waste management is the process of collecting, transporting, processing or disposing, managing and monitoring of waste materials. The term usually relates to materials produced by human activity and the process is generally undertaken to reduce their effect on health, the environment or aesthetics (Enete, 2010). Poor waste management has been a major problem to human health and existence, affecting both rural and urban areas. A clean environment influences good health and good health further affects the productivity of man. Therefore, it can be said that a good and clean environment invariably affects the wealth and economic status of the nation (Adeboye, 2001).

It has been noted that the sheer extent of wastewater issue in Nigeria is difficult to appreciate (Emily, et.al, 2004). There is no open sewage, as the measure of fluid waste that gathers in a matter of hours would be more than the sewage could pull in a day. Nigeria's refuse "dumps" are situated on the sides of the high path at the edge of urban areas. Since there are no methods for regulation, junk regularly spreads into the streets, blocking activity and water channel Nigeria is a country that epitomizes

### Environmental Issues

unending fluid waste administration issues in conjunction with populace development. It is the most crowded nation in Africa, with more than 120 million inhabitants (World Bank 1992), and in the course of recent years, has had the third biggest urban development rate on the planet at 5.51% every year. It is assessed that almost twenty percent of the populace (21 million individuals) live underneath the national destitution line (World Bank 1992).

The Federal Environmental Protection Agency (FEPA) was established in 1988 to control the challenging issues of waste management and contamination in Nigeria (Onibokun and Kumuyi, 2003). Vision 2010 was FEPA's endeavour to address ecological issues in the country. The report proposed objectives to be proficient by the year 2010 that would lead toward reasonable improvement. With respect to strong waste administration, the report says the objective is to "accomplish at the very least 80 percent compelling administration of the volume of metropolitan waste produced at all administration".

### Study Area

Suleja is located in Niger State, North Central Nigeria. It lies on Latitude 9°31' to 9°56' North of the Equator and

Longitude 7°58' to 8°43' East, while the area of study Hashimi B ward is located at the centre of the district and has boundary with Magajiya in the south and Pangumu in the north as shown in Figures 1, 2 and 3. It is situated very close to the boundary between Niger State and the Federal Capital Territory. Aside from its closeness to the Nigerian Federal Capital, it is also regarded as a focal point of West African ceramics; in particular the world celebrated Ladi Kwali Pottery Center, which was set up by Michael Cardew in 1950. The main type of this school of earthenware was Dr. Ladi Kwali, who got overall approval for her works which are in plain view around the world.

Topographic variation on plain introduced by isolated hills are created by igneous intrusion and steep-sided valleys formed by the river and its small seasonal tributaries. The major part of the town has been developed on the flates part of the site; significant development does not occur on slopes steeper than 15 degree (Adedibu, 1989). Private individual may choose for architectural reasons, to site building on a steep slope, but general construction on scoping ground should be discouraged, since apart from being more expensive, the potential problems of water run-off, subsequent erosion and problems of structural failure on exposed weathered bedrock are greatly increased.

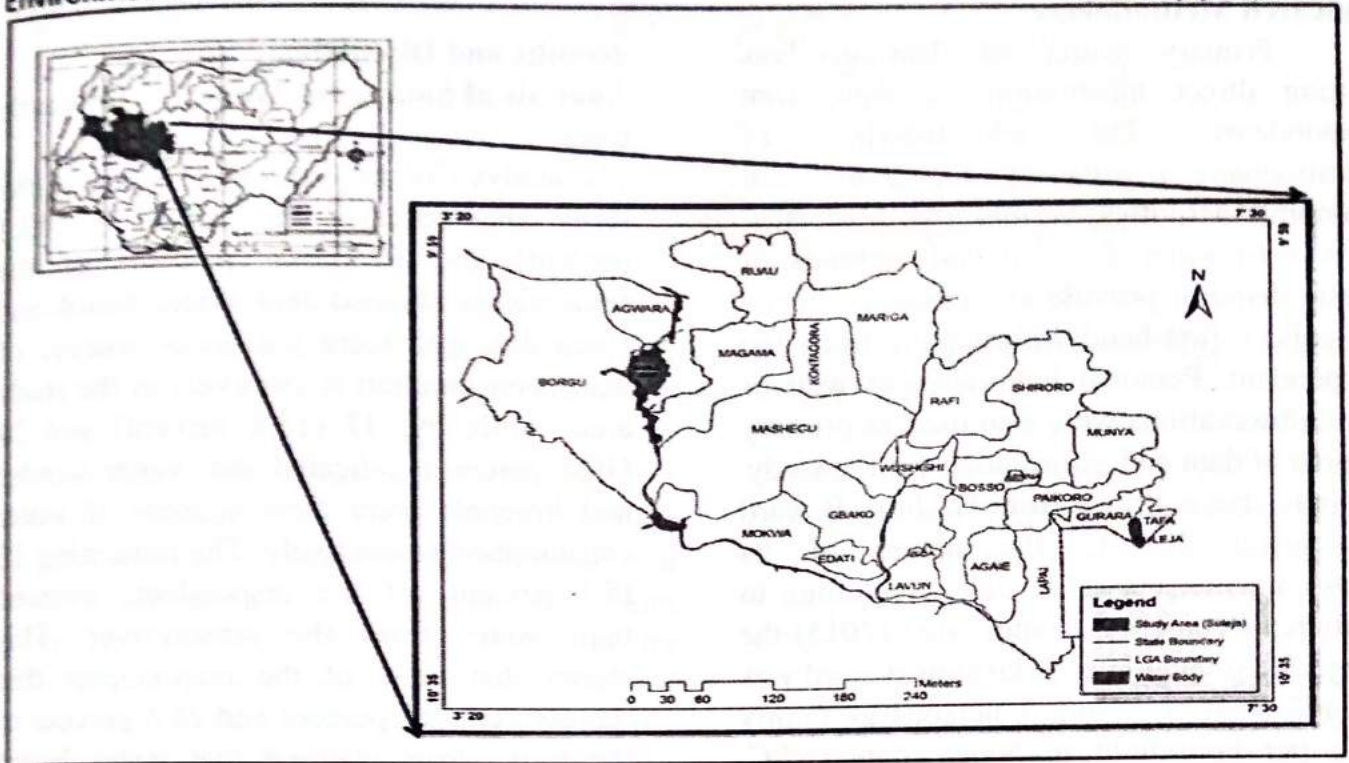


Figure 1: Suleja, Niger State  
Source: Ministry of Land and Housing, Minna (2013)

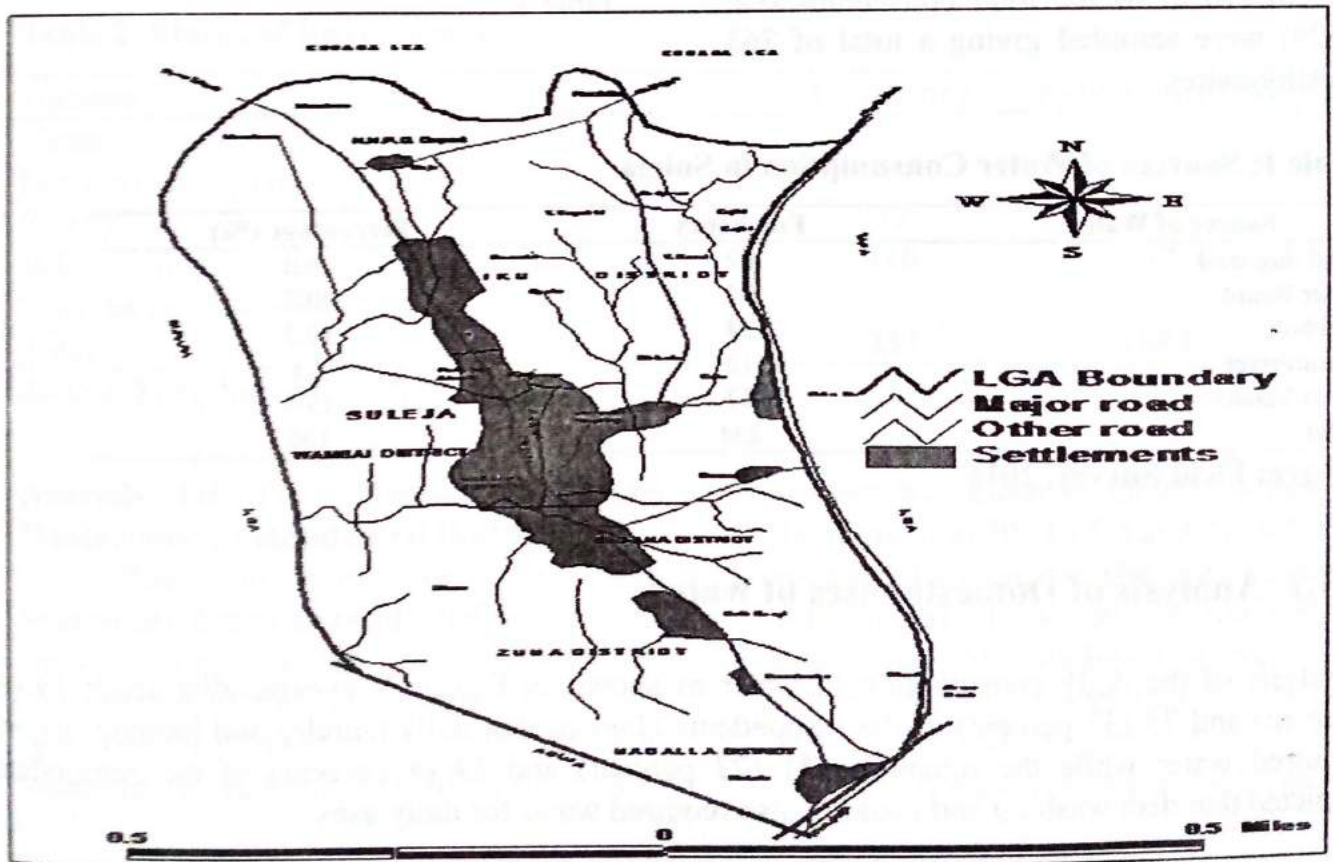


Figure 2: Hashimi B ward in Suleja  
Source: Ministry of Land and Housing, Minna (2013)

Environmental Issues

**Research Methodology**

Primary source of data involves getting direct information or data from respondents. The administering of questionnaire in gathering of data on social economic activities, various risk associated with wastewater disposal and methods of waste disposal provide an elaborate avenue to collect first-hand information from the respondent. Personal interviews as well as field observations were also used as primary source of data and information for the study. Sample size is drawn from Hashimi B ward in Suleja due to the nature of its environmental degraded state. According to National Population Commission (2015) the projected population of Hashimi B ward was 18,403 persons. Using 7 persons as family size per household in Niger State (NPC, 2015), a total of 2,629 households were derived. For the purpose of this study ten percent (10%) of the total households (i.e. 2,629) were sampled giving a total of 263 questionnaires.

**Results and Discussion**

**Analysis of Sources of Water for Domestic Uses**

The analysis of the sources of water in the study area revealed that about 94 (40.2 percent) and 67 (28.6 percent) of the respondents claimed that Water board and Hand dug well were the major sources of water consumption respectively in the study area; while by; 37 (15.8 percent) and 24 (10.3 percent) indicated that water vendor and borehole were their sources of water consumption respectively. The remaining 12 (5.1 percent) of the respondents sourced their water from the stream/river. This shows that most of the respondents that represented 40.2 percent and 28.6 percent of the respondents claimed that water board and hand dug well are the major sources of water consumption in the study area See Table 1.

**Table 1: Sources of Water Consumption in Suleja**

Source of Water	Frequency	Percentage (%)
Hand dug well	67	28.6
Water Board	94	40.2
Borehole	24	10.3
Stream/river	12	5.1
Water Vendor	37	15.8
<b>Total</b>	<b>234</b>	<b>100</b>

Source: Field Survey, 2016

**5.1.2 Analysis of Domestic uses of water**

Analysis of the daily consumption of water as shown in Figure 3 revealed that about 89 (38 percent) and 75 (32 percent) of the respondents claimed that daily laundry and bathing majorly required water while the remaining 51 (22 percent) and 19 (8 percent) of the respondents depicted that dish washing and cooking also required water for daily uses.



**Figure 3: Daily uses of water in Suleja Plate I: A Water Logged Street at Hashim B Ward**  
 Source: Field Survey, 2016

**Analysis of the Status of Environment**

Table 2 revealed that about 110 (47%) of the respondents indicated that there are indiscriminate discharge of wastewater from the neighborhoods which affect the quality of life in the area. About 75 (32%) claimed that their environment were dirty and water lodged, 32 (13.7%) ascertained the offensive odour perceived from the environment while

only the remaining 17 (7.3%) of the respondents were of the opinion that their environment was clean. This implies that the respondents perceived their environment has been affected by indiscriminate wastewater discharged from the neighborhoods followed by dirty and water logged. This is depicted in Plate I

**Table 2: Status of Environment**

Options	Frequency	Percentage (%)
Clean	17	7.3
Dirty, water logged	75	32
Smelly	32	13.7
Indiscriminate wastewater discharges from the neighbourhood	110	47
<b>Total</b>	<b>234</b>	<b>100.0</b>

Source: Field Survey, 2016

**Analysis Of The Distance Of Open Wastewater To Residential Buildings**

The proximity of the open wastewater drains to residential buildings is shown in figure 4. the study revealed that 112 (48 %) of the respondents shows that open sewage was very close to their buildings; 70 (30 %) claimed that the open

sewage was close to their buildings while the remaining 30 (13 %) and 21 (9 %) of the respondents indicated that open sewage was very far and far respectively from residential buildings. This implies that most of the respondents that represented by 48 percent and 30 percent indicated that wastewater was very close to residential buildings.

Environmental Issues

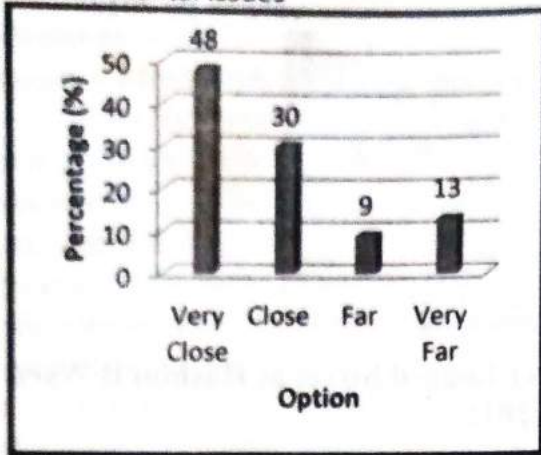


Figure 4: Distance of open wastewater drains  
Source: Field Survey, 2016

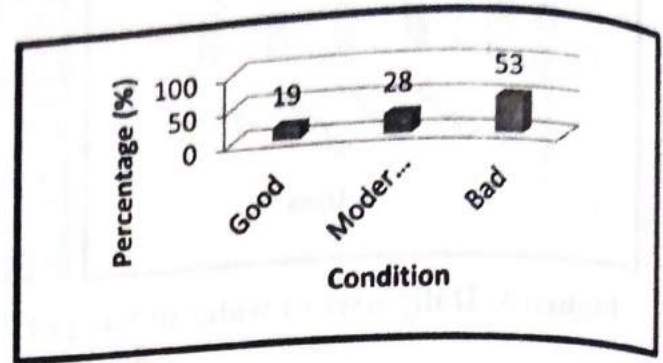


Figure 5: Condition of the Drainage or Sewage in the Study Area to Residential Buildings  
Source: Field Survey, 2016

**Presence of Public or Private Drainages**

The presence of public or private drainage is shown in Table 3. Field study revealed that 157 (67%) of the respondents claimed that their private/public drainage system is located at the front or back of their buildings while the remaining 77 (33%) of the respondents indicated that no private/public drainage was available at the front or back of their buildings. This implies that majority of the respondents (67%) have public/private drainage in front or back of the building (See Plate I).

**5.1.6 Analysis of Condition of the Wastewater Drainage**

Figure 5 depicted that about 124 (53 percent) of the respondents claimed the condition of their drainage or sewage was bad; about 66 (28 percent) revealed the condition of the drainage was moderate

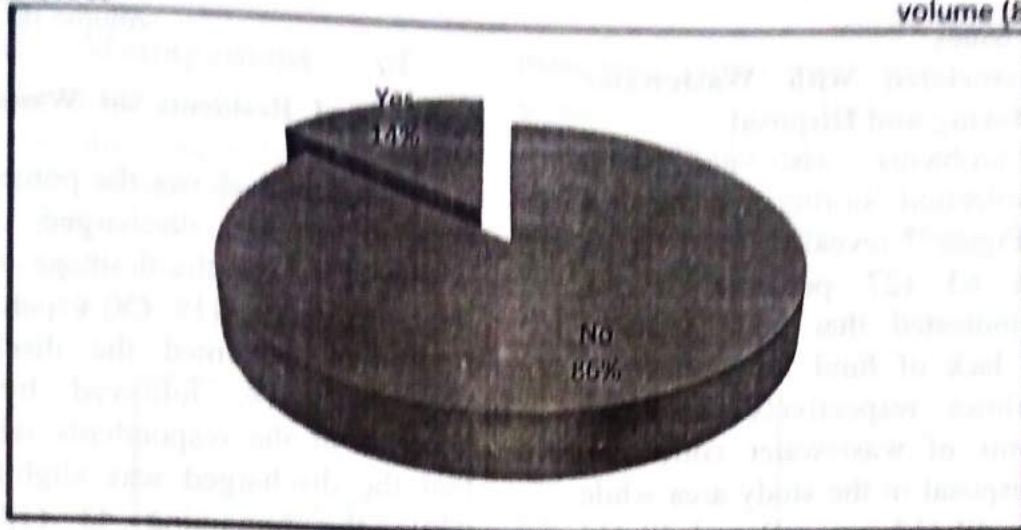
while the remaining 44 (19 percent) of the respondents were of the opinion that the condition of their drainage was good. The study implies that most of the respondents depicted that the condition of their drainage or sewage that conveyed wastewater in the study area was bad.

**Methods of Domestic Wastewater Disposal**

**Presence of a Central Wastewater Collection**

Figure 6 shows that about 201 (86 percent) of the sampled population revealed they are no central wastewater collection in the study area while the remaining 33 (14 percent) claimed there are present of central wastewater collection centre in the study area.





**Figure 6: Presence of a Central Wastewater Collection in the Study Area**

Source: Field Survey, 2016



**Plate II: Constructed Drainage for Wastewater**

Source: Field Survey, 2016

**Methods of Wastewater Disposal**

There are many methods of wastewater disposal in the study area as indicated in Table 3. About 101 (43.2 percent) of the respondents depicted that open dumping on the surface; 68 (29.1 percent) of the respondents revealed they

dump wastewater on the constructed drainage while the remaining 56 (23.9 percent) and 9 (3.8 percent) of the respondents disposed their wastewater on soak away pit and irrigate vegetables respectively

**Table 3: Methods of Wastewater Disposal**

Methods	Frequency	Percentage (%)
Soak away pit	56	23.9
Open dumping on the surface	101	43.2
Dumping in constructed drainage	68	29.1
Irrigate vegetables	9	3.8
<b>Total</b>	<b>234</b>	<b>100</b>

Source: Field Survey, 2016

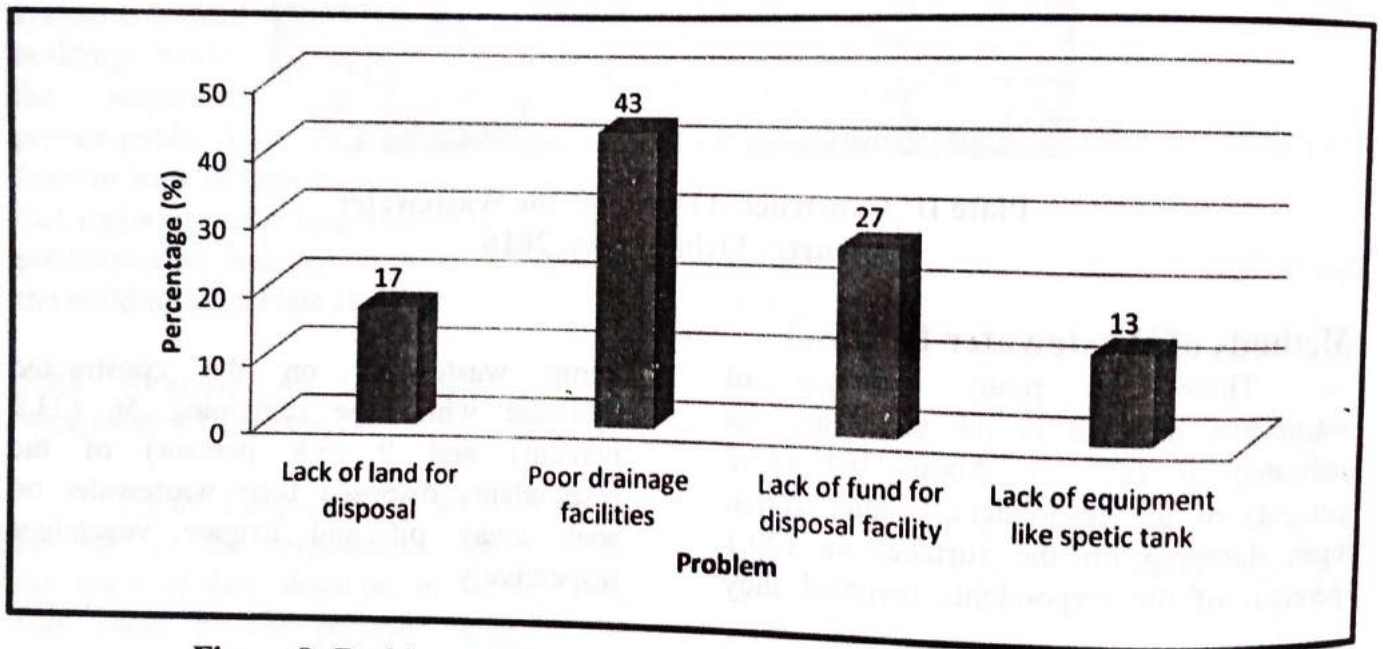
Environmental Issues

**Problems Associated with Wastewater Collection, Storing and Disposal**

The problems associated with wastewater collection, storing and disposal as shown in Figure 7 revealed that 101 (43 percent) and 63 (27 percent) of the respondents indicated that poor drainage facilities and lack of fund for wastewater disposal facilities respectively were the major problems of wastewater collection, storing and disposal in the study area while the remaining 40 (17 percent) and 30 (13 percent) revealed that lack of land for disposal and lack of equipment like septic tank respectively were the problems of wastewater collection, storing and disposal as identified by the inhabitant of Hashimu B ward in Suleja.

**Opinion of Residents on Wastewater from Drainage**

Table 4 shows the perception of the resident on the discharged of domestic wastewater from the drainage or sewage in the study area, 118 (50.4 percent) of the respondents claimed the discharged was very offensive; followed by 73 (31.2 percent) of the respondents who indicated that the discharged was slightly offensive while the remaining 43 (18.4 percent) revealed there is no odour from the drainage or sewage. This implies that most of the resident (50.4%) sampled claimed the discharged of domestic wastewater from the drainage or sewage is very offensive



**Figure 8: Problem of Wastewater Collection, Storing and Disposal**  
Source: Field Survey, 2016

**Table 4: Discharged of Domestic Wastewater from Drainage/Sewage**

Rate of Offensive	Frequency	Percentage (%)
Very offensive	118	50.4
Slightly offensive	73	31.2
No odour	43	18.4
<b>Total</b>	<b>234</b>	<b>100</b>

Source: Field Survey, 2016

## Opinion on Management of Domestic Wastewater

Majority of the respondents that represented 164 (70 percent) depicted that there were no proper management of domestic wastewater in the study area as shown in Figure 9; 40 (17 percent) claimed

there were proper management of domestic wastewater in the study area while the remaining 30 (13 percent) of the respondents claimed there were not sure of any management of domestic wastewater in the study area or not.

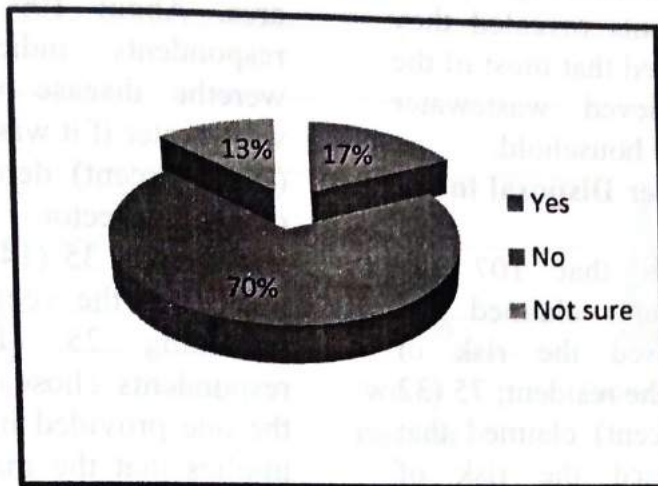


Figure 6: Proper Management of Domestic Wastewater in your Area  
Source: Field Survey, 2016

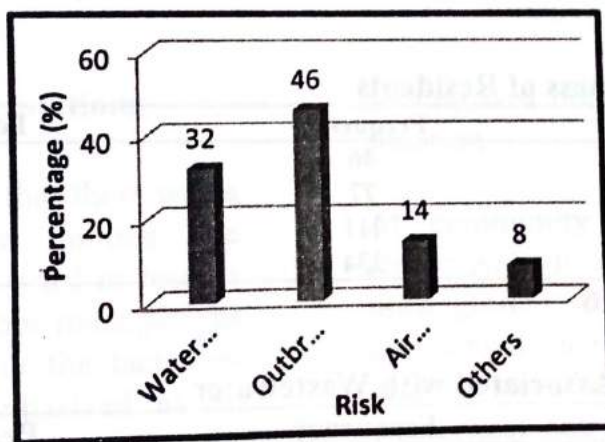


Figure 11: Risk Posed by Wastewater Disposal to the Households  
Source: Field Survey, 2016

### Risks Associated with Wastewater Disposal

#### Awareness of Residents on the Dangers of Domestic Wastewater

Table 10 highlighted the level of awareness of risk associated with wastewater disposal. 111 (47.4 percent) of the respondents claimed that the level of awareness of the resident was low; 77 (32.9 percent) depicted the level of awareness of resident was moderate while the remaining 46 (19.7 percent) of the sampled residents claimed the awareness level was high. This implies that most of the respondents are not aware of the danger of domestic wastewater.

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Environmental Issues

**Analysis of the Effects of Wastewater Disposal on the Households**

168 (72 percent) believed wastewater disposal in the study area has effect on the household or community as shown in figure 4.7; 49 (20.9 percent) revealed that wastewater has no effects on the household or community while the remaining 17 (7.1 percent) of the respondents revealed they were not sure. This depicted that most of the respondents (72%) believed wastewater disposal had effects on the household.

**Risk Posed by Wastewater Disposal to the Households**

Figure 11 shows that 107 (46 percent) of the respondents claimed that wastewater disposal posed the risk of outbreak of epidemics to the resident; 75 (32 percent) and 33 (14 percent) claimed that wastewater disposal posed the risk of pollution to the water body and air respectively while the remaining 19 (8 percent) of the respondents chose other risk

apart from the one provided in the questionnaire.

**5.3.4 Analysis of Disease Vectors Associated with Wastewater**

Table 11 shows the analysis of disease vectors associated with improper way of disposing wastewater in the study area. About 109 (46.6 percent) of the respondents indicated that mosquitoes were the disease vectors associated with wastewater if it was not properly dispose; 65 (27.8 percent) depicted that flies was the disease vector associated with the wastewater; 35 (14.9 percent) revealed that rodents is the vector of disease while the remaining 25 (10.7 percent) of the respondents chose other option apart from the one provided in the questionnaire. This implies that the major diseases vector that associated with the improper way of disposing wastewater is mosquitoes followed by other flies.

**Table 10: Level of Awareness of Residents**

Level of Awareness	Frequency	Percentage (%)
High	46	19.7
Moderate	77	32.9
Low	111	47.4
<b>Total</b>	<b>234</b>	<b>100</b>

Source: Field Survey, 2016

**Table 11: Disease Vector Associated with Wastewater**

Disease Vector	Frequency	Percentage (%)
Mosquitoes	109	46.6
Flies	65	27.8
Rodents	35	14.9
Others	25	10.7
<b>Total</b>	<b>234</b>	<b>100</b>

Source: Field Survey, 2016

**Diseases Transmitted by Poor Management of Domestic wastewater**

The perception of the residents on the diseases transmitted by poor management of domestic wastewater as identified in Figure 12 shows that 89 (38 percent) and 54 (23 percent) of the Sulyman, A.O and Izueke-Okolo, C

respondents revealed that poor management of domestic wastewater transmitted malarial and cholera diseases respectively; 40 (17 percent) and 30 (13 percent) depicted that poor management of domestic wastewater

transmitted diarrheal and typhoid diseases to the resident respectively while the remaining 21 (9 percent) of the respondents claimed poor management of domestic wastewater transmitted ring worm diseases to the

inhabitant of Hashim ward. This depicted that most of the respondents are of the opinion that poor management of domestic wastewater transmitted malarial and cholera diseases to the people of Hashim B ward in Suleja respectively.

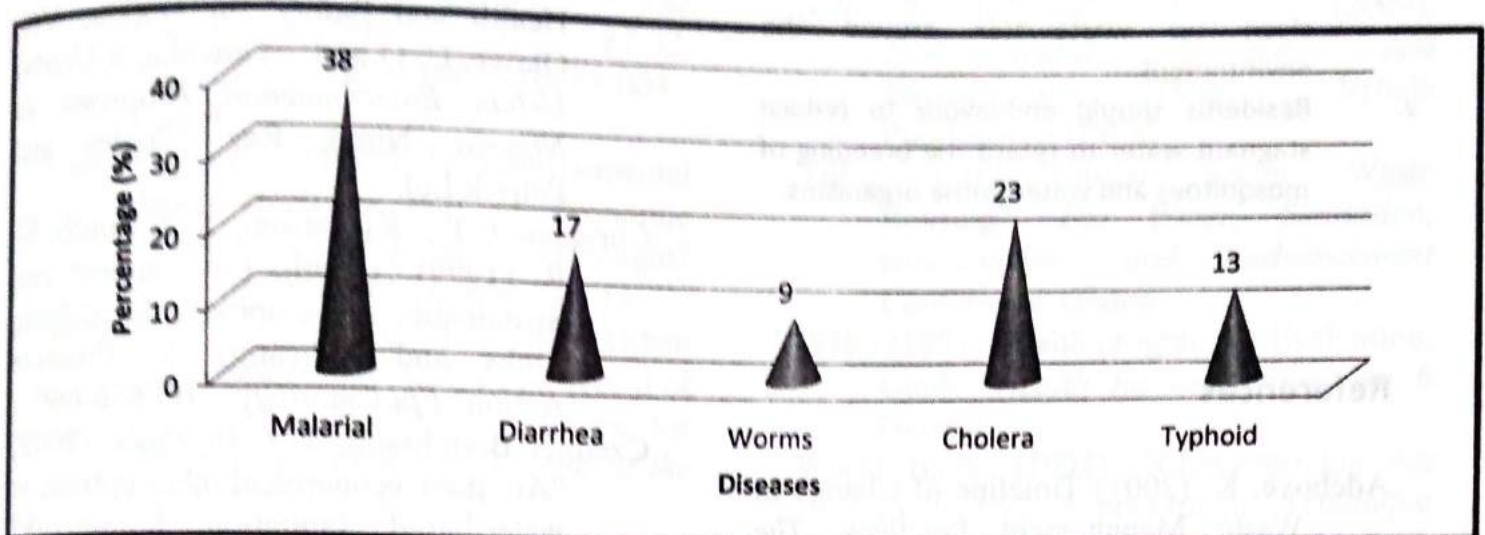


Figure 12: Diseases Transmitted by Poor Management of Domestic wastewater

Source: Field Survey, 2016

### Conclusion and Recommendations

The study concludes that there was a low level of awareness among the respondents of Hashimi B ward in respect of the dangers posed by poor management of domestic wastewater; for the fact, that adequate drainage is emphasized as an environmental engineering measure for controlling mosquito-borne infections. Besides mosquitoes causing malaria, a good number of respondents also associated flies with wastewater, being responsible for spreading of communicable disease such as diarrhoea. Other diseases cited included cholera, typhoid fever, intestinal worms, nausea and vomiting. In addition to the above, most respondents were offended by the bad odour that came from the poorly maintained wastewater collection facilities. A greater proportion of the respondents agreed that management of wastewater in the area was ineffective and that there was risk of disease outbreak if

nothing was done quickly to alleviate the situation.

At community level, the majority of respondents discharged their wastewater in open ground while others on constructed drainage channels worse still, during rainy seasons storm water is contaminated with wastewater and Faecal matter and mainly floods to low laying areas. In addition to the above issues, problems of drainage channel blockage leading to stagnant pools of wastewater for mosquitoes breeding, flies and odours all leading to health hazards in the study area. In order to reduce the risk of wastewater disposal in the study area, the followings are the recommended:

- i. Development of buildings that support soak away pits should be encouraged.
- ii. Public enlightenment of residents on dangers of improper wastewater disposal is required.

Environmental Issues

- iii. Community effort should be used in creation of a central wastewater collection point to help reduce indiscriminate disposal of wastewater.
- iv. Weekly or monthly environmental sanitation should be encouraged to help clean up wastewater around the environment.
- v. Residents should endeavour to reduce stagnant water to retard the breeding of mosquitoes and water borne organisms.

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