

**A COMPARISON STUDY ON HOUSEHOLDS ACCESS TO
SANITATION FACILITIES IN WINDHOEK LOW INCOME
SETTLEMENTS**

**A case study on Onjika, One Nation and Otjomuise Build Together Housing Group:
Khomas Region, Namibia**

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Abstract

This project studied household's access to sanitation in low income areas of Windhoek. The study employed both a quantitative and qualitative study design. The sample was derived from Otjomouise, OneNation and Onjika areas. A logistic regression was fitted to estimated determinants of access to sanitation. Age of household head, income, and education were found to explain the availability of sanitation in all areas.

CHAPTER 1

BACKGROUND INFORMATION

1.1. Introduction

Sanitation generally refers to maintenance of hygienic conditions or cleanness but for the purpose of this study we will refer to sanitation as the provision of facilities and services for the safe disposal of human urine and faeces.

According to (UNDP, 2008) nearly 2.4 billion people in the world lacked adequate sanitation and the majority of these live in the developing world. Sanitation is one of the basic services which all of us need every day; toilet and water are some of the services that the developed world takes for granted while in the developing countries they are highly lacking. However in Namibia, these two services were identified as major basic essential needs that are lacking and of which the nation especially the people living in rural communal areas had been deprived of. Sanitation coverage in rural areas and informal settlements which are now referred to as low income settlements has remained behind creating uncertainties on the nation's capability to achieve the targets of the Millennium Development Goals (4, 6 and 7) which are to Reduce Child Mortality, Combat HIV/AIDS, Malaria and other diseases and to ensure environmental sustainability

Targets: MDG target (Goal 7 and Target 7.C) is to halve by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.

According to the Unicef, diarrhoea is a leading cause of death for children under the age of 5 in Namibia, accounting for around 23% of deaths, pneumonia accounts for 25% of all deaths, while malnutrition accounts for another 9% "This means that well over half of all child deaths in Namibia are related to the lack of access to sanitation and safe water as well as poor hygiene practices," said Unicef country representative Micaela Marques de Sousa. (New era newspaper 2012).

The researcher may at times be talking water and sanitation together but this must not confuse you as water and sanitation go hand in hand, either one needs water to flush down the faeces and urines or they need water after to wash their hands once they finish using the toilet. However this paper focuses on a specific sanitation facility only.

By 2000, the World Health Organization estimated that 1.1 billion people still lacked access to safe water supply, but over twice as many people, 2.4 billion, and lacked access to basic sanitation. Development agencies believe the new sanitation target agreed at the WSSD is more realistic; the new sanitation target joined the existing Millennium Development Goal of halving the proportion of people without access to

safe water by 2015. Together they provide an international commitment for an integrated approach to sanitation, water supply, and hygiene promotion. With this in mind, Namibia has reformed its water and sanitation policy in its pursuit of reaching the United Nations MDGs including a target to reduce by half the proportion of people without access to basic sanitation by 2015. According to Ndokosho this new Policy was introduced in order to effectively manage water supply and sanitation situation in Namibia.

Low income settlements were once referred to and are still known to many as the informal settlements or shacks. Recently the city of Windhoek changed the name informal settlements to low income settlements as there are so many different ways of classifying informal settlements and due the other fact that there are some formal houses in these localities that are referred to informal.

1.2. Description of the study area

Geographically and politically Namibia is divided into 13 regions and within the regions is constituencies and there are about 107 constituencies. Khomas is a region that is located in the heart of Namibia and is where Windhoek the capital city as well as where the study will take place is found. According to the census 2011 preliminary data, Khomas is home to a population of 332 300 of which 45800 and 42400 resides in Tobias Hainyeko and Khomasdal North constituencies were the three settlements are located in their respective suburbs.

1.3. Problem statement

It is globally believed that, the toilet sits at the centre of a global crisis in which it is estimated that at least 2, 6 billion people's lives are hugely impacted by a lack of access to proper toilet facilities. However as it is known that proper sanitation practices cannot be separated from access to potable water, the issues of addressing poor sanitation is therefore a challenge in dry countries such as Namibia. The World Toilet Organisation (WTO) recently noted that "in future, the flush toilet will become extinct due to lack of water hence slowing the attainment of provision of improved sanitation.

Lack of sanitation coverage presents serious health implications to nearly 1.3 million of Namibia's population of just over 2 million who do not have access to proper toilet facilities, making it about 60% of the population. Sanitation is hence an issue which needs to be addressed globally because, around the world as: 3 million people still lack safe sanitation, 2.4 billion people have no access to basic sanitation and 5.7 % of diseases are due to poor water sanitation and hygiene

According to the census report 2001, More than half of the households in the country have no toilet facility and Over 78% of the rural households use the bush as their toilet. Apart from residences for upper

and middle class households, sanitation is insufficient in most residential areas. Private flush toilets are too expensive for virtually all residents in townships due to their water consumption and installation cost. As a result, access to improved sanitation has not increased much since independence: In Namibia's rural areas 13% of the population had more than basic sanitation, up from 8% in 1990. Many of Namibia's inhabitants have to resort to "flying toilets", plastic bags to defecate which after use are flung into the bush. The use of open areas close to residential land to urinate and defecate is very common. Increasing access to sanitation is a key component of development and poverty reduction, as it has major health benefits as well as associated social, economic and environmental benefits. Improving safe excreta disposal and safe hygiene practices has a great health impact but sanitation and hygiene is also more than health and environmental protection.

1.4. Study objectives

The proposed study will therefore investigate and compare low income household's access to sanitation facilities in Windhoek while it identifies current sanitation and practices in the above mentioned settlements. The research will investigate the relationship within the settlements the different households' socio-economic status and access to sanitation. The research will also investigate how far municipality interventions to improving sanitation in the two constituencies are.

1.5. Keywords

- **Sanitation**- Sanitation is the management of human excreta and grey water.
- **A human excreta** - human bodily waste which is excreted from the body, such as urine and faeces.
- **Grey water (or sullage)** is the dirty water that comes from washing in bathrooms and the kitchen.
- **improved sanitation** or facility is referred to as when the toilet is being used only by household members or if the facility used by the household separates the waste from human contact, While the opposite goes for the un improved sanitation or facility. (NDHS 06/07)
- **Adequate sanitation** is defined as the safe management of human excreta and includes both 'hardware' (sanitation technologies, such as toilets and hygienic latrines) and 'software' (hygiene promotion, such as hand washing with soap)
- **Hygiene**- Hygiene refers to practices associated with ensuring good health and cleanliness.

CHAPTER 2

LITERATURE REVIEW

The Namibia Sanitation Situation Analysis (2008) defines sanitation as interventions that improve the management of human excreta (urine and faeces) and "grey water" or sullage. It also refers to grey water as dirty water that has been used for washing, cooking, washing clothes, showering, etc. This water is usually heavily contaminated specifically when used for cleaning the clothing and nappies of infants and very young children.

A wide range of sanitation systems exist to properly and safely manage excreta. All these systems are more or less complex but they all obey to the human excreta management cycle which generally includes the following steps:

- Disposal (user interface and storage), collection, treatment (on site or off site), transfer and re-use (sludge or treated effluent)

Some 2.6 billion people worldwide – two in five – do not have access to good sanitation, and about 2 billion of these people live in rural areas. Barely more than one third of the population uses adequate / improved sanitation facilities in West/Central Africa (36 per cent), South Asia (37 per cent) and Eastern/Southern Africa (38 per cent). 'Improved' sanitation facilities are those that reduce the chances of people coming into contact with human excreta and are likely to be more sanitary than unimproved facilities. These include toilets that flush waste into a piped sewer, septic tank or pit, as well as dry pit latrines constructed with a cover. Such facilities are therefore only considered to be improved if they are private rather than shared with other households. However, global sanitation coverage increased from 49% in 1990 to 59% in 2004, and about 1.2 billion people gained access to improved sanitation facilities over that period. Given this background the world is not yet making sufficient progress to meet the MDGs sanitation target (UNICEF, 2006).

It is hence predicted that for sufficient progress to be done towards the attainment of Millennium Development Goal the rate of improvement over the past 15 years would have to double between now and 2015. If current trends continue, there will be 2.4 billion people, partly as a result of population growth, without basic sanitation in 2015.

Of the approximately 120 million children born in the developing world each year, half will live in households without access to improved sanitation facilities and one fifth in households without access to

improved water sources, at grave risk to their survival and development. Inadequate availability of water for hygiene and lack of access to sanitation together contribute to about 88 per cent of deaths from diarrhoeal diseases, or more than 1.5 million of the 1.9 million children under five who perish from diarrhoea each year. This amounts to 18% of all under-five deaths and means that more than 5000 children are dying every day as a result of diarrhoeal diseases. Diarrhoea's impact is particularly severe in children. Acute diarrhoea, as occurs with cholera (a water borne disease), if left untreated can cause death within a day or less. Diarrhoeal diseases are transmitted through human excreta, and it is therefore critically important to have effective barriers in place to prevent this major transmission route (UNICEF, 2008).

Improved sanitation alone could reduce diarrhoea-related morbidity by more than a third; better sanitation combined with hygiene awareness and behavioural change could reduce it by two thirds. Such behaviours include consistent use of a toilet or latrine by each person in the household, safe disposal of young children's faeces, and hand washing with soap or ash after defecation and before eating. Under nutrition, which is associated with more than half of all under-five deaths, 9 are closely linked to diarrhoea. Infectious diseases and diarrhoea in particular, are the main determinants of wasting and stunting of growth in population in developing countries (UNICEF, 2006).

Namibia Sanitation Situational Analysis Report, 2009, with references of findings from the Demographic and Health Survey. Show that 32.9% of the total population has access to adequate sanitation facilities while 67.1% use non improved facilities or the bush. In 2009, it is estimated that 1 411 000 persons do not have access to adequate sanitation facilities in the country.

In rural settings only 13% of the population has access to adequate sanitation against 61% in urban settings. In urban areas, 58% of the population is connected to the sewerage against 5.5% in rural area. This result is consistent with water coverage figures (DHS 2006- 2007) showing that almost 81% of the urban population get piped water into the plot against 23% in rural areas. Only households having running water may be equipped with flush toilets and may be connected to sewers.

In urban settings, 18% of the population shares toilets against 2.3% in rural areas. The percentage of population using individual on site sanitation systems such as septic tanks, Ventilated Improved Pit-latrine pit toilets or Ecological Sanitation (Ecosan) toilet is low and represent only 3.6% in urban areas and 7.8% in rural areas. In urban areas there is still 15.7 % of the population who practice open defecation against almost 80% in rural areas.

In the Kunene Region, 2 236 cases of acute diarrhoea were reported at different health facilities with 10 cases being confirmed as cholera (Sibeene, 2008). Namibia is in need of resources for this intervention. More than US\$350 million is needed for Namibia to attain Vision 2030's long-term targets for sanitation services and improved water supply.

According to Red-Cross statistics, 78 % of rural people in the north central still answer to nature's call in the bush. Only 12 % have access to proper toilets, while 10 % use non-improved facilities. Although the situation of urban dwellers looks better because 70% are estimated to have adequate sanitation facilities while 17% still use the bush, the urban coverage of proper sanitation facilities is decreasing due to growing informal settlements. Regarding water, 98% of the urban population has access to safe water while in the rural areas the coverage is 80%

With estimation that 73% of the population projected at 2.8 million in 2030 will be living in urban settlement more facilities will be needed to cater for them. The improvement of water supply will require N\$690 millions while sanitation services will need N\$2160m for the country to attain long-term goals of vision 2030.

Table 1: Types of sanitation facilities

IMPROVED SANITATION FACILITIES	UNIMPROVED SANITATION FACILITIES
> Flush or pour –flush to: - piped sewer system - septic tank - pit latrine	> Flush or pour–flush to Elsewhere (not to sewer/ septic tank/pit latrine)
Ventilated improved pit Latrine	> Pit latrine without slab or open pit
> Pit latrine with slab	> Bucket
Composting toilet	> Hanging toilet or hanging Latrine
	> No facilities or bush or field

Adopted from the MDG report, 2004.

CHAPTER 3

RESEARCH DESIGN/ METHODOLOGY

3.1. Data

The research was designed in a cross sectional way as data was collected at a single point in time and as mentioned in the objectives gives a snapshot of the current status of the population studied, a survey was carried out.

Due to variation in literacy level of the target group, participants were interviewed and their answers were recorded on the answer sheets provided in the questionnaires. Those who could have wanted to be recorded on tape were welcomed; however none of the participants opted for that choice. Questions were asked in a standard language preferred by the participant as they were translated into the local languages. A mini questionnaire was also set up for the municipality in order to assess interventions they have towards improving the sanitation levels in Windhoek.

3.2. Data collection summary

In order to have a full and in-depth picture of the situation at hand, data was collected in a form of structured interviews. After a few appointments with the staff from the municipality, they advised that the researcher should get to know the community leaders of these settlements as it will help make the data collection process a bit easier. Following that, introductory meetings were then held with community leaders and those ones in charge of chosen groups. This was done to familiarise with the settlement and to avoid a lot of refusals.

- Interview schedule and questionnaire with open and close ended questions were developed as it was necessary for recommendation purposes and also reduce long and tiring interviews.
- Call back cards were designed in case of household members were not at home at the time.
- Face to face interviews were conducted with available head of household or household members
- Through the many appointments and different meetings with the municipality staff, questions from the mini questionnaires were asked by the researcher and they were answered, some were mailed to them by e-mail and returned back.
- Questionnaires were filled in by head of household and where they opt not to it was then handed to household members who opted to fill in.

- The data collection process included a team of four persons, with three field interviewers plus a researcher. The 3 persons were provided with all the necessary information and they could read, write and understand well in English and an additional local language.
- The interviews were conducted during the day, preferably from 8.am to 5.pm and where the household members were absence the designed call back cards were left behind and weekends served as alternative.
- The interview ran for 2 weeks and at least 8 households were covered by each interviewer daily. However an extra was added for the not at home and those that responded to the call back cards this was necessary to get the required sample size.

3.3. Sampling strategy

Both probability and non-probability sampling techniques were used and it was done at multi stages. Khomas region is divided into constituencies and these constituencies are divided into suburbs and under each suburb there are different settlements. Two constituencies namely Tobias Hainyeko and Khomasdal North were selected, then from these two suburbs namely Okuryangava and Otjomuise were chosen and lastly three settlements were selected through purposive or judgemental sampling. This is because the features, location of the settlements makes them suitable for the purpose of the study which is to compare. According to City of Windhoek representatives, these settlements are best for the study.

The unit of analysis that is used is the households in the selected settlements. The survey began with the introductory phase where a researcher gave a brief about the survey to community leaders. These leaders were told to inform their communities about the study. This was necessary so that the researcher is made known to the community and that those to be chosen for the study are made aware of the study.

From about 70 homes in the Otjomuise build together group settlement, 50 households were chosen through simple random sampling. In One Nation with a population of about 300 households, 120 were chosen through systematic sampling, choosing every 3rd household. Finally Onjika settlement has about 318 households of which 130 households were sampled through systematic random sampling.

According to the City of Windhoek, they have conducted various surveys in these settlements and for the purpose of the survey; each structure (that represented a household) was allocated a unique number (marked at conspicuous place). The number was used and continues to be used as

an identifier for the household. This research also used these numbers as identifiers for sampling the households.

3.4. Statistical data analysis

Based on the data collected, different variables were created. In order to examine the relationship, independent and dependent variables were analyzed with bivariate and multivariate correlation analysis. The variables created were demographic characteristics, education, income as independent and sanitation facilities as dependent variable and were analyzed with bivariate and multivariate methods.

The table show different variables to be created and analyzed.

Demo... characteristics	Education	Income	Sanitation facilities
Gender	Education level	Income level	Toilet
Age	Health education	Monthly savings	Sewer line provision

Bivariate correlations were used to establish and observe significant relationship between dependent variables while multivariate, more specifically, linear and logistic regression were used to study the relationship between independent and dependent variables which are listed above.

The logistic regression is used to model the relationship between a quantitative response variable and one or more explanatory variables. Our response variable has only two values: success or failure, live or die, yes or no, If we let the two values be 1 and 0, the mean is the proportion of ones, $p = P$ (success). With n independent observations, we have the *binomial setting*. We have data on an *explanatory variable* x . We study how p depends on x . in this study, the dependent variable is access to toilet facility and the dichotomous nature of the dependent variable is: either the household has access to sanitation facility or does not, while p is the probability that a household has access to sanitation facility. As a probability it must lie between 0 and 1. The standard logit model used is:

$$\text{logit}(p) = \log\left(\frac{p}{1-p}\right) = X_i \beta_i \text{ (Rethelford and Chop, 1993)}$$

where p represent the logit transformation of Accesses, X_i represent the independent variable and β_i is a vector co-efficient related to specific independent variables. The odds of using socio-economic determinants of access to sanitation can equivalently be determined in terms of probability of current use, p , as

$$3.4.1. \quad p = \frac{\exp(\beta_0 + \beta_1 x_1 + \dots + \beta_q x_q)}{1 + \exp(\beta_0 + \beta_1 x_1 + \dots + \beta_q x_q)} = \frac{1}{1 + e^z}$$

where $z = \beta_0 + \beta_1 x_1 + \dots +$

The fitted Cox & Snell's regression hazard models (R^2) was used to establish impacts of how strong the observed relationships and trends are. The proportional hazards model assumes that the time to event and the covariates are related. The hazard function is a measure of the potential for the event to occur at a particular time t , given that the event did not yet occur. Larger values of the hazard function indicate greater potential for the event to occur.

CHAPTER 4

RESULTS AND ANALYSIS

In this chapter, descriptive, chi-squared, bivariate and multivariate analyses of the findings are presented of each settlement and a comparison is done in a combined way. Findings from the interview with municipal staff are also presented.

4.1. Feedback from municipality

1. Looking at the income level of the low income community members, are they able to gain access to subsidised sanitation facilities? **Response:** Initially, water usage for the communal taps was charged through a community member collecting a nominal fee from residents. Subsequently, the municipality moved to a pre-paid fee system which is less hustle and more affordable.
2. Since people do not have proper sanitation facilities, is it because they do not want or was there not provision done? **Response:** After independence, people started settling unlawful in the remote areas in and around Windhoek. Although permission was not given for the establishment of such settlements, over time the residents have demanded basic services from the municipality (water, roads, electricity, land for settlement etc). Since there was no formal town planning in place prior to, or during settlement, the municipality is unable to provide services such as water, sewage and electricity to individual households. It was only possible to provide basic services at a communal level. These only consist of communal taps and toilets.
3. Are there environmental / health education conducted at the community level to raise awareness on the importance of sanitation? **Response:** Yes there are, these programs are intended to help improve the healthy living standards more especially to those that didn't get a chance to go to school
4. Do any planning processes involve concerned community members or is it the government that makes decision? **Response:** The City of Windhoek, settlement section has helped informal settlement communities to identify and elect people who will form a committee that represents them on issues relating to community development. So the consultation is done before any decision is made.
5. Are there any resources made available for this intervention? **Response:** Yes

4.2. Descriptive statistics

Toilet Facility

Toilet facility is an essential basic need in our everyday life that we need to use every day. Having access to one is thus a necessity although there are a whole lot of obstacles that is faced with in accessing a toilet. In developed world they are more accessed than in the developing world. A lot of factors influence one's access to sanitation or more specific proper sanitation facility.

Table 4.1 Percentage of households' access to sanitation for the three settlements

		Valid Percent	Cumulative Percent
Valid <i>One Nation</i>	No	55.3	55.3
	Yes	44.7	100.0
	Total	100.0	
Valid <i>Onjika</i>	No	13.2	13.2
	Yes	86.8	100.0
	Total	100.0	
Valid <i>Otjomuise</i>	No	29.0	29.0
	Yes	71.0	100.0
	Total	100.0	
Valid <i>Overall</i>	No	32.7	32.7
	Yes	67.3	100.0
	Total	100.0	

This table shows that in One Nation, more than half of the households in do not have access to toilet facilities and a mere 44.7% have access to toilet facilities. However in Onjika settlement the majority of the households have access to toilet facilities and only 13% do not have access to toilet facility. Most of these toilets are individual toilets as the settlement has just recently been serviced by the municipality providing them with a sewer line and this made it a bit easier for

households to connect to it. Although about 8% still use municipal toilets. Additionally it also gives us snapshot of a current situation on access to toilet facilities in Otjomuise low income settlement. It can be seen that about 30% of the households do not have access to toilet facilities while 71% have access to toilet facility.

What is more is that it also give us in a nutshell that overall, 67.3% have access to toilet facilities while those that do not have makes up slightly more than a third, standing at 32.7% respectively, they use either bush or riverbed as only a few of them use toilets at their workplace or school. Of all those that have access to toilet facilities some of them have their individual toilet facilities and some are municipal, however in some cases were households have individual toilets the municipality provided them with a sewer line where they can connect pipes to.

Age of Respondent

The age of a respondent is among the indicators of access to toilet facilities. The age of a person may and can influence their access to sanitation in such a way that that the older a person grows, the more they are more likely to have a toilet as they are too ashamed to go to the bush or riverbed, they are also at risk of being crime or murder victims.

		Toilet Facility		Total
		No	Yes	
<i>Otjomuise</i>	<29	9.7%	22.6%	32.3%
	Age of respondent 30-49	19.4%	29.0%	48.4%
	50<	0.0%	19.4%	19.4%
Total		29.0%	71.0%	100.0%
<i>Onjika</i>	<29	5.3%	34.2%	39.5%
	Age of respondent 30-49	7.9%	42.1%	50.0%
	50<	0.0%	10.5%	10.5%

Total		13.2%	86.8%	100.0%
<i>One Nation</i>	<29	18.5%	14.9%	33.4%
Age of respondent	30-49	29.5%	19.9%	49.4%
	50<	7.3%	9.9%	17.2%
Total		55.3%	44.7%	100.0

Table 4.2 Percentage of gender of households' access to sanitation for the three settlements

The table shows that in Otjomuise, out of the total percentage of 32.3 of those aged below 29 only 9.7% don't have toilet facility while about 23% do have access to toilet facilities. Those that are middle aged make up almost half of the population and out of those ones at least 19% do not have toilets or access to toilets while the remaining percentage is of the opposite per say. In addition to that the elderly or those one aged above 50 years and above all have toilet access to toilet facility. This could be due some of the reasons mentioned above however since they are old it might be that they have settled at this particular location for some times and it only makes sense that they have no plans of relocating any further so having a toilet they will keep it for life. In Onjika, it can be seen that out of the 39.5% of those that are below the age of 29 only 5.3% of them that don't have access to toilet facilities while the rest have access to toilet facility. The middle aged ones are makes up the highest percentage of all the ones that have access to toilets, of which 42.1% have access to toilets while a mere 7.9% do not have. However from those that are above the age of 50 all of them have access to toilets and this could be because of their age that they are too old and scared to go out in the bush or in riverbeds. On the other hand in One Nation, from the total percentage of 55.3% of those that do not have access to toilet facilities, 29.5% represents those that are middle aged making it the age group with the highest percentage without access followed by those below 29 years with 18.5% and the ones above 50 years bottom the list with 7.3%. Additionally, those that said yes the order of the list is still the same

with the middle aged group contributing 19.9%, Those that are younger are slightly lower with 14.9% and those that are above 50years have 9.9%.

Gender

Gender may also play a role on the access to toilet facility as it is known that biologically men and women are not the same and for this reason sometimes men are more comfortable than women. Additionally it gives dignity and security for women (women get assaulted when they go to the bush) with this we can thus conclude that women are more likely to have toilet facilities than male.

		Toilet Facility		Total	
		No	Yes		
<i>Otjomuise</i>	Female	12.9%	41.9%	54.8%	
	Gender of respondent	Male	16.1%	29.0%	45.2%
	Total		29.0%	71.0%	100.0%
<i>Onjika</i>	Female	10.5%	50.0%	60.5%	
	Gender of respondent	Male	2.6%	36.8%	39.5%
	Total		13.2%	86.8%	100.0%
<i>One Nation</i>	Female	20.7%	27.9%	47.6%	
	Gender of respondent	Male	34.6%	16.8%	51.4%

Total	55.3%	44.7%	100.0%
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Table 4.3 Percentage of gender of households’ access to sanitation for the three settlements

The table above shows that in Otjomuise, females have the highest percentage of those who have access to toilet facilities with a 41.9% and only about a third of them do not have access to toilet facilities. On the other hand 29% of males have access to toilet facilities while more than half of that percentage does not have access to toilet facilities and this could be due to the reasons explained above regarding social and biological characteristics of human beings. Similarly to Otjomuise, Onjika also have a high percentage of those that have access to toilet facilities than male taking up the whole half of the percentage while males only 36.8 have access to toilet facilities. 10.5% and 2.6% of females and males respectively still do not have access to toilet facilities in Onjika settlement. Finally in One Nation, out of the 47.6% females 27.9% have access to toilet facilities and 20.7% do not have access to toilet facilities. 34.6% of males do not have access to toilet facilities while only about half of male respondent have access to toilet facilities. There is a small percentage of 16.8% difference between those that have access to toilet facilities and those that do not have access to toilet facilities, meaning that the population is almost equally distributed of those that have and those that do not have access to sanitation facilities.

Highest Education level

Access to toilet facility also varies by education of residents. The knowledge gained through education will not only enable one to have a better chance of being successful and having good job but it enables one to have a greater awareness of sanitation and more hygienic way of living and it thus can influence one having a toilet or using a toilet facility.

The table below therefore shows us that all those that didn’t get any education do not have access to toilet facility, Additionally, those that only had as far as primary education have a highest percentage overall of those that do not have toilet facilities at 16% while only 6.6% of the same education status have access to a toilet facility.

Highest education level * Toilet facility Crosstabulation

		Toilet facility		Total
		No	Yes	
Highest education level	None	3.2%	0.0%	3.2%
	Primary	16.0%	6.5%	22.5%
	Secondary	6.6%	54.8%	61.4%
	Tertiary	3.2%	9.7%	12.9%
Total		29.0%	71.0%	100.0%

Table 4.4 Per cent of highest education level and households' access to sanitation (Otjomuise)

		Toilet facility		Total
		No	Yes	
Highest education level	None	2.6%	0.0%	2.6%
	Primary	2.6%	13.2%	15.8%
	Secondary	8.0%	68.4%	76.4%
	Tertiary	0.0%	5.2%	5.2%
Total		13.2%	86.8%	100.0%

Table 4.5 Percent of highest education level and households' access to sanitation (Onjika)

The table above shows that none of those that didn't receive any sort of education have access to toilet facilities and those that do not have make up 2.6%. Furthermore those that attended primary school 2.6% do not have access to toilet facilities as compared to those 13.2% of those that have access to sanitation. Additionally, those that went as far as secondary education, the majority of them have access to toilet facilities as compared to those that do not have, with 68.4% and 8.0% respectively. However off all those that have attend tertiary or are at tertiary level, all of them have access to toilet facilities with 5.2% This could be due to that they have a better understanding of the importance of a toilet facility compared to those ones that had none or little education.

The table below shows that overall those that did not have access any education, they have 4.9% for those that have no access to toilet facilities and only 1.4% with access to toilet facilities. Of those that attended primary school, there are 22.9% of those that do not have access to toilet facilities while those ones that have are slightly lower at 17.1%. Those that have attended secondary school are represented by 66.4% out of all those that said they do not have access to toilet facilities, while those that have they are standing at 73% out of all those that have access to toilet facilities. These high percentages could be due to that a large population of Namibia have at least gone until secondary level. Out of those one that do not have access to toilet facilities 5.8% have gone to tertiary while from those that answered yes to them having access to toilet facilities, 8.5% went to tertiary institution. Those that did not attend or have only primary education they have a higher percentage of those that do not have access to toilet facilities than those who have access to toilet facilities. This is however the opposite to those that had secondary and tertiary education.

Highest education level

Toilet facility		Valid Percent	Cumulative Percent
No	Valid		
	None	4.9	4.9
	Primary	22.9	25.7
	Secondary	66.4	91.4
	Tertiary	5.8	100.0
	Total	100.0	
Yes	Valid		
	None	1.4	1.4
	Primary	17.1	19.4
	Secondary	73.0	94.4
	Tertiary	8.5	100.0
	Total	100.0	

Table 4.6 Percent of highest education level and households' access to sanitation (Overall)

Environmental/Health education

Education in general enables one to have a better standard of living socially, financially, physically and so much more, However health education gives more than just that as it helps one to have a greater awareness of sanitation and more hygienic way of living, eating and to use health-care facilities. With that said one can thus say that those that had any environmental or health education conducted at the community level to raise awareness on the importance of sanitation have a high chance of having access to toilet facilities.

Environmental health education * Toilet facility Cross tabulation

	Toilet facility		Total
	No	Yes	
Environmental health education			
Never	33 12.9%	66 25.8%	38.7%
Sometimes	16.1%	45.2%	61.3%
Total	29.0%	71.0%	100.0%

Table 4.7 Percentage of highest education level and households' access to sanitation (Otjomuise)

The above table shows that those that have received health/environmental awareness on the importance of sanitation have a high percentage of those that have toilet facility standing at 45.2% and only 16% do not have respectively. However those ones that said they never received any form of such awareness overall have a high percentage of those that do not have access to toilet facilities and 25.8% of them have access to toilet facilities which makes up 36% of the 71% of those that have toilet access to toilet facilities.

Environmental health education * Toilet facility Crosstabulation

		Toilet facility		Total
		No	Yes	
Environmental health education	Never	7.9%	18.4%	26.3%
	Sometimes	5.3%	68.4%	73.7%
Total		13.2%	86.8%	100.0%

Table 4.8 Percent of highest education level and households' access to sanitation (Otjomuise)

The table above shows that ones that have never had any environmental/health education have a higher percentage of those that do not have access to toilet facilities with 8% compared to 5.3% of those ones that at least had any sort of environmental/health education. More than half of the respondents that said yes to access to sanitation facilities are those ones that had some form of environmental or health education with 68.4% and only 18.4% from those ones that said they have never heard or attended any sort of environmental/health education.

Environmental health education

Toilet facility			Valid Percent	Cumulative Percent
No	Valid	Never	45.7	45.7
		Sometimes	54.3	100.0
		Total	100.0	
Yes	Valid	Never	25.0	25.0
		Sometimes	75.0	100.0
		Total	100.0	

Table 7.9 Percent of highest education level and households' access to sanitation (Overall)

From the table above it shows that from those that said there was never any environmental health education conducted in their community makes up 45.7% of those that have access to toilet facilities and those that answered the opposite, with 54.3%. Of those that have access to toilet facilities, the highest percentage of 75% is scooped by those that had some sort of education while the remaining percentage is for those ones that have never had any environmental health education.

Sewer line provision * Toilet facility Crosstabulation

		Toilet facility		Total
		No	Yes	
Sewer line provision	No	20.6%	15.9%	36.4%
	Yes	12.1%	51.4%	63.6%
Total		32.7%	67.3%	100.0%

Table 4.10 Percent of sewer line provision and households' access to sanitation (Overall)

The table above shows that out of those that have access to toilet facility half of them have a sewer line provision while 15% said that there is no sewer line provided and this means that they either do not have flush toilets or they have flush to elsewhere apart from the sewer line. However those that do not have access to toilets 20% of them have no access to sewer line and only 12% said they have been provided with a sewer line although they still do not have toilet facilities because they are not provided like the sewer line or they simply cannot afford to set up toilets themselves.

4.3. Bivariate and multivariate

4.3.1. Analysis of Regression and Logistic Regression Results

Regression analysis is a more sophisticated way of examining the relationship between two or more variables. In each equation, a two tail test was conducted and used. The overall goodness-of-fit of the equations to the data was measured by the fitted Cox & Snell's regression hazard models (R^2). On the other hand logistic regression is used to model the relationship between a quantitative response variable and one or more explanatory variables, our response variable has only two values: success or failure, odds ratio were used to explain that any change in response variable x is attributed to change in the explanatory.

4.3.2. Model Building and Specification

The general model of this study was presented as follow:

$$TF_t = f(SL_t, AG_t, GDR_t, HEL_t, EHE_t, IL_t, MS_t)$$

where:

TF: Toilet Facility

SL: Sewer Line

AG: Age

GDR: Gender

HEL: Highest Education Level

EHE: Environmental Health Education

IL: Income Level

MS: Monthly Savings

T: Time factor

Equation 1.

Toilet facility and sewer line provision

$$TF = 1.44 + 1.70SL$$

(SE) (0.308) (0.447)

$$R^2 = 0.531$$

$$ODDS \text{ RATIO} = 5.87$$

According to the coefficient when the sewer line provision increases, the implication was a positive effect on access to toilet facilities. Previous studies have shown that provision of sewer line have positive implication on accessing sanitation facilities, this equation also came to the same conclusion. The Cox's model shows that about 53% of the variation in access to toilet is explained by the sewer line provision. Additionally the odds ratio shows that an increase of one unit in the log provision of sewer line (x) is associated with a 6unit increase in the odds that an one have access to toilet facility.

Equation 2.

$$\text{LOG (TF)} = -20.782 + 0.759AG - 0.868GDR + 20.894HEL - 1.150 EHE - 0.348IL + 0.073SAV$$

SE (28303) (.799) (.858) (.922) (.628) (.711)

$$R^2 = 0.821$$

Odds Ratio 2.13 1.075

In equation 2, the researcher found that it somehow came of a surprise that there is a negative relationship between access to toilet facility with age of respondent and respondents' monthly savings. Considering that descriptive statistics showed some sort of pattern them and that it makes sense to say that as one gets older the more they are likely to want to have toilet facility for security reasons and the more on saves they are more likely to have toilet facility.1 unit increase in age and monthly savings results in a 2.1 and1.1 decrease in the odds that one have access to toilet facility.

Gender, education level, health environment and income level have conformed to the theoretical expectations. The regression as a whole was statistically significant at 10% and 5% levels of significance. It can be seen from the coefficients that the above mentioned variable have positive relationship with access to toilet facilities. A unit increase in these independent variable implies that there is also an in the odds that one have access to sanitation facility. The goodness of fit was rather fairly high, which shows that the variation on access to toilet facilities is explainable by 82% of the whole regression taken into account.

4.4. Conclusion

The chapter presented descriptive statistics, linear regression, logistic regression more specifically odds ratio and the goodness of fit using the Cox & Snell model. Most of the variable in the study and those that were selected for the analysis have shown that they are actually related to one's access to toilet facility. They were also mostly significant at their levels of significance.

CHAPTER 5

DISCUSSION AND RECOMMENDATIONS

5.1. Discussions

From the results presented in the previous chapter, different current sanitation practices were identified, investigated and compared of the low income households in the three different settlements. Relationships as well as their strength were analysed, and finally an investigation on how far the municipality interventions to improving sanitation facilities.

It shows that more than half of the study population have access to toilet facilities while one third still do not have access to toilet facilities with 67.3% and 32.7% respectively. In Onjika settlement majority of them have access to toilet facilities compared to the other settlements. This is due to the fact that Onjika has recently just been serviced by the municipality, providing them with all the basic services such as water lines, electricity lines, sewer lines and proper streets. Those that have not yet have access to these services are either just too poor to or they do not want to as the municipality made sure that individuals knows that there is a line that have been provided for them to connect to.

Otjomuise comes second after Onjika in terms of access to toilet facility. Before any settlement can be serviced, some people have to be relocated from that settlement to another one in order to make enough space to move around, to make street and give each location a unique identifier which will be referred to as the ERF number. Before they move people to a particular location, they make sure that the land is serviced for those that will be relocated there, part of Otjomuise have therefore served as such a location.

Finally Onjika has the lowest percentage of those that have access to toilet facilities, More than half of the population in Onjika have no access to toilet facilities and majority of them use the river bed or bushes as toilet facility, although a tiny percentage said that they use toilet facilities at their workplace and schools. This could be because they settlements have not yet been serviced by the municipality like in cases of the others.

Gender, education level, health education and income level have impact on the access to toilet facilities as it can be seen from the descriptive that females are more likely to have access to toilet facilities than males, the more educated the respondent is the more they are likely to have access to toilet facilities. Additionally those that have any sort of environmental or health education are more likely to have access to toilet facilities than those that do not have any health education to raise sanitation awareness. Lastly those that have a high income are more likely to have access to toilet facility than those that have none or little income.

However, even if the descriptive shows that age and monthly savings may have an impact on one to have access to toilet facilities, regressions shows the opposite that they do not have any impact on it as there is a negative relationship between them.

From the regression it shows that provision of a sewer line to the community makes it easier for one to have access to toilet facility, it thus makes sense for one to say that the more the community is provided with sewer line then they are more likely to have access to toilet facilities.

The age of respondent and their monthly savings did not have that much of an effect on accessing toilet facilities, comparing them to the other variables with the level of education topping the list, followed by health education, gender and income level respectively.

5.2. Recommendations

While the provision of safe water and sanitation to households has improved since independence, much remains to be done. Schools could play a key role in making future citizens aware of their right to water and sanitation as well as helping to give them the understanding and skills to improve and preserve their facilities. Schools are an important place for promoting hygiene, as children can be agents of behavioural change within households. Health education should be introduced in school as from the early level of primary for everyone to have knowledge on it as it is known nationwide that at least 80% of the population have received primary education.

Like water and sanitation, Sanitation and hygiene also go hand in and as it cannot be managed or done without sanitation in question. In order to maintain and adopt safe hygienic practices, the nation, communities and individuals needs to change their behaviours towards hygiene and sanitation and this can be done through a lot of approaches. We can only achieve this by

promoting hygienic conditions. Hygienic behaviours, such as using latrines, hand washing with soap after use and cleaning sanitation facilities are important in improving public health. Much support to the ministry of Health and Social Services on their National Sanitation Strategy is given by the researcher as they suggested like the researcher that “The adoption of safe hygiene practices requires individual to change their behaviours and a wide range of participatory approaches and education tools exist to make changes happening faster and make changes sustainable”

Some of the approaches do need the government and its line ministries, different institutions, private entities as well as the communities concerned to come forward and work together as a team in order to achieve the country’s targeted goals on sanitation.

There is great need for community involvement in any planning and development that is concerned and affects a certain community. Even though the municipality makes provision for that, much more still needs to be done from both sides the community and all sanitation stakeholders. The community needs to be educated on their rights and acquisition of basic services in their settlements but this can only be possible if people stop being ignorant and actually start to attend the different meetings that the municipality and other stakeholders initiates. Municipality and stakeholders need to make sure that they also go an extra mile when they are organising these meetings and they need to put the behaviour of different individuals in mind.

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APPENDIX: QUESTIONNAIRES

Mini questionnaire for the City of Windhoek staff

Thank you for agreeing to give me your time to participate in this study by answering the following questions.

1. Looking at the income level of the low income community members, are they able to gain access to subsidised sanitation facilities?
2. Since people do not have proper sanitation facilities, is it because they do not want or was there not provision done?
3. Are there environmental / health education conducted at the community level to raise awareness on the importance of sanitation?
4. Do any planning processes involve concerned community members or is it the government that makes decision?
5. Are there any resources made available for this intervention?

Household questionnaire

Rosalia Kangoya, with the University of Namibia is carrying out a research project as part of the final year curriculum. This survey aims to investigate and compare households' access to sanitation facilities and services in the low income settlements in Windhoek

I would very much appreciate your participation in this survey, so I'm asking you to take few minutes to fill in or answer this questionnaire.

NB: THE INFORMATION COLLECTED/PROVIDED WILL BE KEPT CONFIDENTIAL AND WILL BE USED FOR THE PURPOSE OF THE STUDY ONLY.

Thank you for your co-operation and participation

To be filled in by interviewer

Questionnaire number	
Constituency	

Suburb	
Settlement	
Household number	
Interviewer's name/number	

SECTION

A

DEMOGRAPHICAL INFORMATION

1. Please tick in the appropriate box or fill in the space provided

1.1. Title Mr. Mrs. Ms. other

specify _____

1.2. Age < 29 30-49 50 <

1.3. Sex Male Female Other

1.5. How long have you resided at your current place of resident? Less than a year

1-5 years 5-10 years more than 10years

Place of origin (Region, Town /Village) _____

SECTION B

1. EDUCATION

1.1. What is your highest education level? Pri

Seco Te Lite

1.2. Are there environmental / health education conducted at the community level to raise awareness on the importance of sanitation?

Always Sometimes Never

2. INCOME

2.1. Occupation

specify _____

2.2. What is your main source of income? Salary Grant

Personal income

2.3. What is your income level less than 500 500-1500

1500-3000 more than 4000

- 2.4. How much is your monthly expenditure/spending? Less than 1000
 1000-3000 more than 3000
- 2.5. How much is your monthly savings? None less than 500
 500-1500 more than 1500

SECTION C

SANITATION FACILITIES

- 1.1. Do you have toilet facility around here? Yes No
- 1.2. The next four questions for those who answered NO to the previous question only, if you answered yes proceed to question 1.7
- 1.3. If not why? Not provided Can't afford other
 (specify) _____

- 1.4. Where do you go for toilet use? _____
- 1.5. Was there any interventions done by the municipality on toilet facilities provision?
 Yes No
- 1.6. If yes, are there any progress done on the provision? Yes No
- 1.7. What type of toilet facility do you use?
- | | | | |
|---|--------------------------|----------------------------------|--------------------------|
| Flush or pour –flush to: - piped sewer system | <input type="checkbox"/> | Flush or pour–flush to Elsewhere | <input type="checkbox"/> |
| Septic tank | <input type="checkbox"/> | Pit latrine | <input type="checkbox"/> |
| Ventilated improved pit Latrine | <input type="checkbox"/> | Pit latrine with slab | <input type="checkbox"/> |
| Pit latrine without slab or open pit | <input type="checkbox"/> | Bucket | <input type="checkbox"/> |
- 1.8. Do you share a toilet? Yes No
- 1.9. If yes, how far is your toilet to your house? Inside house inside yard
 less than 50m 50-100m more than 100m
- 1.10. How many household uses the same toilet? Less than 5 5-10
 10-20 more than 20
- 1.11. Was the toilet provided by municipality or by an individual? Yes
 No
- 1.12. Is there a sewer line provided by the municipality? Yes
 No

