



**UNIVERSITY OFTM
KWAZULU-NATAL**

**INYUVESI
YAKWAZULU-NATALI**

Dissertation Topic:

Investigating the role of community educational programs in bridging the gap between sanitation policy and practice of ecological sanitation in low-income peri-urban communities: A case study of Umbumbulu, eThekweni Municipality

By

Thandeka Msebenzi

Student number: 209524778

Dissertation submitted in partial fulfillment of the requirements for the degree of Master of Housing, School of Built Environment and Development Studies, Faculty of Humanities
University of KwaZulu-Natal

2019

Abstract

Water scarcity has triggered the importance of reconnoitering alternative sanitation approaches to overcome the sanitation backlog in South Africa and meet target goals of access to adequate sanitation in line with the global Sustainable Development Goals. Remarkable technological innovations have been made in an attempt to meet sanitation backlogs in the design and implementation of alternative sanitation in South Africa. This dissertation focused on Urine Diversion (UD) toilets used mostly in peri-urban areas of eThekweni Municipality.

The dissertation used a mixed method research approach to obtain in-depth understanding of human experiences and their behaviors in respect of UD toilets. Data analysis from data collected was used to highlight the importance of education in promoting the correct use of UD toilets and other post-implementation issues that hinder UD toilet adoption in communities. This dissertation provides an overview of the basics of the importance of community participation in a community project. The dissertation concludes by highlighting recommendations on beneficiary education programs in promoting proper use and adoption of UD toilet technology as a fundamental component in planning for the implementation and post-implementation of UD toilets.

Permission to submit

As the candidate's supervisor I agree/do not agree to the submission of this dissertation.

Signed: _____ *(to be signed by your supervisor before
you hand in to the administrator)*

Declaration for dissertations

Kindly take note of 4.3 below (entire excerpt is taken from university guidelines for thesis and dissertation submission): please use ‘dissertation’ for masters work and ‘thesis’ for PhD work, not both.

4.2 Each copy of the thesis/dissertation to be examined must be signed and dated by the student and supervisor.

4.3 The following sentence must appear on the page after the abstract and before your declaration:

“As the candidate’s Supervisor I agree/do not agree to the submission of this thesis” and space provided below for the supervisor’s signature and date.

4.4 Plagiarism: (this comes on the page after 4.3 above, titled Declaration):

Each dissertation must contain the following declaration by the candidate:

DECLARATION

I THANDEKA MSEBENZI..... declare that

(i) The research reported in this dissertation, except where otherwise indicated, is my original work.

(ii) This dissertation has not been submitted for any degree or examination at any other university.

(iii) This dissertation does not contain other persons’ data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

(iv) This dissertation does not contain other persons’ writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:

a) their words have been re-written but the general information attributed to them has been referenced;

b) where their exact words have been used, their writing has been placed inside quotation marks, and referenced.

(v) Where I have reproduced a publication of which I am author, co-author or editor, I have indicated in detail which part of the publication was actually written by myself alone and have fully referenced such publications.

(vi) This dissertation does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the thesis and in the References sections.

Signed: (candidate)

Ms. Thandeka Msebenzi

Acknowledgements

“There are moments when troubles enter our lives and we can do nothing to avoid them. But they are there for a reason. Only when we have overcome them will we understand why they were there.”

-Paulo Coelho-

I would like to acknowledge a number of people for their contribution in the process of writing and completion of my dissertation:

- My supervisor Dr Pauline Adebayo for her incredible support especially in tolerating my slow progress during the supervision of my masters. Thank you for your amazing patience in guiding and encouraging me throughout to the completion of this dissertation.
- The School of Built Environment and Development Studies for administrative support particularly Ms. Nolundi Mzolo.
- Participants from Umbumbulu and eThekweni Municipality Water and Sanitation Unit for their willingness to participate and share information which gave my dissertation a vital enlightening input.
- My mentor, colleague, friend and brother Sandile Mbatha I am short of words to express my gratitude to you for the support from the beginning to the end of this journey.
- My sister from another mother Nadja Mbatha, I am grateful that we met in this life. Thank you for helping me find courage when I couldn't and opening your doors day and night from your home and heart.
- My family, particularly my mother, Ms. Bukiwe Msebenzi you are an extraordinary and amazing matriarch. I have eternal love for you. Thank you for your prayers and support, without you I wouldn't be where I am Ndlovukazi. A special thanks to my siblings that I love with all my heart Sindi and Mlungisi for your support, encouragement and understanding when I couldn't be home to spend time with you guys. Linda, Ronja, Luna and Luthando are worth mentioning.
- All my friends, thank you for your support.

“There is only one thing that makes a dream impossible to achieve: the fear of failure.”

-Paulo Coelho-

Table of Contents

Abstract.....	i
Permission to submit.....	ii
Declaration for dissertations.....	iii
Acknowledgements	v
LIST OF FIGURES AND MAPS	viii
LIST OF TABLES	ix
LIST OF ANNEXURES	x
LIST OF ABBREVIATIONS	xi
1 CHAPTER 1: INTRODUCTION	1
1.1 Introduction and background of the study	1
1.2 Problem statement	6
1.3 Significance of the study	9
1.4 Research objectives	9
1.5 Research questions and sub-questions	10
1.6 Definition of terms	10
Community participation.....	10
Ecological sanitation (Eco-san).....	11
1.7 Research methodology and study area.....	12
1.8 Methodological justification.....	13
1.9 Methodology	13
1.9.1 Sources of data	13
1.9.2 Data collection	14
1.9.3 Sampling	16
1.9.4 Data processing, analysis and presentation	16
1.10 The case study area	17
1.11 Dissertation structure	19
1.12 Summary of chapter 1	20
2 CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW 21	21
2.1 Introduction.....	21
2.2 Theoretical framework.....	22
2.2.1 Theory of planned behavior	23
2.2.2 People centered approach	25
2.3 Conceptual framework.....	26

2.3.1	Participation	26
2.3.2	Community participation	27
2.3.3	Sanitation	29
2.3.4	Ecological Sanitation.....	34
2.3.5	Peri-urban areas.....	40
2.4	Summary of chapter 2	43
3	CHAPTER 3: A REVIEW OF ETHEKWINI MUNICIPALITY UD TOILET BENEFICIARY EDUCATION AND TRAINING APPROACH	45
3.1	South African Sanitation Policy.....	45
3.2	UD toilet community education programs.....	47
3.2.1	Posters and leaflets.....	48
3.2.2	Street theatre	49
3.2.3	House visits	49
3.3	Summary of chapter 3	50
4	CHAPTER 4: FINDINGS AND DATA ANALYSIS.....	52
4.1	Introduction.....	52
4.2	Results of the study from key informant and household interview	52
4.2.1	Choosing UD toilets for eThekwini Municipality peri-urban areas	52
4.2.2	The need to consider education and training for UD toilet beneficiaries.....	53
4.2.3	EThekwini Municipality Water and Sanitation Unit decision on the types of education programs implemented.	53
4.2.4	UD toilet delivery process for peri-urban areas in eThekwini Municipality	56
4.3	Results of the study from household surveys.....	56
4.3.1	Condition of UD toilets	56
4.3.2	Discussion of findings.....	74
4.4	Summary of chapter 4	79
5	CHAPTER 5: CONCLUSION AND RECOMMENDATIONS.....	80
5.1	Summary of findings.....	80
5.2	Recommendations	82
6	REFERENCES	84

LIST OF FIGURES AND MAPS

FIGURE 1: CIRCULAR FLOW IN AN ECO-SAN SYSTEM.....	12
FIGURE 2: UMBUMBULU LOCALITY MAP.....	18
FIGURE 3: ILLUSTRATION OF MODEL OF PLANNED BEHAVIOUR.....	24
FIGURE 4: ARNSTEIN'S LADDER OF CITIZEN PARTICIPATION.....	28
FIGURE 5: EXAMPLE OF A URINE DIVERSION TOILET.....	38
FIGURE 6: ECOLOGICAL SANITATION.....	38
FIGURE 7: CONVENTIONAL WATER BORNE SANITATION.....	39
FIGURE 8: URINE DIVERSION DRY TOILET (UDDT) LEAFLET.....	48
FIGURE 9: FRONT EXTERIOR OF A UD TOILET	56
FIGURE 10: BACK EXTERIOR OF A UD TOILET	56
FIGURE 11: INTERIOR OF A UD TOILET	57
FIGURE 12: UD TOILET DOOR INSTALLED ON A TRADITIONAL PIT LATRINE TOILET.....	58
FIGURE 13: UD TOILET ROOF INSTALLED ON A TRADITIONAL PIT LATRINE TOILET.....	58
FIGURE 14: EXTERIOR OF UD TOILET ALTERED TO A FLUSH TOILET.....	59
FIGURE 15: BACK EXTERIOR OF UD TOILET ALTERED TO A FLUSH TOILET.....	59
FIGURE 16: UD TOILET WITHOUT VAULT COVERS.....	60
FIGURE 17: UD TOILET WITHOUT A DOOR.....	60
FIGURE 18: UD TOILET WITH A CRACKING SLAB.....	61
FIGURE 19: UD TOILET VAULT COVERED WITH OTHER MATERIAL.....	61
FIGURE 20: UD TOILET BENEFICIARY PRACTICES.....	65
FIGURE 21: CISTERN FOR FLUSH UD TOILET WITH A VENT PIPE.....	66
FIGURE 22: GROUND HOLE DUG FOR SEWAGE DISPOSAL OF A FLUSH UD TOILET.....	66
FIGURE 23: UD TOILET USED AS A STORAGE FACILITY.....	67

LIST OF TABLES

TABLE 1: TYPES OF SANITATION TECHNOLOGIES CURRENTLY USED IN UMBUMBULU	68
TABLE 2: UD TOILET CHALLENGES FOR BENEFICIARIES OF UMBUMBULU	74

LIST OF ANNEXURES

Annexure 1.....Ethical clearance

Annexure 2.....Household Interview

Annexure 3.....Key informant interview

Annexure 4.....Participants' informed consent form

LIST OF ABBREVIATIONS

CCODE	Centre for Community Organization and Development
DWAF	Department of Water Affairs
DWS	Department of Water and Sanitation
EWS	EThekweni Water and Sanitation
HSRC	Human Science Research Council
IIED	International Institute for Environment and Development
ISD	Institutional and Social Development
MDG	Millennium Development Goals
MTSF	Medium Term Strategic Framework
NDP	National Development Plan
NGO	Non-Governmental Organization
OECD	Organization for Economic Co-operation and Development
PHAST	Participative Hygiene & Sanitation Transformation
SDG	Sustainable Development Goals
TPB	Theory of Planned Behaviour
UD	Urine Diversion
UDD	Urine Diversion Dry
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
VIP	Ventilated Improved Pit
VIP	Ventilated Improved Pit
WHO	World Health Organization
WSSCC	Water Supply and Sanitation Collaborative Council

1 CHAPTER 1: INTRODUCTION

1.1 Introduction and background of the study

The Economist magazine in 2013 flaunted the toilet as the world's valuable discovery, since it had changed the lives of billions of people. Without a doubt, ever since the 19th century, improved sanitation has saved billions of people from death and disease and helped communities and economies thrive. For decades, the safe and clean disposal of human urine and faeces and related hygiene practices known as sanitation has been widely overlooked as a sustainable development issue (WaterAid, 2011). This negligence has been due largely to widespread sensitivities about managing human waste and a lack of understanding of its unavoidable impacts. However, sanitation is quickly gaining prominence as one of the most important development challenges of the 21st century, and for good reason. In 2013 approximately 2.6 billion people around the world did not have access to a toilet (UNICEF & WHO, 2014). Improved sanitation has become a primary component of the global developmental agenda, primarily because of its established linkages with environmental quality and public health. In pursuance of this developmental agenda, sanitation became one of the main focal points in driving good environmental quality and public health.

To promote public health, hygienic sanitation facilities are crucial. Therefore in 2010, the United Nations General Assembly acknowledged access to sanitation as a human right and called for international efforts to help countries to provide safe, clean, accessible and affordable sanitation. In 2000 the Member States of the United Nations signed the millennium declaration, which later gave rise to the Millennium Development Goals (MDGs) (United Nations, 2000). Goal 7 is to ensure environmental sustainability including access to adequate sanitation (WHO, 2005). Prior to 2015 most countries realized that the MDG for sanitation would not be met as sanitation backlogs continued to escalate. As a result, there was an immense determination in exploring alternative sanitation approaches in order to meet the backlog in developing countries. However, the world did not meet the sanitation goal which aimed to halve by 2015, the number of people with access to basic sanitation. Even though the MDG targets were not achieved, the implementation process left behind a number of valuable lessons on how the countries can tackle the challenges as they roll out Sustainable Development Goals (SDGs), crafted as a vehicle to continue with what was not achieved through MDGs.

An alarming increase over global sanitation backlogs, water shortages and sanitation related diseases supports the drive for innovative sanitation solutions. Driven by the need to shift from the sanitation provision model of flush-toilets and sewers which are unsustainable in most poor, arid countries, more focus has been placed on alternative sanitation such as Urine Diversion (UD) toilets (Zurbrügg, et al., 2014). The UD toilet requires no water, no central management and results in a nutrient-rich urine stream that is safe to handle and can be used as a fertilizer in agriculture rather than pathogenic wastewater (Tilley, 2015). Tilley argues that the UD toilet concept is attractive in theory. However, the challenge is when beneficiaries do not practice agriculture, the low acceptance of the innovation and sometimes the awkwardness of using the toilets, resulting in low usage rates and wasted infrastructure investments (Roma, et al., 2013). With incompatible approaches used to promote the ecological sanitation concept, it is not hard to imagine why the toilet models are not warmly embraced.

Even though there are many barriers to progress in sanitation access in South Africa, this dissertation focuses on the lack of public awareness of the need to shift from water borne sanitation towards ecological sanitation (Burger, 2015). The lack of public awareness is due to inconsistent and mismatched approaches used to promote the ecological sanitation concept. Beneficiaries of urine diversion toilets and the overall public in South Africa are generally not well-informed about the need to shift from water borne sanitation towards ecological sanitation. There is a need to educate the public not only about water and sanitation but also promote the use and adoption of a range of choices for providing safe sanitation and the costs and benefits associated with these choices. Education and demonstration projects are crucial in achieving good acceptance with users, as operation and management depends strongly on users (Zurbrügg, et al., 2014).

The study focuses on sanitation in the context of peri-urban communities because peri-urban communities are faced with challenges in sanitation (Austin, 2005). These challenges are caused by water scarcity and the steep terrain particularly in KwaZulu-Natal province of South Africa among others. Urine diversion toilets have been regarded by the eThekweni municipality as the most cost effective and environmentally friendly technology towards addressing sanitation backlogs in peri-urban and rural areas in eThekweni Municipality, KwaZulu-Natal. The research therefore looks at the educational mechanisms put in place to persuade and encourage beneficiaries to adopt the urine diversion toilets. It also attempts to evaluate the impact these mechanisms have on beneficiaries in respect of meeting eco-san outcomes. The

research seeks to investigate the correlation between the envisaged use of ecological sanitation and the de facto practices.

The study is informed by an observation that suggests that there is a disjuncture between the planned ecological sanitation and the de facto practices of the beneficiaries in peri-urban areas within eThekweni Municipality. This disjuncture is exemplified by how many households have either converted their urine diversion toilets into storage facilities and flush toilets and those who are not using them at all. As a result, they have converted their urine diversion toilets into storage facilities and flush toilets. The assumption is that urine diversion toilets have been rejected by communities in peri-urban areas of eThekweni due to mismatch between the methodologies used to promote urine diversion toilets and the recipients of such promotion efforts. Methodologies used to promote urine diversion toilets fail to correspond or relate to the norms and practices of urine diversion toilets beneficiaries. Zurbrügg et al (2014) suggest that communities and staff should be trained to promote the acceptance and smooth operation of the UD toilet system. The general understanding of policy formulation is that it takes into account socio-political, cultural, economic, and environmental factors that reflect the context in which implementation is conducted. Policy formulation also includes a setup of institutional arrangements that will facilitate implementation. The research seeks to understand the role of educational programs put in place in bridging the gap between the policy and practice of ecological sanitation in low-income peri-urban communities.

According to WaterAid (2011) ecological sanitation (Eco-san) is an environmentally friendly sustainable sanitation system which regards human waste as a resource for agricultural purposes and food security. Boot (2007) argues that ecological sanitation works on the principle that human excreta is not a waste product but contains the nutrients required to fertilise land. Ecological sanitation is a “closed loop” system (a system that promotes a controlled base of both preferred outcomes and feedback from the system). This is because ecological sanitation prevents pollution by recycling nutrients and organic matter. Sawyer (2001) argues that sanitation systems/ sanitation management need to be rethought because human excreta contains valuable resources for food production; the concept of ecological sanitation has evolved from this idea. Ecological sanitation is a safe approach to recovering nutrients from human excreta, recycling them back into the environment and into productive systems. Ecological sanitation protects the environment and saves water as opposed to the common practice of linear waste management which views excreta as something that needs to

be disposed. The ecological sanitation cycle begins with containment, where human waste is held in the sanitation system. The waste is then sanitised through one or several processes which cause pathogens to die off. The resulting safe soil-conditioner (from faeces) and fertiliser (from urine) is then recycled and used to assist crop production.

Research shows that drastic climate change patterns and water scarcity require developing countries to adapt to ecological sanitation and other technologies to help strengthen and meet future challenges of climate change. Furthermore, it has been found that successful adaptation not only depends on governments, but also on the active and sustained engagement of stakeholders including national, regional, multilateral and international organizations, the public and private sectors, civil society and other relevant stakeholders, as well as effective management of knowledge. Adaptation to the impacts of climate change may be undertaken across various regions and sectors, and at various levels. Research shows that promoting the effective development and transfer of environmentally sound technologies is critical in enabling developing countries to pursue their objectives for sustainable development in a climate-friendly manner. The universal climate change agreement in the Bonn climate change conference 2014 states that developed countries should take all feasible steps to promote, facilitate and finance as appropriate, the transfer of environmentally sound technologies and know-how to enable those technologies to implement the provisions of the Convention (iisd, 2014). However, every new technology invented needs systems and processes that control the implementation of the physical structure; in this case the physical structure is a UD toilet. Systems and programs put in place provide an arrangement that works for the benefit of the stakeholders involved, in this instance the Municipality and community, by ensuring that the technology introduced adheres to acceptable ethical standards and best practices as well as to formal laws. Systems and programs put in place should steer or govern organizations or society's operations (Hatanaka and Busch, 2008).

There is a need to shift towards ecological sanitation as the world is going through drastic climate change and water scarcity (WaterAid, 2011). Water scarcity mostly affects the low income groups. Present water usage around the world cannot be considered sustainable; too much water of high quality is taken from the eco-systems and too much polluted water is discharged (WaterAid, 2011). Part of this problem is due to domestic water usage. Often, water used in flush toilets is of drinking quality. Research shows that sewerage systems require the use of large quantities of water to work effectively and in many poor communities there is no

reliable water supply. Boot (2007) argues that 20-40% of water consumed in an average city goes towards flushing toilets. Eco-san systems only require water where it is used for anal cleansing, therefore eliminating this burden on water supplies. Nygatan (2005) argues that introducing a system that does not need water (dry sanitation) helps to close the nutrient and water cycle in a safe manner. This means that the re-use of excreta for urban agriculture and food security helps to return the valuable nutrients contained in excreta back to the soil for healthy plant growth while saving water that would have been used to transport sewerage. Using ecological sanitation systems reduces water consumption and chances of underground water contamination (Nygatan, 2005). When low income households practice urban agriculture, poverty levels are reduced due to the fact that if households have food in their gardens it can be sold in community markets or shops and also eaten by families (Nygatan, 2005).

Otieno and Ochieng (2004) assert that South Africa is a water-scarce country. Matsebe (2012) states that the South African Department of Water Affairs has been rolling out a variety of sanitation technologies using both wet and dry sanitation systems. Statistics show that the most commonly used system is the wet system. The following statistics highlight a 15-year period sanitation backlog in KwaZulu-Natal from 1996 to 2011. In 1996 41.2% of the household population in KwaZulu-Natal had access to flush/chemical toilets, and 15.1% had no access to any toilet facility (Stats SA, 2001). In 2011 53.2% had access to flush/chemical toilets, and 6.3% had no access to any toilet facility (Stats SA, 2011). In a period of 15 years the country cut down the backlog by 9%, bringing down households with no access to sanitation to 6%. In 1996, eThekweni Municipality had 65.3% households with access to flush/chemical toilets, and 2.95% had no access to toilet facilities (Stats SA, 2001). In 2011 eThekweni Municipality had 75.7% households with flush/chemical toilets and, 2.1% with no access to toilet facilities (Stats SA, 2011). In a period of 15 years, eThekweni municipality cut the backlog by 10%.

The wet system which is the commonly used system, depends on extensive use of water in the form of flush toilets. At the same time, the housing sector in major cities is continuously growing and this is putting a strain on water services. The Department of Water Affairs has provided a range of sanitation technologies in various parts of the country, both dry and wet including: waterborne (requiring piped water supply), ventilated improved pit (VIP) toilets, pour-flush and aqua-privy ecological sanitation (widely known as eco-san), in the form of urine diversion dry (UDD) toilets. The latter provides a reasonable solution to the current sanitation

challenge because it operates without water and is suitable for regions with long dry seasons. UDD toilets are suitable for conditions where water is scarce or expensive like the province of KwaZulu-Natal which is faced with drought and water shortages that have led to water restrictions in most residential areas. Hazelmere Dam is the major source of water supply to many areas surrounding Durban.

In 2015 Radebe on SABC News reported that water levels in the dam were dropping to about 32% and that no rainfall was expected for a period of six months from June. In June 2017 Singh (News24) reported that the KwaZulu-Natal province was cautioned by Umngeni water, bulk supplier that the province was not yet safe from worsening drought conditions. Furthermore, Umngeni water had introduced water rationing through a cut of 15% in portable water production at its water treatment plants at Midmar, Pietermaritzburg and Durban. Ecological sanitation is thus very appropriate for areas with water shortages or irregular water supply, and moreover for long term water security South Africa. It is a decentralized system, based on household and community management, and the need to invest in large-scale infrastructure and operate centralized institutions is drastically reduced. Moreover, fewer sewers and deep pit latrines will reduce the risk of pollution of ground and surface water (Andersson, et al., 2000).

1.2 Problem statement

South Africa is amongst many countries faced by sanitation backlogs (WIN-SA, 2006). In response to this challenge, South Africa committed itself towards employing programs that would enhance and fast-track the eradication of the sanitation backlog by 2015. Efforts to meet sanitation targets were developed by improving and developing new alternative sanitation technologies such as urine diversion toilets. In eThekweni Municipality, the roll-out of urine diversion toilets began in 2002 with the goal of improving access to sanitation. Since then over 85 000 urine diversion toilets at household level have been installed. It was envisaged that the eThekweni municipality department of water and sanitation would intervene in the process of education and training of beneficiaries to promote UD toilet beneficiary adoption and proper operation and maintenance of the toilet system (WIN-SA, 2006).

Therefore, the municipality was expected to play a role in the development of community training and education programs that promote acceptance and proper management of the service provided. Institutional and social development (ISD) consultants were trained by the municipal education officers to implement community training and education programs. ISD

employed and trained community facilitators to conduct the training and education implementation process to promote acceptance and proper management of urine diversion toilets by beneficiaries (WIN-SA, 2006).

However, a number of concerns have since arisen over the maintenance and removal of faecal material from urine diversion toilets. These include dissatisfaction amongst household owners over the expectation that they will remove the faecal matter from their urine diversions themselves while other recipients of basic sanitation receive a free service from the municipality (Etter, Udert, & Gounden, 2015; Alcock, 2015).

Roma et al. (2013), Matsebe and Osman (2012) and Matsebe (2011) have documented challenges of UD toilets in eThekweni Municipality. Matsebe and Osman (2012) highlighted that UD toilets were not being used as they were intended by the municipality. Less than 50% of UD toilets were being used as intended by the municipality. Many UD toilets have been rejected by beneficiaries, citing various issues such as cultural and religious problems (Matsebe and Osman 2012). Most of these concerns suggest lack of knowledge and understanding of the environmental and social benefits of UD toilets. Embedded in this are cultural beliefs and social perceptions around the handling of human waste (Matsebe & Osman, 2012). These beliefs and perceptions are a reality for beneficiaries and reflect failures of participatory governance to communicate the primary objectives of introducing UD sanitation technology.

The researcher observed that the majority of beneficiaries did not use and maintain their urine diversion toilets properly i.e. broken items were not repaired, toilet items were repaired with unsuitable material and the toilet was not kept in a usable and hygienic state. Flippo (1961) argues that training is presented on the activities which are designed to improve human performance on the task given. Education is concerned and focused on the development of the human mind and it surges the powers of observation, analysis, integration, understanding, decision making, and adjustment to new situations. It is therefore questionable whether training and education was done to promote acceptance and proper management of urine diversion toilets; and if so, whether it was done properly. In other words, did education and training reach the right people that it was meant to reach? Did the beneficiaries understand the content, if not what was done in order to make sure that beneficiaries understood the training and education? The challenge of verifying whether education and training took place still remains unclear as it was in fact community members who were appointed to conduct training and education as facilitators.

The critical concern of this dissertation is the role played by community education programs in promoting adoption, envisaged usage and maintenance of urine diversion toilets. The argument presented is that eThekweni municipality focuses more on the quantity side of service delivery, while promotion of the service delivered is inadequate. The gist of the argument is that the municipality fails to offer consistent, continuous training and education programs to promote user acceptance of urine diversion toilets. Education and training programs play an important role in overcoming negative perceptions and barriers towards acceptance of most services delivered (Zurbrugg, et al., 2014). A sanitation revolution would have to be twinned with continuous information and education drives to help to improve the chances of acceptance and longevity. Dunker (2014) states that a clear understanding by citizens of how any given technology works, how the systems must be managed, maintained, repaired and/or cleaned is required to ensure any technology's viability and feasibility (Duncker, 2014).

The Department of Water and Sanitation Minister Ms. Makonyane (2015), states that high-levels of local community participation in governance are key to ensuring longevity, and ward committees must be core to this enterprise. Furthermore, she states that there is a need to empower ward councillors with information about government plans, programmes and offerings to deal with water and sanitation challenges on the ground (DWS, 2015).

Moreover, Dunker (2014) states that community social mobilisation should be at the centre of every programme. He further argues that it has been visible in the past that even with the best of intentions, without community participation and engagement, projects fall flat and collapse.

Therefore, this dissertation investigates the role of community training and education programs in promoting acceptance, usage and maintenance of the urine diversion toilet. Using behavioral theories, this dissertation critically evaluates the gap between envisaged practices i.e. the correct practices that were set out by the municipality which were intended to be followed by beneficiaries when using urine diversion toilets, and existing/current practices of urine diversion toilets use, exercised by beneficiaries. The dissertation uses the case study area of Umbumbulu.

Socio-cultural perceptions and practice, as well as technical and environmental factors play a major role towards acceptance or rejection of a sanitation system (Winbland, 2014). The success of a given sanitation technology depends on how involved service users and the society are in the planning and delivery process (Brynard, 2007). Adapting a sanitation system to meet

the diverse needs and cultural norms of users seems to be a formidable challenge for the eThekweni department of water and sanitation. It is evident that the eThekweni Municipality Department of Water and Sanitation has been in the process of eradicating lack of access to proper sanitation in peri-urban areas. However, as some underlying issues have not been addressed, the main aims of the project have not yet been achieved

1.3 Significance of the study

Updates and reports on water scarcity in South Africa continue to rise, informing the state of the challenges that the country is faced with due to the water crisis. The 2018 water crisis in Cape Town and elsewhere in the country has demonstrated the depth of the water challenge. Mark et al (2018) states that research on water crisis in South Africa confirms that what had been forecast to happen in Southern Africa under changing climate in the future is already happening, with more dry periods currently than, approximately, 20 or 50 years ago. Therefore, the water resource system is strained more often than had been estimated.

“This means that droughts which the current water resource system is designed to survive will occur much more frequently. Without adaptation in water supply and demand, events like the 2017-2018 water shortage could occur once every 15 years, on average, compared to the expected once every 50 years.” (Mark et al., 2018)

Matsebe (2012) states that South African government should consider moving away from the linear sanitation system or flush toilet system to ecological sanitation, to continue delivering access to adequate sanitation. The study is important because it addresses technology interface in a context where a potentially beneficial innovative technology struggles for reception by beneficiaries. This presents a prospect to learn about the factors that contribute to the apparent UD toilet technology acceptance challenges. Information from the study could be used to advance the future roll-out of the UD technology that promotes user acceptability and longevity.

1.4 Research objectives

The main aim of this dissertation is to investigate the role of community training and education programs in promoting acceptance, usage and maintenance of the urine diversion toilets in low-income peri-urban communities.

The objectives are:

1. To identify factors that have an impact on the adoption or non-adoption of UD toilets
2. To observe whether the UD toilets in Umbumbulu were adopted as they were originally designed or if adapted by beneficiaries to suit their preferences, and to document the reasons thereof.
3. To examine whether UD toilets can be sustained over time.
4. To identify factors influencing UD toilet acceptance and longevity.
5. To assess the success or otherwise of the educational programs instituted to promote acceptance, usage and maintenance of urine diversion toilets in low income peri-urban communities.
6. To make recommendations for improving acceptance and longevity of the urine diversion toilet

1.5 Research questions and sub-questions

What is the role of community training and education programs in promoting acceptance, usage and maintenance of urine diversion toilets in low-income peri-urban communities and to what extent are the programs effective in promoting the adoption and maintenance of UD toilets?

1. Are there factors impacting the adoption or non-adoption of UD toilets?
2. Were the UD toilets adopted as they were originally designed or adapted by beneficiaries to suit their preferences?
3. Can UD toilets be sustained over time?
4. What are the factors influencing UD toilet acceptance and longevity?
5. To what extent was the implementation of the educational programs instituted to promote acceptance, usage and maintenance of urine diversion toilets in low income peri-urban communities successful or not successful?
6. What are the recommendations for improving acceptance and longevity of the urine diversion toilet?

1.6 Definition of terms

Community participation

Community participation emerges when a community organizes itself and makes a commitment to influence decision-making on issues that affect them (Advocate for Youth, 2001) This process includes recognizing the problems, developing actions, putting them into place and following through. According to Burns et al (2004, p2), “Community participation

concerns the engagement of individuals and communities in decisions about things that affect their lives”. Ndekha et al (2003) concurs with Burns, arguing furthermore that the level to which supremacy is shared in decision-making varies according to type of participation. Community participation in this dissertation refers to the process of community members of the same area with similar situations collectively working together to solve problems affecting their well-being (Burns et al, 2004).

Ecological sanitation (Eco-san)

Ecological Sanitation is an alternative approach to avoid environmental disadvantages of conventional wastewater systems (Werner et al., 2004a) such as excessive water use. The EcoSan paradigm in sanitation is based on ecosystem approaches and the closure of material flow cycles (see figure 1). Human excreta and water from households are recognised as a resource (not as a waste), which should be made available for re-use. According to Werner et al. (2004b), EcoSan:

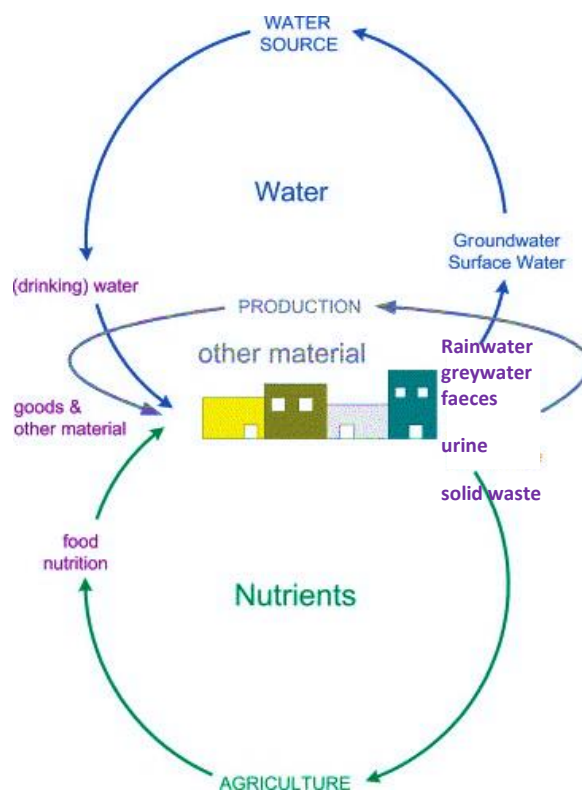
- reduces the health risks related to sanitation, contaminated water and waste,
- prevents the pollution of surface and groundwater,
- prevents the degradation of soil fertility and
- optimises the management of nutrients and water resources

EcoSan represents a holistic approach towards ecologically and economically sound sanitation and is a systemic approach as well as an attitude.

The applied technologies may range from natural wastewater treatment techniques to compost toilets, simple household installations to complex, mainly decentralized systems (Otterpohl, 2004). Therefore, EcoSan is not just a poor people solution, with low standard; it is more a number of appropriate solutions for different specific local situations.

Eco-san in this dissertation refers to the idea of treating different types of waste generated by humans as a resource which can be safely collected, treated and reused to prevent pollution of water bodies and the environment (Sawyer, 2001).

Figure 1: Circular flow in an eco-san system



Source: Langergraber and Muellegger (2005, p435)

1.7 Research methodology and study area

The study of social behaviour in ecological sanitation lends itself to qualitative epistemology therefore the process of selecting the methodology is informed by the nature of the study as a qualitative process.

The purpose of this section is to outline the methodological framework used in the research process. The study is premised on qualitative research methods. Under this methodology various methods were used. These included semi-structured household surveys and observations. Semi-structured interviews were used to assess institutional perceptions on the role of educational programs in facilitating socio-cultural acceptability of ecological sanitation. Household surveys and observations were used to assess user perception and practices in eco-san. Therefore, the purpose of this section is to outline the methodological process adopted in answering the research questions. It begins by unpacking methodological justifications for why the particular methodology was selected and how it enhances the outcomes of the study.

The researcher conducted a literature review exercise and primary data collection in an attempt to understand the issues highlighted in the study. Chapter 2 of the dissertation dealt with literature review whereby existing literature was used to place the study within the existing contextual and theoretical framework. A case study was used for data collection and the data collected was then analysed to produce research findings and conclusion.

1.8 Methodological justification

The study of human behaviour involves complex interaction with socio-cultural, political and environmental factors. All these factors influence how humans react to institutional interventions.

1.9 Methodology

The process of delivering ecological sanitation is embedded in complex institutional and policy frameworks. Stakeholder behaviour and practice is informed by these complex engagements. Therefore in order to understand behaviour and practice of those involved in eco-san the study has employed a qualitative methodology. Welman et al. (2005) state that a qualitative methodology offers opportunities to understanding socially and culturally embedded human behaviour. It also allows for a research study that takes into consideration cultural sensitivities. Welman et al. argues that research subjects are perceived as products of complex socio-cultural, political, environmental interactions. In this study qualitative methodology is used to investigate the role of educational programs in bridging the gap between policy and practice in eco-san in the context of low-income peri-urban settlements. Methods selected allow a study to investigate policy constructs and institutional practices in eco-san. They also allow for an assessment of end user perception and practices in ecological sanitation. Qualitative research was preferred over quantitative in this study because qualitative research does not require making attempts to manipulate the situation, the researcher simply understands and describes the situation (Welman et al., 2005).

1.9.1 Sources of data

This dissertation comprises of both primary and secondary data collection. The main data collection methods used in this dissertation were the desktop data collection, interviews, questionnaires, observations and case study.

The primary data process was aimed at providing empirical evidence on whether the educational programmes implemented contributed to closing the gap between policy and

practice in ecological sanitation. Empirical data was collected from households who are the end-users of ecological sanitation, and government officials who are custodians of sanitation provision.

The need to create a theoretical and conceptual foundation of this dissertation was informed by a selection secondary data sources. Secondary data sources were extracted from a collection of available data which was mainly desktop data collection.

1.9.2 Data collection

This dissertation employed secondary data collection as a preliminary introduction of the study to understand the main issues in sanitation. Data was collected from national government sources and published government reports including international organization reports that had an influence on the provision of sanitation.

Interviews were conducted with either the head of household, spouse or persons who are 18 years and older. Respondents who were below the age of 18 would have required the consent of a parent or guardian as the South African law identifies anyone under the age of 18 years a legal minor (Strode et al., 2010). The duration of an interview conducted was between 45 minutes to an hour for each participant. Participants' narrations during an interview were recorded by a Dictaphone. The researcher personally collected the data. The details of the study were explained to each participant before conducting the interview, including the purpose of the study and how the interview was going to be conducted. The researcher asked for consent from participants to take pictures of relevant documentable information.

The data collection process was undertaken using three important tools. These are outlined in the subsection below. Household and key informant semi-structured interviews and observation were methods used for primary data collection.

a) Semi-structured interviews

Babbie (2007) states that a qualitative interview is an interaction between an interviewer and a respondent in which the interviewer has a general plan of inquiry, including the topic to be covered. Semi-structured interviews involve the use of open-ended questions as an interview guide, and this method is crucial to the study in order to gather more in-depth information relating to the research problem. Household and key informant interviews were developed on

the basis of the research questions and objectives. The purpose was to assess the impact of educational programs in bridging the gap between policy and practice in eco-san. It was also meant to assess whether end users had access to adequate knowledge and information about the benefits of eco-san. The interview questions were divided into various sub-sections (see annexure 2. Two separate set of Household and key informant interviews were conducted). An interview schedule was developed using research objectives as key themes. The purpose of the interview schedule was to provide guidance for the interviewer during the interview process. Semi-structured interview was designed to be administered on government officials and households who are key respondents in this research. The study's topic of discussion was very sensitive for some participants therefore; it was suitable to employ semi-structured surveys for participants to conduct one-on-one interviews. Conducting one-on-one interviews was beneficial to the study as it allowed participants to respond to all questions without feeling embarrassed (Cargan, 2007 and Neuman, 2003). There are well documented cultural sensitivities around talking about sanitation hygiene and faecal material. Providing privacy to research participants ensured openness and accuracy of information.

b) Observations

According to Babbie and Mouton (2001), observation can be in the form of simple observation, where the researcher remains an outside observer, or participant observation, where the participant becomes a member of the group being observed. In addition, Babbie and Mouton (2001:294) state that *"the greatest advantage of observation is the presence of an observing, thinking researcher at the scene of the action"*. This method was used to collect physical evidence of the manifestation of the gap between policy and practice during the fieldwork process. Manifestation of the gap between policy and practice in physical evidence of how households use their UD toilets could not be captured through interviews.

The first two questions of the household interview (see annexure 2. Household interview schedule) were intended to be answered by the researcher on the participants' property after asking for permission from the participant to observe the UD toilet condition with regards to its maintenance and use. The questions were answered on-site just before the interview with the participant commenced. The questions were in the form of a checklist for the researcher to tick as well as ask informal follow up questions. All participants were requested to grant the researcher permission to observe their toilet to which they agreed by signing consent forms.

1.9.3 Sampling

Sampling is a process of defining the population of concern. The purposive sampling method was utilised. Purposive sampling is a type of nonprobability sampling in which the units to be observed are selected on the basis of the researcher's judgment about which ones will be the most useful or representative. The purposive sampling technique, also called judgment sampling, is the deliberate choice of an informant due to the qualities the informant possesses. It is a non-random technique that does not need underlying theories or a set number of informants.

Simply put, the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience (Bernard 2002, Lewis & Sheppard 2006). Purposive sampling is especially exemplified through the key informant technique (Bernard 2002 and Gustad et al. 2004), wherein one or a few individuals are solicited to act as guides to a culture. Key informants are observant, reflective members of the community of interest who know much about the culture and are both able and willing to share their knowledge (Bernard 2002, Campbell 1955 and Tremblay 1957). Initially a total of 20 households from the peri-urban area of Umbumbulu who were the first ones to receive UD toilets were selected. The selection was purposive primarily because it targeted households that had had UD toilets for a sufficient length of time to measure acceptability of the UD toilet technology. However, 1 household did not finish the survey therefore the researcher omitted that particular incomplete survey during data analysis. An interview with 1 municipal official Mr. FH (Pseudonym) from eThekweni Municipality Water and Sanitation unit was conducted. Interviews and surveys were conducted in both English and IsiZulu.

1.9.4 Data processing, analysis and presentation

Material collected through qualitative methods is always unstructured and cumbersome. It is mostly text based with precise transcriptions of interviews or discussion, field notes or other written documents. Moreover, the internal content of the material is usually in detailed and micro form. Content analysis was used in this study to analyze data. This approach enables the researcher to identify themes that are important to the study. The advantage of using content analysis is that it is non-reactive. The process of placing words, messages or symbols in a text to communicate to a reader or receiver occurs without influence from the researcher who analyses its content (Neuman, 2003).

Using the framework of content analysis themes emerging from the study were identified on the basis of how frequently they were raised. Welman et al (2005) argues that this process ensures that the themes are not imposed by the researcher but rather come out of the process.

1.10 The case study area

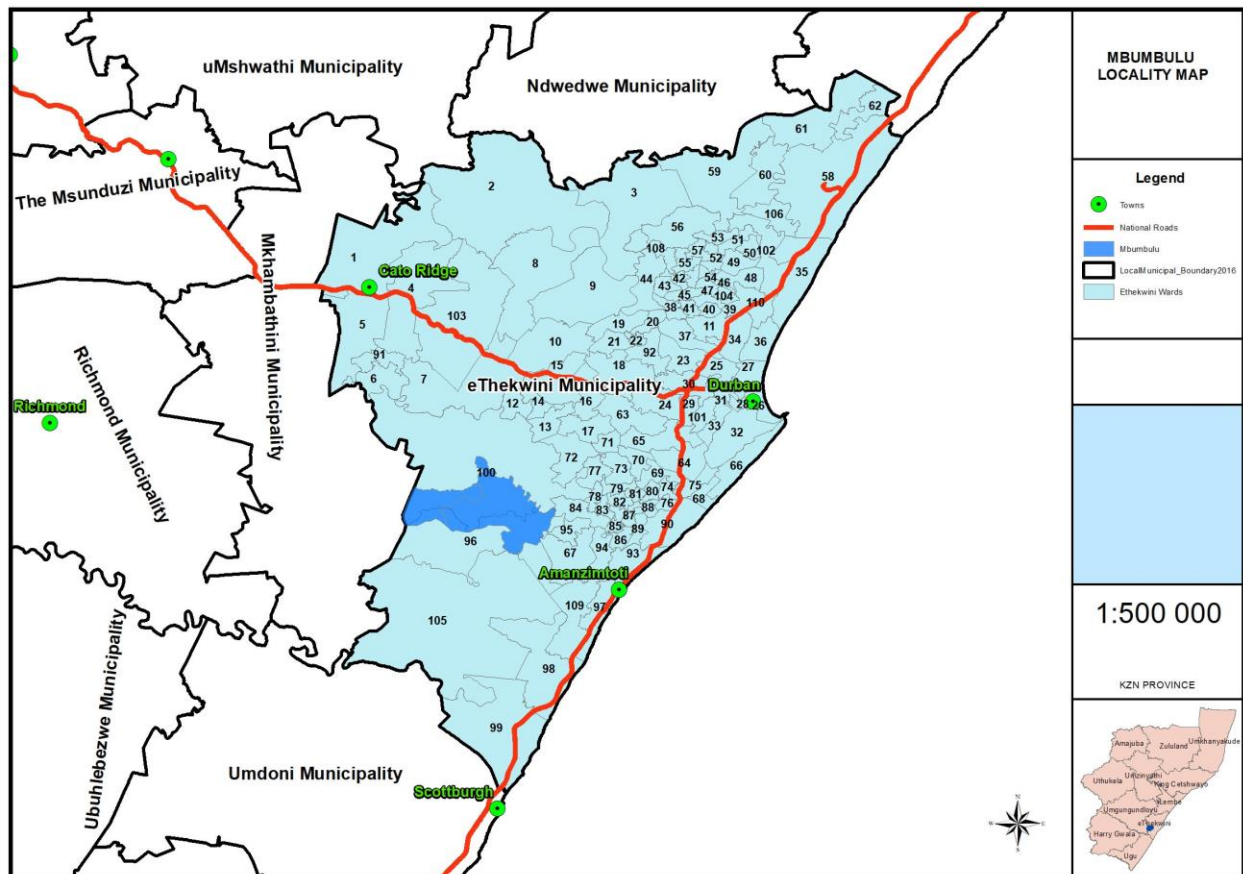
Umbumbulu is a peri-urban area located in eThekweni Municipality within the province of KwaZulu-Natal. The area is twenty-eight kilometres away from the Indian Ocean and forty kilometres south-west of Durban. Umbumbulu lies near Junction Highway M30 and R603 roads. The name Umbumbulu is derived from IsiZulu, a name said to mean the place of the round hill. Umbumbulu is bordered by Madundube on the north-east, and the farming community of Mid-Illovo on the south (Machen, 2011). Machen (2011) states that in the 1970s and 1980s the area was a scene of a local conflict, which saw hundreds murdered, and thousands dislocated. Umbumbulu has since become a picture of peaceful peri-urban living after the late 90s. According to the Stats SA report of 2001 the total population was 2684 and the number of households was 416. The area of Umbumbulu falls under two wards; ward 96 and ward 100. Umbumbulu and its surrounding areas is home to more than a quarter of a million people.

Ortmann and Machete (2003) state that Umbumbulu formed part of the former KwaZulu homeland, characterised by traditional forms of land tenure and subsistence agriculture, usually symbolised by widespread poverty. There is a duality of governance systems in Umbumbulu. Traditional leadership coexists alongside a democratically elected ward councillor. Traditional leadership still occupies a higher degree of importance and commands respect with regards to allocation of land rights, tribal courts and community affairs.

The area falls outside the bulk infrastructure network and the city's development line. Water and sanitation infrastructure in particular do not reach the entire area. Umbumbulu's spatial location (see Figure 2) outside of the service and infrastructure network makes a compelling case for alternative sanitation. This amongst other reasons is why Umbumbulu was selected as a beneficiary of UD toilet rollout by eThekweni Municipality. It is also the reason why the area was selected as a case study. EThekweni Municipality has installed about 85 000 UD toilets since 2002. Due to factors mentioned above, UD toilets were deemed as an appropriate sanitation response to water shortage and other global pressures related to water and sanitation. The UD toilet technology was a replacement of a lower sanitation service level of Ventilated Improved Pit Latrines (VIPs) as the Municipality's basic onsite sanitation option. The

motivation was that UD toilets offered forwards linkages and ease of disposal as compared to VIP toilets. Forward linkages related to the use of faecal sludge and urine in agricultural activities.

Figure 2: Umbumbulu Locality Map



Source: eThekweni GIS (2016)

It was envisaged that UD toilets would be easier to operate and maintain for the general public and require minimum maintenance. The adoption of UD toilets as a service level eliminated the challenges and costs related to pit emptying, sludge transportation and disposal associated with VIP toilets. However, despite the many positive attributes of UD toilets, many users were still not pleased with the new technology, due to the emptying burden and cultural issues associated with handling of faecal material that was for the household (Etter, Udert, & Gounden, 2015).

1.11 Dissertation structure

Chapter one consists of the introduction to the dissertation, including a background to the study and key significant literature, with current discussions on the topic. Through the problem statement the first chapter lays a foundation for the study. Furthermore, chapter one lists the objectives and questions that this study set out to investigate. Thereafter it defines terms and concepts relevant to the study. The chapter presents the methodology used to conduct the study, elaborates on the motivations for selecting particular methodologies, data collection tools, sets of data collected, the process of data analysis and introduces the case study location which consists of a location map highlighting where Umbumbulu is located within the eThekweni Municipality.

Chapter two reviews literature of existing research, relevant to the study and how it relates to the investigation. The main aim of this chapter is to look at theories and concepts that are applicable to this dissertation. Both the theoretical and conceptual framework assists in placing sanitation policy issues within a predefined framework of processes and practice.

Chapter three presents a review of eThekweni Municipality UD toilet beneficiary education and training approach. The introduction of this chapter focuses on the South African Sanitation Policy and thereafter unpacks the training and educational programs offered by eThekweni Municipality Water and Sanitation Unit for UD toilet beneficiaries.

The fourth chapter presents the key findings of the study. Chapter four consists of analysis of data obtained from the field. The chapter presents the research findings on the research questions that were raised for investigation of the role of community educational programs in bridging the gap between policy and practice of ecological sanitation in low-income peri-urban communities.

Chapter five provides a summary of findings and concludes the dissertation, highlighting the recommendations for the improvement of the sanitation policy and process of rolling out UD toilets in eThekweni.

1.12 Summary of chapter 1

The study was conducted to investigate the role of community education programs put in place to bridge the gap between policy and practice of ecological sanitation in low-income peri-urban communities. This chapter gives a detailed introduction to the whole study. Furthermore, the chapter highlights the research's problem statement, research motivation, research objectives and research questions.

2 CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

This chapter reviews relevant literature and establishes the theoretical framework and conceptual framework for the study. The chapter provides the context within which the study was designed. It critically explores the role played by educational and training programs to promote user acceptance and longevity of ecological sanitation interventions in low-income peri-urban communities. Because the study concerns itself with understanding behavior of actors and practice in ecological sanitation it is therefore imperative to ground the research within behavioral theories. Taylor, et al., (1995a) argue that theory of planned behavior stipulates that voluntary human behavior is led by intent to participate in such conduct.

Drawing on relevant literature, the conceptual framework of the study looks at the critical role played by community participation in promotion of UD toilets for user acceptance. This section discusses governance as a tool in sanitation decision making and implementation processes and engages with the concept of governance in the context of service delivery and sociocultural diversity. The section also engages in a debate on how governance could be used as a tool for consensus building in decision-making, and conceptual underpinnings of technical and participatory governance in sanitation decision-making processes.

The important concepts in this study include community participation, sanitation, ecological sanitation, and peri-urban. The problem statement has laid a foundation that in as much as the eThekweni Water and Sanitation Department has taken the initiative to reduce the sanitation backlog by providing UD toilets in peri-urban communities, however the objectives are not necessarily being met. The UD toilet implementation objective aiming to give households access to adequate sanitation has not been effective. Roma et al., (2013) and Matsebe and Osman (2012) state that some of the 85 000 UD toilets rolled out in eThekweni were not being adequately utilized and some not used at all as was envisioned by the municipality. As stated earlier, the city had envisaged that the uptake of UD toilets would support forward linkages that relate to closing the nutrient cycle and use of sanitation by-product for agricultural purposes. Furthermore, it was assumed that UD toilets would contribute to water saving as less to no water would be used for sanitation. Matsebe and Osman (2012) state that households with UD toilets had various reasons for the rejection of UD toilets. Some of the reasons included cultural and religious beliefs. Roma et al. (2013) state that some of the reasons were based on the taboo nature of handling human faeces within the cultural context of KwaZulu-Natal.

However, this study focuses on human behavior as a framework which critically provides a platform on which human behavior can be influenced to achieve positive policy outcomes.

2.2 Theoretical framework

McCluskey and Saint-Blaise (2007) argue that practice is the organized way in which an individual or a group carries out a particular activity. Although it may be more or less tightly framed by guidelines or even laws, practice is necessarily the fruit of what individuals do and is largely composed of tacit knowledge rooted in the experience of those individuals and groups. Practice is difficult to exchange with peers on a large scale because it is context-bound and based on non-formalized knowledge. The major difficulty, but also advantage, with practice is its relative resistance to change (McCluskey & Saint-Blaise, 2007).

Furthermore, McCluskey and Saint-Blaise (2007) state that policy is a set of statements about how a particular goal is to be reached. It seeks to structure and shape specific areas of practice of a large number of people. However only a small amount of practice is dictated by policy. Policy is generally formalized in writing, whereas much practice resides in experience. Although policy may be the fruit of wide-scale discussion, it is not based on the tacit understanding of a group as is practice, but is rather a decision of a person or body invested with authority. That decision is based on such things as underlying values or assumptions, wider concerns, research, study visits, consultation processes but also on chance encounters. The major difficulty with policy is putting it into practice (McCluskey & Saint-Blaise, 2007).

The relationship between policy and practice is generally one-way in education systems. Much policy-making is about controlling practice. It is based on the assumption that it is possible to change the way people work by starting from a written statement (called policy) about what should be done and how it should be done (called practice). In other words, much educational policy-making is based on a mechanistic perspective of change in which policy seeks to dictate practice.

The behavior of humans is complex and frequently beyond understanding. Humans differ individually and vary within groups; groups differ in significant ways from each other. They have multi-dimensional behavior as unique individuals. This dissertation focuses on a theory that involves people as well as behavior and the following individually-focused theory under behavioral theory has been selected.

2.2.1 Theory of planned behavior

The theory of planned behavior evolved from the theory of reasoned action (Ajzen & Fishbein, 2003) which theorized intention to act as the best predictor of behavior. Intention is itself an outcome of the combination of attitudes towards a behavior (Ajzen, 1985). That is the positive or negative evaluation of the behavior and its expected outcomes, and subjective norms, which are the social pressures exerted on an individual resulting from their perceptions of what others think they should do and their inclination to comply with these. The theory of planned behavior added a third set of factors as affecting intention (and behavior); perceived behavioral control. This is the perceived ease or difficulty with which the individual will be able to perform or carry out the behavior and is very similar to notions of self-efficacy (Bandura, 1986 and Terry et.al, 1993).

Darnton (2008) argues that there is a wide recognition of the importance of influencing behavior in order to achieve positive policy outcomes. Hine, et al., (2008) and Southerton et al., (2011) state that reports on influencing behavior that have been published cover the use of behavior change models in general while others focus on behaviors relevant to specific contexts such as climate change, sustainable consumption, or the impact of volunteering on environmental behavior.

The theory of planned behavior is described as an underlying explanation of how behavioral intention determines behavior; how attitude and perceived control influence intent. Behavioral intention is the most important determinant of behavior (Ajzen, 1985). The underlying motive of using planned behavior is that it helps individuals in understanding themselves as well as believing that they can apply the behavior as well as be able to have attitudes that correspond with the behavior and its outcomes. Nevertheless, planned behavior helps individuals believe that they can take control of their behavior. The theory of planned behavior is one of the most widely cited and applied behavior theories. It is one of a closely inter-related family of theories which adopt a cognitive approach to explaining behavior which centers on individuals' attitudes and beliefs.

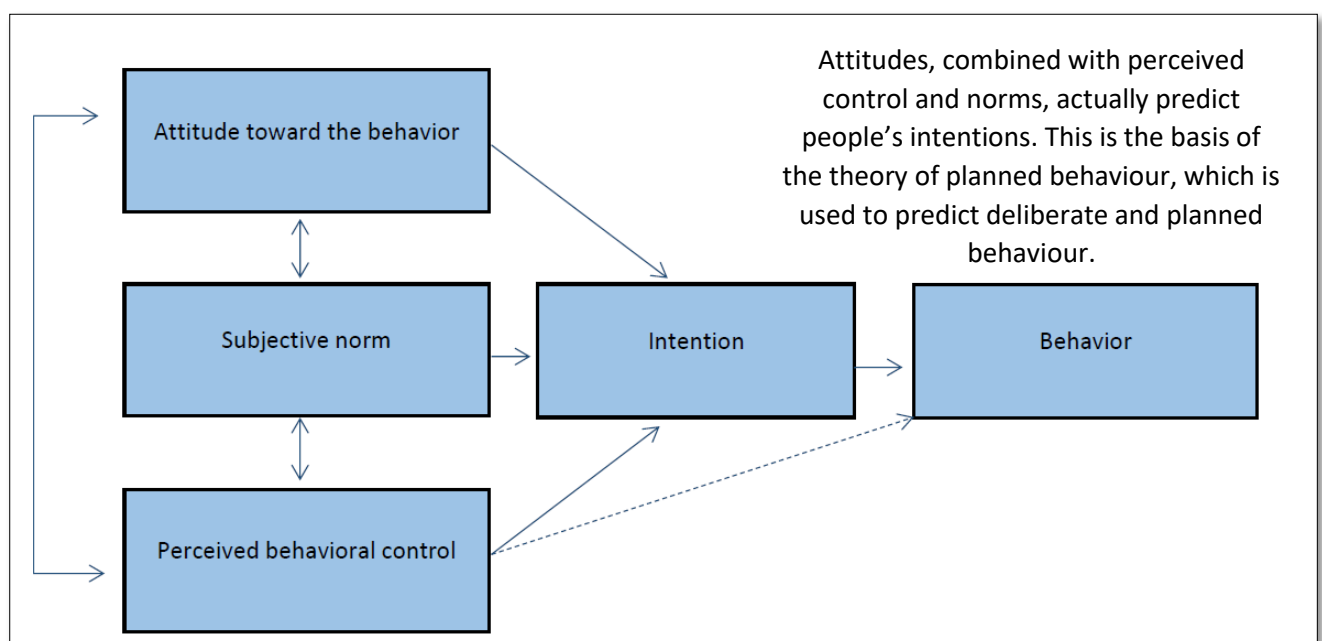
Figure 3 below illustrates the theory of planned behavior by Grizzel (2007). The theory of planned behavior suggests that behavior is dependent on one's intention to perform the behavior. Intention is determined by an individual's attitude (beliefs and values about the outcome of the behavior) and subjective norms (beliefs about what other people think the person should do or general social pressure). Behavior is also determined by an individual's perceived behavioral control, defined as an individual's perceptions of their ability or feelings

of self-efficacy to perform behavior. This relationship is typically dependent on the type of relationship and the nature of the situation.

The hypothesis of planned behavior proposes that behavior is subject to one's intent to carry out the behavior. Intent is dictated by a person's attitude (beliefs and values about the outcome of the behavior) and subjective norm (beliefs about what other people think the person should do or general social pressure). Behavior is controlled by a person's perceived behavioral control, characterized as a person's impression of their capacity or sentiments of self-viability to perform conduct. This relationship is commonly reliant on the sort of relationship and the idea of the circumstance.

Intention has been shown to be the most important variable in predicting behavior change, suggesting that behaviors are often linked with one's personal motivation. This suggests that it may be important to present information to help shape positive attitudes towards the behavior and stress subjective norms or opinions that support the behavior. In the case of motivating beneficiaries to use their UD toilets as envisaged, presenting information to UD beneficiaries in a form of continuous training and educational program that they can understand would influence their behavior towards the use of UD toilets.

Figure 3: Illustration of Model of planned behaviour



Source: Grizzle (2007)

Educational programs include visual, verbal and written information presentation. Theory of planned behavior suggests that people's attitude and behavior can be influenced in order to reach the envisaged outcome. It is now widely acknowledged that face-to-face advice is an important influence on behavioral outcomes and it is likely that, in addition to constituting knowledge exchange, this social interaction promotes critical reflection upon elaboration, deliberation why and how certain activities occur. This study used this theory as a frame of reference for observing and measuring the impact of educational programmes for alternative sanitation.

2.2.2 People centered approach

According to the 2000 World Development Report entitled the role of UNDP in the 1990's; development has as its crucial objective, the improvement of human capabilities to enable people to manage their own lives and their environment (Srinivasan, 1990, p. 7). The people centred approach is one of the mechanisms for ensuring that development improves human capabilities.

Theron (2009) states that the people centred approach is based on the notion that ensures that people/the community are at the centre of decisions which relate to their life. Theron states that a people centred process comprises of listening, thinking together, coaching, sharing ideas, and seeking feedback on planned or delivered services/interventions. Korten (1990) argues that the people centred process is ongoing to ensure that each person is supported concerning their personal goals, even as they develop and change. Korten (1990) states that the main idea is to understand what each individual person wants and needs to live their own, personally defined, good life.

Theron (2009) and Korten (1990) state that to assist people to live in their communities as they choose, the people centred approach employs methods that include techniques of assigning, providing and organising services entrenched in listening to what people want. Services provided for the people are developed to adjust to people's needs rather than people merely being placed in pre-existing services and expected to change/adjust. Korten (1990) argues that people centred approaches do not only limit themselves to what is available within specialist

services. However, they also employ mainstream services and community resources for support and backup.

Person centred practice is also one of the cornerstones of a paradigm shift to more people-centred approach, focused on micro-level as opposed to macro-level theorising. Korten (1990) (cited in Davids, et al., 2009, p. 17) indicates that people-centred development is a process by which the members of the society increase their personal and institutional capacities to mobilize and manage resources to produce sustainable and justly distributed improvements in their quality of life consistent with their own aspirations. Unlike in past theories of development, humans are placed at the centre, contrary to the trickle-down approach in other development initiatives.

Theron (2009) argues that in the people-centred approach, four fundamental questions are asked about the development process and include the following: From what? By whom? From whom? In what way? To paraphrase Kotze's contention (cited in Theron, 2009:105), humanist thinking on development implies more than economic growth and includes transformation of institutional, socio-cultural and political systems and structures, hence addressing development in a holistic way.

2.3 Conceptual framework

2.3.1 Participation

Participation describes active involvement by people in civic and developmental organizations, political parties and local government, with the purpose of influencing decisions that affect their lives (Roodt, 2001). Zahman (1993,) put forward the idea that participation is the exercise of people's power in thinking and acting, as well as in controlling their action in a collective framework. Mikkelsen (1995) argue that participation is the sensitization of people to increase their receptivity and ability to respond to development projects.

Roodt (2001) concurs with this notion, and uses the term concretization coined by Paulo Freire, which refers to a process whereby poor and oppressed people become politically and socially aware that their living conditions are not natural but the result of the exploitative policies implemented by the state and their country's elites. Central to this concept is that this awareness is achieved through active participation in educational/political/social organizations in

conjunction with fellow citizens and enables oppressed people to actively change their lot (Roodt, 2001).

In the context of this dissertation, the term participation is regarded as the ability of the community to identify its challenges and needs and then take charge of its scenario. Participation also refers to empowering people to mobilize their own capacities, be social actors rather than passive subjects, manage the resources, make decisions, and control the activities that affect their lives (International Institute for Environment and Development, 2010). Change agents are only there as catalysts, and the community members are at the center of development.

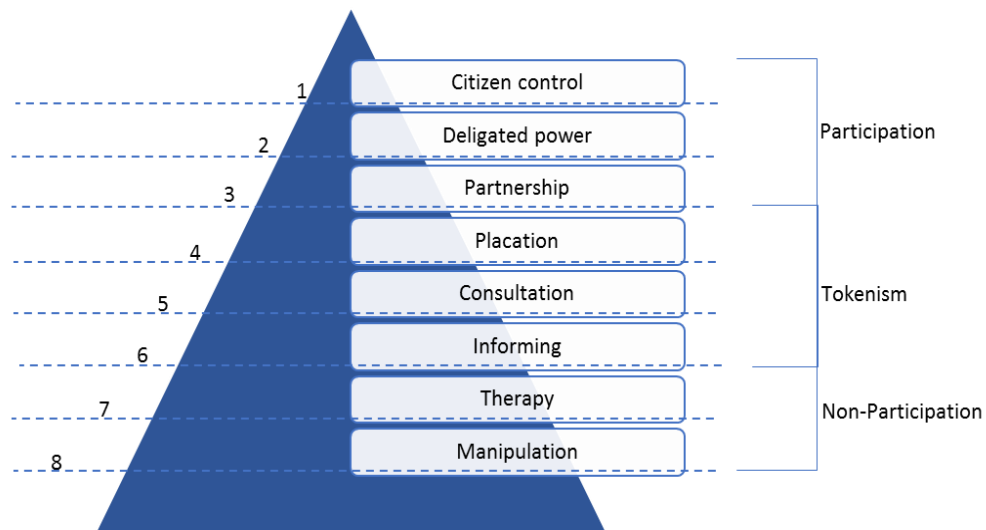
2.3.2 Community participation

Community participation is defined as a process of engaging citizens in decision-making relating to development. Samuel (1986) defines community participation as an instrument of empowerment. In his view, community participation is key in ensuring that development leads to equitable sharing of power and to a higher level of people's political awareness and strength, particularly the vulnerable groups of society.

Other authors (Zakus & Lysack, 1998 among others) define the concept of community participation as a process by which members of the community, either individually or collectively and with varying degrees/ levels of commitment define their needs and challenges with the aim of developing or influencing interventions. The first attempt to measure the level and scale of citizen participation was articulated by Arnstein (1969). She developed a ladder of citizen participation as part of the effort to encapsulate the gradations of participation in various programmes in the United States (Marisa, 1996).

Arnstein conceptualizes community participation as a process that enables the ordinary citizens to be deliberately influenced by decisions about the future of the society they live in. Arnstein states that ordinary citizens' participation is facilitated through power distribution channels that determine their level of engagement with the decision making process. A model of eight levels of participation was developed to help in analysing each type of participation. Figure 4 illustrates Arnstein's Ladder of Citizen Participation. The ladder illustrates 3 levels of community participation paradigms which consist of 8 rungs.

Figure 4: Arnstein's Ladder of Citizen Participation



Source: Choguill (1996)

This dissertation focuses on informing, which falls under the 6th rung of the ladder. Informing citizens of their rights, responsibilities, and options can be the most important first step toward legitimate citizen participation. Shortcomings of this rung is that it takes away the community's control over decision-making. The 6th rung is prescriptive and not necessarily aimed at soliciting inputs from the community. According to Arnstein, this level of community participation falls under what she calls a tokenism paradigm. Frequently the emphasis is placed on a one-way flow of information from officials to citizens with no channel provided for feedback and no power for negotiation. Choguill (1996) argues that under these conditions, particularly when information is provided at a late stage in planning, people have little opportunity to influence the program designed 'for their benefit'. The most frequent tools used for such one-way communication are the news media, pamphlets, posters, and responses to inquiries. Meetings can also be turned into vehicles for one-way communication by the simple device of providing superficial information, discouraging questions, or giving irrelevant answers (Choguill, 1996).

2.3.2.1 Criticism of Arnsteins's ladder of citizen participation

The enthrallment with Arnstein's Ladder of Citizen Participation lies in its simplicity and the aptitude to uncover, in vivid form the power agendas imbedded in many institutionalized

narratives and the differences in the forms and strategies of participation that are desired. According to Collins and Ison (2006), Arnstein's Ladder is inadequate to make sense of participation at conceptual or practical level through its focus on power. They argue that Arnstein's Ladder of Citizen Participation has countless limitations such as the notion that participation is "hierarchical in nature with citizen control held up as the 'goal' of participation – a notion that does not always align with participants' own reasons for engaging in decision-making processes" (Collins & Ison, 2006, p. 2). Furthermore, academics highlight the limitation that Arnstein quotes, that each problem or decision is unique and can involve different levels or types of participation that are not reflected in the broadness of the ladder. Collins and Ison (2006) criticize Arnstein's Ladder of Citizen Participation based on the two reviews. Firstly, at a conceptual level, Collins and Ison argue that Arnstein's conception of participation lacks context and, critically, has no means of making sense of the context in which the ladder is used. Secondly, "in situations when the nature of the issue is highly contested or undefined, Arnstein's ladder provides few insights into how participation might be progressed as a collective process between all of the stakeholders involved" (Collins & Ison, 2006, p. 5).

In this dissertation, the UD toilet beneficiary education approach provided by eThekweni Municipality provides the context for Arnstein's Ladder of Citizen Participation, possibly aiding to establish its validity among academics as it relates to broad visioning processes as a public engagement tool.

2.3.3 Sanitation

There are different definitions for the term 'sanitation'; the term is used in different contexts and circumstances. However, this dissertation recognizes that most sanitation definitions include a range of elements such as physical infrastructure, hygiene-related behavior, disposal of wastewater and excreta. The World Health Organisation (WHO) expert committee had its first meeting on Environmental Sanitation in the 1950s and defined environmental sanitation as the control of community water supplies, excreta and wastewater disposal, refuse disposal, vectors of disease, housing conditions, food supply and handling, atmospheric conditions, and the safety of the working environment (WHO, 1987). Environmental problems have since grown in complexity, especially with the advent of radiation and chemical hazards. The incorporation of the environment and sanitation together was stated as complex by WHO. This then led to isolating the two (environment and sanitation). Sanitation then became used and

understood by people worldwide to refer only to excreta and wastewater disposal. In 1986 a WHO study group formally adopted the meaning of sanitation as the means of collecting and disposing of excreta and community liquid wastes in a hygienic way so as not to endanger the health of individuals and the community as a whole (WHO, 1987).

WHO (2015) states that sanitation provision helps to retain hygienic conditions and improves health to both households and communities. Water Supply and Sanitation Collaborative Council (WSSCC) and WHO (2005) state that sanitation refers to interventions of facilities such as latrines that improve the management of excreta. WaterAid (2011) defines sanitation as measures necessary for improving and protecting health and well-being of people. Sanitation is any system that promotes proper disposal of human and animal waste, proper use of toilet and avoiding open space excretion. The concise Oxford Dictionary states that sanitation refers to all conditions that affect health, especially with regard to dirt and infection and specifically to drainage and disposal of sewage and refuse from houses.

In the South African context sanitation refers to a safe collection and disposal of human excreta and wastewater from household premises. This includes the provision of necessary infrastructure for sanitation services to households. The provision of sanitation infrastructure must be safe, reliable, private, and protected from weather, ventilated, minimise spread of disease, and keep smells to a minimum and easy to manage (DWAF, 2003 and White Paper on Basic Household Sanitation, 2001). Lori and Katharine (2012) argue that sanitation aims to prevent the spread of disease and promotes health through safe and hygienic waste disposal. To do this, sanitation systems must break the cycle of disease. Good sanitation is essential for safe and healthy childhoods. It is very difficult to maintain good hygiene without water and toilets. Inadequate sanitation and lack of provision of sanitation services in housing negatively impact on the health, safety and general well-being of communities (Lori and Katharine (2012).

Significantly, sanitation involves a variety of factors in as much as it is about infrastructure. Most definitions look at hygiene/health related aspects and technicalities/infrastructure. Sanitation is however a system of processes of human interactions involving professionals and beneficiaries. These systems cannot be separated from the concept on its own. Some of the factors that can be considered in conjunction with the concept of sanitation can be housing and socio-cultural factors.

Socio-cultural factors that have implications on sanitation include diversity of cultural and societal norms, individual values, people's beliefs, attitudes and practices, religious

conventions, user preferences and established practices that determine whether a novel approach will be accepted or rejected by its users (Drangert, 2004). Socio-cultural aspect then form an integral part in the conceptualization of sanitation and would contribute to future policy making.

Sanitation cannot be divorced from housing; it forms a part of housing development as it involves human interactions in as much as it is about infrastructure. In South Africa the Department of Human Settlements, recognised the importance of using the term human settlements which include a basket of basic services as part of shelter. The change in name implies a more holistic approach to the complexities of the built environment and the integration of housing and services towards complete functioning residential environments (Charlton et al., 2014). The exclusion of critical factors that play an important role in the conceptualization of sanitation leads to some of the challenges that this dissertation unpacks.

Water supply and sanitation provision is a responsibility of the eThekweni Water and Sanitation unit at the municipality. The eThekweni Water and Sanitation unit is a custodian of bulk sanitation infrastructure provision (Charlton et al., 2014). The Constitution states that the provision of basic household sanitation and basic water supply to the population of eThekweni municipality is the responsibility of eThekweni Water and Sanitation (EWS) unit. Charlton et al. (2014) highlight that EWS unit prides itself in its technological innovation in sanitation provision and water supply and for that, it has been acknowledged worldwide as demonstrated by its 2014 Stockholm Industry Water Awards and various other recognition. The provision of Urine Diversion (UD) toilets to low-income households is an integral part of their responsibility. The eThekweni Municipal boundary expansion demarcation process of 2000 allowed the municipality to classify certain low-income areas as poverty-stricken and therefore as qualifying for the provision of differentiated basic services such as water and sanitation (Burger, 2015). Approximately 85 000 UD toilets have been delivered to these low-income communities since 2003. The driving force behind this provision of UD toilets is embedded in the presumed technical advantage drawn from claims that UD toilets have worked elsewhere else in the developing world (Roma, et al., 2010 and Roma, et al., 2013).

2.3.3.1 Governance Framework in the sanitation delivery context

Sanitation is complex in nature as the governance framework which informs local sanitation delivery is influenced by the socio-economic, political, and administrative context. In its significance, governance is vital in determining the success or failure of any service delivery

intervention. It could therefore be argued that the structure and nature of governance is key in determining acceptable and long lasting alternative sanitation technologies for beneficiary communities. Slyamaker, et al., (2005) argues that ignoring the critical role of governance in sanitation delivery process is detrimental to achieving the objectives of alternative sanitation such as forward linkages linking sanitation by-products to agriculture.

The provision of alternative sanitation delivery occurs within a complex institutional, policy, and implementation environment (Slyamaker, et al., 2005; UN, 1976; Department of Human Settlements , 2009). Alternative sanitation delivery is a multi-stakeholder environment where interaction between actors is governed by a set of principles and ideals. These actors usually include government, the non-governmental sector (NGOs), private sector and communities at various levels of engagement (UN, 1992). Interaction is guided by collective and/or individual ideals and interests. These interests tend to vary between actors, as for instance, the state holds the ideal to fulfil its constitutional mandate, while also meeting its internal targets.

Non-governmental organizations hold varying interests, in particular those in line with the development of communities and in ensuring that they attract more funding from their donors. Communities have an interest in self-development and improvement in access to basic services, while private-sector organisations have an interest in profit margins associated with the delivery of services and infrastructure. It is thus evident that institutional interests are heterogeneous, which further contributes to the complexity in sanitation delivery being realised (UN, 1992).

The process of interaction occurs within particular institutional platforms provided by government (Wempler & McNulty 2011) or established from the community level. It is conceptualised by Pipier and Nadvi (2010) that institutional formations can be observed in ‘invited’ and ‘invented’ spaces. Invited spaces are seen as an introduction of new institutions of public participation within local government, designed to facilitate constructive engagement between communities and the local state whereas invented spaces emanate from the failures of formal ‘invited’ spaces as a result of democratisation and politicisation (see Pipier and Nadvi 2010; Pieterse 2000; Parnell et al. 2002).

Similarly, relative disempowerment of civil society and the co-opted formal ‘invited’ space has influence in the disengagement of civil society from participating in local government

processes and the governance process risks becoming an ‘officialised’ strategy to domesticate, absorb and neutralise participation, as a way of deflecting social energy from other forms of political participation (see Pipier and Nadvi 2010; UN 1992; Nickson 2001; McEwan 2005; Taylor 1998; Thompson 2007).

In the case of eThekweni Metropolitan Municipality, governance around sanitation delivery has a dual approach. Processes surrounding decision-making in the metropole are technical whereas determination on the application of innovations are accepted in a participatory governance manner. This trait is suggestive of the assumption, that technical governance tends to assume that technical efficiency equates to community acceptability of sanitation technologies. It fails to consider as well as understand the socio-economic, political and cultural aspects of communities in the delivery context (Pipier and Nadvi 2010).

By way of introducing the above participatory governance approach, the form of governance is now discussed in more detail. To departure, the approach is defined to inform understanding of the governance approach.

2.3.3.1.1 Participatory Governance

With a primary focus to incorporate views and interests of all key public role-players in policy influence, participatory governance consists of state-sanctioned institutional processes and methods that facilitate engagement between relevant stakeholders in decision-making (see Wempler and McNutly 2011; Schneider 1999; Osmani 2007; OECD 2000). According to Malena (2009), participatory governance is about: (i) affirming a set of principles around the respective rights and responsibilities of citizens and state actors, and (ii) putting those rights and responsibilities into practice. This not only ensures that service delivery is met, but also, citizens are active in the initial stages of planning and monitoring of programmes.

Furthermore, participatory governance as a conceptual framework provides a basis for institutional practicalities required to achieve an integrated and sustainable urban development agenda (Pieterse, 2000). These practicalities involve a process of consistent engagement of various stakeholders in the management of public resources and development efforts (Malena, 2009). Participatory governance allows citizens and civil society to participate in public platforms and to engage in the policy-development processes that shape the service-delivery system (see UNDP 1997; Hyden et al. 2004; Rajesh and Mohanty 2002).

A significant innovation during democracy's third wave has been the widespread involvement of citizens' expressions and opinions into complex policymaking processes (see Gaventa, 2002; Samuel, 2002). Participatory governance brings new actors into incremental decision-making processes; citizens deliberate over and vote on the allocation of public resources and the use of state authority (see Wempler and McNutly 2011; Malena 2009). Evidence to this in reality can however be questioned.

The adoption of participatory governance is often based on the perception that representative democracy is unable, on its own, to improve the quality of state performance, educate and empower citizens, and make reasonably good use of scarce public resources (Santos 2005; Barber 1984; Fung and Wright 2001 2003; Pateman 1970). The adoption of participatory governance is not a rejection of representative democracy, but rather it represents an effort to redesign institutions and improve the quality of democracy, social wellbeing and the state (Wempler and McNutly 2011). The essence of participatory governance is to provide non-governmental actors, both individuals and organisations with a means to genuinely and actively be part of the process of development policy (Edwards 2008; Malena 2009).

2.3.4 Ecological Sanitation

2.3.4.1 *Global realities of sanitation challenges*

Since 1992, 80 per cent of countries have embarked on reforms to improve the enabling environment for water resources management (WHO, 2017). In many cases water reforms have produced significant impacts on development, including improvements to drinking water access, health and water efficiency in agriculture (WHO, 2017). The 80 per cent of countries looking for ways and approaches to the creation of an enabling environment for water resource management (international community) adopted the 8 Millennium Development Goals as a framework for the development activities of over 190 countries in ten regions (United Nations, 2008). The 7th goal aims at sustainability, and target 7c aimed at halving the proportion of people without sustainable access to safe drinking water and basic sanitation (United Nations, 2008).

In 2013 WHO stated that approximately 2.4 billion people would remain without access to improved sanitation in 2015. The same report argued that the rate of progress in the year 2013 proved that the 2015 MDG target of halving the proportion of the 1990 population without sanitation would be missed by 8% or half a billion people. According to the WHO update

(2013) by the end of the year 2012, there were 2.5 billion people who lacked access to improved sanitation facilities. Approximately 761 million of 2.5 billion people used public or shared sanitation facilities and another 693 million used facilities that did not meet minimum standards of hygiene (WHO update, 2013). The remaining 15% of the world population were still practicing open defecation. The majority, 71% of those without sanitation, lived in rural areas where 90% of all open defecation took place (WHO update, 2013).

Studies around the world show that there is a shortage of fresh water (water of the right quality and quantity and at the right place). According to Eliasson (2014) demand for water is projected to grow by more than 40% by 2050. He further claims that “by 2025, an estimated 1.8 billion people will live in countries or regions which are water scarce, and two-thirds of the world’s population could be living in conditions in which the supply of clean water does not meet the demand” (p6). The current conventional sanitation system needs consumption of water for transportation of waste and very few communities in the world are able to afford fully functional sewage systems (WHO update, 2013). The flush system is not an appropriate response in these circumstances of water shortages. The global community has agreed, in the context of both MDGs and now SDGs, that alternative sanitation options are required in order to adequately respond to sanitation demand while taking into account global water scarcity. There has been a growing global awareness that humans create vast quantities of wastewater through inefficiencies and poor sanitation choices. As a result this undermines human water security and the health of the ecosystem (Grant et al, 2012).

Moreover, the water scarcity experienced throughout the world as a result of climate change continues to increase and affect everyone, especially the poor (Rajbhandari, n.d). Disastrous epidemics like cholera affect mostly the urban poor who live in overcrowded peri-urban settlements which lead to health problems resulting from lack of sanitation facilities (amongst other factors). The crowding of large numbers of people in peri-urban areas creates conditions very favorable to the rapid spread of a variety of infectious diseases (Rajbhandari, n.d). Many environments are already seriously polluted, or rapidly becoming so. This is caused by sewers that often leak to various degrees. Very often, they lead to groundwater contamination, which gets worse with increasing population densities (United Nations fact sheet, 2012).

In many densely populated areas sewer leaks have led to nitrate concentrations in groundwater, which exceeds the maximum recommended by the WHO for drinking water and which has been linked to serious health problems, particularly for babies/infants (WHO update, 2013).

Shallow groundwater is still a major source of water supply in rural and peri-urban areas, especially for the poor. The design of the conventional “drop and store” pit-latrines (and of most other on-plot systems) is not compatible with this practice as it deliberately aims to retain only solid matter in the pit and infiltrates much of the liquids into the subsoil (Austin et al, 2005). As these liquids contain all soluble elements of the excreta as well as viruses and pathogens, this type of sanitation, depending on the hydro-geological situation, can be a highway to groundwater contamination (Austin et al, 2005).

To address these shortcomings, it has been necessary to think beyond the limitations imposed by the traditional methods of dry sanitation (modes of sanitation that do not involve water in their disposal). There is an increasing awareness worldwide of the environmental issues associated with sanitation. Furthermore, pressure on land to produce more food to feed the ever-growing populations of developing countries has made the utilization of valuable natural resources, including human excreta of greater significance (Austin et al, 2005). The concept of ecological sanitation is seen in many countries as an alternative solution to some of the problems associated with pit toilets, environmental degradation and food shortages (Austin, 2000).

2.3.4.2 Ecological sanitation

The concept of ecological sanitation (eco-san) was formed from the argument that human excreta contains valuable resources for food production. Ecological sanitation refers to an alternative approach to managing excreta in ways that minimize impacts to the environment. Eco-san systems usually use little or no water and often separate urine and faeces for separate treatment with the goal of using both as fertilizers and soil amendments (LeBlanc et al., 2008).

Esrey et al (2001) argue that eco-san strives to solve most challenges faced by poor communities, and moreover offers an alternative to conventional sanitation. Most pressing challenges affecting the poor in peri-urban areas include: infectious disease, environmental degradation and pollution. Ecological sanitation addresses the challenges by restoring soil fertility, reducing fresh water consumption and protecting the environment (Esrey et al, 2001).

Morgan (2005) argues that eco-san is a system which mainly focuses on wastewater and excreta that carry nutrients and organic matter which can be reused; it deals with the treatment of human excreta and converts it into a usable product (Manila, 2003). Manila argues that the system processes excreta on-site to the point whereby it is no longer carrying pathogenic organisms. When the excreta has no pathogenic organisms, the remains are recycled or used

for agricultural purposes. The main characteristics of the eco-san system are that it prevents pollution and diseases caused by human excreta (Morgan, 2005). Morgan further argues that the system treats human excreta as a resource rather than as waste product, and it recovers nutrients.

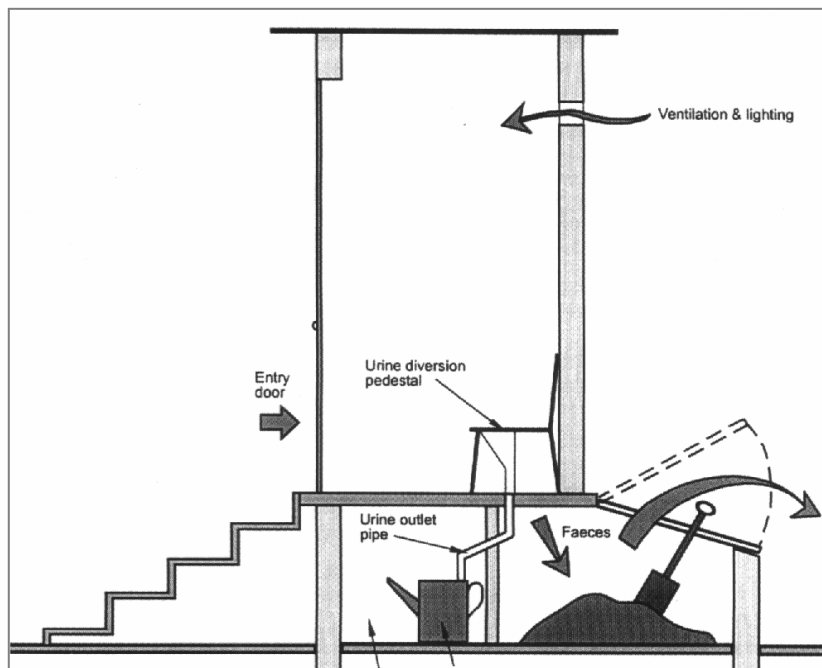
Eco-san focuses on protecting the environment by using ecologically friendly toilet systems which save water and reduce pollution. Furthermore, the system is designed to process excreta in such a way that it is safe and suitable enough to use in agriculture. Eco-san increases food production by using the inexhaustible natural resource of human excreta. Eco-san recognizes human excreta and water from households not as a waste but as a resource that could be made available for reuse, especially considering that human excreta and manure from farming play an essential role in building healthy soils and providing valuable nutrients for plants (Morgan, 2005 and Steven, 2000).

Manila (2003) argues that eco-san is an alternative approach to conventional wastewater treatment systems towards an ecological and economical sustainable wastewater management system. Eco-san can be carried out by a variety of technologies, from low-tech to high-tech solutions. These range from composting or urine diversion dry systems to water-saving vacuum sewage systems with separate collection and subsequent treatment of urine, faeces and grey-water, through to membrane technology for material separation (Austin et al, 2005). This study however only focuses on UD toilet technology because it is the most commonly used ecological sanitation technology in South African peri-urban areas as in most developing countries of the world.

A UD is a toilet that does not need water to operate; the seat has a divider that separates urine and faeces (Buckley et al, 2008). The toilet design is built in such a way that the front vault of the seat collects urine and the back of the seat has a vault that collects faeces. The vault at the back is bigger than the front vault. To help speed up the process of drying faeces; ash, sand or lime is used as a drying material when one finishes defecating (see figure 5). Users have to be careful not to drop faecal material in the urine vault because that would clog the vault; and they also need to monitor urine not to splash down into the faecal material vault (Buckley et al, 2008). Urine Diversion may be used in eco-san concepts, but not all eco-san projects use urine diversion.

Figure 5 below illustrates a standard profile of a UD toilet with all its components.

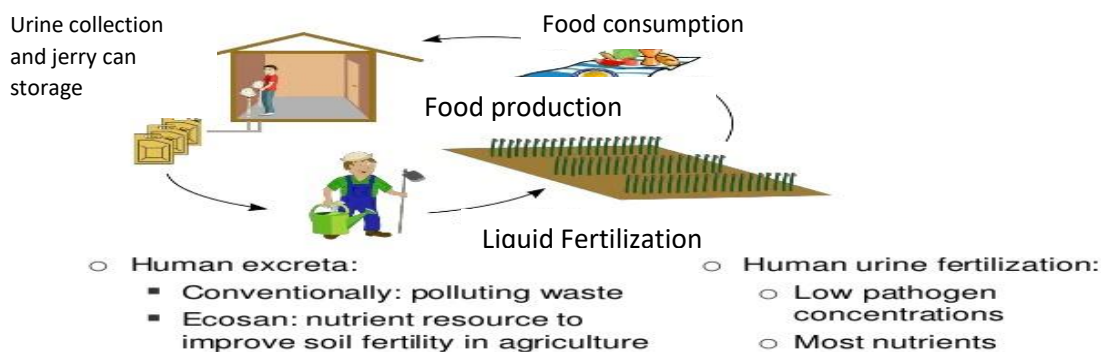
Figure 5: Example of a Urine Diversion Toilet



Source: Austin and van Vuuren, 2001

Figure 6 illustrates eco-san practices where human excreta is used as a resource to improve soil fertility in agriculture and urine is collected used and for as fertilizer as it contains nutrients. The use of treated urine and faeces for agricultural purposes helps in restoring soil fertility, thereafter, producing food that is consumed by households (Jafet et al., 2013).

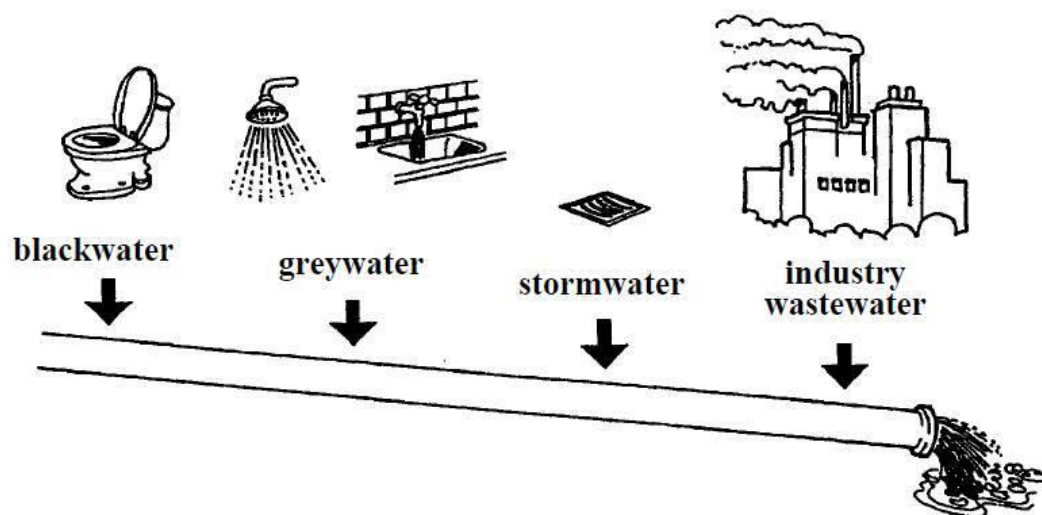
Figure 6: Ecological sanitation



Source: Jafet et al. 2013

Figure 7 below illustrates a conventional water borne sanitation whereby greywater, storm water, black water (human excreta and urine) and industrial wastewater are collected and thereafter flushed/ disposed down the system using drinking water to water bodies (rivers and ocean) and wastewater treatment plants. Conventional wastewater systems are largely linear end-of-pipe systems where drinking water is misused to transport waste into the water cycle, causing environmental damage and hygienic hazards, and contributing to the water crisis (Winblad and Esrey, 2004).

Figure 7: Conventional water borne sanitation



Source: Winblad and Esrey (2004)

Eco-san helps to solve some of society's most pressing problems including infectious disease, environmental degradation, water scarcity and the need to recover and recycle nutrients for plant growth. It also helps to restore soil fertility, conserve fresh water and protect marine environments, all of which contribute toward food security. Eco-san approaches promote local initiatives and leadership, including the establishment of labor-intensive workshops that manufacture urine-diverting toilets, community-based composting centers and home and community organic gardens (Lundqvist and Sandström, n.d).

2.3.5 Peri-urban areas

Peri-urban areas are also commonly referred to as marginal settlements as they are areas at the periphery of urban areas (Hogrewe et al, 1993). When South Africa became free of apartheid control in 1994, millions of South Africans moved to places that were closer to their working areas, which offered better education for their children (World Bank, 2000). This led to a massive, unplanned, spontaneous resettlement for the country. The poor failed to access the existing and well-developed private markets for land and housing while the middle and high-income groups were able to access it (Sadiki and Ramutsidela, 2003). The mushrooming of informal settlements in peri-urban areas resulted from the lack of access to land for the poor (Mogale City for World Bank, 2000).

The term peri-urban is a complex term to define. However, most researchers and practitioners identify a common trend in that peri-urban areas are mostly situated in the boundaries of the formal city. This means that peri-urban settlements extend outside of local government or municipal control in respect of planning and development processes. Furthermore, Hogrewe et al (1993) argue that these settlements are a hybrid of formal and informal.

The boundaries of peri-urban space have a distinct phenomenon which is frequently shown by the loss of rural values or lack of urban attributes. Therefore peri-urban is something between, neither urban nor rural (Bengs and Schmidt-Thome', 2006). The distinct phenomenon on the boundaries of urban areas can be defined as a highly dynamic and complex system of land use, constituted by a singular mosaic of ecosystems (from high to low ecological productivity) and often affected by similar processes to those in the expansion of 'agrarian frontiers' (Morello 1995, cited in Allen et al. 1999). A number of authors argue that social and environmental change processes around the peri-urban boarder need to be considered in light of complex rural-urban interactions, which include consideration of flows of people, goods, income, capital, natural resources and waste (Douglass 1998; Tacoli 1998; 2006; Allen et al. 1999; Allen and Dávila 2002).

Peri-urban areas are located somewhere in-between the urban core and the rural landscape. These areas have been traditionally approached from an urban planning perspective as ground for urban sprawl (Dias, 2012). Allen et al (2006) argues that in peri-urban areas the space around seems less important compared to the flow of people and materials, commodities, resources and waste. Furthermore, they argue that degraded soil fertility, and natural landscape

or low density, lack of accessibility, lack of services and infrastructure often characterize peri-urban areas. The term peri-urban was derived from the analysis of the relationship between urban and non-urban areas, the focal point being the area immediately surrounding cities (Allen et al, 2006).

Other distinctive factors of peri-urban settlements include vague or unlawful land tenure, lack of infrastructure, and lack of recognition by formal governments. Spatially, peri-urban areas are growing much more rapidly than formal urban districts. In many cities the peri-urban sections are already bigger than the formal areas. Their rapid growth and informal status have resulted in low levels of sanitation services. The lack of these services, in particular inadequate excreta (human waste) management, threatens the public health and environment of the peri-urban settlement, as well as the urban area as a whole. But even the few institutions that recognize the problem and want to do something about it find that little knowledge or experience exists about how to address this problem constructively (Hogrewe et al, 1993).

Peri urban areas consist of different land tenure practices which range from individual ownership to traditional African land tenure with a range of hybrids and adaptations. Land tenure dynamics involve disparate overlapping claims and different power structures such as warlords and traditional leaders (World Bank, 2000). In these areas informal trading in land, housing and accommodation takes place. Backyard infill shacks are commonly found (Sadiki and Ramutsidela, 2003). Landlordism occurs as powerful individuals purchase houses informally and then rent them out. As these communities are neither urban nor rural, income levels also vary (World Bank, 2000). Peri-urban areas are zones of rapid change. That change is often ascribed to processes of peripheral urban expansion rather than those that underpin rural change. That is to say those notions of peri-urban are premised on urban change.

2.3.5.1 Peri-urban areas and sanitation

According to the Millennium Development Goals Report (2014), between the year 2000 and 2012; over 200 Million peri-urban dwellers gained access to either improved water, improved sanitation, durable housing or less crowded housing conditions. In the year 2012, close to 33% of urban residents in developing regions were still residing in peri-urban communities (United Nations, 2014). In the year 2000 almost 40% of urban residents in developing regions lived in peri-urban areas. In 2012 the number of people living in peri-urban areas was approximately 863 Million compared to 760 Million in 2000 and 650 Million in 1990 (United Nations, 2014). The consistent increase over the period of 22 years shows that urbanization increases at a fast

rate as years pass by (United Nations, 2014). The Millennium Development Goals Report (2014) states that unplanned urban areas do not give enough space to streets, making it difficult for authorities to provide basic water and sanitation services.

Bradley et al, (n.d) state that millions of people in the Third World live in life and health-threatening homes, mostly in peri-urban areas. These areas have two distinct characteristics that result in serious potential health effects:

- Pathogenic micro-organisms (mostly found in human excreta), caused by lack of infrastructure and related inadequate water supply to remove them;
- Crowded, cramped housing conditions (Bradley et al, n.d).

Safe removal and disposal of excreta and wastewater are critical health and environmental needs in peri-urban areas as these still are major issues in most third world countries (United Nations, 2014). Most urban areas with millions and more inhabitants (informal and formal) have no effective means of off-site disposal of human excreta, especially in Africa and Asia (Bradley et al, n.d). This challenge leads to environmental pollution caused by waste accumulating on streets, open spaces between houses and stagnant pools of water (Bradley et al, n.d).

2.3.5.2 Peri-urban sanitation issues

Most developing countries commonly use waterborne sewerage in urban areas and pit toilets in rural and peri-urban areas (Austin et al, 2005). There are some intermediate technologies, such as septic tanks, but it is a fact that everybody aspires to own a flush toilet (Austin et al, 2005). There is a perception that the use of on-site sanitation implies second class. In the context of South Africa, poor urban families searching for a plot of land on which to build a home are strongly influenced by the existing market prices for urban land. The land that is most desirable for residential construction is the most expensive.

Austin et al (2005) allude that more affordable sites are in areas that are undesirable for formal development, such as those located on steep slopes, along ravines, on soil that is too rocky to excavate easily and in areas prone to flooding. Poor families move onto such land because it is relatively cheap to purchase or because illegal occupation of such sites is less likely to be challenged. The distance between the urban core and peri-urban communities is challenged by the terrain. Peri-urban communities are too far out for waterborne sanitation network to service them; as a result, they cannot get urban services including sanitation. What then seems a logical

alternative for municipalities is ecological sanitation that is envisaged to assist in providing communities with adequate sanitation.

The implementation of UD toilets in eThekweni municipality began after the expansion of eThekweni municipality in 2000 as it included new areas (Austin et al, 2005). The newly included areas that had to be serviced by eThekweni municipality after the expansion resulted in a backlog of sanitation and water. The high cost of emptying Ventilated Improved Pits which were previously used and the inaccessibility of many peri-urban areas due to the topography led the eThekweni municipality to rethink the manner in which it would provide sanitation and water services to these areas (Roma, et al., 2013).

The development and implementation of urine diversion toilets (UDs) in eThekweni municipality began in 2002; this was regarded as the most cost-effective technology to implement towards addressing the sanitation backlog in peri-urban areas. The prevention of further outbreaks of waterborne diseases among the population and the lowering of maintenance costs of the sanitation system for the municipality were the driving forces of the project (Austin et al, 2005). When the water and sanitation project started, the municipality estimated a backlog of 175,000 households without adequate sanitation. The municipality aimed to build 10 500 new UD toilets per year (Roma, et al., 2013).

2.4 Summary of chapter 2

This chapter looked at the conceptual and theoretical framework to place the research within the existing framework of theories using the theory of planned behavior. The chapter provides the reader with a better understanding of the mechanisms and processes that underlie human behavior in order to then decide on which approaches are suitable to achieve behavior change.

The study concerns itself with understanding how and whether the behavior of actors and practices in ecological sanitation are influenced by educational programs; it is therefore, imperative to ground research within behavioral theory.

The nature of ecological sanitation as a contemporary phenomenon was initially aimed at changing the sanitation landscape and help in closing the nutrient cycle. In order for this to be achieved a concerted effort is required to influence behavior and create new norms. Ecological sanitation as a concept positions itself as a response to water scarcity and as means to improve human relationship and behavior towards the environment. The benefits of ecological sanitation are linked to behavioral change and therefore the provision of this sanitation method is linked to the development of tools and methods aimed at influencing behavior. Government

as a custodian of sanitation provision is responsible for developing and planning of tools for influencing how end users behave towards ecological sanitation. Therefore, theory of planned behavior is an appropriate framework for underpinning a study of this nature.

The people-centered approach was mainly discussed, focusing on its main principles. It was shown that for every development initiative to be successful, participation is vital. The final section of the chapter focused on the definition of concepts, especially the ones central to the study viz community participation, sanitation, ecological sanitation and peri-urban areas. As indicated earlier, eThekweni Municipality has delivered over 85 000 UD toilets targeting indigent communities. The city used various educational and training approaches to ensure that beneficiaries of UD toilets realize the benefits associated with the use of alternative sanitation. The purpose of the next chapter is to review the process through which eThekweni has delivered UD toilets including its educational and training approaches.

3 CHAPTER 3: A REVIEW OF ETHEKWINI MUNICIPALITY UD TOILET BENEFICIARY EDUCATION AND TRAINING APPROACH

3.1 South African Sanitation Policy

The sanitation sector is currently regulated by three policy documents, namely the White Paper on Water Supply and Sanitation (1994); the White Paper on a National Water Policy of South Africa (1997) and the White Paper on Basic Household Sanitation (2001). These policy documents provide a set of procedures, rules and allocation mechanisms for sanitation in South Africa, which are implemented through the policy instruments of laws and regulations; economic measures; information and education programmes; and assignment of rights and responsibilities for providing services. Implementation of the South African sanitation policy is guided by the Strategic Framework for Water Services (2003), which provides the ten-year roadmap for addressing the country's water supply and sanitation service delivery imperatives.

The Department of Human Settlements, in conjunction with sanitation partners, reviewed the above mentioned policy documents and developed the 2012 DWA Draft National Sanitation Policy to regulate sanitation in the country (DWA Draft National Sanitation Policy, 2012). However, the DWA Draft National Sanitation Policy was never gazetted as the policy for the country. The DWA Draft National Sanitation Policy did however identify gaps in the earlier policies and addressed key areas. With the White Paper on Basic Household Sanitation focussing largely on peri-urban, rural sanitation and on-site systems, the Draft National Sanitation Policy of 2012 was meant to address the entire sanitation value chain.

Since the formulation of the earlier sanitation policy documents, and based on several years of implementation, a number of challenges and unintended consequences have been identified that require a sanitation policy review, and consequent legislative amendment (DWA Draft National Sanitation Policy of 2012). The sanitation regulatory responsibilities have been unclear over this period, shifting between departments, while responsibility for implementation of these services, as required by the Constitution of South Africa (South Africa, 1996), has devolved to local government. This has resulted in significant changes to the sector, requiring a review of the current policies and strategies to address gaps in current sanitation policy positions. South Africa's developmental path has been reviewed and refined over the past 20 years. The most recent development plan for South Africa is the National Development Plan (NDP), which is implemented through the Medium-Term Strategic Framework (MTSF). These developmental documents are set to steer the sanitation sector for the next 15 years.

There is no legislation or policy which is directly linked to Urine Diversion toilets. The above mentioned policies are the main policies which are used in South Africa as guidelines for the provision of sanitation services (Sanitation services, 2012). While the right to access to adequate sanitation is not specifically provided for in the Constitution Act 108 of the Republic of South Africa, 1996, the Water Services Act 108 of 1997 makes explicit that “everyone has a right of access to basic water supply and sanitation service”. (Water Services Act, 1997)

Sanitation services (2012) states that the national sanitation policy objectives are to ensure that in the provision of sanitation:

- end-users play a central role in all decisions which affect them;
- the service is appropriate to the environmental conditions in an area;
- the service is sustainable and cost effective to the users, on a long-term basis; and
- the service results in improved hygiene and environmental health conditions.

A sanitation service needs to offer a complete, holistic and developmental approach to the community, which includes health and hygiene improvements, environmental health considerations and hardware development (White Paper on Basic Household Sanitation, 2001). The aim of the policy is to promote good health for all by empowering people to take better control of their environment and their living situations. The objective of the policy is to build a relationship with end-users and to facilitate planning, promotion and implementation of sustainable sanitation services (White Paper on basic Household Sanitation, 2001). This policy focuses particularly on the provision of a basic level of household sanitation to mainly rural communities, peri-urban areas and informal settlements. These are the areas with the greatest need. This policy also deals with the need for an environmentally sound approach to providing sanitation services and addresses the need to protect surface and ground water resources from sanitation pollution through integrated environmental management practices (Sanitation services, 2012).

However the Sanitation Policy does not provide guidelines for the education and training programs of UD toilet and other on-site sanitation technologies into detail. The policy also does not give guidelines on operation and maintenance of UD toilets and other on-site sanitation technologies, especially the emptying of full vaults and safe disposal of human excreta. The national sanitation policy only provides a supporting background for municipalities to deliver

viable sanitation services. However concerning issues lie in the interpretation of the policy, such as too much emphasis on toilet construction without giving corresponding focus on the other important facets of sanitation such education and training, behavioural change, operation and maintenance and community involvement. Sanitation policy is an important document as it outlines the assemblages of various institutional stakeholders and end-users in the sanitation delivery process. Understanding some of the highlighted policy constructs is critical in unpacking the complexities that exist between local government and end-users in the process of delivering alternative sanitation – in this case UD toilets.

3.2 UD toilet community education programs

In 2002 eThekweni Municipality realized the need for a cost-effective sanitation technology to implement towards addressing the sanitation backlog in peri-urban areas. The municipality selected the UD toilet technology as the intervention to address the sanitation backlog and prevent outbreaks of waterborne diseases (eThekweni Municipality, 2003). When the municipality determined that one of the ways to deal with sanitation issues in peri-urban areas was to install UD toilets, it realized that the only way to achieve success with the program was after such installation, to introduce community education and training programs of beneficiaries on how to use and maintain the UD toilets so that what was set out to be achieved would be achieved (Gounden et al, 2006). Community education and training programs were introduced to monitor acceptance, problems and successes of the UD toilets as well as to focus on awareness and education in the proper use and management of UD toilets. The community education and training programs target groups comprised of peri-urban communities constituted of women, children and educators (eThekweni Municipality, 2003). Mkhize et al (2009) state that training and education programs are designed to address:

- Why the UD toilets are necessary for the community
- The benefits of UD toilets
- Functions and importance of UD toilets
- Cycle of faecal-oral contamination¹
- Hand washing

¹ A disease that is spread by the faecal-oral contamination can be transmitted from person to person, or in food or water. This can happen when a person fails to wash their hands properly after using the bathroom, and then handles food that is eaten by others, or when faeces contaminate a water supply

The education and training programs include the use of posters and leaflets, house visits and street theatre.

3.2.1 Posters and leaflets

The figure below demonstrates a leaflet provided by eThekweni water and sanitation department as a source of information given to UD toilet beneficiaries.

Figure 8: Urine Diversion Dry Toilet (UDDT) leaflet

WHAT IS A URINE DIVERSION DRY TOILET (UDDT)?

- It is a toilet that separates urine, and the faeces collect in a vault. The importance of separating urine and faeces is to (1) reduce odour (2) enable fast drying of faeces which makes handling of faeces more simple and hygienic (3) reduce environmental impacts; and (4) allow for the recovery of urine, which can be reused as fertiliser.
- The excreta inside the UDDT vault are dried with the help of natural evaporation and ventilation. The toilet requires no water for flushing. UDDTs can be successfully used in all climatic conditions and are most advantageous in arid climates where water is scarce and faeces can be effectively dried.

IN WHICH AREAS ARE THEY MOSTLY SUITABLE?

- Applications are typically found where connection to a sewer based sanitation system is not available or areas where water supplies are limited

QUESTION: Are UDDTs only found in South Africa?

ANSWER: No, but in many other countries in Africa and abroad

BENEFITS OF UDDT

- Safe on-site disposal of human waste
- No new pits required to be dug when full
- No need to move top structure when full
- UDDTs are also more resource efficient due to the reuse potential of the product

HOW DO I/WE MAINTAIN THE UDDT?

- UDDTs are waterless systems that are particularly suitable for conditions where water is scarce or expensive. It protects ground water.
- A double-vault UDDT can transform infectious faeces into a safe product **ONLY** if storage times are respected and the UDDT is operated correctly.
- Odourless and no flies which eliminates transmission of diseases.
- Decomposed contents are safer to handle when removing
- Waste decomposes before being exposed to surrounding soil which minimises water pollution since the faeces are safely contained in a sealed vault.

NOTE: Children need to be taught and be monitored by an adult on how to use the UDDT because it is important that (a) faeces do not fall into and clog the urine collection area in the front, and that (b) urine does not splash down into the dry area of the toilet.

WHAT IS A UDDT TOILET?

UDDT PHYSICAL STRUCTURE AND IMPORTANCE OF EACH ITEM

- The pipe outlet should be sealed with a mesh to trap flies
- Two Vent pipes are provided to ventilate the faeces vault, remove odour from the room and to speed up the drying process and eliminate flies.
- Two vaults above ground, for faeces collection and storage.
- A urine pipe connecting to the pedestal and urinal to the soak pit
- A urinal: is considerate of the fact that in most cultures men prefer to stand when urinating rather than sitting or squatting.
- Closed door prevents flies from spreading disease.
- A bucket with soil /ash to cover the faeces after defecating so the contents will break down and dry faster.

Contact Details

Contact Centre: 080 13 13 0813 TOLL FREE
 SMS: 083 707 3013
 Mxit: 083 707 3013
 Fax: 031 311 8699 or 031 311 8220
 Email: eservices@durban.gov.za
 Website: www.durban.gov.za

(Source: eThekweni Municipality, 2003)

EThekweni Municipality department of water and sanitation unit creates posters and leaflets to address aspects related to UD toilet technology. These aspects of UD toilets include an explanation of what a UD toilet is, how the UD toilet works, how to maintain it and the benefits

of the UD toilet (Reid, 2009). Posters and leaflets are produced for UD toilet beneficiaries in English and IsiZulu, and are circulated to communities, schools and clinics. During house visits the household is given a poster to display in the users' toilets to remind them on health and hygiene awareness² and how to operate and maintain the UD toilet (eThekweni Municipality, 2003 and Reid, 2009).

Through various partnership projects the city has made a closer link between UD toilet by-products and agricultural activities. This was aimed at capturing value of forward linkages associated with the use of dry faecal matter and recycled urine for agricultural purposes. One such project undertaken is the VUNA project, which was an outcome of a partnership between eThekweni and Melinda Gates Foundation. Communication information material developed was targeted at UD beneficiaries and communities in order to educate and train them on how to capture the value of UD toilets for agricultural activities.

3.2.2 Street theatre

The eThekweni water and sanitation unit often exhibits the correct use of UD toilet technology through street theatre. Street theatre is a highly interactive drama performance that involves comedy to reach out to a wide range of users (from first time to old users/beneficiaries) of UD toilets. The shows are held at taxi ranks, shopping centers, clinics, and in ward councilor meetings. The aim of conducting street theatre performances is to emphasize the proper use of UD toilets and also encourage UD toilet beneficiary acceptance of the technology. Through these performances the UD toilet beneficiaries learn how to operate and maintain the UD toilets and gives the beneficiaries a better understanding of the purpose and correct manner of use of the UD toilet technology (eThekweni Municipality, 2003).

3.2.3 House visits

The eThekweni water and sanitation unit identified the need for a training program for beneficiaries of UD toilets in peri-urban communities. A facilitator training manual was developed for the house visit educational program as a guideline for facilitators to help explain aspects of UD toilet technology (Reid, 2009 and eThekweni Municipality, 2003). Institutional and Social Development (ISD) consultants train facilitators chosen from the community where

² An awareness about good hygiene habits such as washing hands, using a toilet for defecation and adopting safe drinking water practices

UD toilets are implemented. The ISD consultants are specialists accountable for the training of community facilitators. The ISD consultants are also involved in the final selection of the community facilitators. Facilitators are community members who are selected by the Project Steering Committee (PSC) and attend training undertaken by the ISD consultants. A Project Steering Committee is a representative community-based forum which represents the community and helps in liaison between the eThekweni Municipality and the community. Facilitators conduct an assessment during the course of training and are selected by ISD consultants and relevant bodies within eThekweni Municipality which determines if they meet or do not meet requirements of becoming facilitators. If the facilitator is selected by the ISD consultant and relevant bodies, then they are responsible for facilitation of the project in the community.

The facilitators conduct five visits per household that are piloted at various stages of the project as outlined below. These house visits cover basic hygiene, a clarification on how the UD toilet works, how to operate and maintain the UD toilet, and how to remove and bury the waste material (Roma et al, 2011).

On the first visit to the household the community facilitator conducts a household survey and explains the plans of the EWS to provide sanitation and water. The household survey helps in creating a baseline of the community. The second visit requires the facilitator to explain the importance of health and hygiene during this visit, and households are made aware of health risks that are related to unhealthy sanitation. On the third visit the facilitator explains to households how the Urine Diversion toilet works. During the fourth visit the facilitator explains how the UD toilet will be delivered to the beneficiary. The fifth visit focuses on the operation and maintenance of the toilet after it has been installed and how to use the toilet correctly, how to maintain it and how to empty it. On the last visit the family is given a poster which is stuck inside the door of the toilet and explains the 'do's and don'ts' on how to use a UD toilet (Reid, 2009).

3.3 Summary of chapter 3

This chapter provide a review of eThekweni Municipality UD toilet beneficiary education and training approach. The chapter first outlined the South African Sanitation policy of how the data was collected and analysed. Exhibiting the national sanitation policy was important in

understanding of the overall picture of what is happening within the sanitation sector in the local context of eThekweni Municipality Sanitation. The chapter unpacked education and training approaches used by eThekweni Municipality to promote beneficiary acceptance and adoption of UD toilets.

4 CHAPTER 4: FINDINGS AND DATA ANALYSIS

4.1 Introduction

This dissertation investigates the role of community education programs in promoting user acceptance, adoption and longevity of UD toilet use in peri-urban communities of eThekweni municipality, KwaZulu-Natal, South Africa. The dissertation uses the case study area of Umbumbulu to depict the gaps. The purpose of this chapter was to present the results of the overall data collected. Data was interpreted in a descriptive form, using categories that emerged from analysis of the data.

4.2 Results of the study from key informant and household interview

The study results are unpacked in two sections the key informant section that focused on the UD toilet project implementation approach, education programs and the need to consider UD toilet technology, and the household survey section that consists of findings from UD toilet beneficiaries in Umbumbulu. The household interview section is focussed on the condition of UD toilets, maintenance of UD toilets, use of UD toilets and education of beneficiaries in respect of such use.

4.2.1 Choosing UD toilets for eThekweni Municipality peri-urban areas

The first question on the key informant interview focused on the motives of eThekweni Municipality for choosing the UD toilet technology. It was significant to probe the motives of the municipality as that gave an understanding of the idea behind the drastic shift and the importance of shifting from the previous sanitation technology to UD toilets. When asked why eThekweni Municipality decided to select UD toilets as sanitation technology for peri-urban areas, the key informant stated that it was due to the backlog of sanitation delivery in eThekweni municipality. Furthermore, he stated that another issue that led to choosing UD toilets was the inability to access properties that had VIP toilets in peri-urban areas using honey suckers (tankers) when emptying the toilets. VIP toilets required to be emptied by tankers when they were full in peri-urban communities. Some properties were located in areas where it was challenging to access the property using a tanker due to steep terrain and inadequate roads. However, the introduction of UD toilets to peri-urban areas allows for human excreta to be disposed without harm on-site. Another reason that the key informant mentioned was that the choice was also influenced by cholera outbreaks which spiralled in the year 2000 around peri-urban communities. The key informant stated that the municipality's aim was to only get involved during installation and to offer education and training. He further mentioned that the UD toilet technology eliminates risks of health when it is compared to the VIP toilet.

4.2.2 The need to consider education and training for UD toilet beneficiaries.

The main objective of this dissertation was to ascertain the role of community training and education programs in promoting acceptance, usage and maintenance of the UD toilets. However, it was important to first highlight the need for education and training of beneficiaries. The Key Informant stated that eThekweni Municipality Water and Sanitation (EWS) Unit identified the need for education and training of UD toilet beneficiaries as the UD toilet technology was new to beneficiaries and they had never been exposed to it. Furthermore, he stated that the EWS unit acknowledged that the UD toilet technology might have offensive/taboo barriers which might affect UD toilet user acceptance, because it had to do with human waste an area that people are not necessarily comfortable with. Therefore, it was important to introduce education and training.

The EWS unit considered education and training of UD toilet beneficiaries to assist beneficiaries to feel comfortable with their new sanitation technology by showing them that if handled carefully and with dignity it can overcome the taboo barriers. The Key Informant mentioned that education and training of beneficiaries was aimed at helping beneficiaries realise the direct benefits of UD toilets through the use of the UD toilet by-product for urban agriculture. Furthermore the EWS units' motivation to consider beneficiary education and training was also driven by the UD toilets' advantage of being less onerous on the use of water as water scarcity was an issue in eThekweni Municipality, these findings confirm the findings in the study conducted by Dunker (2014) and DWAF (2003).

4.2.3 EThekweni Municipality Water and Sanitation Unit decision on the types of education programs implemented.

In order to create better understanding of the process undergone by the city in ensuring acceptance of UD toilets by beneficiaries a review of education and training programs was undertaken. It was important to revisit the reasoning behind the education and training programs from the perspective of the city officials. As already established, the key informant confirmed that three programs were implemented in Umbumbulu: house visits, street theatre, and posters/leaflet education programs. He stated that as most of the people who live in Umbumbulu area were not literate the municipality did not want to give a very academic education and training program to UD toilet beneficiaries, as they would end up not understanding the information given to them. Furthermore, Umbumbulu had people who were culturally steeped in a certain way. For example, he stated that it was culturally believed that

*umakoti*³ was not allowed to share a toilet with her father in-law however; *umakoti* was responsible for conducting household duties which include cleaning the toilet that she is not allowed to enter. Therefore, both the father in-law and *umakoti* had to be informed that the toilet needs to be clean all the time, and therefore that *umakoti* should be allowed to at least enter so that she can perform her duties but, however not use the same toilet to excrete.

The Key Informant mentioned that EWS unit accepted that there were barriers that required the unit to respect the beneficiary cultural background. For example, when it comes to talking about human waste different genders do not necessarily want to be in the same space, and women would feel more comfortable talking about human waste with other women and not men. Additionally young people feel more comfortable discussing such with other young people and not older people. Therefore the programs that were selected addressed some of those barriers. The key informant stated that there were people who worked during the day in Umbumbulu and could not be reached. The EWS in such cases used a methodology that did not exclude beneficiaries who could not be reached in their households. For those who couldn't be reached the municipality made appointments to revisit the households and left behind information packs.

In trying to understand alignment between what is documented versus what happens on the ground with regards to education and training programs, interviews with key informants were conducted. This was important in understanding the gap between municipality's expectations on how beneficiaries would utilize their toilets and how, on the ground, they used their toilets. The objective was to align expectations between municipal expectations and beneficiary practices. Mr FH claimed that house visits were undertaken to assess beneficiaries' understanding of UD toilets and to educate them appropriate use of the technology. for two reasons – to understand. However, what was missing in the municipality's education and training programme was the link between UD toilets and forward linkages relating to the reuse of faecal material for agricultural purposes. Furthermore links to water saving awareness did not come out clear. This is contrary to what is claimed by the municipality as the reasoning behind UD toilets as a technology of choice in water scarce contexts - which is the promotion of forward linkages such as the use of faecal sludge for agricultural purposes. As a result beneficiaries did not seem to be aware of these linkages between UD toilets and sanitation by-

³ A bride or a newly-wed woman

products for agricultural purposes. The main focus of the program was health and hygiene but not the water saving and agricultural benefits of using UD toilet.

Furthermore, education and training programs were rolled out using community facilitators. Based on feedback from household surveys there is an indication that the level of capacity and awareness of the community facilitators was low. This is contrary to the municipal official's claims that community facilitators were adequately trained in order to transmit accurate messages about UD toilets.

In realizing that there were acceptability challenges in UD toilets which mostly related to cultural acceptance, the municipality introduced educational programs as a response. The introduction of educational programs was aimed at soliciting buy-in from beneficiaries and ensuring acceptance. This was prompted by a flurry of complaints from beneficiaries relating to UD emptying. There were cultural issues around handling of human excreta. Street theatre was introduced as a mechanism to solicit buy-in from beneficiaries and also to distribute information on health and hygiene in relation to water and sanitation. These performances were executed in clinics, taxi ranks, shopping centres and at ward councillor meetings. The performances were performed by professional drama actors. The Key Informant stated that performances were more focused on the emptying of the UD toilet and crafted for the audience to relate from their experiences encountered from the toilets that they had. The main aim of focusing on the emptying and maintenance of the toilet was to help beneficiaries understand all processes involved in live action, by observing from the actors. The audience was expected to learn from the performances to resolve challenges that they come across when using their UD toilets. Performances were done at least two times in an area.

The third education program that the key informant stated was the leaflet and poster program. This program was also included on the last house visit, whereby the community facilitator left a poster and leaflet in each household visited. Posters had information detailing the 'dos and don'ts' in the operation and maintenance of a UD toilet. And the leaflets had information entailing what the UD toilet is and why households are given the UD toilets. This information was presented in an accessible format which included graphics and animation. Furthermore, the leaflet had information entailing the importance of keeping the beneficiary toilet clean. The community facilitator was required to stick the poster behind the door of a UD toilet so that all family members would be able to see the poster and remember the dos and don'ts.

4.2.4 UD toilet delivery process for peri-urban areas in eThekweni Municipality

The key informant indicated that as part of the implementation process community leadership and the community were consulted during a community meeting. This was extended to house visits to ensure that those who were not part of the meeting were also reached. The consultation appeared to have been only intended as an information session and not a decision-making session directed at allowing beneficiaries to make a technology choice. It seemed that the municipality has already made the decision on the technology and merely wanted to inform the community. It appeared that some of the barriers alluded to above are as a result of poor consultation. The process does not seem to have allowed beneficiaries to inform or approve the technology choice.

4.3 Results of the study from household surveys

4.3.1 Condition of UD toilets

Observing the condition of the UD toilets of beneficiaries in Umbumbulu during data collection assisted the researcher in ascertaining the current uses or and practices around UD toilets in the area. The condition of UD toilets was observed by the researcher on the participants' property before commencing the interview with the participant. Out of 19 participants five participants' toilets were still in their original state (see figure 9 and 10). 'Original state' refers to a UD toilet with all its initially installed items intact including the door, pedestal, vent pipes and back cover vaults.

Figure 9: Back exterior of a UD toilet



Source: Author, 2016

Figure 10: Front exterior of a UD toilet



Source: Author, 2016

Five respondents had altered their UD toilets into flush toilets. From the 19 respondents that were interviewed 7 had neglected their UD toilets. Neglected toilets were the ones that were poorly maintained as well as the ones that were once used but were no longer in use. Some UD toilets did not have doors, pedestal, roof cover, vent pipes and others had cracking slabs. The following pictures were taken on site from respondents' houses who gave consent for the researcher to photograph their UD toilets.

a) Current state/condition of UD toilet

Current state/condition of a UD toilet in this dissertation refers to the physical situation/circumstance of the UD toilet of a participant that the researcher observed during data collection. there were UD toilets that still had both vaults covers undamaged on the back exterior. there were also UD toilets that had their original doors still intact and both vent pipes. Figure 11 shows the interior of a UD toilet with a pedestal and a closed chamber. Figures 9, 10 and 11 show UD toilets that were still in their original state.

Figure 11: Interior of a UD toilet



Source: Author, 2016

Figure 12 and 13 below illustrate UD toilet building materials used to build a traditional pit latrine toilet. The roof, door and the door frames were taken from a UD toilet that the participant demolished and built a traditional pit latrine toilet. Two respondents' UD toilets had been

demolished and the respondents had used the material to build a traditional pit latrine toilet (see figure 12 and 13).

Figure 12: UD toilet door installed on a traditional pit latrine toilet



Source: Author, 2016

Figure 13: UD toilet roof installed on a traditional pit latrine toilet



Source: Author, 2016

One of the two residents who had demolished their UD toilets used the roof and door from the demolished UD toilet to build a traditional pit latrine. Figure 12 and 13 shows the parts of the traditional pit latrine toilet that were extracted from the UD toilet. Based on the data collected and observation of the study area, respondents appeared to prefer using traditional pit latrines as these toilets were familiar and commonly used. The area had households who had traditional pit latrines and UD toilets, suggesting that residents still use traditional pit latrines even though UD toilets were installed.

Some households had altered their UD toilets into flush toilets (see Figure 14 and 15). On further investigation it was identified that they were using some type of a septic tank to dispose of the human waste. As a result, these UD toilets depended largely on water supply to function which therefore defeated the very purpose of UD toilets which is to save water. Instead it increased the risk of underground water contamination as the septic tank structures were not built to standards and were not approved by the municipality. This can be seen as a rejection of UD technology. It seems that beneficiaries do not accept UD toilets as a service level standard fit for their sanitation purpose. This may also suggest some level of inadequacy in the

securing buy-in on UD as an appropriate sanitation technology choice. The lack of acceptance seems to also point towards a weak education and training program. This also demonstrated beneficiaries' lack of understanding of the linkage between UD toilets and agricultural activity. linkages.

Out of 19 participants' toilets, five were altered to flush toilet system (see Figure 14 and 15). However, the structure of the toilet was kept the same except for the pedestal even after the toilet had been changed. From the five toilets that were altered, two were malfunctioning with failing flush systems as households used water from the yard taps provided. Discharge pipes were leaking. One of the main concerns was where the wastewater was discharged to. Most households discharged their wastewater on the ground. This increased the risk of underground water contamination. The reason for malfunctioning of these UD toilets seemed to be related to poor plumbing done by unqualified personnel. Most of these alterations were done by households themselves who did not have adequate skills to do plumbing.

Figure 14: Exterior of UD toilet altered to a flush toilet



Water
connected to
the altered
UD toilet

Source: Author, 2016

Figure 15: Back exterior of UD toilet altered to a flush toilet



PVC Pipe
transporti
ng human
waste to a
septic tank
on-site

Source: Author, 2016

Figure 16 below shows a UD toilet without a vault cover and figure 17 shows a UD toilet without a door and a loose door frame. The findings on acceptance of UD toilets and inappropriate use suggest that lack of involvement of beneficiaries in the project during planning and implementation deprives beneficiaries of choice-making and understanding the linkages between water scarcity and UD toilet technology. As indicated earlier, these challenges have contributed to neglect of their UD toilets or misuse of their technology and opting to use water-reliant sanitation modes. Mayo and Nkiwane (2013) further support the notion that involving communities during planning and implementation stages of the project is essential as it creates understanding and builds a sense of ownership and commitment among the beneficiaries in the community. This seems to have been missing in Umbumbulu as beneficiaries were only involved in the rollout process but not at the planning stage. It was recorded that beneficiaries did not participate in choice-making on what sanitation technology was appropriate for their household needs. As a result there was no debate around the forward benefits of UD toilet against the sanitation need of the households. Some of these challenges are depicted in Figures 16, 17, 18 and 19 showing some of the physical deficiencies which are as a result of inappropriate use and vandalism.

Figure 16: UD toilet without vault covers



Figure 17: UD toilet without a door



Source: Author (2016)

Figure 18: UD toilet with a cracking slab

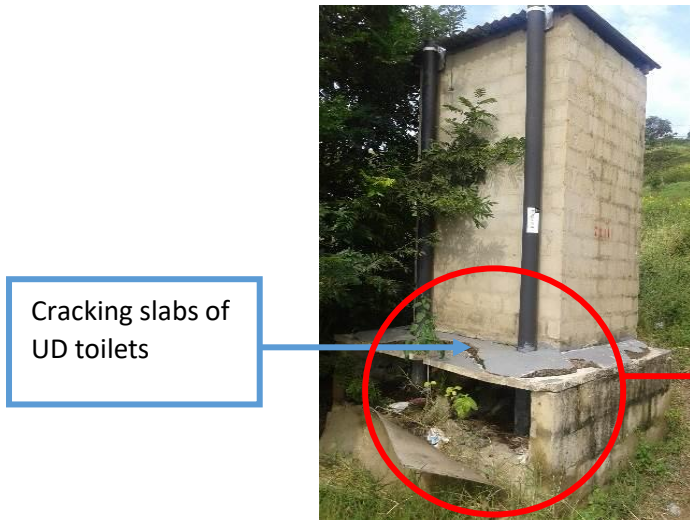


Figure 19: UD toilet vault covered with other material



Source: Author (2016)

Participants stated that UD toilets were costly to maintain as they broke easily. Out of 19 respondents, three respondents' UD toilets did not have doors. Of the seven toilets that were not maintained properly two had no black covers for the vaults at the back. All seven toilets that were poorly maintained had cracking slab both inside and outside. The two toilets that did not have vault covers were still used as toilet facilities as beneficiaries did not have other toilet facilities. Faecal matter was exposed in the open as households used other materials that failed to cover the vaults.

Residents stated that in the area, most UD toilets did not have the vault covers as they broke easily. Residents who had UD toilets without doors stated that the doors fell off and they had tried to repair the doors however, the doors fell off. One participant stated that their door was stolen, they woke up one day and the door was gone. Out of 19 participants' toilets, eight had cracked slabs. Of the seven respondents who had maintenance issues with their UD toilets, one respondent had a UD toilet without a pedestal and urinary pipe. However, the respondent stated that he once used the UD toilet but the toilet was no longer used. The respondent stated that UD material theft was a common issue in the area as some people use the parts of UD toilets to build traditional pit latrines. He stated that some people who take materials from UD toilets that are abandoned/ neglected use them on their own UD toilets as their UD toilets get clogged and have malfunction issues. The respondents seemed to have been unable to maintain their

UD toilets. This is demonstrated by Figure 19, which shows that residents use of foreign materials to repair their UD toilets. This information is useful as it highlights the inability of beneficiaries to maintain their UD toilets - this could lead to other factors contributing to failure of the UD toilet technology over time.

b) UD toilet maintenance

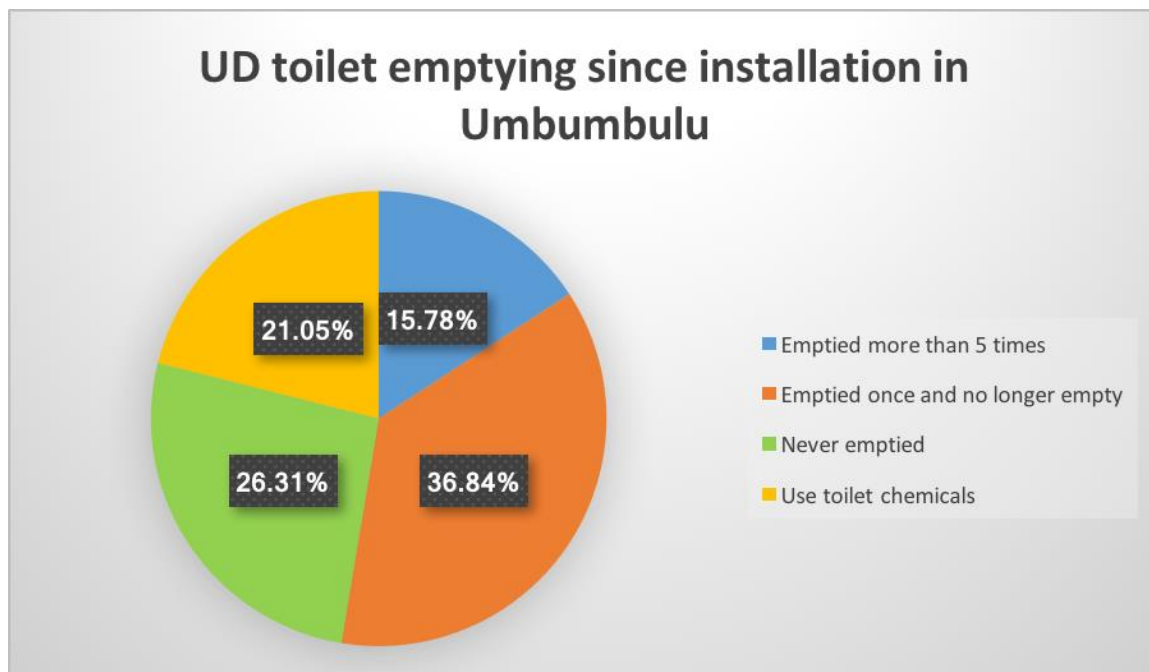
The benefits of UD toilets are linked to appropriate operation and maintenance. Ensuring that beneficiaries empty their toilets appropriately is one of the important processes that links UD toilet to the forward benefits of agricultural reuse of human excreta.

Chart one shows the results of participants' UD toilet emptying since the installation of the toilets in 2005. It is useful to look into this information as it is aligned with objective five of the dissertation which seeks to ascertain the effect of the UD toilet educational programs (training & education to promote acceptance, usage and maintenance of urine diversion toilets) on the uptake of UD toilets in low income peri-urban communities. From the study, out of 19 participants, five participants stated that they had never emptied their UD toilets before. Participants who stated that they had never emptied their UD toilets include those who had converted their UD toilets and participants who have never used their UD toilets, and the ones who had used them and then left them as they were when they got full. Seven participants stated that they once emptied their UD toilets but they no longer empty them. Thereasons given was that it was not a pleasant task to empty the toilets. Participants who had demolished their UD toilets stated that they once emptied their UD toilets.

Out of 19 participants, four stated that they use chemicals to get rid of faecal matter in their UD toilets. The use of chemicals was said to be common practice in Ventilated Improved Pit VIP latrines. Respondents who stated that they used chemicals to empty their UD toilets stated that they used them because they did not know of any other ways to empty their UD toilets. Three respondents stated that since the installation of UD toilets they have emptied their UD toilets more than five times. However, when asked how they dispose the faecal matter one respondent stated that she waited until it was raining and opened the vault at the back of the UD toilet. One respondent stated that she used a rake to pull the faecal matter and the rain washed it to the river below the back of her house, which is contrary to how the municipality expected beneficiaries to dispose of the contents of their UD toilets. This

demonstrates a disconnect between expectations of the municipality and the practices of beneficiaries. Further demonstrating this disconnect is an assertion by another respondent that she dug a hole in the open space away from the houses and gardens and used a wheelbarrow to transport the faecal matter and bury it in the hole that she dug. Another respondent stated that she hires a boy to empty the toilet and she had no idea where the faecal matter is disposed.

Chart 1: UD toilet emptying in Umbumbulu



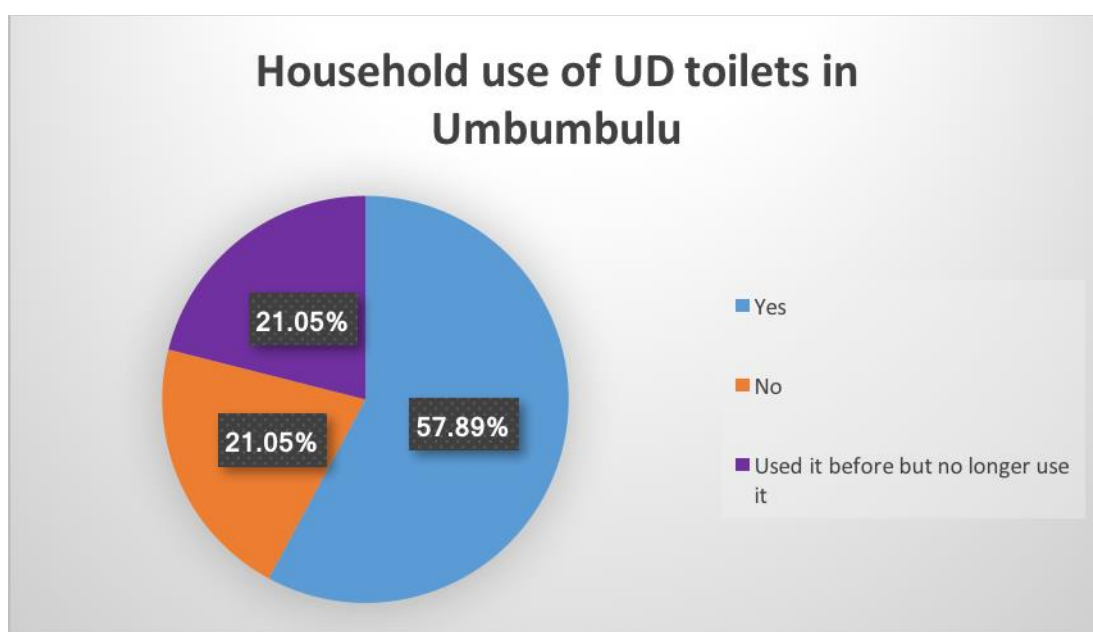
Source: Author (2016)

Chart two below illustrates respondents' use of UD toilets in Umbumbulu. 11 respondents stated that they used their UD toilets, while four respondents stated that they did not use their UD toilets. Respondents who stated that they did not use their UD toilets were inclusive of the respondents who had demolished and those who had neglected their UD toilets, meaning that they never used their UD toilets at all. The other four respondents stated that they once used their UD toilets but had stopped using them.

The use and non-use of UD toilets is relevant to investigate because it addresses objectives five and six of the study, which are to assess the success and failure of educational and training programs to promote acceptance, correct usage and maintenance of UD toilets; and to make recommendations for improving acceptance issues and longevity of UD toilet use. Non-use and

incorrect use of UD toilets is a result of multiple factors. These include inadequate education and training programs which fail to make a link between UD toilets and forward linkages. Another factor relates to the lack of inclusion of beneficiaries at decision-making and planning stages which deprives them of making a technology choice appropriate to their needs. The municipality seems to take a decision on the basis of water scarcity and benefits of UD toilets without adequate consultation with end-user beneficiaries of UD toilets. As a result, beneficiaries either convert their toilets, abandon them or use them inappropriately.

Chart 2: UD toilet use in Umbumbulu



Source: Author (2016)

a) UD toilet beneficiary practices

UD toilet beneficiary practices address the first objective of this dissertation which seeks to find out whether the UD toilets in Umbumbulu were adopted as they were originally designed or if they were adapted by beneficiaries to suit their preferences. Participants who stated that they used their UD toilets also mentioned that the UD toilet works similarly to the pit latrines they previously had. However, they argued that the UD toilets were more challenging due to complex maintenance relating to emptying and operation compared to the pit latrines which never needed any maintenance. This is supported by the following quotes:

“We use it like the previous toilet we had, we used to have a long drop⁴ just that this one has smaller holes that get full and require more money to buy toilet chemicals.”
(respondent 1)

“My children do not use this toilet because they cannot reach the back part of the toilet. They used to defecate in the pit latrine that we used to have because it was not as complicated as this one.” (respondent 2)

Figure 20 below illustrates urine diversion toilet pedestals of participants with human excreta and toilet paper in a urine diverting fitting highlighting incorrect beneficiary practices.

Figure 20: UD toilet beneficiary practices



Source: Author, (2016)

Findings of the research showed that participants' lack of knowledge and awareness led to incorrect participants' practices/use of UD toilets as shown in figure 20 above. Maintenance measures that participants applied to address issues that were caused by incorrect use of UD toilets were not aiding the situations as they were not the correct measures. Measures that were applied included vault clearing by using chemicals to burn faecal matter and depositing faecal matter in a river when it rains. One of the participants who had altered their UD toilet to a flush toilet had sewage disposal challenges. The flush toilet was installed and a pit to deposit sewage was dug behind the toilet. However, the pit was not covered as the respondent stated that they ran out of funds. The respondent stated that when it rained, he had issues as the neighbours

⁴ Pit latrine

would complain about faecal matter flowing over his yard from the pit that was dug for sewage disposal.

Figure 21 shows a well build cistern for a converted flush UD toilet. The figure shows a covered cistern with a covered vent pipe on the ground behind the UD toilet for sewage disposal.

Figure 21: Cistern for flush UD toilet with a vent pipe



Source: Author (2016)

Figure 22 below shows a hole dug on the ground for sewage disposal of a converted UD toilet to a flush toilet. Because the hole is not covered, when there are rains excreta overflows spilling over to neighboring households.

Figure 22: Hole dug in for ground sewage disposal from a flush UD toilet



Source: Author (2016)

b) UD toilet used for other purposes

It was important to explore whether beneficiaries used their UD toilets for other purposes instead of those for which it was installed in accordance with the municipality's objectives. This would also give an opportunity to assess whether education and training programs had the desired impact in this regard. The main objective of the study was to investigate the role of educational programs in promoting acceptance and adoption of UD toilets. The findings indicate that some respondents used their UD toilets as storage facilities. Such example is shown in figure 23 below. Out of the total 19 respondents, three stored tools and other household belongings in their UD toilets. One participant who altered his UD toilet to a flush toilet stored his belongings in the vaults as the vaults remained empty when the UD toilet was converted to a flush toilet. At least two beneficiaries from the study did not use their UD toilets for anything else except to store their belongings. This is demonstrated in the following quotes and pictures:

"I changed my UD toilet to a flush toilet and I use the chambers as storage facility because there is space that is not being used." (respondent 1)

"I store some of my belongings in there because I do not use this toilet for anything else it's just an empty space." (respondent 2)

Figure 23: UD toilet used as a storage facility



Source: Author (2016)

c) Other types of sanitation technologies on participants' properties

It was worthwhile to look into other types of sanitation technologies that households of Umbumbulu area used to ascertain the level of UD toilet adoption. During fieldwork it was observed that participants had other types of sanitation technologies in their properties and they preferred to use those even though UD toilets were installed in their properties. Participants stated that UD toilets had odour, flies, were unhygienic and caused infectious diseases. The flush toilet was more popular amongst residents compared to the traditional pit latrine and the septic tank. Participants stated that they used other sanitation technologies as they knew how to use them and they were simple to use. Table one shows other types of sanitation technologies (other than UD toilets) used in Umbumbulu area the table shows 13 of the 19 respondents:

Table 1: Types of sanitation technologies currently used in Umbumbulu

Toilet type	Number of respondents
Flush toilet	6
Traditional pit latrine	5
Septic tank	2

Source: Author (2016)

The majority of respondents who had other types of toilets in their properties as shown in Table 1 had flush toilets. Six respondents had flush toilets on their properties. Five respondents had traditional pit latrines. Respondents who had traditional pit latrines included the ones who had demolished their UD toilets. Two respondents had septic tanks. Six respondents had no other type of toilets except for UD toilets.

Maintenance was one of the main reasons many participants disliked the UD toilet as they stated that they had never used the technology before and those who used it experienced challenges. Emptying the UD toilet caused tensions in many households because some believed that it was a job that many preferred not to do while others believed that it was something that should not be practiced. It was discovered that UD toilets were predominantly cleaned and maintained by females in the household, and this included the emptying of the toilet. A small proportion of respondents reported that the task of emptying the toilet was done by older females, because it was believed that being in contact with faecal matter would bring bad luck

to younger females. As a result, maintenance of UD toilets was generally poor as most beneficiaries surveyed disliked the process of maintaining their toilets.

4.3.1.1 Community involvement in UD toilet delivery

The main aim of this dissertation was to ascertain the role of community training and education programs in promoting acceptance, proper usage and maintenance of urine diversion toilets in low-income peri-urban communities. DWAF (1996) highlights that sanitation is more than just the delivery of toilets. It involves technical, financial, environmental, social and educational frameworks in order for it to be viable. An educational framework can only be understood if people are part of planning and are involved in choosing the sanitation technology (McConville and Rosemarine, 2012). It is therefore, crucial to investigate community involvement in UD toilet planning, implementation and education in this study, to ascertain UD toilet project promotion success or otherwise.

Participants stated that they were consulted through home visits by young people who came to the area and said they were facilitators, claiming that they came from the municipality. The young people asked households how many people lived in each house and where households would like their toilets to be positioned within their properties. This is demonstrated from the following extracts:

“Someone came to my house and counted us, she asked where I would like to put my toilet around my yard and I showed her. She said we were going to receive 2 toilets because we had a huge family.” (respondent 1)

“Someone came to my house and asked where I wanted to place my toilet and I showed them. After a while they came back and built it. They left a rake and a spade.” (respondent 2)

“I was not at home and when I came back my neighbour told me that there were people who came by and asked where we would like to build our toilet. I told my neighbour to show them if they came back again. Instead they came back and built without asking and left the rake and spade inside the toilet.” (respondent 3)

The study results suggest that there was little or no effort to involve community members during the planning, implementation and education phases of the program.

4.3.1.2 UD toilet beneficiary ownership period in Umbumbulu

Looking into the level of adoption was important as it highlighted challenges which formed the basis for the recommendations made to address challenges. All participants received their UD toilets in 2005 (they had had them for 13 years at the time of the fieldwork in August 2016). However, the majority appeared not to have adopted/got used to UD toilets. This is based on the following assertions

“I once used that toilet but I couldn’t stand the smell and flies inside. We have since then moved back to our VIP toilet.” (respondent 1)

“It is difficult to use that toilet especially for us as women when we are menstruating, we rather go to the old VIP toilet because menstrual blood is left on the pedestal at close range and everyone knows because they see the blood in the toilet.” (respondent 2)

“I have never used the toilet since they were given to us. Because I don’t know how to use the toilet and I have heard that it has a bad smell and flies” (respondent 3)

On the basis of the above responses, respondents did not seem to know how to operate and maintaining the UD toilets provided to them. They appeared to have a lot of negative perceptions which led to either incorrect use or rejection of the technology, in some cases. However, it appeared that the longer the beneficiaries had UD toilets, the more they accepted the technology. This was asserted by comparing how long a participant had owned a UD versus how well maintained their UD toilets were. There was a clear correlation between the length of time a participant had owned the UD toilet to the appropriate use. It is unclear whether this is due to repeated exposure to education and training or just general acceptance of UD technology as the only sanitation option.

4.3.1.3 Impact of education and training on Beneficiaries of UD toilets

Asking what participants knew of UD toilet was important as the study focused on the user education and its impact in promoting adoption. Participants’ knowledge about UD toilets indicated poor level of knowledge being passed on to them by the municipality. At least ten participants stated that they did not have enough knowledge of the UD toilets they did not even know the name of the toilet. Five participants were able to call it urine diversion toilet. This is reflected by responses from the 19 respondents which included the following quotes when asked whether they knew what a UD toilet was:

Participant 1 stated that: “I don’t know.”

Participant 2 stated that: “I don’t know but I know they are different from other toilets.”

Participant 3 stated that: “We call it ibhakede⁵ here.”

Participant 4 stated that: “I wouldn’t know what it is called”

Participant 5 stated that: “It’s a dry toilet, that’s what they call it at the municipality.”

Participant 6 stated that: “I know that we have to empty the toilet ourselves, people say different things about these toilets.”

The results of the study show that UD toilet beneficiaries had little or no knowledge of what a UD toilet was. Majority of participants (eleven) reported that they did not receive education about UD toilet maintenance, health and hygiene. However, eight respondents stated that they were not sure if there was any training conducted to help them in using their UD toilets. Respondents who mentioned that they never received training stated that they were told that the municipal officials would come again after the toilets were installed to train them on how to use the toilets. Out of eight respondents who reported that they were not sure if there was training conducted, five stated that they were not home when their UD toilets were installed. Respondents who mentioned that they never received training stated that they were told that, after the installation municipal officials would come and train them. However, after installation no one came to train them.

4.3.1.4 Education preferences of participants

Identifying beneficiary preferences in the education approaches used was important to help in recommendations section. Participants were asked to pick from a list of the education and training approaches that were employed by the city (street theatre, house visits, community leaflets/posters and community presentation) for informing them about UD toilets and their associated benefits. From the 19 participants 16 participants stated that they would like to receive information and knowledge about their toilets through training done by visits to each household and training on a regular basis. Some estimated that five times a year would be appropriate. Their argument was based on that sometimes they have visitors and new people come to their households who may need to use and maintain the UD. They indicated that they preferred to receive training in their homes.

⁵ Bucket

“If we had to receive training with regards to the use and maintenance of UD toilets I would like to receive training at home because it would make it easier for everyone at home to see because I don’t think it would help to read something that you might not understand.” (respondent 1)

Others were concerned about the taboo of handling of faecal matter. They preferred some privacy when talking about their sanitation practices. As a result they claimed that if training is conducted at home they would have better privacy and will be able to ask questions freely. This assertion was confirmed by a number of respondents.

“I would prefer home training because I don’t think it would be easy to ask questions when there is the whole community listening. Faeces and toilets are not easy topics to discuss especially around people you are not comfortable with.” (respondent 2)

“Home training would make things much easier as it would be easier to ask private questions and you get full attention, even when you don’t understand they would find ways to make you understand than when there is everyone from the community and other people understand things faster.” (respondent 3)

Most residents highlighted that it would be easier for them to understand training in their homes and ask questions that they might have freely. Residents stated that they would like training to be conducted at least five times in a year because some family members might not be available sometimes. If a family member misses two sessions, at least they would still have three sessions.

4.3.1.5 UD Challenges for beneficiaries

It was important to probe beneficiary challenges with their UD toilets for the researcher to identify gaps in municipal expectations and beneficiary practices relating to UD toilets and forward linkages that could be highlighted on the recommendations so that they will not be overlooked in UD toilet future implementation. Out of 19 respondents five stated that they considered cultural and social beliefs⁶ as a challenge to the adoption of UD technology. Three respondents stated that their major challenge was the bad odour, flies and health issues especially for women. From the three respondents, two women reported that they had contracted infections more than once which they believed through the use of UD toilets.

⁶ There is a belief that people practice witchcraft with faeces and that touching faeces is bad omen.

Furthermore they mentioned that it was difficult to keep the toilet clean, especially the pedestal as a result of which they caught vaginal infections. At least 9 participants considered lack of education and awareness of the benefits associated with UD toilets as a major challenge for adoption of the UD technology as they had no idea how to use the toilet. Various respondents reiterated this point, as seen in the following comments.

“These toilets are really a challenge especially when it comes to our beliefs. You see I am isangoma⁷ and I believe that anything that has to do with human faeces once it leaves the human body, no one should touch it unless you are practicing witchcraft. I find it difficult to empty these toilets because every time after emptying the toilet vaults I have to perform a cleansing ritual to get rid of the bad omens that are associated with faeces.” (respondent 1)

“If I knew how the toilet works maybe I wouldn’t have converted it, but I just couldn’t figure it out and decided to go for what I was familiar with and I had always wanted to own a flush toilet.” (respondent 2)

“It is difficult to use this toilet, I need assistance every time I go to the toilet as the toilet doesn’t have a ramp for my wheelchair and there is no space inside the toilet for my wheelchair.” (respondent 3)

“I find it difficult to clean this toilet because the front part of the seat gets clogged with faeces every time. When the front part is clogged we get exposed to infections as women because the front part of the seat is very close to our vaginas. Another issue with the toilet is bad odour and flies especially in summer, as you can see my toilet is close to the house and the door faces the door of this house. You can imagine what happens in summer then.” (respondent 4)

Participants who used their UD toilets stated that their children were not allowed to use them. They feared that their children might drown as some children were not tall enough to reach the back part of the seat and while their feet remain on the ground to maintain balance.

The table below illustrates challenges experienced by UD toilet beneficiaries. Majority of respondents highlighted lack of education as their main challenge out of the 19 respondents.

⁷ Traditional healer, however other sangoma’s do not practice as healers.

Table 2: UD toilet challenges for beneficiaries of Umbumbulu

UD toilet challenge	Number of respondents
Cultural and social beliefs	5
Lack of education	9
Health hazard	2
Bad odour	3

Source: Author (2016)

4.3.1.6 Benefits of UD toilets

Respondents were asked whether they understood the benefits of using UD toilet by-products. While others recalled their experiences of using animal faecal matter for agricultural purposes they indicated their unwillingness to use human excreta. Their reluctance to utilize sanitation by-products for agricultural purposes is influenced by various factors. One factor reported relates to cultural perceptions on handling of human excreta. Others stated that they were unsure that this would be healthy and safe to do. None of the respondents seemed to have experience using human excreta as a sanitation by-product for agricultural purposes. While others reported having heard people claim that human excreta was good for plants, they had not tried it themselves. Many were unwilling to try.

These responses indicated the strength of socio-cultural perceptions as a barrier to acceptance of UD toilet by-products for agricultural purposes. It also points towards inadequacy of education and training programs to alter these perceptions. Ultimately, the key benefits of UD toilets are not leveraged as a result.

4.3.2 Discussion of findings

Fruman et al. (2012), argue that consistent education and training is crucial for a new technology to be adopted. In this study, the researcher explored the role that education programs contribute towards promotion of acceptance, use and maintenance of UD toilets in peri-urban communities. The findings of this research show that there has been limited acceptability of ecological sanitation within beneficiary communities. The research findings suggest that there is a relationship between UD toilet education programs and acceptability and

maintenance of the technology system. This was observed from the case study of Umbumbulu peri-urban area. From the data obtained, there is no direct relationship between beneficiary maintenance of UD toilets and the level of acceptance, because even beneficiaries who were maintaining their toilets adequately still aspired to have their toilet changed from the UD toilet to a flush toilet.

A review of eco-san experience in East Africa and South Africa conducted in 2005 suggests that promoting the dry urine-diversion toilet around social factors through giving the right information to beneficiaries yields large-scale success of the technology. Wide scale acceptance was acknowledged by the choice householders had between different technologies and because ecological sanitation best satisfied their basic sanitation needs given the water, geological and cost limitations. Akin to the theory of planned behavior which was highlighted earlier in this dissertation in chapter two. Ajzen (1985) state that, the theory of planned behavior is explains how behavioral intention determines behavior and how attitude and perceived control influence intent. This suggests that to shape positive attitudes towards the behavior of UD toilet beneficiaries and stress subjective opinions that support proper use and acceptance of UD toilets, it may be important to present information that support such behavior. For example: in the case of motivating beneficiaries to use their UD toilets as envisaged, presenting information to UD beneficiaries in a form of continuous training and educational program that they can understand would influence their behavior towards the use of UD toilets. Mkhize et al (2017) argue that using a toilet is a learned behavior. Therefore, it is a lost opportunity to offer limited education to UD toilet first time user beneficiaries on how to use the toilet, so that they can understand how to use it and teach others in the correct attitude and behavior, since using a toilet is a learned behavior.

In this dissertation, the results suggest that education programs offered by the municipality focuses on baseline information of the area, proper use of the UD technology, emptying of UD toilet challenges that beneficiaries experience and hygiene awareness. However, the results from the study assume that the roll out of programs as offered by the municipality are not continuous as they were only made available to beneficiaries for a limited time. An example of such, the key informant stated that street theatre performances were performed two times in the area and the households had five visits from community facilitators. Highlighting the number of visits allocated to beneficiaries for education purposes suggests that the content of education provided is sufficient and relevant. Nonetheless consistency and time allocated to deliver the programs that are capable to influence beneficiary behavior towards the use of UD

toilets is questionable. From this study the amount of time spent to influence beneficiaries' acceptance and adoption of UD toilets as well as directing correct operation and maintenance of their UD as envisaged by the municipality is criticized.

The study claims that the amount of time spent to educate beneficiaries plays a role in influencing behavior of beneficiaries towards the acceptance, adoption and use of UD toilets. It is for the following reasons that time spent to deliver education programs is criticized.

- 1.) Beneficiaries of UD toilets in Umbumbulu were not exposed to UD toilet technology before let alone ecological sanitation.
- 2.) The results of the study assume that the change towards eco-san was not optional for beneficiaries.

Due to this lack of acceptance, claimed key informants, eThekweni experienced cholera outbreaks which spiraled in the year 2000 around peri-urban communities and across KwaZulu-Natal province as a whole. This assertion confirms the claims made by Roma et al (2011).

Therefore, a sufficient amount of time was required to conduct such education programs to realize the role played by the programs to influence beneficiary behavioral change. This assumption is confirming claims made by Jackson's (2005) study of eco-san experience in Eastern and Southern Africa. The study indicated that eco-san requires more user education compared to other sanitation technologies. The first easy lesson for beneficiaries is mastering the use of soil and ash after every toilet visit. Jackson states that a consistent educational program helps users to understand the technology. Furthermore, he highlights that public health practitioners are well aware of the simple challenge of instilling the practice of handwashing with soap and water in sanitation. Eco-san introduces another level of complexity and public health risk. Sufficient resources are needed to make users fully aware of their responsibilities and provide for follow-up visits until operational requirements have become common knowledge. This assertion is in line with Jackson's (2005) assertions.

On the basis of these findings the nature of education programs should be inclusive and take socio-cultural aspects into consideration. This claim is similar to that observed by Austin et al (2005), Communities are not illiterate, and to a degree they can understand and process simple information provided in order to make proper decisions which is similar to what Parker & Kindig (2006), stated in their study. UD toilets require a higher level of commitment from users

than do other forms of dry sanitation, education should be provided according to beneficiary needs. These claims are similar to those stated by Austin et al. (2005). To achieve envisaged and proper practices of UD toilets beneficiaries need to be involved in UD toilet roll out community projects. The research finding suggest that the roll out of UD toilets in Umbumbulu was delivered to beneficiaries with limited efforts to involve the community in the project. The key informant stated that all education programs (house visits, street theatre, posters and leaflets) were implemented in the area however, respondents' views differed. Respondents stated that they were consulted by community facilitators through one home visit per household.

The study shows that partnering with communities in development projects is critical and improves the quality of the intervention. Minkler (2005) claim similar observations and further states that while it is impossible and unnecessary to force people to participate in development which affects their lives it is important to provide space and platform for their participation. The importance of using Arnstein's Ladder of Citizen Participation as a framework to understand the extend of citizen's involvement in decision-making process, planning and implementation of UD sanitation in Umbumbulu has been justified. On the basis of this framework beneficiaries of UD toilets in Umbumbulu fall under the 6th rung because they reported not to have had control of the technology choice. It does not seem that beneficiaries were consulted in the decision-making process. Instead the technology choice was made on their behalf. The objective of the education and training program appeared to only serve the purpose to inform rather than to negotiate the sanitation choice. In this regard beneficiaries in Umbumbulu were not afforded what Arnstein (1969) calls legitimate citizen participation. There is no indication that beneficiaries were informed of their rights, responsibilities and options. The UD toilet sanitation choice seems to have been a result of a one-way flow of information from officials to citizens with no channel provided for feedback and no power for negotiation.

Further to the above assertions other observations and findings seem to indicate a severe lack of adequate stakeholder consultation in the process of rolling out UD toilets. This is supported by respondents who claimed that they only knew about the project during the first house visit conducted by community facilitators. In this regard beneficiaries were not given an opportunity to influence program design. As a result the citizens are deprived of influence when information is provided at late stages of the planning process. As claimed by Mkhize et al (2017) in other studies, the importance of consultation in the planning process offer correct information, lessen

negative opinions and communicate expectations, concerns, fears and preferences of all those involved.

Notably, the results from this study suggest that the roll-out of UD toilets in eThekweni Municipality followed a ‘one size fits all’ approach. A generic approach was utilized instead of a case specific approach that took into account the specific socio-cultural complexities of Umbumbulu. The number of visits conducted did not seem to cover aspects specific to Umbumbulu which would have taken into consideration context specific circumstances. Jackson (2005) states that diverse cultural, geographic and demographic conditions yield different reactions to eco-san technologies. This assertion further confirms the importance of context specific approaches to sanitation delivery, particularly in the situation where cultural perceptions run the risk of negatively influencing acceptance of a sanitation technology. These all point towards the importance of adopting people centered and bottom-up approaches in the delivery of sanitation, that take into consideration varying and complex cultural, geographic, political complexities.

Jackson (2005) further argues that people centered approaches allow beneficiaries and potential users of UD toilets to understand their roles and responsibility in making the technology work. Without this understanding there may be complaints and future problems with acceptance of UD toilets. Findings of this research are in line with Jackson’s assertions. Furthermore, recorded taboos related to the handling of human excreta is in line with findings of previous studies by Jackson (2005); Matsebe (2011) and Roma et al (2011), which claimed that in Africa handling of human waste is seen as culturally taboo. Often these taboos are difficult to break and require concerted efforts from local governments or delivery agents. The findings also highlighted challenges related to accessibility of UD toilets as some were not designed for physically disabled beneficiaries and did not take into account gender and age related complexities.

Although the focus of the study was not on gender, age and disability accessibility challenges, significant issues of access relating to these factors were identified. For instance, female respondents reported that they experienced discomfort in using the UD toilet during menstruation, as there was lack of privacy. This is in line with Jackson’s (2005) assertion that, women need privacy and space, and ways of dealing with waste items related to menstruation, which could have a big impact on health and potential re-use of UD toilet by product. This study also confirms Matsebe’s (2011) findings in East Africa, where safety, particularly for

children, and privacy were found to be a main concern in alternative sanitation. From this research, a disabled respondent reported to have experienced challenges accessing the UD toilet. Based on observations, UD toilets did not have ramps for wheelchairs and the interior did not have a facility to allow for transfer from a wheelchair to the pedestal. This made it impossible for disabled beneficiaries to use their toilet and to operate it. Moreover, other respondents asserted that their children did not use UD toilets due to safety concerns. Instead, children defecated in the open or used the traditional pits. What these findings suggest is the importance of taking into account needs of various the various population groups such as women, children and the disabled in the design process of UD toilets.

4.4 Summary of chapter 4

The chapter presents key findings of the study in a narrative format. Within the chapter results are presented in two sections – key informant section which was aimed at presenting the approach used to implement UD toilet project, education programs and the need to consider UD toilet technology. The second section was the household survey section, this section highlighted findings from UD toilet beneficiaries in Umbumbulu. The household interview section entails the condition of UD toilets, maintenance of UD toilets, use of UD toilets and education of beneficiaries in respect of such use.

5 CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Summary of findings

Firstly, the research set out to identify factors that have impacted on the adoption or lack thereof of UD toilets in Umbumbulu. Findings have indicated that a poorly designed education and training program is one of the key factors contributing to lack of acceptance and inadequate use of UD toilets. What has come out clearly in the findings is that education and training program failed to adequately articulate the benefits of UD toilets with regards to nutrient recovery and agricultural reuse. Another key factor is lack of involvement of beneficiaries at the planning stages and in the decision-making processes. Findings indicate that the decision on UD toilet as a choice was top-down and was not inclusive. As a result, there has been significant rejection of the technology. This is demonstrated by lack of proper use, abandonment and conversion of UD toilet to flush toilets or as storage spaces.

Secondly, the research set out to observe whether UD toilets were utilized as envisaged by the municipality or whether beneficiaries altered them to suit their purpose. The findings indicated that the majority of beneficiaries either converted their UD toilets to suit their needs or abandoned them. This was mainly linked to a poor education and training program and lack of involvement in making the technology choice. Due to alterations and abandonment there is a clear indication that sustainability of UD toilets over time is questionable. What came out clearly is that without broad acceptance of UD toilets by communities as a technology of choice, it is unlikely to be sustainable over time.

Some of the factors contributing to acceptability challenges include socio-cultural issues relating to handling of human excreta. The city's education and training program did not seem to have adequately addressed cultural sensitivities around the handling of human waste. As a result, perceptions and taboos linked to human excreta prevail and prohibit full acceptance of UD toilets. Consequently, benefits of UD toilets as they relate to nutrient recovery for agricultural use and water saving are not taken advantage of.

With regards to the education and training programs it was clear that they were inadequately designed and undertaken. The findings indicate that there were a number of gaps with regards to how education and training was conducted. While the city had tried to make these programs accessible, they did not have the wider reach and penetration required in order to change perceptions and attitudes. There was also a clear indication that instead of education and training programs being undertaken at the implementation stage, instead consultation and

engagement would have been ideal for collective decision making to take place. This would have ideally encouraged buy-in from beneficiaries. A sizeable number of scholars indicated that participatory processes in sanitation choices have always yielded wider acceptance from beneficiaries. On the balance of findings, the education and training program for UD toilets appears to have been unsuccessful. This is indicated by entrenched negative perceptions about UD toilets and unchanged cultural sensitivities which have led to rejection of the technology.

Moreover, consistent educational programs would play a fundamental role to assist in overcoming negative perceptions and societal obstacles towards the adoption and proper use of UD toilets. Furthermore, continuous monitoring of education programs should be further investigated in routine evaluations to identify challenges/issues and thus intervene to increase longevity of the technology. To assist promote proper use and adoption of eco-san especially UD toilets, eThekweni Municipality needs to realise the importance of community participation and continuous provision of education as a tool to facilitate beneficiary acceptance of the technology. According to de Villiers (2004), human behaviour is largely influenced by the dialogues prevalent to society. He argues that behaviour is connected to the creation of human identity as it is through behaviour that we define who we are.

The results of the study highlight that attaining the benefits of ecological sanitation still requires a change in how people think about and act towards human excreta. People need to be assisted to overcome cultural taboos if they are to accept and adopt the UD toilet technology. Mayo and Nkiwane (2013) state that for new technology to be adopted by the users, it is important that all constraints that may restrict its adaptability such as cultural, religious and access to information be identified at the planning stage of the project. This may include involving communities during planning and implementation stages of the project, which is considered as very important because it builds a sense of ownership and commitment among the local people (Mayo and Nkiwane, 2013). Esrey et al (1998) state that eco-san systems are neither generally known nor well understood. Furthermore, he argues, eco-san systems cannot be replicated without a clear understanding of how they function and how they can malfunction. Eco-san technologies have some unfamiliar features that beneficiaries were not previously exposed to such as urine-diversion pedestals. In addition, Esrey et al (1998) argue that eco-san technologies require more promotion, support, education and training than VIP toilet due to their unfamiliar nature and the complex forward linkages related to operation, maintenance and use of by-products for agricultural purposes.

The study findings highlight that maintaining and operating UD toilets are other aspects requiring attention. Austine et al (2005) state that communities normally accept dry sanitation programmes when sufficient time for education programs is invested by the project team.

Gender perspectives on conventional sanitation systems have not been well established. It is difficult to generalise on this aspect in sanitation, given that women and men are not homogenous groups and gender relations are context specific. There are, however, a number of gender aspects that influence how women, compared with men, are involved in and benefit from improvements to sanitation. Women's perceptions need and priorities in relation to sanitation can be quite different from men. Integrating gender perspectives, biological differences disability and age or giving attention to all populations involved, in ecological sanitation programmes is important for securing human rights and social justice. It is also critical for ensuring that the aims of eco-san, particularly in relation to adoption and longevity, are effectively achieved.

5.2 Recommendations

These recommendations are by no means prescriptive but are mere suggestions based on the findings of this study. The following recommendations have been made on the basis of the study's findings:

The decision-making process on the sanitation choice needs to be participatory and inclusive. Beneficiaries should be involved from the conceptualization stages of any sanitation project in order to allow for buy-in over time. This process will not only empower beneficiaries but will also work towards positively influencing cultural perceptions around the handling of faecal material. Allowing beneficiaries to be part of the process from decision-making until implementation will allow for mainstreaming of gender related issues and issues of the vulnerable groups in the community such as children and people with disability.

On the education and training side, programs need to be comprehensive and explicit about the forward linkages relating to nutrient recovery and reuse for agricultural purposes. The programs should be design with cultural perceptions in mind and should have clear behavioural change objectives. Education and training programs should be accompanied by strong and explicit marketing campaigns aimed at promoting alternative sanitation in order to mitigate any negative perceptions. Social marketing messages should be conveyed using easy and accessible

instruments and approaches, for example animated posters and social media messages. Some of these should be directed towards behavioural change in a similar fashion as educational and training programs. As mentioned above the study findings highlighted challenges of using a UD toilet for vulnerable residents therefore education and training programs need to be inclusive and cater for vulnerable populations (disabled, children and women populations).

- Developing education and training materials that are inclusive and cater for vulnerable populations. This includes highlighting vulnerable populations challenges and solutions to their challenges.
- Actively arranging social meetings and events that are a space to address and understand challenges mainly faced by vulnerable beneficiaries.
- Creating stronger links between schools and other sectors of community stakeholders to facilitate marketing campaigns aimed at promoting alternative sanitation.

Finally, there is a need to set up clear monitoring and evaluation program to track operational and maintenance issues, acceptability challenges and etc. A monitoring and evaluation program need to be developed at the beginning of the program taking into account baselines before the commencement of the project. Without explicit monitoring and evaluation program issues of cultural acceptability, operation and maintenance will not be identified and mitigated timeously.

6 REFERENCES

- Ajzen, 1985. From Intentions to Actions: A Theory of Planned Behavior. In *Action control* (pp. 11-39). Springer, Berlin, Heidelberg
- Ajzen & Fishbein, 2003. Questions Raised by a Reasoned Action Approach: Comment on Ogden. (pp. 431-434).
- Ajzen & Madden, 1986. Prediction of goal directed behavior. *Attitudes, intentions, and perceived behavioral control. Journal of Experimental Social Psychology*, Issue 22, (pp. 453-474).
- Alcock, N., 2015. *Urine Diversion Toilet Waste Removal and Processing using Black Soldier. A Guide for Low and Middle Income Countries*. Practical Action Publishing, s.l.: s.n.
- Andersson, Esrey, Hillers & Sawyer, 2000. Ecological Sanitation for Food Security. *Publication on Water Resources*, Issue 18.
- Arnstein, 1969. A Ladder Of Citizen Participation. *Journal of the American Institute of Planners*, 35(4), (pp. 216-224).
- Austin, L. et. al, 2005. *Ecological Sanitation Literature Review*, WRC Report No: TT 246/05: WRC.
- Bandura, 1986. *Social Foundations of Thought and Action*. New Jersey: Prentice Hall.
- Boot, 2007. *Practical action: Technology challenging poverty "ecological sanitation"*. Bourton-on-Dunsmore: Schumacher Centre.
- Borgman et al, 2009. Fostering Learning in the Networked World. *The Cyberlearning Opportunity and Challenge*.
- Bradley, D., Stephens, C., Harpham, T. & Cairncross, S., 1992. *A review of environmental health impacts in developing country cities*. Available at: <http://documents.worldbank.org/curated/en/493871468741335710/A-review-of-environmental-health-impacts-in-developing-country-cities>.
- Brynard, 2007. Home schooling as an open-learning educational challenge in South Africa.
- Burger, 2015. *South Africa probing socially acceptable low- and no-water sanitation alternatives*. Available at: http://www.engineeringnews.co.za/article/sanitation-revolution-2015-07-03/rep_id:4136
- Burton, 2000. *Questionnaire design*. In D.Burton (Ed.), *Research training for social scientists: A handbook for postgraduate researchers*. London: SAGE.
- Charlton et al., 2014. *From Housing to Human Settlements: Evolving Perspective*. Braamfontein, South Africa: South African Cities Network.
- Choguill, 1996. A ladder of community participation for underdeveloped countries. pp. 431-444.
- Darnton, 2008. *Practical Guide: An overview of behaviour change models and their uses in: Government Social Research Unit, GSR behaviour change practice guide 2*. London: s.n.

Davids, Theron, Maphunye & Kealeboga, 2009. *Participatory development in South Africa: A development management perspective*. Pretoria, South Africa: Van Schaik.

de Freitas & Oliver, 2005. *How can exploratory learning with games and simulations within the curriculum be most effectively evaluated?*, s.l.: Elsevier.

Department of Human Settlements , 2009. *"The Policy Context Part 2"*. [Online] Available at: http://www.dhs.gov.za/uploads/documents/1_simple_Guide_Policy [Accessed 15 March 2017].

Drangert, 2004. *Norms and Attitudes Towards Ecosan and Other Sanitation Systems - Desk study by a group of experts on ecological sanitation*, Sweden: SEI (Stockholm Environment Institute) .

Duncker, 2014. The application of appropriate technologies and systems for sustainable sanitation.

DWA (2012). Draft National Sanitation Policy. Department of Water and Sanitation: Pretoria, South Africa

DWAF, 2003. *Department of Water Affairs and Forestry anual report: 2002/2003*, s.l.: Department of Water Affairs and Forestry.

DWS, 2015. *2015 National Sanitation Indaba*, Durban, KwaZulu-Natal: Ministry of Water and Sanitation.

Economist Magazine, 2013. The great innovation debate. 12 January.

Eliasson, J., 2015. The rising pressure of global water shortages. *Nature News*, p. 6.

Etter, Udert & Gounden, 2015. *VUNA Final Report*, Dübendorf, Switzerland: Eawag.

Flippo, 1961. *Principles of personnel management*. New York: McGraw Hill.

Flyvbjerg, 2013. *Five Misunderstandings about Case-Study Research*. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2230464 [Accessed 15 12 2015].

Glanz, Lewis & Rimers, 1990. *Health Behavior and Health Education: Theory, Research, and Practice*. San Francisco, CA: Jossey-Bass.

Glatthorn, A. A. & Joyner, R. L., 1998. *Writting a Winning Thesis or Dissertation*. London: Sage Publications Ltd.

Grainne, C., 2010. Bridging the gap between policy and practice. *A reflective review and looking forward to the future*, p. 13–27.

Grant, S. et al., 2012. Taking the “Waste” Out of “Wastewater” for Human Water Security and ecosystem sustainability. 10 August, 337(6095), pp. 681-686.

Gravetter & Forzano, 2011. “Research Methods for the Behavioural Sciences”. *Cengage Learnin*, p. 146.

Grizzell, 2007. *Behavior change theories and models*. [Online] Available at: <http://www.csupomona>

Herek, 1986. The instrumentality of attitudes. *Toward a neofunctional theory. Journal of Social Issues*, pp. 99-114.

Hine, Peacock & Pretty, 2008. *Evaluating the impact of environmental volunteering on behaviours and attitudes to the environment. Report for BTCV Cymru*, Colchester: University of Essex.

Hovland et.al, 1953. *Communication and persuasion; psychological studies of opinion change*, New Haven, CT: Yale University Press.

iisd, 2014. *A Reporting Service for Environment and Development Negotiations*. [Online] Available at: <http://www.iisd.ca/climate/adp/adp2-4/->

Jackson, 2005. Guidelines for Systematic Reviews in Health Promotion and Public Health Taskforce; Criteria for the systematic review of health promotion and public health interventions. *Health Promotion International*, p. 367–374.

Kim, M. S. & H. J. E., 1993. Relationships among attitudes, behavioral intentions, and behavior. *A meta-analysis of past research, part 2. Communication Research*, p. 331–364.

Korten, 1990. *NGO strategic networks: From community projects to global transformation*, Bangkok, Thailand: s.n.

Machen, 2011. *eThekwini Municipality*. Available at: http://www.durban.gov.za/Discover_Durban/History_Communities/Our_Town/Pages/Umbumbulu.aspx.

Marisa, C., 1996. A ladder of community participation for underdeveloped countries. *Habitat International*, 20(3), pp. 431-444.

Matsebe, 2012. Ecological Sanitation in urban South Africa: socio-cultural, design and operational challenges of Urine Diversion Dry (UDD) toilets and the impact of users' perceptions.. *4th international Dry Toilet Conference*.

Matsebe & Osman, 2012. *Ecological Sanitation in Urban South Africa*. Tampere, Finland, Paper presented at the 4th International Dry Toilet Conference.

Mayo & Nkiwane, 2013. *The role of community participation on cost recovery and sustainability of rural water supply projects in Hai District*, Tanzania: J. Environ. Sci. Water Resource.

McCluskey & Saint-Blaise, 2007. *From clockwork to webs of relationships*. [Online] Available at: http://www.connected.org/learn/policy-to-practice.html#_ftn1

Mikkelsen, 1995. *Methods for development work and reseach: A guide for practitioners*. New Delhi, and Thousand Oak : SAGE .

Morgan, 2005. Ecological Sanitation in Southern Africa-Many approaches to a varied need. *Ecological Sanitation Research (EcoSanRes)*, p. 8.

Nygatan, 2005. *Norms and Attitudes Towards Ecosan and Other Sanitation Systems*. Stockholm, Sweden: Stockholm Environment Institute.

Ochieng, O. a., 2004. *“Water management tools as a means of averting a possible water scarcity in South Africa by the year 2025”*. Cape Town, South Africa, s.n.

Nordquist, J., Kitto, S., Peller, J., Ygge, J. and Reeves, S., 2011. Focusing on future learning environments: exploring the role of space and place for interprofessional education.

Phillips & Jonas, 2011. *Behaviorism*. Available at: <http://www.funderstanding.com/theory/behaviorism/>.

Proudfoot, 2001. *Mvuramanzi Trust*. Harare, Zimbabwe: Personal communication.

Radebe, M., 2015. *KZN faces water crisis*. [Online] Available at: <http://www.sabc.co.za/news/a/3a99bd0048caeece9eb9fea9ee5d8a7f/KZNUndefinedfacesundeinedwaterundefinedcrisis-20151806>

Roma, Buckley, Jefferson & Jeffrey, 2010. *Assessing users' experience of shared sanitation facilities: a case study of community ablution blocks in Durban*, Durban, South Africa: Water SA.

Roma, et al., 2013. User perceptions of urine diversion dehydration toilets: Experiences from a cross-sectional study in eThekweni Municipality. *Water SA*, 39(2), p. 1.

Roodt, 2001. Participation, civil society and development. In: Coetzee, Graaf & Wood, eds. *Development theory, policy and practice*. Cape Town: Oxford University Press Southern Africa, pp. 470-480.

Rudestam & Newton, 1992. *Surviving your dissertation: A comprehensive guide to content and process*. Carlifonia: Sage.

Samuel, P., 1986. Community Participation in Development Projects: the World Bank experience. *Readings in Community Participation: The Economic Development Institute of the World Bank*, Volume 1, p. 46.

Sawyer, 2001. Closing the Loop. *Ecological Sanitation for Food security*, pp. 63-67.

Singh, 2017. *News24: Authorities warn KZN still in drought danger*, Durban, KwaZulu-Natal: News24.

Slyamaker, Christianson & Hemming, 2005. *Community based approaches and service delivery*, s.l.: Overseas Development.

Southerton et.al, 2011. *International review of behaviour change initiatives: climate change behaviours research programme*. London: Government Social Research Unit.

Srinivasan, 1990. Pre-Purchase External Information Search for Information. In: Zeithaml, ed. *Review of Marketing, American Marketing Association*. Chicago: s.n., pp. 153-189.

Stats SA, 2001. Census 2001: Achieving a Better Life for All : Progress Between Census '96 and Census 2001. *Issue 3, Parts 2-16 of Report (Statistics South Africa)*.

Stats SA, 2011. *Statistical release revised*, s.l.: Statistics South Africa.

Strode, Slack & Essack, 2010. Child consent in South African law. *Implications for researchers, service providers and policy-makers*, April, 100(4), pp. 247-249.

- Taylor, Shirley & Todd, 1995a. Decomposition and crossover effects in the theory of planned behaviour. *A study of consumer adoption intentions*, 2(12), pp. 137-155.
- Taylor, Shirley & Todd, 1995b. Understanding Information Technology usage. *A test of competing systems research*, Volume 2, pp. 144-176.
- Terry et.al, 1993. *The Theory of Reasoned Action: Its Application to Aids-preventive Behavior*. s.l.:Psychology Press.
- Theron, 2009. *Waste not: Externalisation and the management of waste in Cape Town*, Cape Town, South Africa: PLAAS.
- Tilley, 2015. Acceptance, impact and feasibility of incentives for increasing toilet use. *A case study in eThekweni, South Africa*, p. 3.
- Trochim, 2000. *The Research Methods Knowledge Base, 2nd Edition*. Cincinnati, OH: Atomic Dog Publishing.
- UN, 1976. *From the Report of Habitat: United Nations Conference on Human Settlements*, Vancouver, Canada: s.n.
- UN-factsheet, 2012. *The future we want: water and sanitation*. Rio de Janeiro, Brazil: Uncsd2012.org.
- UNICEF & WHO, 2014. *Progress on Drinking Water and Sanitation: 2014 Update*. s.l.:World Health Organization, 2014.
- United Nations, 2000. *Millennium Declaration: Millennium Summit of the United Nations*, New York: s.n.
- United Nations, 2008. *The Millennium Development Goals Report*, New York: United Nations Department of Economic and Social Affairs (DESA).
- United Nations, 2014. *The Millennium Development Goals Report*, New York: United Nations Department of Economic and Social Affairs (DESA).
- Van Die, R.V.S.A., 2000. Government Gazette. Presidency, 1(785).
- WaterAid, 2011. *Technical handbook- Construction of Ecological Sanitation latrine*, Nepal: WaterAid.
- Welman, Kruger & Mitchell, 2005. *Research methodology*. 3 ed. Cape Town (Cape Town, South Africa): Oxford University Press Southern Africa.
- White Paper on Basic Household Sanitation, 2001. *White Paper on Basic Household Sanitation*, s.l.: DWAF.
- WHO, 1987. *Health guidelines for the use of wastewater in agriculture and aquaculture : report of a WHO scientific group [meeting held in Geneva from 18 to 23 November 1987]*, Geneva: World Health Organization.
- WHO, 2002. *Community Participation in Local Health and Sustainable Development: Approaches and Techniques* /[text Editing: David Breuer]. Volume 4 of European sustainable

development and health series ed. s.l.:World Health Organization, Regional Office for Europe, 2003.

WHO, 2005. *Health and the Millennium Development Goals*. s.l.:World Health Organization, 2005.

WHO, 2015. *Health Topics: Sanitation*. [Online]
Available at: <http://www.who.int/topics/sanitation/en>

WHO, 2015. *Progress on Sanitation and Drinking Water : 2015 Update and MDG Assessment*. s.l.:World Health Organization, 2015.

WHO, 2017. *World Health Organization Media Centre*. [Online]
Available at: <http://www.who.int/mediacentre/factsheets/fs392/en/>

Winbland, 2014. Towards an Ecological Approach to Sanitation. *Water Resources*, Issue 05.

WIN-SA, 2006. *eThekwini's water and sanitation programme - WIN-SA lessons series*, s.l.: Water Information Network South Africa.

WIN-SA, 2011. *Use of Eco-san products in Malawi: Experiences from Users in Peri-Urban Areas*, Pretoria, South Africa: s.n.

Zahman, 1993. *People's self development*. London, UK: Zed.

Zakus, J. & Lysack, C., 1998. Revisiting community participation. *Health Policy and Planning*, 13(1), pp. 1-12.

Zanna & Rempel, 1988. *Attitudes: A new look at an old concept*. Cambridge, United Kingdom: University Press.

Zurbrügg, et al., 2014. *Compendium of Sanitation Systems and Technologies*. Dübendorf, Switzerland: Swiss Federal Institute of Aquatic Science and Technology (Eawag).

ANNEXURE 1

Ethical Clearance



18 February 2015

Miss Thandeka Precious Msebenzi 209524778
School of Built Environment and Development Studies
Howard College Campus

Dear Miss Msebenzi

Protocol reference number: HSS/1540/014M

Project title: Investigating the role of governance in bridging the gap between sanitation policy and practice of ecological sanitation in low-income peri-urban communities: Case study of Umbumbulu

Full Approval – Expedited Application

In response to your application received on 29 October 2014, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shamila Naidoo (Deputy Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

Cc Supervisor: Sandile Mbatha
Cc Academic Leader Research: Dr Catherine Sutherland
Cc School Administrator: Mrs Meera Dalthaman

Humanities & Social Sciences Research Ethics Committee

Dr Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building

Postal Address: Private Bag X54001, Durban 4000

Telephone: +27 (0) 31 260 3587/8350/4557 Facsimile: +27 (0) 31 280 4608 Email: ximbap@ukzn.ac.za ; amymanm@ukzn.ac.za ; mohunp@ukzn.ac.za

Website: www.ukzn.ac.za



Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

ANNEXURE 2

Household Interview

Investigating the role of community educational programs in bridging the gap between sanitation policy and practice of ecological sanitation in low-income peri-urban communities: A case study of Umbumbulu, eThekweni Municipality.

Survey Number:

Respondent's pseudonym name:

Respondent's Sex:

Mark only one option.

- ☐ Male
- ☐ Female

Respondent's Age (from 18 years):

Number of UD toilets

Mark only one option.

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ Other:

How many people live in this household?

Section A: State of UD toilet

The first 2 questions are not questions directed to the respondent, they need to be answered by a fieldworker from their observation of the structure -UD toilet- on site.

Current state of Urine Diversion toilet

Mark only one option.

- ☐ UD toilet still in its original state
- ☐ UD toilet has been changed to flush toilet
- ☐ UD toilet Changed to Pit Latrine
- ☐ UD toilet demolished and built another toilet with UD toilet material
- ☐ Other:

UD toilet is being used for other purposes such as:

Mark only one option.

- ☐ Storage facility
- ☐ Chicken pen
- ☐ Other:

If the UD toilet is being used for other purposes, why is it used for such purposes?

When was your UD toilet installed? (year)

Were you informed of what UD sanitation system is and what it does before it was installed?

Mark only one option.

- ☐ Yes
- ☐ No

If yes, how and when were you informed? (before or after UD toilet was installed) For example door to door presentation, community meeting, notice boards

If no, how did you get your UD toilet

Section B: Use of UD toilet

Do you use your UD toilet?

Mark only one option.

- ☐ Yes
- ☐ No
- ☐ I have used it before but I no longer use it

If you use your UD toilet/ have used it before have you emptied it?

Mark only one option.

- ☐ Yes
- ☐ No

How many times did you empty it?

Mark only one option.

- ☐ Once
- ☐ Twice
- ☐ More than 2 times
- ☐ I do not empty it
- ☐ I use toilet chemicals

Who empties it?

Why is it emptied by the person mentioned above?

Where do you use the by-product that you empty from the chambers?

If you do not use your UD toilet or have stopped using it, why please explain

For what purposes do you use your UD toilet:

Check all that apply.

- ☐ Toilet facility
- ☐ Storage facility
- ☐ Chicken pen
- ☐ Other:

Do you have any other type of sanitation facility in your property?

Mark only one option.

- ☐ Yes
- ☐ No

If yes, what type(s)

Check all that apply.

- ☐ Flush toilet
- ☐ Traditional pit latrine
- ☐ Septic tank
- ☐ Other:

Why do you have another type of sanitation facility?

Section C: Education and training of household on UD sanitation technology

Were you informed and trained on how to properly use your UD toilet?

Mark only one option.

- ☐ Yes
- ☐ No

Were there educational sessions presented to you before or after you had received your UD toilet?

Mark only one option.

- ☐ Yes
- ☐ No

How many times were the educational sessions presented?

Mark only one option.

- ☐ Never
- ☐ Once
- ☐ Few times (2 – 5 times)
- ☐ Many times (6 times and more)

What form of presentation was used?

Check all that apply.

- ☐ Presentation session/ workshop
- ☐ Play/ public performance
- ☐ DVD
- ☐ Posters with mostly words and few pictures or diagrams
- ☐ Posters with mostly pictures or diagrams and few words
- ☐ Handouts or pamphlets with mostly words and few pictures or diagrams
- ☐ Handouts or pamphlets with mostly pictures or diagrams and few words
- ☐ Other:

Was the information presented to you clear and simple to understand?

Mark only one option.

- ☐ Yes
- ☐ No

Which form(s) of presentation(s) would you prefer or understand clearer as a form of receiving information

Check all that apply.

- ☐ Presentation session
- ☐ Play/ public performance
- ☐ DVD
- ☐ Posters with mostly words and few pictures or diagrams
- ☐ Posters with mostly pictures or diagrams and few words
- ☐ Handouts or pamphlets with mostly words and few pictures or diagrams
- ☐ Handouts or pamphlets with mostly pictures or diagrams and few words

- Other:

What difficulties did you have in understanding the information presented?

Why would you choose presentation type(s) selected above?

During the educational program were you told of the benefits that UD toilet has when used properly?

Mark only one option.

- Yes
- No

If yes, what are the benefits of a properly used UD toilet?

Have you experienced any of the UD toilet benefits?

Mark only one option.

- Yes
- No

If yes, which benefits did you experience?

Why do you think the benefits that are said to emanate from UD toilets have not been experienced by you and your household members?

If you were not educated or trained on how to properly use your UD toilet how do you use it?

Would you attend training sessions on how to use your UD toilet if there were any?

Mark only one option.

- ☐ Yes
- ☐ No
- ☐ Not sure

How many sessions do you think would be enough for you to understand how to properly use your UD toilet?

Mark only one option.

	1	2	3	4	5	6	7	8	9	10	
											More than 10 sessions

Which form(s) of presentation(s) would you prefer or understand clearer as a form of receiving information

Check all that apply.

- ☐ Presentation session
- ☐ Play/ public performance
- ☐ DVD
- ☐ Posters with mostly words and few pictures or diagrams
- ☐ Posters with mostly pictures or diagrams and few words
- ☐ Handouts or pamphlets with mostly words and few pictures or diagrams
- ☐ Handouts or pamphlets with mostly pictures or diagrams and few words
- ☐ Door to door sessions
- ☐ Other:

Why would you choose presentation types selected above?

In your experience what are the good aspects of using a UD toilet?

What are the bad aspects of using a UD toilet?

If you were to improve on these bad aspects, how would you do so?

Does a UD toilet pose any cultural limitations when using it?

Mark only one option.

- ☐ Yes
- ☐ No

If yes, How?

Are community educational programs still ongoing

Mark only one option.

- ☐ Yes
- ☐ No
- ☐ I do not know
- ☐ We never received them

Do you attend?

Mark only one option.

- ☐ Yes
- ☐ No

Do you have a garden?

Mark only one option.

- ☐ Yes
- ☐ No

Do you know any UD toilet benefits?

Mark only one option.

- ☐ Yes
- ☐ No

Would you use the UD by-product if you knew how to use it?

Mark only one option.

- ☐ Yes
- ☐ No

From your answer above, why would you use it or not use it?

ANNEXURE 3

Key informant interview

Investigating the role of community educational programs in bridging the gap between sanitation policy and practices of ecological sanitation in low-income peri-urban communities: case study of Umbumbulu

1. Respondent's Occupation: _____
2. Respondent's Unit: _____

Background and validation

3. When were UD toilets introduced and built in eThekweni Municipality?

4. Why were UD toilets introduced in eThekweni Municipality?

5. What processes did the department follow when the UD toilets were introduced to beneficiaries? (for example?)

6. How were these processes followed? (explain each process, the steps followed and stakeholders involved in each process)

7. Were beneficiaries informed?

Yes ☐

No ☐

8. How were they informed
for example, community meeting, door to door visits, publicized on community/ councillors
notice board, radio advertisement

9. Why were they informed in that way?

10. Who informed them

Councillor

☐

City official

☐

Committee member

☐

Community radio

☐

Other

☐

11. When were they informed (before UD toilets were built or after)

Before

☐

After

☐

12. Why were they informed at that stage? (informed before or after)

13. During the time when beneficiaries were informed were there specific targeted age groups invited to attend?

Yes

☐

No

☐

14. If yes, which age groups

15. Why those age groups

16. When beneficiaries were informed, were they asked if they accept UD toilets?

Yes ☐

No ☐

17. If no, why were they not asked?
skip to question 20 when 17 has been answered

18. If yes, ☐ did all beneficiaries accept UD toilets when they were asked if they accept?
Yes

No ☐

Some did not ☐

If YES skip to question 27

19. If no or some did not accept, why did they reject?

20. What were the steps taken for community buy-in of UD toilets when the community rejected them?

21. ☐ If no or some did not, were there programs introduced for community buy-in?
Yes

No ☐

22. What were those programs?

23. How were community buy-in programs piloted?

24. Who piloted them?

25. When were they piloted? Before UD toilets were built or after

Before ☐

After ☐

26. Why were they piloted before UD toilets were built or after?

Education of beneficiaries

27. Were beneficiaries told why they were given UD toilets?

28. UD toilet is being used for other ☐ **purposes such as:**
Storage facility

Chicken pen ☐

Other (please specify) _____

29. If the UD toilet is being used for other purposes, why is it used for such purposes?

30. When was your UD toilet installed? (year) _____

31. Do you have any knowledge of what ecological sanitation is?

Yes ☐

No ☐

32. If yes, please explain what you think eco-san is

If NO skip to question 12

33. Where did you hear about it from?

Friends and family

☐

Workshop/ session organized by the department of water and sanitation

☐

Newspaper, magazines, books, television, radio

☐

Do not remember

☐

Other (please specify) _____

34. If you have knowledge of what eco-san is, do you find it useful?

Yes

☐

No

☐

35. If yes, how is eco-san useful?

If yes from question 10

36. If no, why is eco-san not useful?

If no, from question 10

37. Were you informed of what UD sanitation system is and what it does before it was installed?

Yes

☐

No

☐

38. If yes, how were you informed?

for example, education, presentation, participation, publicizing, promoting, providing and projecting

39. What were you told specifically?

40. By whom?

for example: city official, Councillor, ward committee member etc.

Yes ☐ **41.** Did you understand what you were told/ thought?

No ☐

Section B: Use of UD toilet

Yes ☐ **42.** Do you use your UD toilet?

No ☐

43. If not, why please explain your reasons

44. If yes to question 18, for what purposes do you use your UD toilet:

Toilet facility ☐

Storage facility ☐

Chicken pen ☐

Other (please specify) _____

45. Do you have any other type of sanitation facility in your property?

Yes ☐

No ☐

46. If yes, what type
Can tick more than 1 option

Flush toilet ☐

Traditional pit latrine ☐

Other (please specify) _____

47. Why do you have another type instead of using the one provided?

Section C: Education of household on UD sanitation technology

48. Were you informed on how to properly use your UD toilet?

Yes ☐

No ☐

49. Were there educational sessions presented to you before or after you had received your UD toilet?

Yes ☐

No ☐

50. Where were the sessions held?

Community hall ☐

School ☐

Church ☐

House to house (household visits) ☐

On the street ☐

Other (please specify) _____

51. How many times were the educational sessions presented?

Never ☐

Once ☐

Few times (2 – 4 times) ☐

Many times (5 times and more) ☐

52. What form of presentation was used?

Presentation session ☐

Play/ public performance ☐

DVD ☐

Posters with mostly words and few pictures or diagrams ☐

Posters with mostly pictures or diagrams and few words ☐

Handouts or pamphlets with mostly words and few pictures or diagrams ☐

Handouts or pamphlets with mostly pictures or diagrams and few words

☐

Other (please specify) _____

Yes ☐ **53.** Was the information presented to you clear and simple to understand?

No ☐

54. If no to question 29, what difficulties did you have in understanding the information presented?

55. If no to question 29 above, which form(s) of presentation(s) would you prefer or understand clearer as a form of receiving information
Can tick more than 1

Presentation session

☐

Play/ public performance

☐

DVD

☐

Posters with mostly words and few pictures or diagrams

☐

Posters with mostly pictures or diagrams and few words

☐

Handouts or pamphlets with mostly words and few pictures or diagrams

☐

Handouts or pamphlets with mostly pictures or diagrams and few words

☐

Other (please specify) _____

56. Why would you choose presentation type(s) selected above?

57. During the educational program were you told of the benefits that UD toilet has when used properly?

Yes ☐

No ☐

58. If yes, what are the benefits of a properly used UD toilet?

59. Have you experienced any of the UD toilet benefits?

Yes ☐

No ☐

60. If yes, which benefits did you experience?

61. If no to question 35, why do you think the benefits that are said to emanate from UD toilets have not been experienced by you and your household members?

62. In your experience what are the good aspects of using a UD toilet?

63. What are the bad aspects of using a UD toilet?

64. If you were to improve on these bad aspects, how would you do so?

65. Does a UD toilet pose any cultural limitations when using it?

Yes ☐

No ☐

66. If yes, How?

ANNEXURE 4

DECLARATION OF CONSENT

PROJECT TITLE: Investigating the role of community educational programs in bridging the gap between sanitation policy and practice of ecological sanitation in low-income peri-urban communities: A case study of Umbumbulu, eThekweni Municipality

RESEARCHER

Full Name: Thandeka Precious Msebenzi

School: Built Environment and Development studies

College: Humanities

Campus: Howard College

Proposed Qualification: Housing Masters

Contact: 081 718 5211

Email: precymse@gmail.com

SUPERVISOR

Full Name of Supervisor: Dr. P. Adebayo

School: Built Environment and Development Studies

College: Humanities

Campus: Howard College

Contact details:

Email: adebayop@ukzn.ac.za

HSSREC RESEARCH OFFICE

Full Name: Prem Mohun

HSS Research Office

Govan Bheki Building

Westville Campus

Contact: 0312604557

Email: mohunp@ukzn.ac.za

I, **Thandeka Precious Msebenzi**, Student no. **209524778** am a Housing Masters student, at the School of Built Environment and Development Studies, at the University of KwaZulu-Natal. You are invited to participate in a research project entitled: **Investigating the role of community educational programs in bridging the gap between sanitation policy and practice of ecological sanitation in low-income peri-urban communities: A case study of Umbumbulu, eThekweni Municipality**. The aim of the study is to investigate the lack of correlation between planned use of ecological sanitation and actual practices in peri-urban communities.

Through your participation, I hope to understand your perceptions and challenges when using Urine Diversion toilets. As well as to gain your views on the validity and effectiveness of education programs provided and the impact they make. I guarantee that your responses will not be identified with you personally only with your pseudonym. **Your participation is voluntary and there is no penalty if you do not participate in the study.** Please sign on the dotted line to show that you have read or someone read it for you and understood the contents of this letter. The questionnaire will take approximate 45 minutes to an hour to complete. The researcher will use a Dictaphone to record the interview and you will be contacted for follow up session or re-interview if there is a need for that.

Feedback will be given to the councilor and the Department of Water and Sanitation eThekweni Municipality information officer in a Disk saved in a PDF format. All participants will be notified via email and sms when the document is available.

DECLARARTION OF CONSENT

I..... (Print Full Name) hereby confirm that I have read and understand the contents of this letter and the nature of the research project has been clearly defined prior to participating in this research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

Participants Signature.....

Contact details

Tel/Cell:

Email:

Date.....