FACTORS INFLUENCING SANITATION OF WATER-CLOSET TOILET PROJECTS IN EATERIES IN KENYA: A CASE OF MERU TOWN, MERU COUNTY

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DECLARATION

This research project report is my original work and has not been presented for any degree in any other University.

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This research project report has been submitted for examination with my approval as the University supervisor.

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DEDICATION

I dedicate this to research project report to my beloved parents Mr. and Mrs. Nyaga who have been supportive throughout this journey. I am grateful for their constant encouragement in my life goals and dreams. I also dedicate this research study to my siblings who have always been there for me, and have constantly been a pillar of strength to do my very best even when the going was very tough. May the almighty God always be with you all and reward you abundantly.

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LIST OF ABBREVIATIONS

CDF	-	Constituency Development Fund
Domwass	-	Diocese of Meru Water and Sanitation Services
IEA	-	Institute of Economic Affairs
Imethawasco	-	Imetha Water and Sanitation Company
IRIN	-	Integrated Regional Information Networks
JMP	-	Joint Monitoring Programmes
KDHS	-	Kenya Health and Democratic Survey
MDGs	-	Millennium Development Goals
Mewass	-	Meru Water and Sewerage Services
MoPHS	-	Ministry of Public Health and Sanitation
MoWI	-	Ministry of Water and Irrigation
ODF	-	Open Defecation Free
UN	-	United Nations
UNICEF	-	United Nations Children's Fund
VIP	-	Ventilated Improved Latrines
WASH	-	Water, Sanitation and Hygiene
WC	-	Water Closet
WHO	-	World Health Organization
WSTF	-	Water and Sanitation Trust Fund

ABSTRACT

Factors resulting to inadequate sanitation, such as lack of or improper sanitary water closet systems have been found to be a major problem in the world. Inadequate sanitary utilization of water-closet toilets projects has for decades been a unique and important contributor to poor health and environmental degradation in different settings in the world, including the settings where majority of Kenyans consume food and beverages. This study was set to investigate factors influencing sanitation of water-closet toilet projects in eateries in Kenya, a case of Meru town, Meru County. The objectives of the study were to establish how adequacy of water-closet toilet projects in eateries influence sanitation, to determine how level of proper utilization of water-closet toilet projects in eateries influence sanitation and to establish how sewerage connectivity of water-closet toilet projects in eateries influence sanitation. The study adopted a descriptive survey as the research study. Sampling technique used was the non-probability convenience sampling. The study focused on 382 respondents in 121 eateries in Meru town. Data was collected using structured observation checklists which focused on customers whereas interviews of key informants focused on staff from the eateries. Data analysis took place with the help of a statistician via Statistical Package of Social Sciences using descriptive, inferential statistics. The results were presented in tables and figures. The results of the study established that majority of water-closet toilet users are the young people aged between 20-30 years of age whose practice of hand washing and flushing is below average. Majority of eateries have adopted new technology that is required to construct and maintain water-closet toilet systems yet less than half have complete systems available for ensuring proper hand washing and flushing practise as well as sufficient separation and disposal of human excreta. The study established that behaviour and self-efficacy that directly affect utilisation of water-closet toilet systems including frequency of cleaning of the water-closet toilet systems with regard to sanitation was quite low which greatly contributed to high levels of bad odour and flies nuisance. Furthermore, majority of respondents were aware of the importance of personal hygiene and sanitation as well as health risks associated with this yet majority are not putting the necessary sanitation practises into action. Blockage of sewerage connections mainly results due to lack of flushing after use, blockage by sanitary pads, papers and other inappropriate materials use anal cleansing. Challenges experienced due to this are mainly high cost of repairs and maintenance, nuisance caused by flies and odour and water-borne diseases as well as loss of revenue due to closure of eateries by public health personnel. Cost related factors were the highest hindrance to adherence to policies and procedures. Suggested improvements by respondents included the need for interventions by the County government including subsidize legal and County policies which would guarantee that these projects meet the expected health standards and hence meet the needs of the intended beneficiaries. The study recommended that beneficiaries should adopt an attitude and practice that ensures proper their proper usage hence guarantee high sanitation standards in eateries. It also recommended that self-efficacy and motivation are key factors in ensuring behaviour change. That ownership as well as participation, co-ordination and collaboration with stakeholders are necessary to facilitate the required improvement, and that partnerships with stakeholders from the relevant backgrounds including health and legal fraternity in conjunction with the government can be relied upon to assist in water-closet project success in facilitating sanitary performance.

CHAPTER ONE
INTRODUCTION

The aim of this chapter is to capture the background information with regard to sanitation of water-closet toilet projects from the global, national, regional and Meru town perspective as well bring focus to matters related to sanitation in eateries.

1.1 Background to the study

According the WHO sanitation can be defined the provision of facilities and services for the safe disposal of human urine and faeces. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities (WHO, 2014).Utilization involves proper human waste disposal, water handling from the source to the point of consumption and effective washing hands with soap after using the toilet. (Waterkayn,2000). National sanitation guidelines (2000) defines adequacy of sanitation facilities as the state of cleanliness of the facilities, it involves presence of clean latrines and urinals, functioning hand washing facilities with soap and water.

A report by UN on International Decade for Action, Water for Life (2005 – 2015) argued that 2.5 billion people which is roughly 37 percent of the world's population still lack what many of us take for granted, access to adequate and sustainable sanitation. Open defecation is one of the main causes of diarrhoea. The report continues to say that this results in the deaths of more than 750,000 children under age 5 every year. This translates to statistics showing that every 20 seconds a child dies as a result of poor sanitation. It was also reported that 80 per cent of diseases in developing countries are caused by unsafe water and poor sanitation, including inadequate sanitation facilities.

In 2012, 89% of the global population used an improved source of drinking water, and 64% used an improved sanitation facility. Also 116 countries have already met the Millennium Development Goal (MDG) drinking water target, and 77 have already met the MDG sanitation target. Despite increases in sanitation coverage, progress has been slow. Globally, 2.5 billion people do not have access to improved sanitation facilities.

The MDG sanitation target aims to reduce the proportion of the population without access to improved sanitation from 51% in 1990 to 25% in 2015 (UN /WHO, 2014).

There are still 46 countries where less than half the population has access to an improved sanitation facility. Despite knowledge of the existence of improper sanitation practices involving water closet toilet projects worldwide, adequacies and hygienic standards of water- closets already in place and their proper utilization is still lacking (UN /WHO, 2014).This can be assumed to be worsened by increased population growth and urbanization as well as lack of proper connection to sewerage systems for appropriate final disposal of human excreta.

Poor sanitation costs Kenya 27 billion Kenyan Shillings each year, equivalent to US$324 million, according to a desk study by the Joint Monitoring Programme for Water and Sanitation Program. This cost is in terms of money spent due to poor sanitation including treatment of illnesses resulting due to poor sanitation practices. (Water and Sanitation Program, 2012).This sanitation crisis impairs progress to attaining the MDGs, Vision 2030 and ODF (open defecation free) roadmap targets in Kenya (Water and Sanitation Program, 2012).

According to the official Meru County government website, the Meru County has three major water service providers which include Mewass operating in Meru town and its environs, Imethawasco operating in the rural areas and other towns and Domwass operating various schemes in the county rural areas. Domestic water supply in Meru includes urban supply and rural supply. On the other hand sanitation services include urban services which include sewerage and eco-san toilets and rural services that include VIP latrines as well as septic tanks (Meru County government website, 2018).

The number of households with access to safe water sources include, access to piped water standing at 21,920 while households with access to portable water are 6,744. This contrasts sharply with the abundance of water as only 2 percent of the population has access to piped water (Meru County government website, 2018).

Access to water is greatly related to access to safe human excreta disposal and management. Toilets are one important element of a sustainable and functional sanitation system. WHO recommends proper and timely case management in communicable diseases including cholera treatment centres. From 1st January 2017 through 29th November, 20 of 47 counties (43%) in Kenya had reported positive cholera cases. The affected communities should have improved access to water, effective sanitation, proper waste management, and enhanced hygiene and food safety practices (WHO, 2017).

1.2 Statement of the problem

The persistence of poor sanitation and hygiene in third world countries continues to contribute to avoidable water borne diseases which should not be a major health issue in this day and age. This study therefore sought to investigate factors influencing sanitation of water-closet toilet projects in eateries in Kenya: a case of Meru town, Meru County.

Poor sanitation coupled with rising urbanization is one of the leading causes of morbidity and mortality rates related to disease outbreaks in Kenya, this result to malnutrition, poverty as well as environmental degradation and its pollution due to poor excreta disposal. With Kenya's population projected to grow by up to 1 million people per year, existing water and sanitation facilities will be stretched further (IRIN, 2010).

Factors resulting to inadequate sanitation, such as lack of or improper sanitary water closet projects have been found to be a major problem in the world; this is according to WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP), released in early 2017 (collected in 2015).The same Programme also supports that in the world, according to its latest estimates, 36 % of the world's population 2.5 billion people lack improved sanitation facilities. Inadequate access to safe water and sanitation services leads to impoverishment and diminished opportunities for thousands more hence the importance of doing this study (WHO/UNICEF, 2015).

This study was also important because, in Kenya access to safe water supply stood at 57% in urban areas and 42% in rural in the year 2000.These percentages also contribute to the low percentages of adequate sanitation coverage in the country (KNBS/SID, 2015).

There is a need to improve sewerage coverage which is currently at 5% in Meru town; the county government aims to increase it to 70%. According to the County of government of Meru revised annual development plan dated 2017/2018, the major challenges related to sanitation encountered include old dilapidated systems, low accessibility to water, lack of proper and adequate sewer disposal There is therefore a big gap which can be covered by improving sanitary projects in eateries within Meru town centre and its environs. This can be achieved through investigating factors that influence sanitary performance of water closet projects in eateries in Meru town centre to ensure workable standards as well as lasting mitigation measures (Meru County Government website, 2018).

1.3 Purpose of the study

The purpose of this study was to investigate factors influencing sanitation of water closet toilet projects in eateries in Kenya: a case of Meru town, Meru County.

1.4 Objectives of the study

1 To establish how adequacy of water-closet toilet projects in eateries influence sanitation.

2 To determine how level of proper utilization of water-closet toilet projects in eateries influence sanitation.

3 To establish how sewerage connectivity of water-closet toilet projects in eateries influence sanitation.

1.5 Research Questions

1 How does adequacy of water-closet toilet projects in eateries influence sanitation?

2 How does level of proper utilization of water-closet toilet projects in eateries influence sanitation?

3 How does sewerage connectivity of water-closet toilet projects in eateries influence sanitation?

1.6 Significance of the study

It has been noted that although water supply has over the past two decades increased in terms of coverage, sanitation facilities have lagged far behind. Nonetheless, there is some effort being made to improve the situation. By investigating factors influencing sanitation of water-closet toilet projects in eateries in Kenya; a case of Meru town, Meru County this study would help provide valuable insights into what remains to be done. The study looked into how adequacy, level of proper utilization of already available water closet projects of eateries as well as how sewerage connectivity influence sanitation of water-closet toilet projects in Meru town, Meru County.

A water-closet toilet system is also known as a flushing toilet that disposes of human excreta by using water to flush it through a drainpipe to another location for treatment and disposal, thus maintaining a separation between humans and their excreta. Their adequacy and level of proper utilisation include ensuring that every eatery has a functional water-closet toilet system, its proper usage, maintenance, proper disposal and treatment of waste. Factors influencing sanitation basically should mean that these projects are able to meet their objectives in ensuring sanitation prestige of Meru town.

This is therefore important to project managers, health and education policy makers , humanitarian agencies as well as government funding agencies concerned with sanitation in town centres given that this study will concentrate on Meru town a prime area for business hence mostly attracts a variety of people on a day to day basis.

The findings and the subsequent recommendations shall be useful in better project planning and management of sewerage works within town as well provision of modernized projects hence improved methods of sanitation that are efficient and effective and encourage various stakeholders to put more effort to increase sanitation coverage to meet the millennium development goals.

The study may add scientific value to help researchers interested in similar or related studies to further understand the health hazards on the ground in relation to sanitary utilization of water closet projects in Meru town and therefore address the shortfalls accordingly. This also creates perspective into carrying out further research into related topics with the aims of improving sanitation coverage.

The study highlights the sanitation situation on the ground; challenges experienced and proposed improvements to what is expected. This may help Meru town and its environs to bridge this gap, hence through project managers, public health practitioners and other related stakeholders improve overall health in Meru and its environs through setting out health strategies that in turn shall result in equitable and maintainable health promotion.

1.7 Delimitations of the study

The specific area where the study was carried out was in eating houses that have water-closet toilet systems within Meru town, Meru County.

Only structure observation checklists and interviews of key informants were used as tools for data collection in relation to the three objectives of the study.

1.8 Limitations of the study

The research study was limited to eateries in Meru town, Meru County.

The study was also limited by data collection process in that there is secrecy when it comes to the use of toilets thereby details pertaining to this were not easy to come by. This was minimised by taking time to explain the confidentiality that would be guaranteed to the respondents.

1.9 Assumptions of the study

The assumption was that the respondents have knowledge of what measures are taken to ensure food safety an as well provide hygienic standards of water closet toilet projects in eateries. It was also assumed that the structured observation checklists and interviews of key informants were valid in measuring the desired constructs and that the respondents answered questions correctly and truthfully.

1.10 Definition of significant terms

Adequacy: This is the state or quality of being acceptable, sufficient or satisfactory for the purpose concerned.

Eatery: This is a restaurant, an eating house or other commercial establishments serving food.

ICF Macro: Provides research and evaluation, management consulting marketing and communications, and information technology services for governments and businesses in the United States and internationally.

Level of utilisation: This is the extent or proportion at which water-closet toilet systems are being used to ensure proper separation and disposal of human excreta.

Meru town centre: Includes the central part or main business and commercial area of Meru Town.

Project: Includes a unique, transient endeavour, undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes or benefits. A project is usually deemed to be a success if it achieves the objectives according to their acceptance criteria, within an agreed timescale and budget.

Sanitation: This is the hygienic means of promoting public health through prevention of human contact with human excreta as well as the treatment and proper disposal of sewage or wastewater.

Sewer: An artificial, usually underground conduit for carrying of sewage or rainwater.

Sewerage: This is the provision of drainage by sewers.

Sewerage connectivity: This is the infrastructure that conveys sewage and how they are attached to one another functionally.

Water-closet toilet system: An enclosed room or compartment containing a toilet bowl fitted with a mechanism for flushing.

Water-closet toilet system in eateries: An enclosed room or compartment containing a toilet bowl fitted with a mechanism for flushing within a restaurant, eating house or other commercial establishment serving food

1.11 Organization of the study

The research study is organised into five chapters. Chapter one contains the background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, delimitations, limitations, assumptions of the study, definition of significant terms and organisation of the study. In chapter two literature is reviewed in the following order; sanitation of water-closet toilet projects, adequacy of water-closet toilets projects in eateries, level of proper utilization of water-closet toilet projects in eateries and sewerage connectivity of water-closet toilet projects in eateries. The chapter also presents a theoretical framework based on the theory of behavioural change and conceptual framework showing the dependent and independent variables and the various indicators. Chapter three outlines the research methodology used in the study and includes research design, target population, sample size and sampling techniques, data collection instruments, pilot test, validity of the instruments, reliability of the instruments, data analysis and ethical consideration. The study also presents the operationalization of variables table. Chapter four presents analysis, presentation and interpretation of data. Chapter five entails summary of findings, discussions of findings, conclusions, recommendations and suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter highlights various studies previously done by professionals in different parts of the world with regard to sanitary utilization of water-closet toilet projects in eateries and related topics.

2.2 Sanitation of water-closet toilet projects.

Having access to sanitation is a basic human right, yet almost a third of the world's population suffer on a daily basis from a lack of access to a clean and functioning toilet. Sanitation is the safe disposal of human excreta and associate hygiene promotion. Sanitation so described is important as it separates humans from excreta. A safe toilet accompanied by hand washing with soap, provides an effective barrier to transmission of diseases. Without toilets, untreated human waste can impact a whole community, affecting many aspects of daily life and ultimately posing a serious risk to health. In the developing countries, sanitation projects having a functional sewerage system in a hotel is rarely a priority (WHO/UNICEF 2012).

For the effective management or investigation of a water project, sanitation project or hygiene project, the manager or researcher has to be aware of the current state of the project at any given point to be able to review its direction and measure progress towards its goal. Many indicators of progress can be measured but collecting and analysing information is expensive, so choosing which indicators to use and deciding when, where and how to measure them is important. Chosen indicators which should be specific, measurable, attainable, relevant and time bound should be easy to understand and relevant for decision making, evaluation and communication, hence measurements are useful for all stakeholders involved with a water and sanitation project. Well chosen indicators can ensure the services delivered are efficient and effective (Schwemlein, S., Cronk, R., & Bartram, J. 2016).

According to the international journal of environmental research and public health published in 2016, drinking water, sanitation, and hygiene (WaSH) are important for human health, well-being, and development. In September 2015, the United Nations launched the Sustainable Development Goals where a set of 17 goals and 169 targets for sustainable human development. The SDGs include a goal for water and sanitation: to "ensure access to water and sanitation for all" by 2030. Since 1990, 2.6 billion people have gained access to improved water sources and 1.9 billion people have gained access to improved sanitation. However, 663 million people lack an improved water source and 2.4 billion people do not use improved sanitation (Schwemlein et al, 2016).

The same journal supports that monitoring water, sanitation, and hygiene (WaSH) is important to track progress, improve accountability, and demonstrate impacts of efforts to improve conditions and services, especially in low- and middle-income countries. In this case performance can be measured through improved monitoring of (WaSH) conditions which is needed to track progress, improve accountability, and demonstrate impact. Monitoring data can be used to inform policy development and resource investment. Monitoring data can be used to identify opportunities to adjust the implementation strategy of a project or program at an interim stage, thus contributing to improved results (Schwemlein et al, 2016).

WHO (2009) argues that Assessment of performance of sanitary projects can be as simple as monitoring hand hygiene. Monitoring hand hygiene adherence serves multiple functions: system monitoring, incentive for performance improvement, outbreak investigation, staffing management, and infrastructure design. Detection of hand hygiene compliance by a validated observer (direct observation) is currently considered the gold standard in hand hygiene compliance monitoring. It is the only method available to detect all occurring hand hygiene opportunities and actions and to assess the number of times and appropriate timing when hand hygiene action would be required in the sequence of care.

WHO (2009) continues to show that observations are usually performed by trained and validated observers who observe care activity directly and count the occurring hand hygiene opportunities and determine the proportion being met by hand hygiene actions.

Observation is a sophisticated activity requiring training, skill and experience. Observers have to be aware of the multiple potential biases introduced with the observation process and they can help to minimize these by gaining a full understanding of the methodology. A stringent adherence to the same methodology over space and time is required.

2.3 Adequacy of water-closet toilets in eateries

In 2012 there were outlined clear targets for water and sanitation provision. These targets were quite ambitious in their aim of reducing by half those who lacked access by 2015 but short of ensuring universal access. These efforts over the past decade have yielded some progress. The target for water supply was reported as being met in 2010, with 2 billion people gaining access to improved water since 1990. However, this achievement is somewhat overshadowed by the fact that achievement of the MDG target for sanitation now appears beyond reach. (Elisa et al., 2012).

In spite that eateries are embracing modern methods of water and sanitation provision there continues to be sanitary projects undertaken that fail to results in overall improvement of health and hygiene. Despite this, limited studies have been conducted in relation to the cause and effect of sanitary projects to health. It is said that one toilet and one wash hand basin must be provided for up to 5 staff in the workplace at any one time. It is preferable for staff toilets to be separate from customer toilets, but where they are shared, the number of toilets may need to be increased to ensure the staff can use them without undue delay (NEA,1999)

Lack of adequacy in terms of numbers of available and usable water closet projects is a contributing factor that influences sanitary behaviour of their use by a community. When a basic standard service is adequate to a particular group then the consequences related to this such as health related issues become an emerging health issue (WHO, 2004). Adequacy of water closet toilet systems continues to be an issue in the modern times, as supported by UNICEF (2016) it has been more than 160 years since the link between sewage-polluted drinking water and cholera was first established yet from December 2014 to August 2016, more than 17,000 people were hospitalized due to cholera in Kenya. It is a stark reminder that inequalities do persist, and that sanitation and clean

drinking water are still of crucial importance if Kenya is to stand to achieve the new Sustainable Development Goals. The world Toilet Day which aims to push sanitation to the centre of the development agenda is therefore key for Kenya and for accomplishing the country's Vision 2030ambition.

Sanitation facilities are required at public buildings to facilitate proper excreta waste disposal. The large number of people using a concentrated facility can cause problems if there is inadequate on-site drainage and a lack of proper planning, general maintenance, such as cleaning of the toilet and drainage. Most types of on-site sanitation systems can be used, provided that project managers and developers take note of the special requirements for public facilities (Austin, L M and Van Vuuren, S J. 2001).

Many people in developing areas are not only unable to afford sophisticated sanitation systems, but these systems may also be technically inappropriate for them. At the same time, the sanitation alternative with the lowest overall cost may also be inappropriate because of the community's cultural background or because of its unwillingness, lack of knowledge or inability to operate the system correctly. Also, proper latrine use is behaviour much beyond structures. Using a latrine, hand washing after latrine use, maintaining a latrine in an adequately sanitary state, is in many cases, more of factors of attitude and habit than existence of structures (Austin et al., 2001).

2.4 Level of proper utilization of water-closet toilets in eateries

Improper utilization of already available water closet toilet systems is a factor that influences the sanitary utilization of public facilities, which in this case includes eateries in Meru town. It is also important to create awareness of the related issues such as consequences of poor sanitary behaviour of excreta disposal within eateries in order to improve overall public health. Contributing factors to lack of awareness of consequences of poor sanitation can be attributed to geographic, socio cultural and economic inequalities. Others its mere ignorance since they believe it is not the customer's obligation but that of the hotels to ensure sanitation regardless of the situation.

Eliminating this issue is greatly intertwined with the need to for poverty reduction hence cycle of communicable diseases which is the mother of many health related issues in Kenya (Munganiaand G.K. Rukaria 2008).

Kenya is a developing country where inequalities are apparent. According to the UNICEF report 2014 Update, improved services have continued to be disproportionately more accessible to more advantaged populations in the world. This means that there is need to make nationwide efforts to move people up the sanitation ladder, encouraging communities to participate in sanitation projects and practice better sanitation and construct sanitation facilities that are functional and easy to maintain (Mungania et al., 2008).

Proper utilisation of sanitary project is highly linked to urbanisation. Urbanization is often associated with rapid and unplanned growth, poverty, and environmental degradation. Substandard housing, crowding, air pollution, water pollution, over usage of water sources, and inadequate sanitation facilities and services are mostly related to rapid urban growth (Moore et al., 2003). Adequate sanitation is the foundation of development but it has been found a half of the people in the world do not have access to toilets or latrines. The percentage of those with access to hygiene sanitation facilities has declined slightly over the 1990‟s, as construction has fallen behind population growth (UNICEF, 1997).

Only 19.5% of the urban households are connected to the sewer network system. There is therefore an urgent need for up-scaling using appropriate sustainable low cost on-site sanitation systems in order to cover many more people within a short term at a low per capita cost. (WSTF, 2010).This is because the eateries' owners cannot make these changes by themselves, but rather in conjunction with stakeholders to facilitate methods that are affordable, accessible and sustainable. These should be implemented to improve sanitation in these projects.

The weakest part is always the cistern flushing unit which is often broken down due to improper usage thus causing high maintenance cost. The toilet bowl consists of a siphon which provides a water seal against bad odours from the effluent pipe. Faeces and urine are then flushed away with water stored in the cistern. Depending on the type, 5 to 25 litres can be used per flush. These types of toilets provide the highest level of convenience and if made available hence adequate and maintained appropriately then they will provide very clean and hygienic waste disposal methods (WHO/UNICEF, 2010). Improper usage of water closet toilet systems has shown to negatively affect sanitary projects worldwide. Improper waste disposal is a universal problem. Worldwide 2.6 billion people were without proper adequate means of excreta disposal facilities by 1990 and the gap widened in 1994 to 2.9 billion people (UNICEF, 1994). This is why devising functional methods that ensure adequate numbers of water closet systems in eateries is imperative.

2.5 Sewerage connectivity of water-closet toilet projects in eateries

According to Kuruvilla et al, (2018) healthy life is an outcome of sustainable development including a powerful and undervalued means of achieving it. Sustainable development can be said to be that development that meets the needs of the present without compromising the future generations to meet their own needs. The goals of sustainable development cannot be achieved when sanitation projects do not directly result to reduced prevalence of debilitating illness and poverty, and the health of a population cannot be maintained without a responsive health system and a healthy environment.

Poverty greatly influences all other factors since it is the root cause of slow progress in improved sanitation. In Meru County, considering improvement and efficient sanitation projects are important. Involvement of all stakeholders in community development to ensure support of human rights to adequate sanitation is highly recommended. Resultant lack of the above elements brings about a vicious cycle. This includes lack of proper utilization of water closet projects, improper excreta disposal, contaminated food and

water which in turn results in spread of waterborne diseases and further increase of poverty levels (Munganiaet al., 2008).

The MoWI's own assessment indicates 20% of urban Kenyans have sewerage connections as gathered in 2007, but that only 3–4% of urban wastewater receives treatment, while industrial wastewater treatment including that coming from hotels is also a concern. This means that human excrement is rarely properly treated before secondary disposal. In the long term, sewerage remains the likely preferable option in human excreta disposal in the urban areas, but exploration of low-cost technologies which are efficient and functional is required if it is to benefit Kenyans living and working in the urban setting to promote sanitation (Mowi, 2007).

MoWI (2007) continues to support that investigating factors influencing sanitary utilization of water-closet toilet projects in eateries within Meru town centre therefore could be a major breakthrough in solving sanitation issues related sewerage connectivity of eateries in Meru town centre. This will therefore help project managers come up with improved sanitary projects that are long lasting efficient and effective.

A malfunctioning or nonexistent sewerage system will affect the adequacy of sanitary projects, health of those using them and impact the environment negatively as a whole. Functional sanitation projects interrupt the transmission of faecal–oral disease at the most important source by preventing human faecal contamination of water and soil. Poor waste disposal practices due to poor sewerage connections are responsible for significant proportion of world's infectious disease burden. Diseases due to poor tap water supply, sanitation and personal and domestic hygiene cause 4.0% of all deaths and 5.7% of all disability or ill health in the world (WHO/UNICEF, 2002).

A report entitled The True Cost of Poor Sanitation UNICEF (2017) estimated that Kenya's economic losses due to poor sanitation amount to Ksh. 57 billion per year. This report, launched during the Tokyo International Conference on African Development (TICAD), hosted by Kenya in August of this year, based this estimate on the costs due to

lost productivity from sanitation-related illness, coupled with the cost of treatment. These costs are borne by taxpayers as well as patients themselves.

According to World Bank (2015) donor support has been seen in sanitation projects widely although community ownership seems to be lagging behind. We find sanitary projects with proper sewerage connections that don't perform as expected. Studies have been carried out to identify policies to address sanitation initiatives. Standard water closet toilet systems are recommended and put into place but not properly utilised which negative affects their performance. It is therefore important to investigate factors that influence their utilisation to gain a better understanding of the issue on the ground.

2.6 Theoretical framework

This study was guided by the following theory; the theory of behavioural change.

2.6.1 Behavioral change theory

The behavioural change theory was developed by Ajzen in 1988. This theory proposes a model that tries to explain why people do and do not adopt certain health behaviours. This theory examines the predictors and precursors of health behaviour. This theory includes self- efficacy and motivation. Self- efficacy is ones belief in their ability to do something, such as change health related behaviour and it is grounded in ones past success or failure in a given activity. Ones self- efficacy is seen as predicting the amount of effort one will expend in trying to change (Bandura 1977).

According to Ajzen he believed that the theory can be used to predict a health related behaviour such as utilisation of water-closet toilet projects in eateries, are they being hygienically used? The Theory of Planned Behaviour (TPB) started as the Theory of Reasoned Action in 1980 to predict an individual's intention to engage in behaviour at a specific time and place. The theory was intended to explain all behaviours over which people have the ability to exert self-control. One of the key components of this model is the behaviour intentions as influenced by attitude and the benefits of the outcome (Sniehotta, 2009).

2.7 Conceptual framework

This research study sought to investigate factors influencing sanitation of water-closet toilet projects in eateries, a case of Meru town, Meru County. The independent variables are adequacy, level of proper utilisation as well as sewerage connectivity of water-closet toilet projects in eateries in Meru town. The research study sought to determine the effects of those factors on the dependent variable which was sanitation of water-closet toilets in Meru Town.

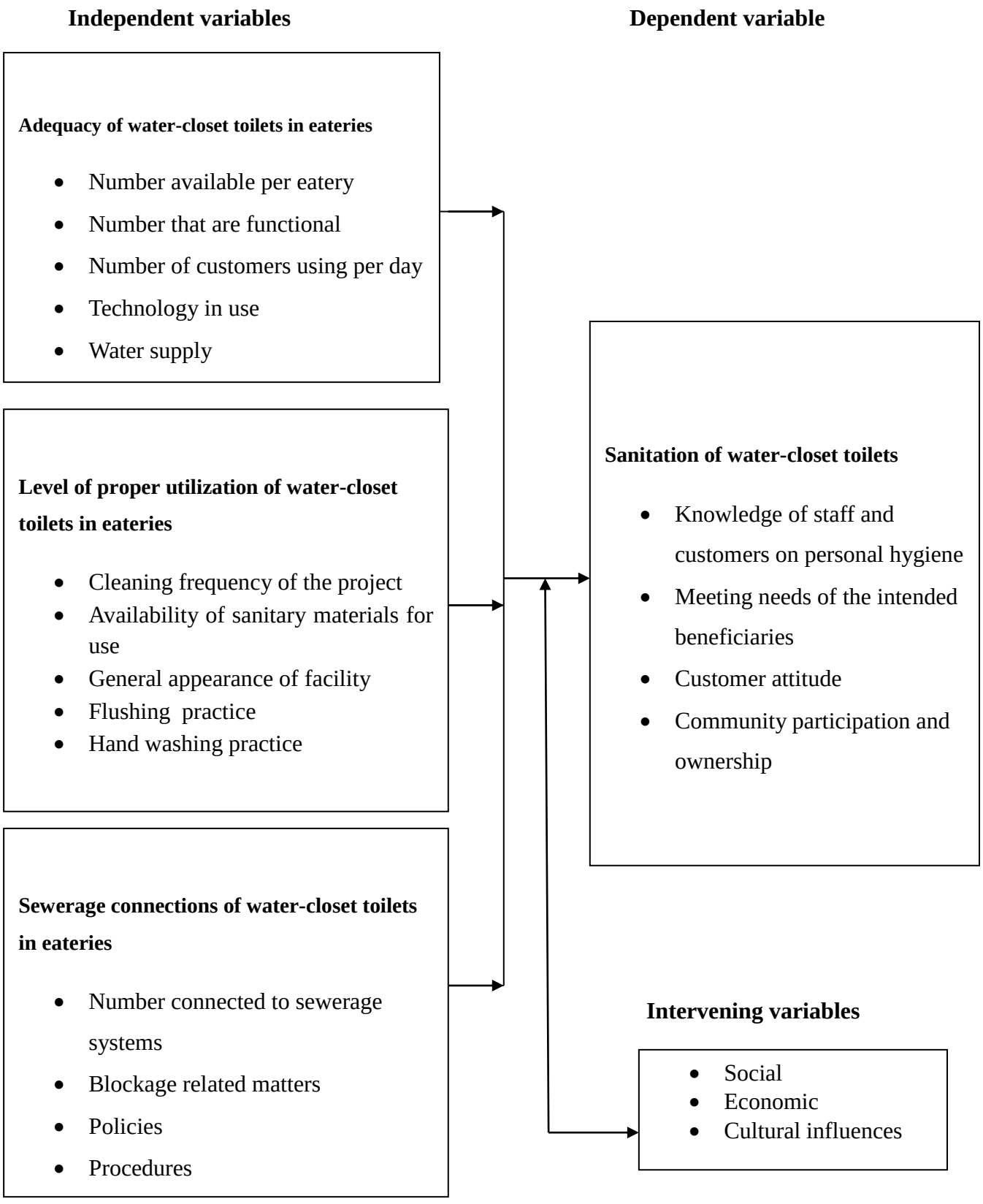

Figure 1: Conceptual framework

2.8 Relationship of variables

The relationship of variables was that the dependent variable which is sanitation of water-closet toilet systems shall be influenced by the independent variables which are adequacy, level of proper utilization and sewerage connectivity of water-closet toilet projects in eateries. Knowledge of staff and customers on personal hygiene, meeting the needs of the intended users such as availability of tapped water and soap for hand washing, customer attitude towards the sanitary projects already available and community participation and ownership are indicators of the dependent variable.

Whereas the indicators under adequacy of water-closet toilet projects was number available per eatery, number that are functional, number of customers using per day, technology in use and water supply which shall help show the relationship between adequacy and sanitation of water-closet toilet projects in Meru town. Indicators under level of proper utilization included cleaning frequency of the projects, availability of sanitary materials for use, general appearance of facility, flushing practice and hand washing practice which will help meet the goals of the second objective of the research study.

The third independent variable which was sewerage connectivity of water-closet toilets in eateries focused on number of water-closet toilet projects connected to sewerage systems, blockage related matters, policies and procedures involved. The intervening variables affecting the study included social, economic and cultural influences which affect sanitation of water-closet toilet projects.

2.9 Research gaps

This chapter has given literature review from secondary sources derived from different parts of the world. It is based on sanitation with regard to the objectives of the research study. Sanitation as a basic human right has been highlighted and the gap on what is being practiced on the ground as opposed to what is expected has been established. It has been indicated in many parts of the world that sanitation including access to water and proper human waste deposal continues to lag behind as other projects steer ahead. The

factors influencing sanitation of water-closet toilet projects in eateries including sanitation adequacy of water- close toilet systems continues to be a major issue in these modern times. In spite improvement in housing, education and technology its level of proper utilization continues to be wanting. This is evident with the current information on level of avoidable communicable diseases that continue to top the most common health related issues worldwide costing billon on shillings to mitigate burdening developing countries in terms of progress. Another indicator is the slow progress to ensure sustainable development and meeting the millennium development goals where poor sanitation is a common factor in a majority of countries worldwide including Meru town. These factors therefore set this particular research study at the forefront to improve sanitation and hence prompted the researcher to carry out the study.

2.10 Summary of literature review

The chapter reviews the literature on factors influencing sanitation of water closet toilet projects from a global perspective, regional as well as local context. The literature covers the concept of basic sanitation as a human right as supported by scholars in the world. The chapter also includes perspectives on adequacy of the water closet toilet projects, their proper utilisation, their sewerage connectivity and how these factors relate to sanitation of water-closet toilet projects. The chapter also highlights the theoretical framework which was based on the behavioural change theory as developed by Ajzen in 1988. With support by this particular theory Ajzen believed that it can be used to predict a health related behaviour, which in this case relates to usage and maintenance of water closet toilet projects. The chapter also presented the conceptual frameworks on which the study is based.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter highlights the description of the research methods and tools. This section covers; the study area, study design, study population, target population, sample size determination, sampling technique, data collection, data management and analysis, its presentation, dissemination and ethical considerations.

3.2 Research Design

The research design used was the descriptive study design. The researcher used this research design to investigate factors that influence sanitary performance of water-closet toilet projects in eateries within Meru town at one point in time.

Descriptive research design is a scientific method which involves observing and describing the behaviour of a subject without influencing it in any way (Shuttleworth 2008). This design is preferred since data measurement of exposure and effect can be done at the same enabling a method of collecting information by observation and interviewing relevant respondents, hence formulation of important principles of knowledge, and solution to significant problems. (Kothari, 2003).

3.3 Target population

This includes the population that utilizes eateries but specifically the ones who utilize water-closet toilet projects in the same eateries within Meru town. According to the latest public health records there are 121eateries in Meru town. These eateries are structured with a separate kitchen and dining place for serving meals within the town and include a water-closet toilet system. In each eatery 1 staff was randomly selected to participate in the interviews of key informants and 2 customers one male and one female to participate

in the filling of the checklists as follows. We therefore had 3 participants from each eatery in total so therefore the target population was as follows:

Table 3.1: Target Population

Categories	upper-class	middle-class	lower-class	
Number of customers per day (average)	30	200	100	
Number of hotels in each class	12	75	38	
Number of respondents in each eatery	3	3	3	
Total	**1,080**	**45,000**	**11,400**	**57,480**

Since we have 3 representatives from each eatery we had a target population derived from 121 eateries who were categorised into three classes. We had upper-class, middle-class and lower-class hotels with average number of people who visit them per day. These three classes were categorized based on average pricing of food in the eating houses respectively.

When we add the total from all the three classes we have a target population of 57,480 respondents.

3.4 Sample size and sampling procedure

3.4.1 Sampling size

According to Churchill and brown (2004) the correct size of the sample size in a study is dependent on factors including nature of population to be studied, purpose if the study, the number of variables in the particular study, the type of research design, the method of data analysis and the size of accessible population.

A sample size that is larger than 30 and less than 500 are appropriate for most research. In descriptive research is it suggested that 10% of the accessible population is enough, bearing in mind that sampling is defined as selecting a given number of subjects from a defined population as respective of that population. This defined populations referred to as the sampling frame (Mugenda and Mugenda, (2003).The sample size shall be calculated from the sampling procedure as shown below.

3.4.2 Sampling procedure

The sampling technique used was the non probability convenience sampling technique**.**In convenience sampling the researcher chooses the sample based on or because of their convenient accessibility and proximity.(Kothari, 2004).

The researcher used the Krejcie and Morgan table of 1970 to randomly select the respondents which is attached as an at the back of the research study which came to a sample size of 382 respondents. Scientifically when calculated we had a total sample population of 37 respondents from upper class, 236 respondents from middle class and 119 respondents from lower-class which gives a total of 392 respondents as shown below:

Table 3.2: Sample Size

Categories	**upper-class**	**middle-class**	**lower-class**	
Number of hotels in each category	12	75	38	
Total number of eateries	121	121	121	
Total	**37**	**236**	**119**	**392**

Since we randomly selected 1 staff to participate in the interviews of key informants and 2 customers one male and one female to participate in the filling of the checklists, we had 128 staff in total and 256 customers in total participating in the study. This was derived as follows:
1/3 of 392 respondents = 131 staff; 2/3 of 392 respondents = 261 customers hence a total of 392 respondents.

3.5 Data Collection instruments

The instruments used were a structured observation checklists and interviews of key informants since they are convenient for this type of research. Also because utilization of toilets is a sensitive matter and participation in the study has to be encouraged in a manner that does not have any un-necessary negative impact to customers as well as management of the eateries.

Structured observation checklist targeted customers; a single male and female participant per eatery. Interviews of key informants targeted one member of staff who works in the eatery and utilizes water closet projects in each selected eatery. The instruments were used to gather information related to adequacy in number, level of utilization of already available facilities as well as availability of sewerage connectivity to water closet toilet projects in eateries in Meru town.

However, before commencement of the data collection, respondents' consent to participate was sought from respondents.

3.5.1 Pilot testing of the instruments

Piloting was done to test validity and reliability of the instruments.

This was the second step following selection of the data collection instruments where the respondents targeted are 10% of the sample size. The pilot ran provided a check on the feasibility of the proposed procedure for coding data and show up flaws and ambiguities. By using a sample size of 392 respondents, a sample of 39 respondents was used during the pilot study from the three classes of eateries.

The eateries were visited to list and identify eligibility. After initial listing, two trained public health officers visited the selected eateries for data collection and sanitation inspections using structured observation checklist and interviews of key informants whose validity and reliability was confirmed by pretesting these instruments prior to data collection in eateries within Nkubu town.

3.5.2 Validity of Data Collection Instruments

An instrument is said to be valid when it actually measures what it claims to measure. (Mugenda&Mugenda,2003) Content validity was established through two steps. The first step was consulting senior academic lecturers who are experts in the field. The supervisor of this study was closely consulted. The feedback was to help affirm and improve the instrument.

3.5.3 Instrument reliability

An instrument is reliable when it can measure a variable accurately and consistently and obtain the same results over a period of time. Reliability is the instrument which measures the repetition of research findings Cant et al (2011).

A pilot study shall be carried out at Nkubu town to determine the reliability of interview guides of key informants and structured observation checklists for the study. A pilot group should ideally be at least 10% of the sample size, Denscombe (2009).

3.6 Data Analysis

After data management, data analysis followed using results from structured observation checklist and interviews. The process took place via Statistical Package for the Social Sciences with the help of a statistician using quantitative and qualitative methods of analysis. For the purposes of identification and confidentiality, no names were used. Qualitative data obtained was presented in a narrative format whereas quantitative data was quantified and interpreted using descriptive analysis including frequency tables.

3.7 Ethical Consideration

Permission was sought from the department of extra mural studies, the University of Nairobi to carry out this study.

The study subjects' information was sought with extreme confidentiality which involved ensuring that an informed consent of the study prior to data collection was given.
Confidentiality of individual client information was catered forby use of unique identifiers for study participants and limiting access to the principle investigator as well as research assistants of study information by storing data collected and all documents with participant information in a lockable cabinet.

3.8 Operationilization of variables

The research study has three independent variables and one dependent variable as shown in the conceptual framework. Table 3.3 below discusses the indicators of the variable, instruments to be used in collecting data for the indicators and the methods to be used in analyzing the variables in the study.

Table 3.3 Operationilization of variables

Research Objectives	**Variables**	**Indicator(s)**	**Measurement of Indicator(s)**	**Measurement Scale**	**Data collection method**	**Data analysis Methods**
Establish how adequacy influences sanitary performance of water-closet toilet projects in eateries in Meru town	Adequacy of water-closet toilet projects	Number available per eatery Number that are functional Number of customers using per day Technology in use Water supply	Number found available and functional General appearance of facilities Available facility separate for customers Number of customers served per day Available technology in use Availability of water supply	Nominal/ Ordinal	Structured observation checklist Interviews of key informants	Descriptive statistics
Determine how level of proper utilization influences sanitary performance of	Level of proper utilization of water-closet toilet projects	Cleaning frequency of the project Availability of sanitary materials for use General appearance	Signs of use and cleaning of the facilities Frequency of cleaning Sanitary materials and bins available Appearance of facilities	Nominal/ Ordinal	Structured observation checklist Interviews of key	Descriptive statistics

water-closet toilet projects in eateries in Meru town.		of facility Flushing practice Hand washing practice	Flushing practice on the ground Hand washing practice on the ground Nuisance of facilities (flies/odour/ faecal matter) Health risks associated		informants	
Establish how sewerage connections influences sanitary performance of water-closet toilet projects in eateries in Meru town	Sewerage connections of water-closet toilet projects	Number connected to sewerage systems Blockage related matters Policies Procedures	Number connected as opposed to those not connected Number of blockage related matters Policies involved Procedures involved Challenges faced Proposed improvements	Nominal/ Ordinal	Structured observation checklist Interviews of key informants	Descriptive statistics

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This Chapter presents the analysis and findings of the study based on the stated objectives of adequacy, proper utilization and sewerage connection in eateries and how they influence sanitation of water-closet toilet projects in Meru town, Meru County. The study sampled 392 respondents in water-closet toilet projects in eateries in Meru town. The analysis was done through descriptive and inferential statistics and presented in the form of tables showing percentages and frequencies.

4.2 Response rate

Out of the 392 data collection instruments issued respondents, 384 were returned giving a 97.9% response rate. The study involved a total of 392 documents although there was a response rate of 384 documents being filled successfully. 2 upper class hotels and 6 lower class hotels did not wish to participate in the exercise.

4.3 Demographic information of respondents

This study sought to determine the demographic information of respondents by seeking information on gender and age with a view to investigate how these factors are manifested and their influence on the findings.

4.3.1 Distribution of the respondents by gender

The study sought to determine the gender of the respondents. Their responses were as shown in Table 4.1 below.

Table 4.1: Distribution of respondents by gender

Gender	Frequency	Percentage (%)
Male	171	44.53
Female	213	55.47
Total	**384**	**100**

From the findings in Table 4.1majority of the respondents were females who accounted for 55.47% while their male counterparts constituted for 44.53%.Females tend to utilize water closet toilet projects more than their male counterparts.

4.3.2 Distribution of respondents by age group

The researcher sought to know the age brackets that the respondents fall in so as to identify which age group mostly utilize water-closet toilet projects in eateries.The findings are as indicated in Table 4.2 below.

Table 4.2 Analysis for respondents by age group

Age group	Frequency	Percentage (%)
20-30	247	64.32
30-40	73	19.01
41-50	42	10.94
51 years and above	22	5.73
Total	**384**	**100**

From the findings in Table 4.2, 247 respondents were between ages 20-30 years representing 64.32%, 73 were between ages 30-40 years representing 19.01%, 42 were between ages 41-50 representing 10.94% and 22 were 51 years and over representing 5.73%. Majority of respondents were between ages 20-30 years, at higher age brackets the users are few.

4.4 Analysis of adequacy of water-closet toilets in eateries

This was the first objective of the study. The study sought to investigate how adequacy of water-closet toilet projects in eateries influence their sanitation by asking respondents questions related to sanitation. Their responses are represented in Table 4.3 to Table 4.7

Table 4.3 Availability of water-closet toilet systems

Number available	Frequency	Percentage (%)
upper class	60	15.63
middle class	220	57.29
lower class	104	27.08
Total	**384**	**100**

It was found that in all the areas data was collected there was an available water-closet toilet system for use by customers as well as staff. Some eateries had more than one water-closet toilet system available. While in others, the facilities were not found within the eateries hence respondents shared with neighbouring businesses adjacent to the hotels, more so in the lower-class hotels.

4.4.1 General appearance of water-closet toilet systems with relation to their functionality

It was found that there was a significant relationship between the general appearances of water-closet toilet systems in relation to their functionality. This is further illustrated on the table below:

Table 4.4 General appearance in relation to functionality

Class	Upper class =34	Middle class = 236	Lower class = 114	Totals = 384
General Appearance	34/34 = 100%	112/236 = 47.46%	38/114 = 33.33%	
Functionality	34/34 = 100%	110/236 =46.61%	38/114 =33.33%	

Table 4.4 Illustrates that general appearance and functionality were closely related. Respondents who said that the general appearance was favourable also thought their

functionality was favourable. The percentages were almost similar in the concurrent classes.

It also found that respondents stated water-closet toilet systems were not functional since there were technical issues involved including the following related problems covered in Table 4.5 below:

Table 4.5 Adequacy in relation to sanitary functionality

Frequency	=384	Total=100 (%)
Available facility that is separate for customers	187	48.70
Number of facilities shared by customers and staff	197	51.30
Number that have water supply available	378	98.44
Number that have complete hand washing facilities	287	74.74
Water-closet toilet projects that are functional	367	95.57
Water-closet toilet projects that are non functional	17	4.43

From Table 4.5 shown above the number of water-closet toilet systems shared by customers and staff is slightly above 50%, whereas majority of eateries had water supply available, which was found to be at 98.44% although those with a complete hand washing facility were lower than those with water supply at 74.74%.

Number of water-closet projects that are functional was found to be 95.57% whereas those non functional at 4.43 % since majority have a complete hand washing facility and water supply available.

4.4.2 Number of customers served per day in relation to those who utilize water-closet toilet projects

A significant number of customers who utilize water closet toilet systems are higher than those who are served in a day as shown in the Table 4.6 below:

Table 4.6 Number of customers who utilize these facilities verse as those served per day on average

Those who utilize verse as those server per day	Frequency	Percentage (%)
Number who utilize the water-closet toilet projects	387	90
Number of customers served per day	430	100
Proportion	0.9	

The results showed that 90% of customers who are served per day on average utilize water-closet toilet projects in eateries and therefore an important project in hotels in Meru town, Meru County.

4.4.3 Availability of modern and complete technology used

The study required to find out the technology used and whether it had an influence on sanitation of water-closet toilet projects in eateries. The results are exhibited in Table 4.7 below:

Table 4.7 Availability of modern and complete technology used

	Frequency		Total	Percentage		Total
	Yes	No		Yes	No	
Modern technology	114	13	127	89.76	10.24	100
Complete technology	62	65	127	48.82	51.18	100

The findings showed that 89.76 % of eateries had water-closet toilet projects constructed with modern technology although only 48.82% had a complete build in functional technology in place.

4.5 Level of proper utilization of water-closet toilet projects in eateries

The study sought to know the level of proper utilization of water-closet toilet projects in eateries and how this influences their sanitation. The Table 4.8 below further illustrates findings.

Table 4.8 Illustration on level of proper utilization of water-closet toilet projects

Level of proper utilization	Frequency n = 256	Percentage (%)
Favorable general appearance of water-closet toilet systems	143	55.86
Obvious indication of use and cleaning	151	58.98
Sanitary bins and materials (toilet paper) available	156	60.94
Flushing practice taking place	154	60.16
Hand washing practice taking place	152	59.38
Improper waste disposal (sanitary pads, fecal matter, urine)	113	44.14
Nuisance (flies, odor)	133	51.95

The results in Table 4.8 illustrate that slightly above 50% of the water-closet toilet systems in Meru town, Meru County show favorable general appearance that is 55.86% whereas obvious indication of use and cleaning is at 58.98%. Sanitary bins and materials available for use was at 60.94 %, which also showed that hand washing and flushing practice, were not so far behind at 59.38% and 60.16%. Majority of indicators of hygienic standards are lower than 80% as seen on the results tabulated on the table above.

Signs of below average sanitation practices are evident with improper waste disposal practices at 44.14% whereas flies nuisance topped with 51.95% according to the study results. It is evident that level of utilization of water-closet toilet systems has an impact on their sanitary performance

4.5.1 Frequency of cleaning

It is evident that the staffs do the cleaning of the water-closet toilet projects although their frequency shall further help in determining how it influences their sanitation. This is further illustrated in Table 4.9 below.

Table 4.9 Frequency of cleaning

Number of times	Frequency	Percentage (%)
Once	57	44.53
Twice	38	29.69
Thrice	20	15.63
After every use	13	10.16
Totals	**128**	**100**

Frequency of cleaning is a direct indicator of nuisance of flies, odor and improper disposal of sanitary materials. From the results as shown on Table 4.9 above it is evident that majority of eateries clean their washrooms less than three times a day, with those cleaning once at 44.53%, twice at 26.69%, thrice even lower at 15.63%, and after every use at 10.16%.

4.5.2 Awareness on personal hygiene and sanitation

The study sought to know if the respondents were aware about the importance of personal hygiene and sanitation. The respondents were asked to give a general view of what personal hygiene and sanitation entails. These were the responses as shown below on Table 4.10.

Table 4.10 Level of awareness on personal hygiene and sanitation

Level of awareness	Frequency	Percentage (%)
Very well aware	15	11.72
Well aware	39	30.47
Fairly aware	68	53.13

Not aware	5	3.91
Confused	1	0.78
Totals	**128**	**100**

The level of awareness on personal hygiene and sanitation had a majority of respondents at fairly aware with 53.13%, followed by well aware at 30.47 %, very well aware at 11.72%, not aware at 3.91 % and lastly confused at 0.78 %.

4.5.3 Awareness on health risks associated with not washing hands

The study sought to find out if respondents had any awareness on health risks associated with not washing hands so as to further understand how this influences sanitation of water-closet toilet systems. Respondents were asked on whether they think there is any health risks associated with not washing hands. Their responses areas tabulated below.

Table 4.11 Awareness on health risks associated with not washing hands

Level of awareness	Frequency	Percentage (%)
Yes	122	95.31
No	6	4.69
Total	**128**	**100**

The finding on Table 4.11 show that majority of respondents are aware of health risks associated with not washing hands at 95.31% yet we find quite a number are not putting this practice into action as tabulated in previous section under level of proper utilization of water-closet toilet systems.

4.6 Sewerage connections of water-closet toilet systems

The study sought to know how sewerage connections in eateries influence sanitation of water-closet toilet systems in Meru town, Meru County. The respondents were asked whether there was any sewerage connections in place and their response are as tabulated below on Table 4.12.

Table 4.12 Sewerage connections in place

Sewerage connections in place	Frequency	Percentage (%)
Yes	113	88.28
No	15	11.72
Total	**128**	**100**

The study findings on Table 4.12 indicate that majority of eateries have sewerage connections, which was found to be 88.28%, where those without connections during the data collection period were found to be 11.72%. The respondents argued that their water-closet toilet projects were blocked and were not in use at the moment, while others when left overnight unblock and continue usage until they block once more.

4.6.1 Causes of blockages in sewerage connections

The study sought to find out the causes of blockage that result in water-closet toilet systems found in eateries. Their response is as tabulated in table 4.13 below.

Table 4.13 Causes of blockage

Causes of blockage	Frequency	Percentage (%)
Sanitary pads	21	16.41
Lack of flushing	52	40.63
Papers and other materials used for anal cleansing	15	11.72
All of the above	40	31.25
Totals	**128**	**100**

Key informants explained that the highest cause of blockage was due to lack of flushing, that customers would use the facilities and not flush after use causing build up on waste and anal cleansing materials. While 31.25% of respondents supported that these were due to dropping of sanitary pads in the toilets, lack of flushing as well as the use of inappropriate materials for anal cleansing that further causes blockage related problems.

Blockage solely by sanitary pads was t 16.41% whereas blockage solely by papers and other materials used for anal cleansing was at 11.72%**.**

4.6.2 Challenges faced related to connections of sewerage systems

The study sought to find out the challenges faced by key informants related to connections of sewerage systems. The following are results from the respondents as shown on table 4.14 below.

Table 4.14 Challenges faced related to connections of sewerage systems

Challenges faced related to connections of sewerage systems	Frequency	Percentage (%)
High cost of repairs and maintenance	63	49.22
Flooding into the hotels	2	1.56
Nuisance (flies, odor)	22	17.19
Closure of hotels by public health	11	8.59
Water-borne diseases	25	19.53
No response	5	3.91
Totals	**128**	**100**

Table 4.14 indicates that majority of challenged faced by respondents that are related to connections of sewerage systems were due to high cost of repairs and maintenance at 49.22% respectively. Challenges due nuisance caused by flies and odor went toe to toe with water-borne diseases at 17.19% and 19.53%. As a result of health related issues a number of eateries faced closure by public health personnel at 8.59%.

Very few respondents felt that challenges faced were due to flooding as a result of blockage at 1.56% and those with no response at 3.91%.

4.6.3 Policies and Procedures involved

The study sought to find out the policies and procedures involved when it comes to sewerage connections. This was aimed to further understand the factors influencing

sanitation in eateries with water-closet toilet projects. The results are as tabulated in Table 4.15 below.

Table 4.15 Policies and Procedures involved

Policies and Procedures involved	Frequency	Percentage (%)
Public health regulations	20	15.63
County government regulations	10	7.81
Occupational health and safety regulations	7	5.47
Legal regulations	15	11.72
All the above	76	59.38
Totals	**128**	**100**

Table 4.13 shows that majority of policies and procedures involved in sewerage connection related matters involve Public health, County government, Occupational Health and safety and Legal regulations at 59.38%.

4.6.4 Policies and Procedures related challenges

The study sought to find the relationship between policies and procedural matters with sanitation challenges experienced in eateries with water-closet toilet systems. Respondents were asked to share the procedures followed and challenges faced. The following are results as tabulated on Table 4.16 below.

Table 4.16 Policies and Procedures related challenges

Policies and Procedures related challenges	Frequency	Percentage (%)
Cost factor	58	45.31
Time factor	34	26.56
Interpretation and communication factors	21	16.41
Legal factors	5	3.91
All the above	10	7.81
Totals	**128**	**100**

Study findings show that challenges faced by respondents were more so cost related at 45.31% than time taken to process procedures at 26.56% and interpretation and communication related matters at 16.41%. A lower number of respondents felt that legal factors and all the above mentioned challenges were the reasons they experienced sewerage connection problems in their hotels. This is a clear indicator that cost is a major challenge to ensuring sewerage connection problems is solvable.

4.6.5 Suggested improvements with regard to water-closet toilet projects

The study sought to find out the views of the respondents on the ground on improvements they would wish to have with regard to water-closet toilet projects in order to improve sanitation practices in eateries. The results are as tabulated below on Table 4.17 below.

Table 4.17 Suggested improvements

Suggested improvements	Frequency	Percentage (%)
Affordable construction materials	23	17.97
Maintainable construction materials	25	19.53
Subsidized legal and County policies	21	16.41
Involvement in policy formulation	11	8.59
Intervention by stakeholders	48	37.5
Totals	**128**	**100**

From the Table 4.17 above, it is seen that majority of respondents supported that the necessary interventions by stakeholders more so the government would boost efforts in facilitating sanitation improvements seen at 37.5 %. They stressed that such efforts would help in by looking into sewerage connection problems in eateries and ensure long lasting solutions that are feasible and effective. Others supported that having maintainable construction materials would certainly solve sewerage connections problems at 19.53%.the lowest percentage was at 8.59% where respondents supported that involvement in policy formulation hence teamwork and community involvement would improve sanitation efforts.

CHAPTER FIVE
SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECCOMMENDATIONS

5.1 Introduction

The chapter encompasses the summary of the research findings, discussions, conclusions as per the objectives of the study, recommendations guided by the study's objectives, and suggestions for further studies.

5.2 Summary of findings

This particular section is a summary of the findings from the data collected in the research. The purpose of this study was to investigate factors influencing sanitation of water-closet toilet projects in eateries, a case of Meru town, Meru County. It explores how each of the variables which are adequacy, level of proper utilization and sewerage connectivity of water-closet toilet system in eateries influence sanitation.

5.2.1 Adequacy of water-closet toilet systems in eateries

In an attempt to realize the first objective of the study in all the areas were data was collected there was a water-closet toilet system available for use by both staff and customers of both genders. The upper class hotels had more than one water-closet toilet project for use whereas some had to share with adjacent businesses in the lower class category. General appearance to functionality of the projects was closely related. It was found that the percentages in each class of the hotels closely scored, whereby upper class hotel scored 100% both in general appearance and functionality, middle class had a percentage of 47.46 in general appearance and 46..61% and the same reflected in lower class hotels.

Majority of the eateries had water-closet toilet systems separate for customers as well as staff, which had adequate water supply and complete hand washing facilities that were functional and usable. 90% out of the customers served per day utilize water-close toilet systems daily and on average. On adequacy of modern and complete technology of water-closet toilet systems it was found that majority have access to modern technology seen at 89.76% yet less than 50% have access to a complete set that ensures proper hand washing and disposal of human excreta seen at 48.82%.

5.2.2 Level of proper utilization of water-closet toilets in eateries

In attempt to realize the second objective, level of proper utilization was seen to have a direct impact on sanitary performance of eateries. Study findings showed that level of proper utilization of water-closet toilet systems was slightly higher than 50% whereby cleaning of the facilities, availability of sanitary bins and materials (toilet paper), flushing practices, hand washing practices which involve self-efficacy and motivation were all slightly above 50%. A high rate of improper waste disposal (sanitary pads, fecal matter, urine) was realized at 44.14% whereas nuisance from flies and odor at 51.95%.

A direct indicator of nuisance of flies, odor and improper disposal of sanitary materials was seen in frequency of cleaning of water-closet toilet systems. Majority of water-closet toilet systems in Meru town, Meru County are cleaned once a day seen at 44.33%, 29.69% at twice a day whereas only 10.16% are cleaned after every use. 50% and above of the respondents have some awareness on importance of personal hygiene and sanitation whereas even a higher percentage at 95.31% are aware of health risks associated with not washing hands yet majority are not seen putting these vital practices into action.

5.2.3 Sewerage connectivity of water-closet toilet projects in eateries

In the final objective of the study it was evident that majority of eateries had sewerage connections although there were a number that have blockage problems from time to time seen at 11.72%. The main causes of blockage were due to lack of flushing after use, blockage by sanitary pads, papers and other inappropriate materials use anal cleansing. High cost of repairs and maintenance as a result was seen to be the highest rated challenge at 49.22%.Challenges due nuisance caused by flies and odor went toe to toe with water-borne diseases at 17.19% and 19.53%. As a result of health related issues a number of eateries faced closure by public health personnel at 8.59% from time to time. While dealing with above mentioned challenges, the policies and procedures mostly involved include Public health, County government, Occupational Health and safety and Legal regulations seen at 59.38%.

Cost related factors was the highest hindrance to adherence to policies and procedures seen at 45.31%. Suggested improvements by respondents included majority at 37.5%

saying that interventions by the County government would surely enhance improvements on sewerage connections including sanitation issues related to the water-closet toilet projects in the eateries. Approximately 40% of the respondents supported that affordable and easy to maintain construction materials including subsidize legal and County policies would make it easier for them to ensure that these projects meet the expected health standards and hence meet the needs of the intended beneficiaries.

5.3 Discussions of the findings

From the findings of adequacy of water-closet toilet systems in eateries, it is evident that majority of customers who visit eateries do utilize water-closet toilet systems. Majority of eateries had water-closet toilet systems separate for customers yet rate of flushing and hand-washing practice was lower than 80% in all the eateries where data was collected. This is a clear indication of poor sanitation practice and a big gap that needs to be met in order to meet the MDG which is in agreement with a study done by Elisa et al (2012) who support that this achievement is somewhat overshadowed by the fact that achievement of the MDG target for sanitation now appears beyond reach

Majority of respondents have embraced the adoption of modern technology for their eateries although only 48.82 % have been able to purchase a complete set that ensures proper hand washing and disposal of human excreta. This is in agreement with NEA (1999) who indicate that in spite that eateries are embracing modern methods of water and sanitation provision there continues to be sanitary projects undertaken that fail to results in overall improvement of health and hygiene.

From the findings of level of proper utilization of water-closet toilets in eateries; it was evident that the level of proper utilization of water closet systems was lower than 80% since practices expected to be much higher including cleaning of the facilities, availability of sanitary bins and materials (toilet paper), flushing practices, hand washing practices which involve self efficacy and motivation yet majority of respondents seen at 95.31% are aware of health risks associated with not washing hands yet majority are not seen putting these vital practices into action.This is in agreement with a study done by WHO/UNICEF (2012) where it is supported that a safe toilet accompanied by hand washing with soap, provides an effective barrier to transmission of diseases.

Furthermore, majority of water-closet toilet systems in Meru town, Meru County are cleaned once a day seen at 44.33%, 29.69% at twice a day where as only 10.16% are cleaned after every use yet 50% of the respondents have some awareness on importance of personal hygiene and sanitation. There is an obvious challenge when it comes to practice and attitude as opposed to knowledge. Supporting this in literature review by WHO/UNICEF (2012) that notes that almost a third of the world's population suffer on a daily basis from a lack of access to a clean and functioning toilet. This is also with agreement with a study done by Austin et al., (2001) which supports that proper latrine use is behaviour much beyond structures, and is in many cases, more of factors of attitude and habit than existence of structures.

Sewerage connections are an important aspect of water-closet toilet systems and hence sanitation of these facilities. It is evident that 11.72 % of the eateries studied suffer from blockage related issues from time to time which is a precipitator of water borne diseases, nuisance of flies and odor, loss or revenue due to closure of establishments and more so high cost of repair and maintenance which majority cannot afford. It is a cycle of events whereby one challenge leads to another resulting in overall poor hygiene and poverty. In agreement with this is Mungania et al.,(2008) who notes that poverty greatly influences all other factors since it is the root cause of slow progress in improved sanitation. Resultant lack of the above elements brings about a vicious cycle. This includes lack of proper utilization of water closet projects, improper excreta disposal, contaminated food and water which in turn results in spread of waterborne diseases and further increase of poverty levels.

It is also clear that majority of challenges experienced are the cost and maintenance related factors which many are unable to cater for. Stakeholder intervention is the key to facilitate efficiency and effectiveness in meeting the need of the beneficiaries of water-closet toilet systems in Meru town, Meru County. This is with agreement by a study done by Mowi (2007) which supports that exploration of low-cost technologies which are efficient and functional is required if it is to benefit Kenyans living and working in the urban setting to promote sanitation.

5.4 Conclusions

The study aimed to understand the factors that influence sanitary utilization of water-closet toilet systems, in Meru town, Meru County. The study concludes that majority of the people who utilize water-closet toilet systems have the knowledge on the expected sanitary requirements of water-closet toilet systems although attitude and practice remains a big challenge. Level of utilization of water-closet toilet systems with regard to sanitary standards are below average where self efficacy and motivation is a major challenge. Simple everyday practices such as hand washing, cleaning and flushing of the water-closet toilet systems are below average. It is also evident that interventions by stakeholders are needed in meeting the needs of the beneficiaries of these facilities. Therefore the factors related to cost, maintenance, repairs, legal requirements, stakeholder participation, co-ordination and communication and community participation are the drivers of sanitation. Hence adequacy, proper utilization as well as sewerage connectivity influence sanitation of water-closet toilet systems in eateries.

5.5 Recommendations

1. The study found that majority of water-closet toilet systems have adequate water supply yet less than average utilize this water to facilitate high sanitation standards. The study recommends that beneficiaries should adopt an attitude and practice that ensure proper usage of water-closet toilet systems to guarantee high sanitation standards in eateries.

2. The study found that level of proper utilization of water-closet toilet systems needs to be thoroughly improved. It is recommended that self efficacy and motivation are key factors in ensuring behavior change. That ownership as well as participation, co-ordination and collaboration with stakeholders is necessary to facilitate the required improvements with regard to sanitation of eateries.

3. The study found that there were challenges with facilitating sewerage connections which were efficient and effective. It is recommended that participatory approach and good governance with stakeholders in different sectors including health and legal fraternity in conjunction with the government can be relied upon to assist in water-closet projects success in facilitating sanitary performance.

5.6 Suggestions for further research

The study also makes the following recommendations for research

1. That more sanitation awareness campaigns should be implemented through mass media and other social forums where all age group can be reached. Public health personnel should be thoroughly engaged in frequent training and public speaking forums with the public in order to improve overall health standards and combat environmental degradation that results from poor sanitation.

2. There is need to strengthen inter-sectoral and intra-sectoral collaboration and co-coordination with stakeholders to facilitate adequate access to primary healthcare and hence meet the sustainable development goals.

3. Monitoring and evaluation of water-closet toilet projects should be considered and implemented.

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APPENDICES

APPENDIX I: LETTER OF TRANSMITTAL

Maury Karimi Nyaga

The University of Nairobi

P.O. Box3279-00100,

Meru.

Dear Respondent,

RE: REQUEST FOR RESEARCH DATA

I am a student at The University of Nairobi. In partial fulfillment for the award of a Master of Arts Degree in Project |planning and Management, I am carrying out a research study on factors influencing sanitary performance of water-closet toilet projects in eateries, in Meru town.

You have been identified as one of the people that could be of assistance with the research and I therefore request our participation on the research. Essentially, you will be required to participate in an interview. You will be treated anonymously and your responses will e treated with utmost confidentiality. The information you provide will be used only for academic purposes.

Yours Faithfully,

Maury Karimi Nyaga

L50/5733/2017

Thank you in advance.

APPENDIX II: CONSENT FORM

INTERVIEW CONSENT FORM

Good morning/Afternoon/Evening

I am ----------.I wish to thank you for taking your time to talk to me. We are asking questions to people such as you throughout Meru town, Meru County. If you agree to be interviewed, I will be asking you questions about your utilization of water closet projects and other health related questions as well as your ideas, attitudes on similar issues.

This interview is only interested in finding out the key factors that influence sanitary utilization of water- closet toilet projects in eateries within Meru town, Meru County. This information will be used for my research purposes only. Your opinion and experiences are important to us. Your answers will be STRICTLY CONFIDENTIAL and your participation in this study is VOLUNTARY. The questions you will be required to respond to are personal and are mainly about water, personal hygiene and sanitation. If you are uncomfortable with a question, you do not have to answer it if you wish. You may also stop the interview at any time.

Signature of the respondent ……..

Date: ……..

APPENDIX III: STRUCTURED OBSERVATION CHECKLIST

Please tick the appropriate box where required. Please tick only one entry unless otherwise stated**.**

EATERY NUMBER _____ **DATE** _____

OBSERVER _____ **TIME** _____

OBSERVER NO. _____

NUMBER	CHECKLIST	YES	NO
1	Is there a functional water closet toilet system available for use?		
2	Is its general appearance favourable (clean) for use?		
3	Is there a separate water closet toilet system for customers?		
4	Is water available for flushing by customer?		
5	Does customer flash toilet after use?		
6	Does it show signs of use?(cleaning materials, discoloured bowl)		
7	Is there a sanitary bin available?		
8	Are anal cleansing materials available?		

9	Is there visible nuisance of (flies and /or odour)?		
10	Is there visible dropping of faecal matter and or urine on top?		
11	Is there dropping of sanitary pads on top of and inside the toilet?		
12	Is there a complete hand washing facility (soap, water) available?		
13	Is the complete hand washing facility being utilized?		
14	Is there a staff assigned to clean the washrooms?		
15	Is there active cleaning of the washrooms after customer use?		
16	When flashed are there signs of blockage or leakage		

APPENDIX IV: INTERVIEW GUIDE FOR KEY INFORMANT

1. Is the respondent male or female?
2. In which age bracket does the respondent fall in? 20-30, 31-40 or 41-50, 51 years and above?
3. What is their level of education? Primary, Secondary, Tertiary or University?
4. How many water-closet toilet projects are available per eatery?
5. Is at a modern and complete water-closet toilet system in terms of technology used?
6. Are they shared by both genders?
7. Approximately how many customers use the toilets per day?
8. Are the water-closet toilet projects functional?
9. If not, why are the water closets projects nonfunctional?
10. How many times per day are they cleaned? Once, twice, three times, after every use?
11. Is there a sewerage connection in place and if so, do you experience blocking of the water closet toilet systems?
12. If so who is the cause of this and how do they cause it?
13. Are there any challenges that you face related to connections to sewerage systems?
14. What policies are involved?
15. What procedures does one have to follow?
16. Do you face any challenges related to this? If so please tell me about them.
17. If so please tell me about them.
18. What do you consider as the **main challenges** in providing water closet toilet projects to customers?
19. If given a chance what improvements would you like to make with regard to the water closet toilet projects?
20. Are you aware about importance of personal hygiene and sanitary disposal of human excreta? Are you very well aware, well aware, fairly well aware, not aware or confused?

21. Do you think it is necessary to wash your hands after visiting the toilet?
22. Are there any health risks associated with not washing of hands before eating food or drinking a beverage? Yes or no.

APPENDIX VII: SAMPLING TABLE

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

APPENDIX VII: PLAGIARISM REPORT