A WEB OF RELATIONS: CO-PRODUCTION ARRANGEMENTS IN URBAN SANITATION INFRASTRUCTURE PROVISION IN INFORMAL SETTLEMENTS IN ARUSHA CITY, TANZANIA

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ABSTRACT

Many city governments and actors have tested approaches or models and technological developments to address urban service crises. But this has tended to be without much success, as the service delivery gap keeps widening, leading to governance failure. One response to this decline in governance capacity has been the evolution of co-production arrangements. The overarching aim of this thesis was to examine the co-production arrangements of urban sanitation infrastructure provision among multiple actors in informal settlements, and to interrogate whether the predominance of such arrangements was indicative of an alternative form of city governance. Two wards within Arusha city (Tanzania) were selected as case studies. A range of research methods was employed to uncover the landscape of actors involved, and to explore co-productive processes, socio-cultural aspects and other complexities shaping sanitation provision in the two selected informal settlements. Case study methodology was used with a range of data collection methods (household surveys, focus group discussions, document review and semi-structured interviews). The study adopted a relational approach informed by Actor-Network Theory as the analytical framework for understanding the human-material interactions in the sanitation chain. Key findings indicate that co-production serves a public function, but it is not recognised as such in Tanzanian public policy. Individual and collective co-production arrangements have been established that bring together various state and non-state actors in the sanitation chain to form networks. These networks make service delivery possible, which one actor alone could not deliver. The study reveals that sanitation infrastructure in informal settlements is largely provided by the household, although some are either inactive or captured co-procuders. Further, the narratives indicate that complexities and the contextual factors (including gender-based power dynamics, social norms, values, traditions and culture) shape access to sanitation facilities in the city of Arusha. The study found that the exclusion of women and children from sharing toilet facilities motivated *Maasai* men to practice defection in open areas. Further, this study speculates on an alternative form of governing city affairs based on actor-networks in the co-production process: co-productive networked governance. Future research is needed to examine how co-productive networked governance could

be integrated into the existing city governance structures and how informal governance arrangement could be recognised and enhanced.

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Furaha Abwe,
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DEDICATION

To my much-loved wife Rehema Masimango and my daughter Blessy and son Ethan for their unwavering support, patience and love.

To all generous people who provide their resources to support others in attaining their dreams.

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LIST OF ABBREVIATION AND ACRONYMS

ACC	Arusha City Council
ANT	Actor-network theory
AUWSA	Arusha Urban Water Supply and Sanitation Authority
CCI	Centre for Community Initiatives
CBD	Central Business District
CBOs	Community-Based Organisations
CCM	Chama Cha Mapinduzi
CHADEMA	Chama Cha Maendeleo na Demokrasia
CLTS	Community-Led Total Sanitation
CSO	Civil Society Organisation
DAWASA	Dar es Salaam Water Supply and Sanitation Authorities
EBE	Faculty of Engineering and the Built Environment
EcoSan	Ecological Sanitation
IRC	International Water and Sanitation Centre
JMP	Joint Monitoring Programme for Water Supply and Sanitation
MDG	Millennium Development Goal
MKUKUTA	Mpango wa Kukuza na Kuondoa Umaskini
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children, commonly referred to as the Ministry of Health and Social Welfare
MoWI	Ministry of Water and Irrigation
MoESTVT	Ministry of Education, Science and Technology and Vocational Training,
MoU	Memorandum of Understanding
NBS	National Bureau of Statistics

NGOs	Non-Governmental Organisations
NSGRP	National Strategy for Growth and Reduction of Poverty
NSHP	National Sanitation and Hygiene Policy
PO-RALG	President's Office-Regional Administration and Local Government
REPOA	Research on Poverty Alleviation
SDGs	Sustainable Development Goals
SAPs	Structural Adjustment Programmes
TUPF	Tanzania Federation for the Urban Poor
TSCP	Tanzania Strategic Cities Project
TDHS	Tanzania Demographic, Health Survey
UN-Habitat	United Nations Human Settlement Programme
UNICEF	United Nations Children Fund
UN	United Nations
UNFPA	United Nations Fund for Populations
UNDP	United Nations Development Programme
UCT	University of Cape Town
UDDT	Urine-Diverting Dry Toilet
URT	United Republic of Tanzania
USAID	United States Agency for International Development
VIP	Ventilated Improved Pit
WHO	World Health Organisation
PRA	Participatory Rural Appraisal
EWURA	Energy and Water Regulatory Authority
WSSA	Water Supply and Sanitation Authority

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CHAPTER ONE

INTRODUCTION

1.1. Background and research problem

Rapid urban growth and population increase under poverty, accompanied by diminishing State capacity in infrastructure and services provision, has generated sharp inequalities and socio-spatial fragmentation within many cities of the global South (Kyessi, 2005; UN-Habitat, 2006; 2010a). This differentiation, evidenced by levels of access to infrastructure and services, is at the source of the formation of 'a tale of two cities within one' (UN-Habitat, 2006, p.v). Whereas city dwellers in planned neighbourhoods enjoy the provision of adequate infrastructure and services, their counterparts in informal settlements suffer from a severe lack of access to sanitation, infrastructure and other basic services.

Globally, 2.3 billion people do not have access to improved sanitation infrastructure. They are forced to practise open defecation (892 million) or use unimproved facilities such as pit latrines without a slab or platform, hanging latrines or bucket latrines (856 million) (WHO/UNICEF JMP, 2017, p.15; UN-Water, 2018; pp.11-12). Improved sanitation facilities, as defined by the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP), refers to toilet facilities which allow hygienic separation of excreta from human contact and which is not shared with other households, where excreta are safely disposed in situ or transported and treated offsite (WHO/UNICEF JMP, 2016, p.5). Such infrastructure includes flush toilets, ventilated improved pit latrines, pit latrines with slabs and composting toilets. However, these tend to be unaffordable to the majority of informal settlements dwellers (Black and Fawcett, 2008a). Many city inhabitants in informal settlements still rely on infrastructure such as pit latrines without a platform, hanging latrines and bucket latrines. For those who cannot even afford their own facilities, they either share toilets or must opt for open defecation in bushes, on the banks of streams, or plastic bags commonly known in Kenya as 'flying toilets' (Mcfarlane, 2008; Letema, 2011; Cumming, 2015; WHO/UNICEF, 2017).

Following the natural necessity of human excretion (Black and Fawcett, 2008a), the next concern is the disposal of emitted wastes. While planned neighbourhoods are networked to city sewerage systems, informal settlements largely rely on on-site disposal of waste water and human excreta (African Development Bank, 2007; IRC, 2010). The on-site system presents numerous challenges, including the topography of informal settlements and the nature of the soil in built areas, housing density and space scarcity. Many unplanned settlements are located on marginal land, often with poor drainage and porous soil conditions, which makes it difficult to dig durable and/or new pit latrines when the previous ones are full. Alternatively, informal settlement dwellers use a variety of methods to empty their pit latrines, which often lead to unsanitary and unhygienic local living conditions, and pollution of local urban environments (African Development Bank, 2007; IRC, 2010).

The crisis of urban sanitation in the global South is one of the most complex challenges of our time (Otsuki, Mungai and Gera, 2013). The majority of the population in the global South use pit latrines as their basic means of sanitation (Fawcett and Black, 2008; Graham and Polizzotto, 2013; Dickin, Bisung and Savadogo, 2017; Gudda et al, 2019). The implications associated with the use of pit latrines and other unimproved sanitation infrastructure are that many residents will continue to be exposed to health problems and threats to their human dignity and lives, due to risks attached to the use of poor sanitation infrastructure. Some documented practices of poor sanitation infrastructure for daily disposal of human excreta by slum dwellers in Bombay & Mumbai, India,(Black and Fawcett, 2008b; Mcfarlane, 2008; Jewitt, 2011) and Nairobi, Kenya (Letema, 2011) show that people lacking access to toilets use portable plastic bags and buckets, or walk some distance to communal infrastructure services to defecate in open spaces as the only means to relieve themselves.

Poor sanitation, combined with inadequate and unsafe water supply, is usually associated with several infectious and nutritional outcomes, and these outcomes also cause a heavy burden of disease. Various reports from the World Health Organisation (WHO) show that diarrhoea is the top cause of all illness and death, causing an estimated 1.4 million deaths annually or 19% of all under-five deaths in low-income settings (WHO, 2006; Freeman *et al.*, 2017, p.929). Because of these high death rates,

UN-Habitat (2006, p. vii) has described poor sanitation as a ‘silent tsunami’. Improved sanitation infrastructure does not only save millions of lives by improving public health in informal settlements, but also contributes to the socio-economic well-being of millions of people in the global South by restoring their human dignity and reducing expenditure on medical treatments (Hutton and Haller, 2004; Hendriksen *et al.*, 2012).

Several attempts have been made to address the global sanitation crisis at an international level. The most remarkable example is the addition of Target 10 to the Millennium Development Goal (MDG) 7 in 2002, which sought to improve access to safe water and sanitation by 2015; and the declaration by the UN General Assembly that 2008 would be the International Year of Sanitation. The other outstanding example is the recognition of access to safe and clean drinking water and sanitation as a human right by the UN Assembly in 2010 (Cohen, 2008; Jewitt, 2011b; McGranahan, 2013; Cumming, 2015). In 2014, United Nations member states agreed a set of Sustainable Development Goals (SDGs) to succeed the MDGs. These are now used as reference goals for the international development community for the period 2015–2030. Goal 6 of the SDGs aims to ensure availability and sustainable management of water and sanitation for all (Blanc, 2015). Despite this international recognition of the sanitation problems and the need to address them concertedly, there is no consensus on the approaches necessary to achieve the required levels of improved sanitation infrastructure in local contexts of many cities of the global South (Bourque, 2010; McGranahan, 2013; WHO/UNICEF JMP, 2013).

For decades, the nations of the global South have responded inadequately in addressing sanitation infrastructure problems in informal settlements (Kyessi, 2005; Ibem, 2009) UN-Habitat, 2006). This failure triggered non-state actors to intervene and collaborate with the affected communities in co-producing sanitation infrastructure in informal settlements. Some notable cases include the initiatives by Slum Dwellers International in the cities of Kampala, Uganda and Cape Town, South Africa (Odendaal, 2012; Siame, 2017), the Orangi Pilot Project in Karachi (Mitlin, 2008; McGranahan, 2013), the partnership between Mahila Milan, the Society for the Promotion of Area Resources Centre and the Indian Slum Dwellers Federation in Mumbai and Pune, India, (McGranahan, 2013), the International Institute for

Environment and Development in Latin America (McGranahan, 2013), Shack Dwellers Federation of Namibia (Mitlin, 2008), Water Aid-Tanzania (Chaggu, 2004; Trémolet and Muruka, 2013), and Environmental Engineering and Pollution Control in Arusha, Tanzania (Shayo, 2008). However, the relationships of accountability and the different forms of service co-production arrangements forged among the various actors remain largely unexplored (Joshi and Moore, 2006).

Moreover, the practices and experiences of the existing co-productive arrangements between city governments and non-state actors in sanitation infrastructure provision from different contexts call for in-depth investigation (Watson, 2014). This research adopts the definition of service co-production as “the process through which inputs used to produce a good or service are contributed by individuals who are not “in” the same organizations” (Ostrom, 1996, p.1073). Service co-production allows users and communities to supplement government provision where a particular service is not reaching certain groups or individuals (Allen, 2010). This implies that citizens play an active role in producing urban services of consequence to them (Moretto and Ranzato, 2017).

Regardless of attempts by international agencies and local communities to improve the situation, the sanitation sector remains marginalised and unpopular among practitioners and policy makers at national and local levels. This neglect is due to a number of factors: in some arenas it is taboo to speak about human waste in public (Black and Fawcett, 2008a); academics lack curiosity about sanitation infrastructure (Jewitt, 2011b); and it has a low political priority within national and local government development plans (Cumming, 2015). This raises the question as to whether elites, executives and politicians are well informed about the problems, costs and benefits of providing effective sanitation infrastructure. There is also a lack of pressure by the victims of poor sanitation to hold state actors accountable because of the voiceless and powerless status of informal settlement dwellers (Fawcett and Black, 2008; UN-Habitat, 2006).

In sub-Saharan Africa, sanitation infrastructure faces countless complexities and challenges. The WHO and UNICEF JMP report that of the 69 countries which did not

meet the MDG Goal 7 by providing access to improved sanitation infrastructure for all by 2015, 37 are in sub-Saharan Africa (Beyene, Hailu, Faris, and Kloos, 2015, p.2). The situation is worse in urban settings which, typically, have large and dense concentrations of people, many of which have small house plots with little or no space for pit latrines (Satterthwaite, 2015; 2016). Socio-cultural issues, coupled with insecure land tenure and housing tenancy arrangements, fuel sanitation infrastructure challenges, particularly in informal settlements (Isunju *et al.*, 2011). In Tanzania, more than 70 per cent of its population resides in settlements developed outside urban planning laws and regulations, and sanitation issues attract little attention of politicians, executives, and researchers, particularly in small towns of less than a million inhabitants, such as Arusha city.

While the challenges of sanitation infrastructure are dominant in many small cities of Tanzania as in other cities of the global South, this thesis focuses on Arusha as the main case study. The governance infrastructure for sanitation in Arusha is weak and fragmented in various line ministries at the national level and other government organs. Besides this, Arusha faces growing political and urban management challenges. It is a city where the presence of multiple actors involved in the co-production of services is evident and is currently a stronghold of the main opposition party in the country. The increase in urban population has overwhelmed the existing Arusha city government's capacity to provide surveyed and serviced land, housing and other infrastructure services (UNFPA, 2007; UN-Habitat, 2006). Instead, people acquire land informally and/or rent houses from locals who own land under customary tenure arrangements and develop it outside urban planning laws and regulations, hence the proliferation of informal and unplanned settlements. Arusha also presents some complex urban management challenges which are under-researched.

1.2. Research questions

In light of the above, there is an epistemic imperative to search for answers to the urban sanitation problems in Arusha and the global South. This requires a deeper understanding of the problems of urban sanitation infrastructure provision in local contexts, the settings of governance structures, and of the web of relations emerging from the multiplicity of actors engaged in sanitation infrastructure provision.

The overarching, but interrelated, research questions are as follows:

What co-productive arrangements for sanitation infrastructure provision exist among the multiple actors in informal settlements of Arusha, Tanzania? Given the predominance of such arrangements, are these indicative of an alternative form of city governance?

Subsidiary research questions:

1) What is the extent of sanitation infrastructure coverage in Tanzanian cities?
2) What is the status of urban sanitation infrastructure provision in Arusha?
3) What are the existing human excrement-management practices in informal settlements in Arusha?
4) What are the complexities shaping urban sanitation infrastructure in informal settlements in Arusha?
5) Who are the actors, what are their roles, and how are they related in co-producing urban sanitation infrastructure in informal settlements in Arusha?
6) What governance arrangements are emerging from the multiplicity of actors involved in the co-production process of urban sanitation infrastructure in informal settlements in Arusha?

1.3. Thesis Structure

Following Chapter 1 as the introduction, Chapter 2 of this thesis reviews literature on urban infrastructure provision in the global South. The chapter provides a background on, and shows the interplay between, urban growth and the crisis in infrastructure provision as the ineffectiveness of the governance apparatus. The chapter traces the emergence of co-production after a review of service delivery models, and ends by suggesting research gaps. The aim of Chapter 3 is to review published literature on urban sanitation in the global South. The chapter covers sanitation technologies, complexities, politics and governance in the provision of urban sanitation infrastructure; and identifies research gaps as well. In chapter 4, Actor-network theory (ANT) is discussed as the theoretical framework, which guided the research. The methodological approach of the thesis and the wider issues pertaining to methodology

involved are outlined in Chapter 5 which focuses on the case study method. Chapter 6 traces the history of Tanzania from German colonial rule and documents urban growth and development frameworks. It also traces the evolution of the urban local government system and the implementation of countrywide sanitation programmes; and it answers the first subsidiary research question on the extent of sanitation coverage in Tanzanian major cities. Chapter 7 presents the fieldwork results for Arusha city and addresses subsidiary research questions number two, five and six, which aim to explore respectively the status of urban sanitation in the city of Arusha, uncover the landscape of actors, their roles and their relationships in co-production process; and lastly explore the governance arrangements. Chapter 8 focuses on the two informal settlements of Sombetini and Baraa as cases. It also provides answers to subsidiary research questions number three and four which aim respectively to explore the existing human excreta management practices, and examine the complexities shaping sanitation practices in these two informal settlements. Chapter 9 reflects on the aim of the thesis and responds accordingly; presents the synthesis of key research findings; considers the theoretical contribution of the work; and finally draws the conclusion to the research by considering possibilities for future research.

CHAPTER TWO

URBAN INFRASTRUCTURE PROVISION:

A STATE OF GOVERNANCE FAILURE IN THE GLOBAL SOUTH

2.1 Introduction

> *In an increasingly urbanised world, it will be crucial to ensure that public services in urban areas deliver for poor people as well as the wider population, and it is now well known that governance factors are important in constraining or enabling effective public service delivery* (Jones and Harris, 2014).

City governments and actors are compelled to innovate approaches that can deal effectively with the challenges brought by rapid urbanisation in the global South. A number of approaches or models and technological development have been tested in redressing urban service crises, without much success, as the service delivery gap keeps on widening (as outlined in Chapter 1). This is what is referred to as governance failure: where the city government or the equivalent urban institution fails or lacks the capacity to address the needs of urban poor households, particularly those residing in informal settlements (Bakker *et al.*, 2008; Peters, 2015). One response to this decline in governance capacity has been the evolution of co-production arrangements (Joshi and Moore, 2006:41). Governance apparatus can play a vital role in enabling effective urban service delivery in the cities of the South (Jones and Harris, 2014; Jones, Cummings and Nixon, 2014).

This chapter aims at documenting the pressure of urbanisation on urban planning and its impact on proliferation informal settlements in the South. It also shows how the adoption of various formal service delivery models alone cannot help in addressing service delivery gaps in informal settlements of the global South. Further, the chapter traces the emergence of co-production as an alternative process in service delivery. Lastly the chapter documents governance challenges in the delivery of urban infrastructure service.

2.2 Urbanisation, urban growth and informal settlements in the global South

Urbanisation is real and is on the rise. At the beginning of 2014, the world recorded a population of 7.2 billion, and it is projected that this will reach 8.3 billion in 2030. If current conditions remain constant, the global population is projected to reach 9.6 billion by the year 2050 (United Nations, 2014a, p.2). It is also estimated that almost a quarter of the current world's population, and more than half of the projected population, will live in the global South by 2050 (ibid.). The lion's share of this increasing world population will live in towns and cities, marking the beginning of a new era of the *Astycene*. This term is used to describe the characteristics of modern urbanisation and recognises that there is a new period in earth's history where humans are altering the function of the global environment (Seto, Sánchez-Rodríguez and Fragkias, 2010). Currently, more than 54 per cent of the world's population resides in urban settlements and by 2030, it is estimated that this figure will rise to 60 per cent. By 2050, the percentage of urbanites is expected to reach 66 per cent (USAID, 2013, p.5; United Nations, 2014b, p.2).

This global urban growth requires critical attention in the management of everyday life of cities and towns. Today, cities and towns are vital in the implementation of most of the global as well as national development initiatives such as the UN's Sustainable Development Goals. For that, they no longer function as mere spaces for human settlement, urban productivity and consumption, infrastructure and services provision; but rather greatly shape and influence socio-spatial, economic and power relations at all levels (as the above definition of *Astycene* implies).

Cities and towns are also major centres of power, guiding and influencing the visioning and implementation of urban laws and policies (UN-Habitat, 2009; United Nations, 2012; Curtis, 2016). However, many cities in the global South appear to be unprepared and lack the capabilities to meet the challenges of the rapid urbanisation. In sub-Saharan Africa, for instance, urbanisation is taking place in the absence of industrialisation, lower rates of economic growth, fewer employment opportunities, extreme poverty and various socio-economic settings compared to Latin America and some parts of Asia (UN-Habitat, 2009).

As urban growth unfolds rapidly in an unplanned and uncontrolled manner in many parts of the South, and more specifically in many sub-Saharan African cities and towns, it is directly associated with increased urban health problems, unmet demands for urban infrastructure and services, and the expansion of informal settlements (Konteh, 2009; Pieterse, 2010 ; UN-Habitat, 2010a). In many cases, these urban settlements expand their boundaries sporadically and engulf neighbouring villages and land parcels at the periphery which are neither surveyed nor serviced. Consequently, new expanded city boundaries add to the number of existing unplanned settlements that city governments have not planned for and are unable to manage. These settlements, known in different parts of the globe as slums, shanty towns, informal settlements, squatter settlements, unplanned settlements, *bidonvilles, favelas, umjondolo*, *uswahilini, mabatini* or *mabanda,* are identifiable by their lack of access roads and open spaces, overcrowding, poor housing conditions, insecure land tenure, uncollected solid wastes, poor drainage systems, inadequate water supply, and poor sanitation. Yet they are home to about a third of the world's population (UN-Habitat, 2003a; 2003b; 2006; 2010b). This informal urbanisation dominates most of cities and towns in sub-Saharan Africa.

Over and above this, the growing number of city residents living in these overcrowded and confined spaces are exposed to physical conditions that are a cause for major sanitary concerns, including threats of cholera epidemics of the kind that exploded during industrialisation in the North (Black and Fawcett, 2008a).

The growth of urban informal settlements in sub-Saharan African cities and towns is not only a threat to health, but also to city governance and to sustainable development in general. In some cities, unplanned or inadequately managed urban expansion has led to rapid sprawl, pollution, and environmental degradation, together with unsustainable production and consumption patterns (United Nations, 2012). Despite the fact that it has been estimated that the proportion of the urban population living in life-threatening settlements has been decreasing in the global South (from 46.2 per cent in 1990 to 32.6 per cent in 2010 and 29.7 per cent in 2014 as shown in Table 2.1), it is important to note that the sheer number of people living in informal settlements is on the increase: over 880 million city residents lived in informal

settlements in 2014, compared to 830 million in 2010, and 689 million in 1990. This shows that much still needs to be done to improve access to urban infrastructure and basic services in the informal settlements of the global South, and Table 2.1 illustrates that this is particularly pronounced in sub-Sahara African cities and towns (UN-Habitat, 2016a,p. 203).

Region	1990	1995	2000	2005	2010	2014
Total Global South	46.2	42.9	39.4	35.6	32.6	29.7
Sub-Saharan Africa	70.0	67.6	65.0	63.0	61.7	55.9
Latin America & Caribbean	33.7	31.5	29.2	25.5	23.5	21.1
Southern Asia	57.2	51.6	45.8	40.0	35.0	31.3
South-eastern Asia	49.5	44.8	39.6	34.2	31.2	28.4

Table 2. 1: Proportion of population living in informal urban settlements in the global South (in percentages); *Source:* UN-Habitat, 2016*, p.203;* United Nations, 2014b

At an individual sub-Saharan African country level, the situation is not homogeneous. With the exception of a few countries with the lowest number of residents in urban informal settlements (mainly South Africa and Zimbabwe with 23 and 25 per cent respectively), more than 50 per cent of sub-Saharan urban dwellers are currently living in urban informal settlements, as shown in Table 2.2. In 2014, it was estimated that 77 per cent of urban residents in Madagascar were living in informal settlements, 56 per cent in Kenya, 54 per cent in Zambia; 50.2 per cent in Nigeria, and 50 per cent in Tanzania (UN-Habitat, 2016). This increasing socio-spatial informality is one of the signs of the failure of city governance machinery and tools, including urban planning and management.

Country	1990	1995	2000	2005	2010	2014
Nigeria	77.3	73.5	69.6	65.8	62.7	50.2
Madagascar	93.0	88.6	84.1	80.6	76.2	77.2
Kenya	54.9	54.8	54.8	54.8	54.7	56.0
Tanzania (United Republic)	77.4	73.7	70.1	66.4	63.5	50.7
Zambia	57.0	57.1	57.2	57.2	57.3	54.0

Table 2. 2: Proportion of population living in informal urban settlements in selected countries of the global South (in percentages); *Source: UN Habitat, 2016, p.203; United Nations, 2014*

2.3 Urban planning and urbanisation pressures in the global South

Urban planning is one of the tools or instruments that cities and towns rely on to plan for infrastructure provision in their areas of jurisdiction. For this reason, there is much expectation that planning will play a central role in assisting city governments to overcome and manage urban challenges brought by urbanisation, including curbing the growth of socio-spatial informality. However, as Watson, (2009a;b) observed, in many parts of the global South, largely in sub-Saharan Africa, conventional control-centered planning is simply not keeping pace with the demand for urban infrastructure and services; instead planning approaches are blamed for contributing to more urban challenges rather than functioning as city governance tools for environmental, economic and socio-spatial development of cities and towns.

Many city governments in sub-Saharan Africa have failed to provide, and/or enable the provision of, urban infrastructure in response to urban growth. Consequently, there is an increasing number of informal urban settlements and a severe shortage of planned and serviced land and other basic urban services and infrastructure (Watson, 2009, 2016, UN-Habitat, 2009; Lwasa, 2012; 2014; Watson and Odendaal, 2013).

As noted earlier, much of the urban growth in sub-Saharan Africa is happening on the peripheries of cities and towns where land is claimed to be affordable and easily accessible; and where there are few, if any, urban planning laws or regulation enforcement mechanisms. The failure of urban planning and management systems is attributed to shortages of municipal financial resources, the absence of political will and an historical adoption of Northern or modernist planning approaches which champion unnecessarily high planning standards that fail to accommodate the local realities of everyday life or handle increasing socio-spatial informality (Roy, 2009; Watson, 2009a;b; Fernandes, 2011, pp.15-16; Lwasa, 2012; 2014; Watson and Odendaal, 2013).

The concept of informality has been debated in urban scholarship for decades, predominantly in the global South, and has been variously and controversially defined (Kudva, 2009; Roy, 2009; Fernandes, 2011; Mcfarlane, 2012; Cheng, 2014; Ahlers et

al, 2014; Brown, McGranahan and Dodman, 2014; Bhide and Waingankar, 2015; Okyere and Kita, 2015; Pasquetti and Picker, 2017). For Roy, “informality refers to the state of deregulation, one where the ownership, use, and purpose of land cannot be fixed and mapped according to any prescribed set of regulations or the law. Indeed, here the law itself is rendered open-ended and subject to multiple interpretations and interests. The ‘law as social process’ is as idiosyncratic and arbitrary as that which is illegal” (Roy, 2009, p.80). For McFarlane, informality is considered to be a ‘descriptor’, “a way of expressing something about the broad arrangement of urban space, a short-hand device for dividing different areas of a city, or a means of making particular forms of urban practice materialise, such as casualised labour” (Mcfarlane, 2012, pp.90-93). McFarlane emphasises that informality should be thought of as practices that do not take place in a specific urban place; but instead practices that are involved in the production of space itself (ibid.). Guha-Khasnobis et al. (2006) conceptualise informality as forms of organisation outside the influence of the official governance apparatus.

Fernandes details the main causes of informality in Latin America, which are similar to the sub-Saharan African scenario. Informality is attributed by him to low levels of income among urban residents; borrowed and impractical urban planning approaches such as high plot densities; high housing development conditions; and prohibitions in terms of carrying of economic and business activities in non-designated areas. In addition, the shortage of planned and serviced land and a paralysed judiciary systemaugment problems for city residents. Poor urbanites face problems such as a lack of tenure security; shortage of urban infrastructure and services; inaccessibility of economic opportunities; and environmental and health hazards (Fernandes, 2011).

In order for urban planning systems to be effective, they need to be driven by local realities and be innovative enough to equip city and urban governments with the necessary tools to address urbanisation challenges. The literature shows that there is a close relationship between urban planning and infrastructure provision, as planning is expected to guide spatial distribution of basic infrastructure. Unfortunately, this does not always happen. Watson (2009b, p.2260) argues that the reasons why systems of urban planning have been less than adequate in addressing such issues in the cities

of the global South are complex and cannot always be blamed on planning itself, but rather on the adoption of control-centered planning (which assumes a strong state with resources that provide the infrastructure backbone to the plan) that contributes considerably to the failure. Thus, there is a need to re-examine the models used for the provision of urban infrastructure and services as they seem not to deliver according to expectations.

This research considers informality in two main ways. The first looks at the form of settlements, particularly to denote informal settlements (Kamete, 2013; Bhide and Waingankar, 2015; Okyere and Kita, 2015; Pasquetti and Picker, 2017). The second is related to the changing nature of state-society relations (Guha-Khasnobis et al. 2006; Ahlers *et al.*, 2014; Cheng, 2014). These changing relations mean that non-state actors have become increasingly involved in urban services provision (which was previously the purview of the state). Erik Swyngedouw calls these changing relations as governance-beyond-the-state (Swyngedouw, 2005) since they provide a window of opportunity for non-state actors to become important players in urban service provision (Guha-Khasnobis et al. 2006; Ahlers et al, 2014; Cheng, 2014).

2.4. Models of urban infrastructure provision

> *There is much agreement that monopolistic provision entirely through state agencies is unfeasible, undesirable, or simply rather old fashioned. However, there is little consensus on alternatives* (Joshi and Moore, 2004).

Over the past decades, a number of models of urban infrastructure delivery have been adopted in several cities and towns of the global South, yet they seem to be relatively ineffective in meeting the needs of the poor dwellers of informal settlements (Joshi and Moore, 2004; IRC, 2010; McGranahan, 2013). On the failure of the existing models of urban infrastructure delivery, Prasad (2007) agrees with Joshi and Moore (2004) that there is no consensus on a single model which facilitates the wide reach of urban infrastructure to billions of informal settlements dwellers in the global South,

as one size does-not-fit-all. As McCourt (2013) has put it, where the approaches or models failed, it was not because of their intrinsic deficiency, but because they were responses to problems which arose in one setting, but which did not arise in another. There is thus an imperative to innovate problem-specific models based on the local context.

The next section traces the various conventional models of urban infrastructure provision, namely centralisation, decentralisation, and privatisation; and unearths the emergence of co-production arrangements in urban infrastructure in informal settlement settings of the global South.

2.4.1. Centralisation model

Historically the provision of urban infrastructure fell under the natural monopolies of the central governments; and it is here referred to as the centralisation model. This model remained the dominant approach for a number of reasons. Basically, most central governments in the global South adopted the model for:

- Ensuring balance in social and economic objectives rather than focusing exclusively on profit maximisation;
- It was perceived necessary to promote growth, especially in physical infrastructure;
- Nationalisation of failing private businesses aimed at either preserving employment or the continuation of production of essential goods and services;
- There was historical resentment of the foreigners who owned many of the largest production firms (Prasad, 2007; Megginson and Netter, 2014).

The literature shows that the assumption of sole provider under the centralisation model is neither empirically realistic, nor well founded theoretically (Bardhan and Mookherjee, 2006). With time, the centralisation model was claimed to be inefficient in meeting the needs of citizens, more particularly the urban poor. Opponents of the model believe that the model failed because of:

- weak incentives (especially frail incentives to maximise revenue);
- the lack of monitoring because of collective action problems; and
- budget constraints, as politicians will never apply strict private sector rules in terms of budgetary requirements (Prasad, 2007; Megginson and Netter, 2014).

Because of proven failures of the centralised urban infrastructure delivery model and other development project initiatives, most states in the global South abandoned the centralisation model and embarked on the model of decentralising the provision of urban infrastructure and governance, with the objective of enhancing efficiency and accountability, among others (Olowu, 2008).

2.4.2. Decentralisation model

Many states in sub-Saharan Africa, as it is in the case of others in the global South, moved to decentralisation due to forces of globalisation and the failure of the centralised state to meet the development needs of its citizens (Smoke, 2003; Khumalo, 2015; Mcgranahan *et al.*, 2016), and the desire for more equitable access to and distribution of urban infrastructure such as water and sanitation (Olowu, 2008). Work (2002) adds that the primary reasons for adopting decentralisation included:

- It was considered as an alternative approach to provide urban infrastructure in a more cost-effective way;
- It was believed to be a remedy to counter economic inefficiencies macroeconomic instability, and ineffective governance;
- It was a result of political pressure to democratise; and
- It was viewed as a path to “national unity".

Though the reasons to move to the decentralisation model differ from country to country (Work, 2002; Ahmad *et al.*, 2005), it can be argued that the push to adopt the decentralisation model was triggered by the promises of improving urban local governance, improving basic service delivery and improving equity in redistributing necessary public resources for the provision of basic services (Smoke, 2003; Robinson, 2007; Khumalo, 2015). It was believed that the model would help to bring decision-making machinery closer to citizens, both spatially and institutionally (Crook, 2003). For instance, in South Africa, decentralisation was adopted to redress the

inequalities inherited from the apartheid system, to empower the marginalised majority black population; and it was seen as a relief for central government in terms of existing or potential pressure and administrative responsibilities (Dipholo *et al.*, 2011).

The concept of decentralisation has been defined as the deliberate and planned transfer of responsibility for planning, management and resource raising and allocation from the central government and its agencies, to the lower levels of government, and to peripheral institutions (Khumalo, 2015; Work, 2002;). Decentralisation can also be referred as

> *the transfer of authority and responsibility for planning, management, and resource-raising and allocation from the central government to (a) field units of central government ministries or agencies; (b) subordinate units or levels of government; (c) semi-autonomous public authorities or corporations; (d) area-wide regional or functional authorities; or (e) non-governmental organisations or non-state actors* (Matovu, 2004 in Olowu, 2008; Wunsch, 2001).

Decentralisation can take various forms, and these include deconcentration, devolution, and delegation. The boundaries between these forms can be traced according to the extent to which the planning, decision-making and management authority is transferred from the central government to the other organisations, and the level of autonomy the subnational units have in executing their mandates (Khumalo, 2015).

Deconcentration can be referred to as the transfer of authority and administrative responsibilities from central government to the field administration. This means the field staff exercises some discretion in making routine decisions. In this form of decentralisation, the regions, provinces, districts and municipalities and other sub-national units are led by officials appointed by or directly reporting to the central state department (Khumalo, 2015; Work, 2002).

Devolution refers to the creation of fully independent units of governments to which the central government relinquishes (or devolves) the authority of decision-making, planning, resources and revenue generation and management to a local level public authority. These units of local government enjoy some independence and exercise autonomy within their sphere of operation, with a clear definition of boundaries in terms of law and geographic location (ibid.).

Delegation involves the transfer of decision making and management to organisations that are not necessarily under direct control of a national department. Under delegation, central government functions are transferred to public corporations, regional planning or area development authorities (Khumalo, 2015). It is worth noting that administrative, fiscal, and political decentralisation are the three broad types of decentralisation (Smoke, 2003; Ahmad *et al.*, 2005; Robinson, 2007; Work, 2002).

Documented cases demonstrate the positive link between decentralisation and service delivery. In Indonesia, Philippines, and the Indian states of West Bengal and Kerala, it is reported that service delivery, especially health services, improved significantly after decentralisation (Cabral, 2011); similarly, in Guinea, Mali, Benin, Mozambique (Mehrotra, 2006 in Robinson, 2007). Conyers (2007) citing Makara (2000) and the Government of Uganda (2002) claims that tangible achievements in decentralisation of responsibility for provision of most local public services to district councils have been accompanied by significant improvements in the quantity and quality of service provision, particularly in the case of health and education facilities (Conyers, 2007; Robinson, 2007).

Despite these success stories, there are inconclusive debates on the merits and demerits, even with the available evidence that has positively supported decentralisation (Mcgranahan *et al.*, 2016). In fact, there is empirical evidence that shows that decentralisation has not solved the basic service delivery problems that sought to be addressed, specifically in the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Mozambique, Namibia, Niger, Nigeria, Zambia, Senegal, South Africa, Sudan, Tanzania, and Uganda (Ndegwa 2002 in Olowu, 2008). In South Africa, local

government is still blamed for poor performance in service delivery and poverty alleviation and for its incapacity to implement legislation for promoting local governance, despite having a strong and established decentralised system. A lack of work ethic among administrators is one of the alleged constraints that undermine decentralisation in the country (Dipholo *et al.*, 2011).

Many central governments, such as those of Botswana and Tanzania, are reluctant to fully transfer power and financial resources to lower level entities, hence weakening delivery by local authorities (Wunsch, 2001; Dipholo *et al.*, 2011; Mcgranahan *et al.*, 2016). This is what other scholars described it as 'decentralisation of crisis', referring to the mismatch between increased responsibilities and decreasing resources (A. Allen, 2010, p.45). It is thought that such reluctant decentralisation is just another form of centralisation, as the central governments still dictate to a great extent and remotely control what should be done at the lower tiers of government. The manifestation of the decentralisation phenomenon in many sub-Saharan African countries supports the view that it should not be conceived only as a vertical transfer of responsibilities and resources but also encompasses horizontal transfer between governments and non-state actors. The result has been the increasing privatisation of infrastructure delivery, not necessarily only to private providers, but also to individuals. Privatisation has therefore become a dominant phenomenon in infrastructure delivery (Olowu, 2008).

2.4.3. Privatisation model

Unlike privatisation of urban infrastructure and services in the global North, which might have been driven by the liberalisation of markets and budgetary constraints; privatisation in sub-Saharan Africa was influenced by Structural Adjustment Programmes (SAPs) which were conditions for securing aid or loans from the World Bank, International Monetary Fund, and many other international financial institutions (Moeti and Khalo, 2008; Cook and Uchida, 2003; Chirwa, 2004; Davis, 2005; Kirkpatrick, Parker and Zhang, 2006; Allen, 2010). Privatisation, as a process, involves the reduction of the role of the government in service delivery as sole provider and an increase in the role of the private sector in delivering the same services to citizens. While privatisation is commonly associated with the complete transfer of public enterprise responsibilities to a private actor, it also takes other forms. Examples

include partnerships between public and private institutions; leasing of business rights by the public sector to private enterprises; outsourcing or contracting out specific activities to private actors; management or employee buyout; and discontinuation of a service previously provided by the public sector on the assumption that, if it is necessary, a private actor might engage in its delivery (Chirwa, 2004 citing Vuylsteke, 1988). Proponents of this model argue that privatisation aims to improve basic service delivery to the urban poor through efficiency gains, improved management, and better access to finance than public utilities were able to provide (Franceys and Weitz, 2003; Bakker, 2007).

Opponents of private sector participation argue that the privatisation model is not a reliable means of basic service delivery, as private companies will seek to maximise profits (Bakker, 2007). Davis, (2005) points out that the challenges of access to and affordability of urban infrastructure and services for low-income households do not necessarily go away with privatisation. Indeed, evidence suggests that privatisation does not benefit the majority of people who lack access to improved water supply and sanitation infrastructure in informal settlements. While there have been pockets of relative success, the privatisation of the water and sanitation sector has failed in many cases (Oluwu, 2008). The poor tend to remain excluded from privatised basic services due to their inability to pay or the location of their settlements at the urban fringe (Zaki and Amin, 2009). For example, in Guinea Conakry, privatisation of water and sanitation services raised the price per cubic meter of water by a factor of 6.4 within seven years of operation. Another argument is that private actors are reluctant to extend services to low-income settlements because these areas are perceived to be less profitable (Zaki and Amin, 2009).

In summary, much of the debate on improving urban infrastructure has been polarised between assessing the merits of centralised, decentralised and privatised models of services delivery. In the view of McMillan, Spronk and Caswell, (2014) this debate has tended to obscure/mask the main challenge of urban infrastructure provision in global South cities: that city governments fail to provide urban infrastructure services to the poor living in informal settlements, no matter who owns and operates the services.

The obstacles that limit poor people's access urban infrastructure services are likely to persist whether the provider is publicly or privately owned and operated. The adoption of these models "presented an artificial choice, diverting attention from the real problem of how to reach the poor" (Allen, 2010, p.43; McGranahan and Satterthwaite, 2006, p.1).

The emergence of a **co-production model** that involves city residents themselves, as well as non-state actors, in the service-delivery chain has therefore been seen as a possible way to promote improved urban services delivery in which networks, collaboration and participation are at the core of the model (Bakker *et al.*, 2008; McMillan, Spronk and Caswell, 2014; Brandsen and Honingh, 2015; Brudney and England, 1983). Alford, (2009) notes that the conventional models of urban service delivery have proven to be ineffective due to their neglect in considering the end-users of the services as co-producers and local contextual realities. Since traditional conceptions of urban infrastructure planning and management are now considered outdated, there is a need for the potential shown by co-production relationships among multiple stakeholders to be considered (Bovaird, 2007).

2.5. Co-production: an emerging and alternative process

The co-production model emerged and has been in use for more than three decades (Ostrom, 1996; Mitlin, 2008; Alford, 2009), but it has only recently regained momentum and become a topical issue of debate both in the global North and South (Brandsen and Pestoff, 2006; Boyle and Harris, 2009; Pestoff, 2009; Brandsen and Honingh, 2015; Mitlin and Bartlett, 2018; Galuszka, 2018). The concept caught the attention of scholars in the late 1970s and early 1980s, when a particular set of citizen-state relations emerged in US cities (Ostrom, 1996; Mitlin, 2008; Alford 2009; Cepiku and Giordano, 2014; Tu, 2014; Loeffler and Bovaird, 2016).

The model was first conceptualised in the 1970s by an academic team led by Elinor Ostrom (at Indiana University), who observed the lack of recognition of citizen or service end-users in urban service delivery (Realpe and Wallace, 2010; Mitlin and Bartlett 2018:355). Fledderus, Brandsen and Honingh (2014, p.426) note that

originally Ostrom and her colleagues developed the model to describe the relationship that existed between the ‘regular’ producer and ‘clients’. Mitlin (2008) and Alford (2009) add that co-production was primarily considered as a route to improve the delivery of services, holding that the involvement of citizens, community members, or end-users in the delivery of services might improve the service supply chain. Mitlin and Bartlett (2018, p.355) add that co-production is now seen to “offer more efficient delivery of services (with labour contributions from local residents replacing unavailable state resources) and more effective state plans (through synergistic planning between organised communities and the state)”. In support of this, Adriana Allen and her colleagues also maintain that co-production is “concerned with the integration of various inputs and convergence of resources but also with structural changes in the decision-making process” (Allen, Hofmann and Griffiths, 2008, p.112).

In addition, co-production is rich in multiple hybrid and diverse institutional arrangements which are not found in conventional urban service delivery models. There is a growing body of knowledge that shows the relevance of co-production in urban service provision:

(i) it allows urban service users and community members to supplement government provision in those cases where a particular service is not reaching certain groups or individuals.

(ii) it can help in the development of an effective interface between public/professional urban service providers and users by creating a mechanism for interaction and feedback that allows formulation of policy design and implementation to meet particular needs and expectations of beneficiaries, and

(iii) it can empower citizens to fully exercise their rights and to become agents of change, fostering a type of governance that is not producer-centred but people-centred

(iv) It seems to be the only and most effective way to reach a large number of beneficiaries, addressing their different needs and circumstances and making the most of existing local networks;

(v) *Co-production has a huge diversity in the operational situations in which services are delivered, with different standards, costs, technologies, and so*

on, and often rapidly changing conditions that are difficult to address under standardised solutions or responses (Allen, 2010, pp.53-54; Allen, Hofmann and Griffiths, 2008, p.111);

(vi) *It is an original solution in the repertoire of the available institutional arrangements, which can be mobilised by the state actors seeking to achieve their purposes* (Moretto *et al.*, 2018, p.425).

Wamuchiru, (2017) adds that co-production is relevant in enhancing governance structures when deprived communities - in this case those living in informal settlements - are actively engaged throughout the process of urban service delivery. She adds that the active participation of local communities beyond state-defined spaces may greatly enhance governance processes (Cornwall and Coelho 2007; Miraftab 2004; Holston 2009 in Wamuchiru 2016). Co-production means a move away from the tradition of viewing actors as either 'formal' and 'informal' actors in urban development processes - i.e. clear boundaries between the two sets of actors. (Rhodes 1996;Joshi and Moore, 2004). Instead, co-production makes provision for the engagement of multiple actors in a more diffused and fluid process of power sharing and partnerships (Bovaird 2007; Watson 2014).

Although the concept of co-production has been in use for decades, there is no agreed definition (Joshi and Moore, 2004; (Boyle and Harris, 2009; Cepiku and Giordano, 2014; Alford, 2009). For Mitlin, (2008), co-production is "a strategy used by citizens and the state to extend access to urban services with relatively little consideration given to its political ramifications"; while Ostrom (1996, p.1073) views co-production as "the process through which inputs, used to provide urban services, are contributed by individuals who are not in the same organisation". Joshi and Moore (2004) redefined Ostrom's definition of co-production. They focused on the organisational arrangements, highlighting that in co-production, groups of clients are involved in effective service delivery, on a sustained and regular basis. According to Joshi and Moore (2004, p.31): "Institutionalised co-production is the provision of public services (broadly defined, to include regulation) through regular, long-term relationships

between state agencies and organised groups of citizens, where both make substantial resource contributions".

John Alford, having made an extensive review of the literature, came up with a definition which builds on the notion of groups of citizens being involved in co-production, but adds elements of volunteerism and the creation of value. His definition applies to all kinds of co-producers, whether they are volunteers, clients, other government agencies, community organisations or private firms. He refers to co-production as any active behaviour by citizens outside the government agency which: "is joint with agency production, or is independent of it but prompted by some action of the agency, is at least partly volunteer; and either intentionally or unintentionally creates private and/or public value, in the form of either outputs or outcomes" (Alford, 2009, p.23).

Brudney and England (1983) had earlier put forward that the major contribution of co-production was its appreciation of the role that ordinary citizens can and do play in the chain of urban services provision. They emphasised that co-production places a premium on the relatively mundane forms of citizen participation in the implementation of services and that co-production requires a "critical mix" of regular producer and consumer (citizen) activities. These activities are positive, voluntary, and active in nature. This differentiates the co-production model from traditional forms of citizen participation in urban service delivery (which are usually focussed on decision-making). Moreover, all forms of co-production challenge conventional or traditional models of urban services delivery (Dunston *et al.*, 2009; Marco, 2015 ; Alford and O'Flynn, 2012). The distinguishing feature of the co-production process lies in its relational interactions between the service end-user and the producer, built on the active involvement and decision-making of the former (Löffler, 2010; Cepiku & Giordano, 2014).

Similarly, Watson goes further and identifies the position of co-production in the field of urban governance and planning studies, particularly in the global South. She maintains that co-production mostly works outside traditional rules and procedures of

governance, in terms of engagement with the state, which is not the case in collaborative and communicative planning processes. She adds that co-production processes have often come into being precisely because formal channels of engagement do not exist or are not satisfactory, and other ways to engage must be found (Watson, 2014).

Loeffler and Bovaird, 2016, echoing Brudney and England, and cognisant of the magnitude and variations of definitions of co-production in the literature, caution that not all citizen partnership or participation should be regarded as co-production. Like Watson, they stress that co-production should be distinguished from mere public consultation and public participation. In their view, co-production should be considered the most intensive form of citizen engagement, where the focus is on joint action (Löeffler and Bovaird 2016). They add that public participation involves communication processes towards joint decision-making, and that public consultation primarily involves listening. For that reason, they believe traditional public participation activities and processes may be considered part of co-production only if they result in significant contributions being made by the public in decisions that affect them. In short, for them co-production refers to: *"*public services, service users and communities making better use of each other's assets and resources to achieve better outcomes or improved efficiency*".* In this definition, co-production of public services and public outcomes involves a significant relationship between public services and end users of the services (Loeffler and Bovaird, 2016, pp.1006-1019).

John Alford gives an illustration on the active involvement of residents in waste recycling to promote environmental amenity and resource conservation. In this case, households actively participate in separating out the garbage types such glass, cans, paper or food residues and place them into separate containers for collection by contractors. The task needs to be done prior to collection, as it is virtually impossible for the contractor to separate the garbage once it has been deposited into bins. In urban services, it is not simply the case that the local government provides the service to citizen. The need for residents to participate actively in the production process of such a service which cannot be underestimated (Alford, 2009, p.2).

The above acclaims and merits do not isolate co-production from criticisms. One of the limitations of the concept of co-production has been its elasticity, and that, based on existing studies, it is unclear whether co-production is best understood as merely a description of existing welfare models, or a transformative model for the future (Durose et al 2018, p.136). Critics add that there is a range of perspectives and typologies on each of the following aspects of the co-production of urban services: *"*who is co-producing; how many people are involved; at what stage co-production takes place; what is contributed; and how co-production relates to other forms of citizen participation" *(*Durose, et al, 2018, p.136*).* Castán Broto and Neves Alves, 2018, p. 370) critique service co-production is that it seems equivalent to a 'transfer' of part of the costs for service to individual citizens or citizen groups, thereby raising equity challenges.

Because many lack both knowledge and resources to co-produce, not all citizens have the same capacity to co-produce urban services and infrastructure. Consequently, co-production may not help to overcome the marginalisation of groups that have been generally marginalised and underserved, and indeed it might add to the burdens that they already experience. Such groups might include people living in extreme poverty, older people, the homeless, people with cognitive and communication difficulties (Cinquini et al, 2018; McMullin, 2018). Just as lack of resources and marginalisation might affect co-production, Das (2016) points out that there may also be differences in values, and differentials levels of power and incentives among co-producers.

Drawing on Elinor Ostrom (1996, p.1073), this research adopts the definition of service co-production as

> *the process through which inputs used to produce a good or service are contributed by individuals who are not 'in' the same organizations. Service co-production allows users and communities to supplement government provision where a particular service is not reaching certain groups or individuals (Allen, 2010, p.53).*

This implies that citizens play an active role in producing urban services of consequence to them (Moretto and Ranzato, 2017). The following section describes the various forms of co-production in urban infrastructure provision.

2.5.1. Forms of co-production

Different schools of thought have resulted in different definitions of co-production. Nevertheless, Pestoff, (2014) and Brudney and England (1983) agree on three broad forms of co-production. They are individual, group, and collective co-production forms. According to Brudney and England, these form a hierarchy of co-productive activities. The relative ranking within the hierarchy is determined by the nature of the benefits achieved and the degree of overlap found between the activities of regular producers and consumers. The succeeding section describes these forms of co-production.

Individual co-production

Individual co-production describes those activities undertaken by individuals for their own benefit or situations where a service user individually participates in the production or part-production of the services they use, receiving benefits that are largely personal Eriksson, 2019 p.296; Sorrentino, Sicilia and Howlett, 2018 p.280). Eriksson (2011) says that individual or personal co-production is observed in the delivery of those urban services that generate private value for the individual, as well as public value for the community, but it can also be understood as citizen involvement at various points in the service chain, for instance, of co-designing, co-delivery, and co-managing. Eriksson stresses that the involvement of the individual user of the service as part of urban service delivery is most important and that there is a close interaction between regular producer and end users. Brudney and England (1983) argue that individual co-productive activities may be further categorised into two forms, depending on the nature of service delivered; namely ‘captured’ individual co-production and personal or voluntary individual co-production. In the former, the citizen has little choice but to participate in the urban service delivery chain. Brudney and England note that in ‘captured co-production’, the individual citizen is the beneficiary of co-productive activities, but the critical mixing of productive efforts of regular producer and consumer producers is relatively small, and that generally, regular

producers provide services by following prescribed policy, rules, and regulations subject to their discretion. In contrast, the 'personal' or 'voluntary co-production' sees citizens participating actively without formal organisation and coordination, and the aggregate benefits at the city level may be minimal. Löeffler (2010), citing Needham (2009) and Alford (2009), adds that 'personal' or 'voluntary co-production' encompasses services that generate private value for the individual, as well as public value for the community. Such co-production often occurs in services where the co-production activity can be done alone by the service user. In this case, "both the contributions made and the benefits received by citizens are at an individual level" (Bovaird *et al.*, 2016, p.50).

Group co-production

Unlike individual co-production, where the accrued benefits are largely personal and the extent to which the regular producer and citizen consumer spheres overlap is small, group co-production involves voluntary, active participation by a number of citizens and may require formal coordination mechanisms between service agents and citizen groups (Brudney and England 1983). Brudney and England argue that "neighbourhood organisations can facilitate active co-production by coordinating the efforts of individual consumers and providing a liaison between officials and citizens" (p.64). Bovaird, along with his colleagues, adds that group co-production is mostly voluntary with active participation of a number of citizens through formal coordination mechanisms between service agents and citizen groups. They maintain that the inputs by citizens are collective but that the benefits are largely individually experienced (Bovaird *et al.*, 2016, p.50).

Collective co-production

Brudney and England (1983) explain that the collective approach of co-production rejects the conventional model of urban service delivery process in which the city government delivers services to a largely passive group of citizens. Collective co-production entails the provision of urban infrastructure and services by putting emphasis on direct citizen involvement in the whole process of service delivery and builds on the notion of a redistribution of benefits from citizen activity. Irrespective of

which citizens participate in the service delivery process, the benefits accrue to the city as a collective. In collective co-production, the service environment is characterised by cooperation between regular producers and consumers. As a result, the degree of overlap achieved between these two spheres is considerably significant. Pestoff (2014) citing Hudson (2012) adds that better service quality can be achieved through collective co-production, since it also promotes greater transparency and accountability than ‘consumer’ choice and individual co-production. Löeffler (2010) adds that collective co-production generates instrumental benefits (e.g. improving outcomes) and opens channels to achieve multiple intrinsic values. Löeffler emphasises that the collective approach not only builds trust and improves relationships between service users and service providers, but also contributes to more cohesive community (ibid.). Collective forms of co-production have more potential to impact overall level of community services than individual co-production (Eriksson, 2019, p.297)

Bovaird and others argue that in collective co-production, the co-productive activities result in collective goods whose benefits may be enjoyed by the entire community, where the benefits are collective but the inputs by citizens may be provided individually or together. For them, collective co-production means the joint action of citizens to support public services and achieve outcomes, while individual co-production covers those actions not jointly undertaken (Bovaird, Stoker, Löeffler, Jones & Roncancio, 2016, p.50). Generally, collective co-production covers services where the co-production can only be generated by two or more people, working together as a group such as members of a time bank (Löeffler, 2010 citing Griffiths and Foley, 2009). It is also observed that collective co-production is better at fostering trust and creating social values than individual co-production (Cepiku & Giordano, 2014 citing Löeffler 2010; Needham 2008). In the broadest sense, collective co-production builds on the idea that co-production is not confined to service users, but involves other actors. This type of co-production is designed to produce benefits for the entire community (Sorrentino, Sicilia and Howlett, 2018, p.280).

2.5.2. Experiences of co-production in urban infrastructure provision

There is a significant literature drawing on the concept of co-production by exploring the relations and/or interactions between the state and non-state actors in the chain of urban service delivery (Ostrom 1996; Joshi and Moore 2004; Pestoff and Brandsen 2006; 2009; Bovaird 2007; Mitlin 2008; Alford 2009; Allen, 2013; Allen et al, 2010;2017; Watson, 2014; Cepiku & Giordano, 2014; Voorberg, Bekkers and Tummers, 2015; Ambole, 2016; Mitlin & Bartlett, 2018). Mitlin and Schlappa and Imani (2012), report that there have been wide discussions on the concept of co-production in areas of community safety, social housing, unemployment, health, charitable giving and new media. Research on the exploration of the co-production concept in service delivery in the global South has recently gained momentum (Joshi and Moore, 2004; Mitlin, 2008; Mcfarlane, 2012; Odendaal, 2012; McGranahan, 2013; Allen, 2013; Allen, Hofmann and Griffiths, 2008; Allen *et al.*, 2017; Swilling *et al.*, 2013; Watson, 2014; Mitlin and Bartlett, 2018).

Among the most well-known examples of service co-production are sanitation projects in Brazil and Nigeria, documented by Elinor Ostrom, who shows the benefits of citizen co-production and the inclusion of non-state actors in the provision of urban services (Ostrom, 1996). Another an example is the famous ‘Orangi pilot project’ in Karachi to demonstrate how informal settlement dwellers can co-produce their own sanitation services Mitlin (2008). The literature thus shows that participation has been promoted by an increasing number of co-productionist approaches that seek to include users in the design and implementation of their own services (Joshi, Fawcett and Mannan, 2011; McGranahan, 2013; Patel and Team, 2015; Tukahirwa, Mol & Oosterveer, 2013).

Adriana Allen and co-authors examined service co-production of water services in Kolkata (India), Cochabamba (Bolivia) and Dar es Salaam (Tanzania), where collaboration and the active involvement of individuals and organised communities or groups of citizens, and public service agents, revealed multiple strategies and mechanisms of service co-production (Allen et al. 2017). Allen (2013) has also examined service co-production mechanisms through water users’ associations in Dar

es Salaam (Tanzania) and Technical water fora in Caracas (Venezuela). Nance and Ortolano, (2007) have documented and analysed the forms of community participation in co-production of condominial sewer projects in Brazil. Similarly, Amollo Ambole analysed three case studies of service co-production in urban sanitation interventions in informal settlements of Klein Begin, Klipheuwel and Enhkanini in South Africa (Ambole, 2016). However, documentation of more cases is still needed from different local contexts and settings, so as to build a scientific body of knowledge based on the problems existing in particular cities of the global South, and on the forms of co-production in sanitation infrastructure provision (Cepiku and Giordano, 2014, p.324).

While there are numerous studies on co-production arrangements and partnerships in water and other urban services (Allen, 2013; Allen, Hofmann & Griffiths, 2008), there is scant research on co-production arrangements in sanitation infrastructure provision in the South (Nance and Ortolano, 2007; Allen, Hofmann & Griffiths, 2008; Allen, 2013). The studies that do exist note that with sanitation infrastructure, co-production may occur by necessity rather than by design or designation (Moretto et al, 2018).

This study aims to contribute to the emerging literature on sanitation co-production, and to increase understanding of practices of co-production emerging from the active participation of citizen and non-state actors in the sanitation chain in informal settlements. Arusha, a small city of half million inhabitants was selected.

Given that co-production has emerged and is situated within the governance toolbox of urban infrastructure and service delivery (Watson, 2014; Wyborn, 2015; Durose *et al.*, 2017; Sarmiento and Tilly, 2018; Sorrentino, Sicilia and Howlett, 2018; Eriksson, 2019; Galuszka, 2019; Weaver, 2019; Sicilia *et al.*, 2016; Kekez, Howlett and Ramesh, 2018; Durose *et al.*, 2017; Cinquini *et al.*, 2018; Needham and McMullin, 2018) it is worthwhile to also review the concept of governance. The next section will locate governance in the urban infrastructure and service process.

2.6 Placing Governance in urban infrastructure and services delivery process

Given the nature of challenges around urban infrastructure and service delivery in cities and towns of the global South, and specifically, in sub-Saharan Africa, there is a need to investigate the challenges of governance in the process. Exploring governance issues (explicitly, the interactions between state and non-state actors and their relations in the delivery process) is of paramount importance to this study (Jones, Hesterly and Borgatti, 1997; Nunan and Satterthwaite, 2001; Allen, Dávila and Hofmann, 2006; Rhodes, 2007; Jones and Harris, 2014). As Jones *et al* have emphasised, governance factors are important in facilitating or constraining effective urban infrastructure and services delivery.

Emphasising the place that governance occupies in the delivery of urban infrastructure and services, Allen and others maintain that solutions designed to improve reliable access to urban infrastructure and services will not result solely from technological and engineering innovations. Many cities and towns face a governance crisis rather than an urban infrastructure and service crisis. Thus, in studying the delivery of urban infrastructure and services, the operation and maintenance of imported technologies - and their failure (McCourt, 2013; Resnick, 2014) - should be examined along with governance arrangements and dynamics (and both urban local government and central government levels should be taken into consideration). Allen *et al* argue that:

> *…policies and initiatives that focus exclusively on technical and formal means of delivering these services are not only bound to fail, but will also negatively affect a significant proportion of both households and producers in metropolitan regions who rely on non-formal means of access.* (Allen, et al, 2006, p.20).

It is important to mention that scholars have defined the concept of governance in a number of different ways (Jones, Hesterly and Borgatti, 1997; Devas, 2001; Rakodi, 2003; Allen, Dávila and Hofmann, 2006; Rhodes, 2007; van Bortel, Mullins and Rhodes, 2009; Börzel and Risse, 2010; Kjær, 2011; Lewis, 2011; Peters, 2015; Simiyu *et al.*, 2017). For Börzel and Risse, 2010; pp.113-134) governance

> *includes hierarchical steering by state actors, but also includes the involvement of non-governmental actors (companies, civil society) in the provision of collective goods through non-hierarchical coordination. This coordination ranges from consultation and cooptation, delegation, and/or co-regulation/co-production to private self-regulation inside and outside the control of governments'* (page 115).

Borzel and Risse add that governance consists of both '*structure'* and *'process'.* While the *'structure'* component is concerned with institutions and actor assemblages, *'process'* denotes the modes of social coordination by which actors engage in rule-making and implementation, and in the provision of collective goods. As regards actors, they refer both to state and non-state actors.

Rod Rhodes (2007, pp.1243-1264) defines governance as "'self-organising, interorganisational networks' that complement markets and hierarchies as governing structures for authoritatively allocating resources and exercising control and co-ordination". For Mark Swilling, governance is about the way the power structures of the day and 'civil society' (or non-state actors in this case) interrelate to produce a civic public realm (Swilling, 1997). Following Stoker (1998, p.38), Rakodi, (2003, p.524) defines governance, as "the action, manner or system of governing in which the boundary between organisations and public and private sectors has become permeable. The essence of governance is the interactive relationship between and within government and non-governmental forces".

Drawing from Nick Devas, governance, in the context of this research, refers to the multiplicity of actors and institutions which are involved in one way or the other in the delivery of urban infrastructure and services. These include national and urban local governments, public utilities or government agencies, private companies or, community-based organisations (CBOs), non-governmental organisations (NGOs), and individual citizens and households of all income brackets Devas, (2001, p.393-394). These definitions reflect the view of Torfing, Peters, Pierre and Sorensen that governance is "*a horizontal of interdependent but operationally autonomous actors*

who interact through negotiations which take place within a relatively institutionalized framework and facilitate self-regulated policy-making in the shadow of hierarchy (ibid. p.16).

Moreover, Allen *et al.* (2006, p.46), based on Pierre's (2000) and Pierre and Peters' (2000) work, summarise the ongoing debate on governance through two distinct definitions and sets of concerns. On the one hand, one group of the governance scholarship focuses mainly on the institutional capacity and performance of the state and the way it has adapted to recent developments. On the other hand, governance is increasingly being deployed as a notion that refers to a new process of governing. They denote the two groups of scholarships as 'state-centric' and 'society-centred' respectively. The first group is concerned with assessing the executive / political / institutional capacity of the state to 'steer' society towards certain goals associated with the 'public good', and also with examining the relationship between the role of the state and the interests of the influential actors in the co-production process. The second group is concerned with the role of non-state actors in the governing process and their relations with the state through a variety of institutional arrangements. Thus, the term governance in their study is adopted as the emerging 'governing practices' that seek to build greater capacity for collective action through new relations between diverse the multiple actors. Not surprisingly, they argue that, "the focus of this approach is on multiagency ensembles, such as partnerships and networks devised for creating synergy among different social actors in the pursuit of public policy goals*"* (Allen *et al.* 2006, p.46). For the purposes of this research, and drawing on the above, governance is referred to as 'the process of steering society and the economy through collective action and in accordance with some common objectives'.

In summary, the above definitions and debate on governance imply that managing city and town affairs is no longer solely the role of city governments, but rather involves relationships between state and non-state actors. With this changing context, 'the main role of the city executive is expected to focus more on co-ordination of an increasingly complex and fragmented governance landscape, steering inter-dependent activities through new institutional frameworks and bargaining processes, and integrating and

managing diverse *networks'* (Rakodi, 2003). However, it is important to explore how city institutions interact with other actors in the delivery of urban sanitation infrastructure and what arrangements are put in place to achieve the set goals (Rakodi, ibid.). This is particularly important given the fact that, as discussed above, the governance of urban sanitation infrastructure remains under-analysed in comparison to water and other urban services. Of added significance is the fact that service co-production arrangements (where the citizens and other non-state actors are actively involved in the delivery of urban services and infrastructure) are expected to change the traditional governance model. It seems there might be a need for redefining a clear model of city governance (Cinquini, Campanale, Grossi, Mauro & Sancino, 2018).

2.7. Conclusion

The chapter has reviewed the literature relevant to this study. The review has shown that rapid urbanisation and urban population growth have brought governance challenges to city governments and that the conventional models of urban infrastructure provision, particularly centralisation, decentralisation and privatisation, have proven to have largely failed, and that they create more problems than they solve, mainly in the global South, as has been widely acknowledged (Cummins, 2007; McMillan, Spronk and Caswell, 2014; Pestoff, 2014). City governance in global Southern cities has been viewed as a failure because of the various approaches and attempts at urban infrastructure provision, in informal settlements, since this provision has tended to exclude the citizen or the end users in the service provision chain.

Co-production has emerged and is now gaining popularity not only in management and political science studies, but also in urban geography, urban planning and urban studies (Siame, 2016; Watson, 2014). Watson (2014) urges that co-production experiences must be fully understood within their political, social, and cultural contexts and that inappropriate generalisation should be avoided. “To sharpen the growing focus on co-production in urban service delivery and academic debate, more analysis and investigation is needed” (Sorrentino, Sicilia and Howlett, 2018, p.279).

Based on the problem-centeredness and context-specificity of the co-production model (de Marco 2015: 10), the following research gaps or knowledge lacuna have been identified and form the basis of this study:

- The co-production process of urban sanitation infrastructure provision in Tanzanian cities involve a multiplicity of actors. This research asks: who are these actors and what are their relational roles in urban sanitation chain? What form of co-production is practiced in the selected case study city of Arusha? What is the governance structure emerging from the multiplicity of actors involved in urban sanitation infrastructure provision?
- The review shows that most empirical data on co-production focuses on the water supply, education and health care sectors. Studies on urban sanitation, especially in informal settlements of global South are incipient at best. This study will add to the literature by examining how co-production of urban sanitation infrastructure is unfolding on the ground.
- How performative is co-production, how productive is it, as a relational form that might be more adaptive, resilient and contextually appropriate? Is it just a stop-gap or indicative of something more systemic and potentially sustainable?

The next chapter will focus on urban sanitation infrastructure in the global South. The chapter will document the extent of sanitation infrastructure problems, and their complexities in the global South. It will trace the evolution of sanitation technologies as well as review the various human excreta-management practices and the actors involved.

CHAPTER THREE

URBAN SANITATION INFRASTRUCTURE IN GLOBAL SOUTH

3.1 Introduction

"Sanitation is better than independence" (Mahatma Gandhi).

Improved sanitation infrastructure not only contributes to the urban (environmental) health and functioning of a city (Mcfarlane, 2008; Butala, Vanrooyen and Bhailal, 2010; Cumming, 2015), but also plays a vital role in reducing poverty and death among city dwellers (Hutton and Haller, 2004); and improving the cityscape or the aesthetics of a city (Scott, Cotton and Sohail, 2016). Mahatma Gandhi, father of the Indian nation, recognised the indispensability of sanitation infrastructure as part of the independence struggle (Fawcett and Black, 2008, p.6). Such boldness and commitment from a political leader are what is needed to rescue cities of the global South from their current sanitation crisis.

The need for safe and hygienic disposal of human excreta as well as for the whole sanitation chain in informal settlements of global Southern cities has been given little attention and consideration by practitioners and policy-makers, despite its obvious and direct relationship to public health and human dignity (Black and Fawcett, 2008; Jewitt, 2011; Verhagen and Ryan, 2015; Cumming, 2009). Literature on the status of sanitation infrastructure and urban health, the evolution of sanitation technologies, complexities in, and politics and governance of, sanitation infrastructure in cities of the global South are discussed in the next sections.

3.2. Urban sanitation infrastructure and urban health

It is worth noting that most of the diseases spread by human excreta are associated with faeces that contain germs, parasites and pathogens. These can cause a wide range of illnesses including diarrhoea, cholera and many other health problems. When pathogen-infected faeces reach the wider urban environment, they quickly

contaminate drinking and cooking water and food via flies or human hands, thus potentially exposing a large number of city dwellers to infections and diseases (Jewitt, 2011; Cumming *et al.*, 2014). The World Health Organisation (WHO) reports that diarrhoea is the top cause of all illness and death, and 88 per cent of diarrhoeal deaths are due to a lack of access to, or poor sanitation infrastructure; combined with inadequate and unsafe water. Consequently, each year, 1.2 million children under the age of five die because of poor sanitation (WHO, 2006, 2008; WHO/UNICEF JMP, 2013). One of the key causes of these deaths is exposure to pathogens associated with human excreta, which not only threatens human health, but also urban (environmental) health.

It is small wonder, then, that UN-Habitat (2006: vii) described poor sanitation as a 'silent tsunami'. Improved sanitation infrastructure could not only save millions of lives by improving public health in informal settlements, but also contribute to socio-economic well-being of millions of people in the global South by restoring their human dignity and reducing expenditure on medical treatments; thus impacting on many other non-health externalities (Hutton and Haller, 2004; Isunju *et al.*, 2011; Hendriksen *et al.*, 2012).

- 52% of all people in Asia have no access to basic sanitation infrastructure (Jewitt, 2010)
- In India, only 47.2 per cent of the urban poor have access to adequate sanitation. (Chaplin, 2011, p.58)
- In Madagascar only 4% of the population have access to a hygienic latrine. (Cumming, 2009, p.10)

3.3. Tracing the evolution of sanitation technologies

After the natural necessity of human excretion (Black and Fawcett, 2008a), the next concern is the disposal of the emitted wastes. 'Conventional sewerage' has been a standard method of removing human waste from the urban built environment in the global North since the 19th century. 'Conventional sewerage' refers to a citywide

network of pipes that collect domestic sewage or wastewater to be treated or disposed of at a discharge point, in most cases a wastewater treatment plant.

But ‘conventional sewerage’ requires an in-house water supply and expensive connection to infrastructure. Given the challenges of informal settlements in the global South, such a system is unaffordable and inappropriate for these settlements (Mara, 1996; 2003; 2012). Residents are thus forced to rely on on-site disposal of their wastewater and human excreta. The need for an on-site system presents numerous challenges, and must consider the topography and the nature of the soil in the built area, housing density as well as space scarcity. Many informal settlements are located on marginal land, often with poor drainage and porous soil conditions, which makes it difficult to dig durable and/or new pit latrines when the previous ones are full. As alternatives therefore, many informal settlement dwellers use a variety of methods for emptying their pit latrines, which can lead to unsanitary and unhygienic local living conditions, and pollution of local urban environments (African Development Bank, 2007; Paterson, Mara and Curtis, 2015; IRC, 2010; Isunju *et al.*, 2011; Still and Foxon, 2012a;b; Pastore, 2015; Grolle et al, 2018; odirile, et al, 2018; Gudda et al, 2019).

In endeavours to improve the situation, there are now several promising sanitation infrastructure technologies for non-networked (i.e. not connected to ‘conventional sewerage’) urban settlements of the global South (Starkl *et al.*, 2015). For instance, the ‘condominial sewer system’ innovated to extend wastewater collection to unserved areas in Natal, Brazil (Nance and Ortolano, 2007; Allen, Hofmann and Griffiths, 2008; Allen, 2010; Mara, 2012). Sanitation infrastructure technologies here refer to the particular methods designed to contain and transform products, or to transport products to another functional group (IRC, 2010). For any sanitation infrastructure technology to be considered appropriate, the World Health Organisation (WHO, 1987,p.13) recommends that it should be:

(i) *as inexpensive as possible without jeopardizing the effectiveness of the improvements sought;*

(ii) *be easy to operate and maintain at a local level, and not demand a high level of technical skill or require massive deployment of professional engineers;*

(iii) *rely on locally produced materials rather than on externally provided equipment and spare parts, where this is practicable;*

(iv) *make effective use of local labour, especially in areas where there is a surplus of labour;*

(v) *facilitate and encourage the local manufacture of equipment and parts under the leadership of entrepreneurs;*

(vi) *facilitate the participation of local communities in its operation, and maintenance; and lastly*

(vii) *be compatible with local values and preferences.*

The following section presents a synthesis of reviewed literature on selected sanitation technologies that are used in different parts of the global South to collect, transport, and treat human waste and considers some of the drawbacks of these technologies. Several scholars (Nelson and Murray, 2008; Paterson, Mara and Curtis, 2015) agree that the best technologies for meeting sanitation needs of unconnected informal or unplanned settlements with low population densities and low incomes are those that are both affordable and appropriate. They argue that such technologies should be fully able to provide the same health benefits and user convenience as cistern-flushed toilets and 'conventional sewerage'. However, there is growing evidence that most of these sanitation technologies end up in failure (Morales, Harris & Öberg, 2014; Ambole, 2016). These failures prove that provision of urban services, particularly sanitation infrastructure in informal settlements, should not be considered simply as technological or engineering problems, but also as a governance issue (Allen, et al, 2006, p.20; Mara, 2012).

Among the most adopted technologies across cities in global South is the flush toilet. This is usually associated with formal 'conventional sewerage' infrastructure connected to a centralised system. A water storage facility is used to flush human wastes mechanically. Other designs for water conservation include: dual-flush toilets, a hand-washing station placed above the cistern that drains into the toilet storage tank, and waterless urinals (Nelson and Murray, 2008). However, these technologies work best in planned neighbourhoods, especially due to the absence of water supply infrastructure in informal settlements. Thus, a 'pour-flush' latrine was invented as an

alternative. This is a hybrid of a normal pit latrine and a conventional flush toilet. The human excreta are dropped into a shallow chamber, then manually flushed into a drain pipe with a water seal to block odours from getting in the superstructure. The faeces and urine are not separated and whereas faeces remain in the pit, urine is left to leak into soil, just like in a Ventilated Improved Pit (VIP) latrine. However, a major problem with this technology is groundwater contamination (Nelson and Murray, 2008).

Pit latrines, or traditional pit latrines, remain common forms of sanitation in informal settlements in global South (Thye, Templeton and Ali, 2011; Nakagiri *et al.*, 2016). Their use dates back in 1950s – 1960s, the heyday of disease control campaigns. The main health and aesthetic problems associated with traditional pit latrines are flies, mosquitoes and odours. To overcome these shortfalls, the VIP (initially called the Blair Latrine) was developed in Zimbabwe in the early 1970s. However, the use of pit latrines in urban areas of sub-Saharan Africa has been marred by poor performance in terms of fast filling, inadequacy, bad smells and insect nuisances, risking disease transmission and leading to user dissatisfaction (Nakagiri et al, 2015; Tobias *et al.*, 2017). In addition, pit latrine technology has had several negative consequences for public health and the urban environment (Jenkins, Cumming and Cairncross, 2015; Tobias *et al.*, 2017). Emptying is often unhygienic and expensive, resulting in dangerous practices of overfilling of the pit and/or flooding it out. Sludge from pit latrines contaminate ground water, and in many cases the faecal sludge is dumped into water courses, with devastating effects on surface water quality (Graham and Polizzotto, 2013; Tobias *et al.*, 2017).

The Ventilated Improved Pit (VIP) Latrine system differs from conventional pit latrines in a number of ways. The VIP consists of a dignified enclosed brick structure, concrete cover slab and pedestal, door for privacy, light exclusion to prevent flies, a pit with a cover, a ventilation pipe with fly screen leading from pit to above the level of the superstructure, and a hand washing facility (Nwaneri, 2009). As wind passes over the top of the vent pipe, it causes air to flow from the pedestal, into the pit and then up through the pipe to the atmosphere. Continual flow of air removes unpleasant odours and gas is vented through the vent pipe (Nwaneri, 2009). The advantage of this technology is that the collected wastes undergo decomposition which can delay toilet

fill up, depending on the size and use of the hole. These toilets are used across Sub-Saharan Africa, including Nairobi, Kenya; Durban, South Africa; Kampala, Uganda; and Dar es Salaam, Tanzania (Nelson and Murray, 2008; Nwaneri 2009; Still and Foxon, 2012a; b; Still and O'Riordan, 2012; Nakagiri et al, 2015).

With time, engineers developed a dry toilet technology which does not use water for flushing waste. It may be a "raised pedestal on which the user can sit, or a squat pan over which the user squats. In both cases urine and faeces fall through a drop hole" (Tilley et al, 2014)**.** Dry toilets are user-friendly for people of all ages, since squatting is a natural position in toileting for most societies. Since there is no water seal in use, smell of excreta may be a challenge, depending on treatment technology. Among the demerits of a dry toilet is that odours are normally noticeable, the excreta pile is visible (unless the household utilises a very deep pit), and flies may become a challenge without fly traps and suitable covers (Tilley et al, 2014).

A Urine-Diverting Dry Toilet (UDDT) does not use water and has a divider for diverting urine from faeces. It is constructed in such a way that urine is gathered and channelled in front, while faeces fall into a large hole in a separate compartment at the back. Depending on treatment technology, lime, ash or earth is poured into the hole for drying the excreta immediately after toileting. There are also 3-hole splitting toilets that facilitate anal cleansing water to go into a third container separate from the urine drain and faeces collection. Despite being tested and used in some global South cities and towns, such as Kampala (Uganda) and Comilla (Bangladesh), the UDDT has been resisted in some places due to clogging of faeces, resulting in the piling of excreta. Other reasons included social and cultural barriers, and the high cost of installation (Tilley et al, 2014; Tobias, 2017; Uddin et al, 2014). Tobias et al (2017) recommended the Urine Diverting Dry Toilet (UDDT) as a possible solution for a specific urban slum in Uganda, but nevertheless pointed out the resistance to these simple technologies.

The Community-Led Total Sanitation (CLTS) technology emerged in 2000 in Bangladesh by Kamal Kar. It revisits all the past approaches in the promotion of household sanitation within the context of basic human dignity and considers an individual's or a household's rights and responsibilities of living in a totally sanitised

environment. The CLTS is currently used over 60 countries in Africa and Asia to address open defecation. Participatory mapping is used to show where people live and where they defecate, transect walks are conducted to visit and stand in those places, calculations are made of quantities of *shit* (the crude local word is used) produced by each household and the community, and the participatory process ends by identifying ‘pathways to the mouth’, leading to the shocking recognition that ‘we are eating one another’s shit’. CLTS was praised for substantially increasing access to sanitation facilities in Ghana, Mali, and Ethiopia (Pickering *et al.*, 2015; Crocker *et al.*, 2017).

However, the CLTS process has been criticised for 'shaming' communities and individuals, for using coercion, for providing unsustainable incentives or rewards, for neglecting the most vulnerable and for the lack of agreed standards. In addition, CLTS is not always effective and may be most appropriate under specific settings, such as high baseline open defecation and high social capital (Chambers, 2009; Crocker *et al.*, 2017).

Then there is Ecological Sanitation (EcoSan) technology. EcoSan was abandoned in the global North in favour of “flush and discharge” designs but EcoSan technology is said to be ecologically and economically sound. As opposed to the conventional approach of ‘flush and discharge’, EcoSan does not dissolve faeces. Human excreta are first collected and then treated as a resource and not a waste. EcoSan is considered as an alternative to conventional systems (Muellegger, 2005). Despite the reported merits as sanitation infrastructure and business opportunities, the technology faces the challenges of cultural resistance on the disposal, process and reuse of the human excreta. For instance, in South Africa, there is not a culture of faecal re-use and some taboos are still alive (Abarghaz *et al.*, 2013:60). EcoSan systems present a challenge where preferences for ‘flush and discharge’ systems are pronounced’ (Jewitt, 2011b).

Despite the increase in the emergence of some innovative on-site sanitation technologies, they have not yet been scaled up for a wider implementation in urban areas, and hence not solved the core problem of sanitation in informal settlements,

and (Letema, 2011; Allen, 2010; ; IRC, 2010; Mara, 2012; Wamuchiru, 2017). Most of these technologies seem expensive and inappropriate, and even worse, some are incompatible with local values and preferences (World Health Organisation, 1987; Mara, 1996). This raises a serious concern regarding filling in the current gaps in sanitation provision in informal settlements, which requires more than technical or technological solutions. This calls for a need to explore and look at the sanitation crisis from another perspective, unearthing the multiple actors involved in the sanitation chain to work together through service co-production arrangements and its implications on city governance (Allen, Hofmann and Griffiths, 2008).

3.4. Complexities in the provision of urban sanitation infrastructure

Acknowledgement of the complexities shaping sanitation infrastructure in the global South is significant in addressing the challenges of urban service delivery particularly in informal settlements (Isunju, et al, 2011; Zakiya, 2014). Unless these complexities are considered, improved sanitation will remain a dream in most cities and towns of the South. Land ownership and tenure rights, tenancy, socio-cultural elements, as well as the politics and governance arrangements impact on the service gap in sanitation infrastructure (Allen, Hofmann, and Griffiths, 2008; Isunju, et al, 2011; Simiyu,2016). Since the literature on the complexities is only recently emerging (Akpabio and Takara, 2014; Tagat and Kapoor, 2018; Zakiya, 2014; Scott, Cotton and Sohail, 2015; Ouma, Okeyo and Onyango, 2018), there is a need to enrich the urban knowledge and shed more light on the problem by examining more cases in different geographies. Small cities in the global South, such as Arusha, provide excellent case study opportunities.

The current sanitation crisis calls for disassembling the last great taboo of the disposal of human waste. The main problems impeding the engineering solutions to poor sanitation infrastructure in the global South include interventions that prioritise ‘hardware’ but neglect ‘software’ (including socio-cultural parameters). This may have contributed to the failure of understanding why different sanitation technologies succeed or fail in different socio-cultural contexts (Black and Fawcett, 2008; Jewitt, 2011; Tagat & Kapoor, 2018; Koonan, 2019).

Even if human aversion for excreta is universal, ways of disposing of it differ both geographically and historically. These differences have evolved over time and usually reveal vital socio-cultural variations in cleansing practices as well as an evolution of toilet design in a given geographical and cultural space (Jewitt, 2010). There are many local realities and structural constraints influencing various sanitation practices which call for further investigation (Khanna and Das, 2016).

In addition, the formal sanitation sector's failures in informal settlements can also be put down to critical failures in governance, leadership and accountability. Institutional fragmentation and poor coordination between the various mandated bodies make effective action difficult (Cumming, 2009). This can be seen in weak policy formulation and institutional failures to bid for adequate budget allocations for sanitation. In short, strong champions for sanitation are often absent at both local and national levels. Across the global South, the capability of states to meet their duty to ensure effective delivery of this most essential of services, is invariably weak.

In many cities of the global South, particularly in Sub-Saharan Africa, responsibility for delivering sanitation has been decentralised to urban local government, but without the necessary financing or requisite investments in local capacity. This is compounded by the fact that financing for the sector is largely project based and often off-budget. The sector appears to be mired in a vicious cycle that thwarts progress. Donor and recipient governments alike seem unable, indeed seem unwilling, to diagnose and respond effectively to the crisis that has such clear and profound consequences for the lives of millions of children and the poor. To address the sanitation infrastructure crisis, these critical sector failings must be addressed strategically (Cumming, 2009).

3.5. Conclusion

This review has shown that infrastructure-led technological (or 'hardware') innovation has had its limitations and cannot fully address the sanitation crisis in global South. On-site arrangements in informal settlements are often done in isolation and in makeshift ways that do little to address systemic concerns. Solutions based on governance ('software') alone have also failed, as these may not take adequate account of context, social and cultural factors, local practices and on-site realities. The

two must inform one another, as it will be shown in the coming chapters. One of the concepts that attempts to bring ‘hardware’ and ‘software’ components together is co-production. It also bridges the dichotomy between formality and informality (Ahlers *et al.*, 2014). But even this may not go far enough in considering governance shifts.

The review in this chapter and the previous shows that there a need for a deeper understanding of the problems of urban sanitation infrastructure provision that households in informal settlements in the global South, face. This will be illustrated in the study of Arusha. There is further a need for an analysis of the governance apparatus and the web of relations emerging from the multiplicity of actors engaged in urban sanitation infrastructure provision. The everyday interactions of these actors demonstrate the need for a **conceptual lens** that shows the interrelationship between human and material agency as an ongoing dynamic. Once this dynamic is understood, new forms of governance that incorporate infrastructural and governance elements may be uncovered. Furthermore, research on co-production calls for a **relational lens** (Durose et al, 2018) in examining the relationships among the multiple actors involved (Allen, Hofmann & Griffiths, 2008; Sorrentino, Sicilia and Howlett, 2018).

The next chapter focuses particularly on the development of an analytical framework based on Actor-Network Theory (ANT) which forms the structure, or the scaffolding, framing this study, and will help to address the research gaps identified in Chapters 2 and 3.

CHAPTER FOUR

DEVELOPING AN ANALYTICAL FRAMEWORK THROUGH ACTOR-NETWORK THEORY

4.1 Introduction

The two preceding chapters reviewed literature related to this research and have shown the need to advance our empirical understanding of service co-production. This can best be done by exploring local realities and complexities influencing sanitation practices of infrastructure provision in urban informal settlements. The chapters also highlighted the need to investigate city governance systems amid a multiplicity of actors. In order to best examine these identified knowledge lacunae, it is appropriate to build a conceptual framework for the research.

Developing a deep understanding of sanitation infrastructure problems - the interactions between toilet users, human waste, excreta management and toilet infrastructure in informal settlements; and the relations forged by multiple actors involved in sanitation infrastructure provision - is a complex process. In order to best understand the complexity of these heterogeneous relations, a relational approach, using elements of Actor-Network Theory (ANT) has been adopted to guide the research. This theoretical frame will assist in understanding both the constituent parts of the networks as well as the co-functioning of all the parts as a whole. The object is to make sense of the whole at a city governance level.

This analytical framework is applied here as the structure, the scaffolding from which, or the lens through which, the researcher views the world or the territory to be explored; (Naidoo, 2008; Hu, 2011). It is envisaged that gaps in the knowledge identified in previous chapters will be addressed using this analytical framework. It will also guide the analysis and interpretation of the findings of the research.

The adoption of ANT in a study enables the researcher to build on the strengths and sensitivities of the approach for its analytical value (Müller and Schurr, 2016). “It can bring the tried-and-tested ANT toolbox of concepts to bear on empirical studies of the

emergence of order and disorder in a more-than-human world; it can sharpen the sense of change in socio-material relations; and it can do so in a way that is attentive to the distributed, bodily capacities of humans and non-humans alike". ANT has been employed in this thesis to help unearth and understand the web of relations between the heterogeneous actors involved in the provision of sanitation infrastructure in Arusha. This framework has informed the whole research process, the choice of methodology and the analysis and interpretation of the collected data. The subsequent sections in this chapter describe the theory and its criticisms and lays the foundation for the next chapter on research methodology.

4.2 Actor Network Theory

Actor-network theory (ANT) is a socio-philosophical approach used to examine complex socio-material settings by focusing on relational elements referred to as associations (Latour, 1996; Arnaboldi and Spiller, 2011; Müller and Schurr, 2016). Actor-networks are basically chains of relations that give rise to natural and social realities. ANT was selected for this study due to its analytical focus on unpacking complex webs of relations between households, state and non-state actors as well as the material components of these relations (Ruming, 2009). It is believed that the ANT theoretical framework is appropriate for tracing and analysing the heterogeneous and interrelated networks of human and non-human components in the sanitation infrastructure delivery chain in the selected case studies in Arusha (Callon and Law, 1989).

The adoption of ANT as a framework in urban studies is on the rise because of its key attribute of symmetrical consideration of human and non-human actors, and of social and material elements (Shelton, 2013). Under ANT, these heterogeneous elements are afforded equal analytic importance and are considered to be part of dynamic and never definitive networks, in which the understanding of sociological phenomena lies in the uncovering of associations among them (Arnaboldi and Spiller, 2011). ANT requires the researcher to trace the associations and connections among 'things that are not themselves social' (Latour, 2005; Ruming, 2009). The study of actor-networks is, therefore, the study of associations between different materials and relations through which orders and hierarchies are made and unmade and through which

society is held together and made durable. Thus, the central concern of the ANT approach is how actors mobilise, juxtapose and hold together the bits and pieces of which they are composed (ibid.). ANT's theoretical richness derives from its refusal to reduce explanations to just natural, social, or discursive categories while recognising the significance of each (Comber, Fisher and Wadsworth, 2003).

ANT is viewed as a distinct family of material-semiotic tools, sensibilities, and methods of analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located (Law, 2009). In line with this view, this study explores the web of relations of different actors involved in co-producing sanitation infrastructure provision in two informal settlements in Arusha. ANT, as an approach to inquiry, makes no specific claims about how the coming together of all these actors operates, but instead suggests specific ways to trace their activities to reveal how the co-production arrangement is established. ANT assumes that entities and their attributes are an effect of their relations with other entities, rather than inherent properties (Law, 1999; Rutland and Aylett, 2008). The succeeding sub-sections detail the key ANT concepts relevant to this research and how they impact analytically. The focus will mainly be on the following tenets: actors or actants, actor-network, agency and power

4.2.1 Actors/Actants

In ANT terminologies, the concepts of 'actor' or 'actant' are not given any specific meaning, but ANT plays with them (Mol, 2010) and they are usually used interchangeably. Comber, Fisher and Wadsworth, 2003 based on Law, 1992 explain that an actor is any entity that interacts with other actors or serves as an intermediary between actors in the established network. They further argue that both humans and non-humans are considered as actors, since any interactions between humans are facilitated through objects of one type or another. Callon and Latour, (1981) add that an actor or actant is any element that bends space around itself, making other elements dependent upon it and transforming their will into a language of its own (Afarikumah and Kwankam, 2013; Nhamo, 2006).

Moreover, Crawford, (2004) points out that an actor/actant is any agent, collective or individual that can associate or disassociate with other agents. Actants enter into networked associations, which in turn define them, name them, and provide them with substance, action, intention, and subjectivity. In other words, actants are considered to be basically undetermined, with no *a priori* substance or essence, and it is via the networks in which they associate that actants develop their nature. Actors are combinations of symbolically invested “things,” “identities,” relations, and inscriptions, networks capable of nesting within other diverse networks (ibid.).

In this study, actors and actants include toilet facilities, human waste, excreta management processes, groups of people such as households using toilet facilities on a daily basis, city officials who enforce the sanitation regulations and by-laws, or local organisations doing business with human waste/excreta disposal including the non-governmental organisations and private companies who act as intermediaries (Rutland and Aylett, 2008; Nhamo, 2006).

The term actant is used to conceptually unsettle the assumption that the capacity for intentional action is inherent, and typically only in humans. In ANT's contrasting view, to be an actor is forever an achievement, the result of forging enabling relations with human and non-human others. It is this recognition of the role of non-humans in shaping human capacities and constituting socio-natural worlds that is most often emphasised in ANT-inspired work. For instance, there would not be the emergence of a multiplicity of human actors joining efforts to address sanitation problems in Tanzania if toilet facilities and excreta management were not recognised as the centre of their coming together (Rutland and Aylett, 2008). This study aims to identify human and non-human actors involved in one way or the other in the co-production of sanitation infrastructure in the selected case study.

4.2.2 Actor-network

Informal settlement dwellers, state actors or city officials associate with non-state actors such as Community Based Organisations and local private companies, thus forming a network in which they are all made into ‘actors’ as the associations allow each of them to act on issues related to sanitation infrastructure (Mol, 2010). The

network structure assembles or brings together socio-material actors which include toilet facilities, toilet users, excreta, emptying personnel, emptying trucks, transportation, disposal site, local government by-laws, and city environmental health officials. Murdoch, (1998) notes that the formed network is essential to ANT as it obtains solid sets of relations as the means by which their world is both assembled and stratified.

In the same vein, Afarikumah and Kwankam (2013) add that an actor-network is a set of relations in which an actor constantly influences other actors, thus forming heterogeneous networks of aligned interests, including people, organisations, and standards. Further, the network resembles a series of linked points and as such a network is a web rather than a hierarchical structure. Hence, as a network expands, it is non-linear and therefore has various points of entry. Such points can be human or non-human (Foutain, 1999; Nhamo, 2006). To this end, multiple kinds of relations exist that could be 'oppositional, associative, conditional, simple, complex, ordered, chaotic, etc' (Nhamo, 2006; Fountain, 1999, p.348). With this complexity in mind, the concern of this study is to follow the actors by identifying their working and their ordering in the web, and to understand the established relations in the network of sanitation infrastructure provision in the expanded network at the city level.

4.2.3 Agency

For ANT, agency emerges from actor-network relations of human and non-human actors, where the relations perform agency (Murdoch, 1998; 2001; Odendaal, 2010; Müller and Schurr, 2016). In general terms, agency means the capacity for purposeful action, stimulated through relations and/or an interplay among the human and material actors; and cannot be established by the core properties of any individual components of the network (Sellar, 2009; Delanda, 2006). Drawing on Latour (1999, p. 182), Ren (2011) notes that agency should not be seen 'a property of humans, but rather as an association of actants'. Ren claims that even the power to act does not come only from human intentional capacity, but is rather defined through the actor's capability to engage with a network, hence bringing about certain effects. In addition, the agency of human or non-human/material actors in a network can generally be viewed as the capacity to accomplish a set of activities in a specified condition in proportion to an

intended purpose that influences and shapes the extent and nature of their participation (Engen, Brian Pickering and Walland, 2016). In his various studies, Bruno Latour (Nash, 2006) has maintained that agency is distributed among human and non-human/material actors in actor-networks.

However, agency in ANT language differs from traditional conceptions of agency, as it evolves from autonomous individuals driven by their own values and inclinations, unless constrained by other forces. Rose and Jones (2005) argue that non-human actors are equal contributors to the agency dynamic and that they have transformative capacity, hence the term actant. They draw a distinction between the attributes of human and non-human/material agency and the contribution that agency makes to network formation:

> *…Humans and machines can both be understood to demonstrate agency, in the sense of performing actions that have consequences, but the character of that agency should not be understood as equivalent. Human agents have purposes and forms of awareness that machines do not. The two kinds of agency are not separate, but intertwined, and their consequences emergent. Those consequences are also the subject of human interpretations which provide part of the context for future actions* (Rose and Jones, 2005, p.27*).*

The above arguments supporting human and non-human agency co-existence have been subjected to several critiques, mainly on non-human/material agency. Rose and Jones (2005, p.28) maintain that human agency has a number of distinctive properties that differentiate it from material agency. On the same theme, Jones (1999) asserts that material agency differs from human agency in lacking intentionality and that it is not organised around plans and goals. Cockerham, (2005, p.54) and Emirbayer and Mische (1998) further explain that human agency distinguishes itself from material agency by three remarkable features: firstly, by iteration, which refers to the selective reactivation of past patterns of thought and action; secondly, by projectivity, which constitutes the imaginative generation of possible future trajectories of action in which structures of thought and action may be creatively reconfigured, and, lastly, by practical evaluation, which stands for the capacity to make practical and normative

judgments among alternative possibilities. Giddens, (1984) argued that agency relates exclusively to human actors and that the capability to make a difference dwells within human nature.

Despite these debates and critiques and the bias in the literature towards human agency, material agency cannot be totally discounted. It is acknowledged here that human actors are able to decide, consciously or otherwise; an ability that material or non-human actors do not possess. Human and material actors both exhibit agency, in the sense of performing actions that have consequences, but their characteristics are not the same. Human agents have purposes and forms of awareness and that machines do not. The two kinds of agency are not separate, but intertwined, and their consequences emergent.

4.2.4. Power

Power is among the central concerns for ANT theory. Power is "effected through the production and reproduction of a network of heterogeneous 'actants'" (McLean and Hassard, 2004, p.493-519) and is thus a relational outcome within actor-networks, invested mainly in associations. In a resource-scarce context, the relationship between governance structure and power can potentially influence the outcome of a network relationship in ways contrary to its original intention (Odendaal, 2010; 2012). Odendaal argues that tracing the genealogy of networks can reveal the development of power relations over time. In Foucauldian thinking, power is relational (Foucault, 1982; Allen, 2003; Edkins and Pin-Fat, 2005).

The relational ties broadly speaking take two forms of *power*: *instrumental power* (or *power over*) and *associational power* (or *power to*) (Allen, 2003; Berger, 2005; Florczak, 2016). In Hawks' view *power over* is different from *power to,* although both are goal-oriented (Florczak, 2016 citing Hawks, 1991). *Power over* relations refer to a dominance model where decision making is characterised by control, force and instrumentalism. This kind of power is held over someone or group of people and it is used to obtain leverage. It may also involve influence. Influence is seen as a strong form of power in that there is control over others so that they obey or conform.

Whereas *power to* relations reflect an empowerment model where dialogue, inclusion, negotiation, and shared power guide decision making. This type of power acts more like a collective medium, enabling things to get done or facilitate some common aim (Berger, 2005; Florczak, 2016).

In the instrumental view, power is conceived as capacity and it reflects domination. Domination as a mode of power conveys a sense that the state possesses the capacity to impose their will on others in a variety of situations. In that case power is conceived as a vertical relationship; power is something that is held over others. The structural nature of 'power over' others reveals asymmetries in the unequal distribution of power in the society. Allen (2003, p.26) says that "relations of domination and subordination comprise a subset of power relations, where the capacity to act are not distributed symmetrically to all parties to the relationship". This means that some people and some groups have more power than others, by virtue of the structure of relations of which they are a part. Once the language of command and obey, ruler and ruled is taken to be the defining feature of the domination, then the parties tied to one another are unequally related (Allen, 2003).

Spatial relations of power provide useful entry points for understanding the interface between institutional decision-making, relations of capital and local experience of the sanitation infrastructure issues in informal settlements in the city of Arusha. Where ANT would define power as an outcome of resource mobilisation represented in institutions that seemingly 'hold power', a Foucauldian perspective would argue that power is an outcome of discourse formation that is deepened and translated through institutions and disciplines (Allen 2003; Odendaal 2010). The production of power within and by institutions and disciplines is a critical contribution of Foucault's work. The circulation of power beyond and between these entities is explored by ANT (Allen 2003; Odendaal 2010; Murdoch 2006). The spatial vocabularies of power here is of centres, distributions, extensions and delegated capabilities. In case of this research, the state is viewed as the central actor that guarantees urban infrastructure and service delivery through the distribution of powers to elites and bureaucratic

institutions, mainly urban local governments and public utilities and thus contain society within its territorial boundaries (Allen, 2003).

With the emergence of co-production and a multiplicity of actors in urban infrastructure and service delivery, power is no longer seen operate in either a top-down or a centre-out fashions, but rather upwards and downwards. The playing field is now shared between state and non-state actors. In this more complex geography, power is largely about the reorganisation of scale in so far as it is redistributed to take account of proliferating sites of authority and reordered boundaries. There is a redistribution or shift in capabilities between the different levels of governance. Above the nation state, various non-state actors are currently seen to exercise their influence over the actions of those within their realm, reaching down in many areas directly the lives of those 'on the ground' (Allen, 2003). It is the interest of this research to explore how this shift is happening in Arusha.

Foucauldian analysis gives a useful account of the ubiquity of power; the distribution and creation of power requires a departure from the dichotomous approach that either sees power unified in domination, or in its strategic operations in conflict (ibid.). Power can be stored, it has capacity; it can change and translate as an effect or product (Odendaal 2010; Law, 1992). Callon, (1986) adds that it is the capacity to uphold and to stabilise a network that characterises a strong or powerful actor. ANT considers humans and non-humans as equally endowed with the power to act. In light of this, sanitation infrastructure is an actor since it has been endowed with the ability to act through its position in the network (Holmstrom and Stadler, 2001, p. 201). The main interest of this study is to analyse power relations of actors in ensuring that sanitation infrastructure works for the informal dwellers in Arusha.

4.2.5. Criticisms on ANT

It is suggested that the key to ANT's success lies in its "habit of failing to forge its own internal and external boundaries" (Lee and Hassard, 1999, p. 392). Despite its apparent success, there have been a multitude of critiques of ANT. Gad and Jensen, (2009) observe that since the 1980s the concept of ANT has remained unsettled, and that ANT has continuously been critiqued and hailed, ridiculed and praised. The

following section presents some of the areas of critiques directed at ANT in the literature.

One of the important criticisms of ANT is derived from its assumption of conferring symmetry between the human and non-human aspects in the actor-network (Naidoo, 2008). The main critique is that human beings have been reduced to the same status as non-sentient objects or things and machines or devices. Several critics dispute that considering the assemblage of all actors as equal is problematic: not all actors are equal; some exercise a stronger power than others. However, human qualities such as emotions, which play a vital role in human activity, seem to be lost (Naidoo 2008). ANT is also criticised for the way in which it gives little or no attention to the broader powers and inequalities that are both the condition and consequence of network formations (Naidoo 2008). Latour's (1999:197) counter-argument is that critical theorists rely too much on inequalities of the social.

ANT is also speculated to be more of a method for describing than explaining (Naidoo citing Bloomfield and Vurdubakis, 1999). Nevertheless, Latour (1999) argues that ANT does not claim to explain the actor's behaviours and reasons, but only to find the procedures which render actors able to negotiate their ways through one another's 'world-building' activity. In other words, ANT was never intended to explain the behaviour of social actors, but in a much more ethnographic sense be a way for researchers to study what, how and why actors behave the way they do. ANT did not claim to explain this behaviour by all kinds of exterior forces unknown to the actors themselves (McLean and Hassard, 2004).

The position of the researcher has been seen as another point of critique on ANT. The role of the researcher in tracing actors, defining passage points, scoping the actor-network, describing or telling the story and so on is very influential, and this can affect the results that an ANT study delivers (McLean and Hassard, 2004; Naidoo, 2008). The researcher enters the study with his or her own theoretical backgrounds, ideas and preconceptions (Naidoo, 2008). A way to deal with this critique is to adopt a more reflexive approach towards the researcher within the study. Monteiro, (2000, p. 76)

argues that ‘employing ANT still requires a researcher to make critical judgements about how to delineate the context of study from the backdrop, that is, the researcher should be critical in his or her labelling of actors and in the analysis in general, thereby being guided by the actors themselves.

A few issues are highlighted by Monteiro (2000) regarding ANT. These include that unpacking a network will cause an explosion in terms of complexity, as each actant can potentially be expanded into another whole actor-network. Furthermore, ANT does not specify how to delineate one actor-network from the next (Naidoo, 2008; Monteiro 2000). Despite these criticisms, ANT still provides a better possibility of understanding urban sanitation infrastructure problems and the co-production processes in the delivery chain in informal settlements of Arusha. This is because of its relational robustness and the practices and nature of co-production activities in Arusha. ANT is well suited to guide this research, given the nature of the research problem and the approach adopted.

4.3 Conclusion

The chapter has described ANT as the analytical framework of this study. Though still nascent theory in urban planning studies, the discussion in the chapter has shown that ANT has already demonstrated strong potential in urban research. The description of the frame will help to advance our understanding of the current practices of co-production processes and governance challenges in urban service delivery in the case study areas. The chapter has shed light on how the entire research process should be carried out and the way the data should be collected and analysed. The chapter has opened up the way on how methodology should be developed. The following chapter therefore explores this further.

CHAPTER FIVE

METHODOLOGY FOR UNDERSTANDING RELATIONS, GOVERNANCE AND CO-PRODUCTION ARRANGEMENTS IN URBAN SANITATION INFRASTRUCTURE PROVISION

5.1 Introduction

This chapter outlines the methodological approach taken in this study as it sought to address the research questions presented in Chapter 1. The chapter begins by explaining the philosophical stance guiding the choice of the methodology and goes on to justify the adoption of the case study method and the selection of the cases. The chapter further discusses the methods and tools employed in collecting data, as well as the sampling techniques used for selecting respondents during the fieldwork. The issues of reliability and internal validity in field research are discussed, and ethical considerations are shown. Before the conclusion of the chapter, there is a reflection on the research process and limitations of the methodology.

5.2 Philosophical stand

Scientific knowledge is based upon empirical evidence, derived from the acquisition of experience. If urban research is to account for anything about the real world, it must be empirical; that is, it must count on practices, experiences, facts and observations from the field (Kyessi, 2002). Research is undertaken with the aim of generating knowledge necessary for practitioners to better understand their own environment and themselves. Such generated knowledge makes it possible to explain, predict and understand the empirical phenomena that interact with the reality in which we live (Kasala, 2013). For Scott, (2010), research is a systematic process of inquiry with the aim of creating new knowledge. Scott adds that in undertaking research, a guiding strategy is needed to ensure consistency; and appropriate methods and techniques are selected to address the research questions or objectives of the study. For that, Holden and Lynch (2004) advise that research should not be methodologically led, but rather that methodological choice should be consequential to the researcher's philosophical stance and the social science phenomenon to be investigated. They add that a philosophical review can have a dual effect on researchers: (i) it may open their minds to other possibilities, therefore enriching their own research abilities; and (ii) it

can enhance their confidence in the appropriateness of their methodology to the research problem which, in turn, enhances confidence in their research results. Holden and Lynch maintain that a philosophical position allows researchers room to match their philosophical perspective, methodology, and the problem at hand (Holden and Lynch, 2004).

Further, Guba and Lincoln (1989 in Lupala, 2002) emphasise that philosophers should ask themselves three types of questions when trying to understand how they come to know what they know. The *ontological* question focuses on what is there to be known, what is the nature of reality and what is truth. The *epistemological* question tackles the relationship between the knower and the knowable; what kind of knowledge can be obtained; how it can be validated; and what distinguishes knowledge from opinion. The *methodological* question deals with what are the ways of finding out knowledge, that is, how can we go about finding out things? Mazeau, (2013) argues that through the evolution of social sciences, several research philosophies have been developed which support different visions of how social realities should be approached. Names and definitions of the different philosophies differ from one author to another, and these philosophies also overlap. Two of these are described in the next sections, mainly ontology and epistemology.

Al-Saadi (2014) refers to ontology as the study of ‘being’ and is concerned with the nature of existence and structure of reality: what it is possible to know about the world. Holden and Lynch, (2004) add that ontology relates to the nature of reality, that is, what things, if any, have existence or whether reality is “the product of one’s mind” (Burrell and Morgan 1979, p.1 in Holden and Lynch, 2004).

Victor Jupp (2006), looking at ontology from a social research perspective, defines ontology as a concept concerned with the existence of, and relationship between, different aspects of society such as social actors, cultural norms and social structures (see Al-Saadi, ibid.). In the social research context, therefore, ontological issues are concerned with the kinds of things that exist within society, such as our surroundings or infrastructure and services. In the context of this study, an ontological perspective

allows the understanding of the everyday practices and experiences of actors on sanitation infrastructure in informal settlements.

Epistemology is referred to as the study of the nature of knowledge (Holden and Lynch 2004). It is concerned with “the nature, validity, and limits of inquiry” (Rosenau 1992). Generally, epistemology concerns the assumptions made about the kind or the nature of knowledge (Al-Saadi, 2014 citing Richards, 2003). For Crotty (1998), epistemology is a way of looking at the world and making sense of it. It involves knowledge and, necessarily, it embodies a certain understanding of what that knowledge entails. He further explains that epistemology deals with the nature of knowledge, its possibility (what knowledge is possible and can be attempted and what is not), its scope and legitimacy. Similarly, but with a particular reference to the contrasting views about how natural and social worlds should be studied, epistemology as “an issue, concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline” (Al-Saadi, 2014, p.13). Thus, for this study, epistemology helps in uncovering the relational roles of actors and the networks formed in the co-production process.

The underlying philosophical position of this study is pragmatism: it focuses on the research problem and uses pluralistic approaches to derive knowledge about the problem under investigation (Creswell, 2014; Creswell and Creswell, 2018). Pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as different forms of data collections and analysis. As Biesta, (2015), indicates, pragmatism offers a very specific view of knowledge, one claiming that the only way we can acquire knowledge is through *the combination of action and reflection.*

Given the very practical nature of sanitation infrastructure as a real-world problem in informal settlements and the co-production arrangements that emerge as a consequence of the failure of city governments, pragmatism seems a good fit for this study. Pragmatism encourages the adoption of mixed-method approaches (Ragab and Arisha, 2017; Creswell and Creswell, 2018; Creswell and Plano Clark, 2018) and is chosen as the philosophical paradigm of this study.

5.3 Research Methodology

“Methodology is the strategy, or design, lying behind the choice and use of particular methods and links the choice and use of methods to the desired research outcomes. It really is a sort of ongoing reflectiveness or thoughtfulness in doing research” (SAGE, 2017, no page) More than this, methodology is the way to systematically answer a research question (Kothari, 2004) and sets out the system of practical and explicit rules and procedures upon which research will be based and against which claims for knowledge will be evaluated (Nachmias and Nachmias, 1996 in Lupala, 2002). While ontology (what there is to be known) and epistemology (the theory of knowledge, methods and validation) guide the approach to research, pragmatism has also informed the methods used, which include case studies and convergent mixed methods.

5.3.1. Research approach: Mixed methods research

Traditional research was categorised into either qualitative or quantitative methods. Mixed research methods encourage the researcher to use both. By doing so, the researcher is provided with “multiple ways of seeing and hearing, multiple ways of making sense of the social world, and multiple standpoints on what is important to be valued and cherished” (Creswell and Plano Clark, 2018, p. 4). In using mixed methods, the researcher is able to mix or combine “ quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” (Johnson and Onwuegbuzie, 2004, p.17). These authors hold that by using mixed methods, the researcher will be more inclusive, pluralistic and complementary, adding that mixed methods research legitimises the use of multiple approaches in answering research questions, rather than restricting or constraining researchers’ choices (when using either qualitative or quantitative methods). Kitchenham states that "Mixed methods research works well for case study research as it allows the researcher to take the rich empirical data yielded from case studies and apply either quantitative or qualitative methods to the data” (Kitchenham, 2010, p.562).

Indeed, a mixed approach brings together the best of what the qualitative approach offers in terms of rich and deep data collection, with what the quantitative approach offers in analysis and presentation of data. As it does so, it is able to remove the

biases that can occur when using one or the other method on its own. It is objective, seeks facts of social phenomena and replicable data in the form of numbers to be quantified to assume a stable reality (Blaster *et al,* 2005). Furthermore, quantitative approaches may be applied to increase the possibility of making limited generalisations, thus increasing validity and reliability of the research findings (Nachmias and Nachmias 1996; Kasala, 2013; Yin, 2004, 2009).

5.3.2. Research designs: Case study method

The research design, also called a package of methods (Laws, et al., 2003 in Mazeau, 2013) or the strategy of inquiry (Creswell and Creswell, 2018) is the general strategy for the investigation. More simply, Robert Yin says that a research design is a "*logical plan for getting from here to there"* (Yin, 2014, p.28). He explains that the word "*here"* is used to mean the initial set of questions to be answered, while the word "*there"* means a set of conclusions about these questions. Several major steps are found between "*here"* and "*there"* and these include data collection, analysis, reporting and discussion of the findings. The choice of the research design aims to fit the aim and the research objectives of the study, for that reason, this study has employed case study design as the main methods guiding the whole research process ((Yin, 2009; 2014; Creswell and Creswell, 2018).

An investigation of the sanitation infrastructure problems faced in urban areas of the global South requires a method "of thoroughness, richness, completeness and variance" (Flyvbjerg, 2006, pp.219-245). It is believed that a case study approach is most suited to such an investigation. This is because of the features of the method itself, explained by Patton (1987) as follows:

> *Case studies become particularly useful where one needs to understand some particular problems or situations in great depth, and where one can identify cases rich in information – rich in the sense that a great deal can be learned from a few exemplars of the phenomenon in questions.*

The nature of the research questions for this study requires a close and detailed examination of issues surrounding the co-production processes and governance of

sanitation infrastructure in Arusha, which makes the case study method particularly appropriate. Robert Yin cites a case study as “an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2009, p.18)”.

With the goal of contributing to the scientific body of knowledge on city governance in the global South (by developing a deep understanding of the co-production process in sanitation infrastructure provision in informal settlements of Tanzania), this study makes solid suggestions in the search for durable solutions to the problem under study. To do so, concrete and context-dependent experience must be at the centre of this research. Since the primary interest was to develop a deep understanding of local sanitation infrastructure problems, the investigator interviewed household members who are the dwellers in two informal settlements, and documented the conditions of the sanitation facilities used on an everyday basis for the disposal of human excreta and de-sludging or emptying methods involved. This in-depth case study approach was adopted to get close to the subject matter and the communities concerned; to overcome what Flyvbjerg (2006) called ‘a stultified learning process, which in research can lead to ritual academic blind alleys, where the effect and usefulness of research becomes unclear and untested’. The case study method s provides room to use a full range of data collection methods that allow data triangulation to avoid potential problems of validating information (Yin 2009; Creswell and Creswell, 2018).

The choice of the case study method is not made in ignorance of its limitations and critiques. One such critique is that it provides little basis for scientific generalisation from a single case (Yin, 2009). This thesis will add to the generalisability of the case study by adopting two major techniques: (i) strategically choosing the cases under study and (ii) by aiming at analytic generalisation rather than particular analysis (Yin, 2009; Flyvbjerg, 2011).

In addressing the critique regarding the generalisability of a single case, Flyvbjerg (2006, pp.219-245) argues:

> *One can often generalize on the basis of a single case, and the case study may be central to scientific development via generalisation as supplement or alternative to other methods. But formal generalisation is overvalued as a source of scientific development, whereas "the force of example" and transferability are underestimated.*

Another critique concerns the lack of rigour of case study research. As recommended by Yin (2009), data was carefully collected by systematically following the set research procedures, and by managing the equivocal evidence or biased views which influence the direction of the findings and conclusions. Fairness and objectivity in reporting findings from the field were highly considered.

5.3.3. Selection of the main case study

Arusha city as the main case study area and geographic context

Arusha city was selected as the main case study of this research as it provided a rich source of data for understanding governance challenges, socio-cultural complexities and co-production processes in sanitation infrastructure provision in informal settlements. As argued by Duminy, Watson and Odendaal (2014) "developing an understanding of complexity requires detailed knowledge, which in turn requires a large amount of data and intensive analysis".

Arusha is on the southern slopes of Mount Meru and is located approximately 50 km west of Mount Kilimanjaro, the highest peak in Africa, along the great northern road, and halfway between Cape Town (South Africa) and Cairo (Egypt). Its absolute position lies between latitude 2° and 6° South and longitude 34.5° and 38° East. Arusha has marginal status in scholarly and policy-related research, when compared to Dar es Salaam, the prime and largest city in the country.

Yet Arusha is one of the cities with growing political and urban management challenges in Tanzania. Other major towns with city status are Dar es Salaam, Mwanza, Tanga and Mbeya. Arusha is the third largest city after Dar es Salaam and

Mwanza respectively; and is currently home to 416,442 people (National Bureau of Statistics, 2013). It covers a total area of 208 km^2 (Arusha City Council and Space and Development Company, 2012). The city is the commercial hub of the northern and eastern parts of the country and hosts several small and medium sized industries, the headquarters of the East African Community, the International Criminal Tribunal for Rwanda, and several other international organisations and corporations. Arusha is also famously known for its tourist attractions. This comparative advantage triggers not only rural-urban migration of young people, but also regional mobility of the workforce.

As a secondary city, Arusha is already absorbing the lion's share of urban population growth in Tanzania and is anticipated to face more urbanisation challenges, particularly related to infrastructure services in informal settlements (UN-Habitat, 2010; Namangaya, 2014). Unfortunately, the increase in urban population overwhelms the existing Arusha city government's capacity to provide surveyed and serviced land, housing and other basic infrastructure and services (UNFPA, 2007; UN-Habitat, 2006). Instead, people acquire land informally and/or rent houses from locals who own land under customary tenure arrangements and develop it outside urban planning laws and regulations, hence the proliferation of informal and unplanned settlements. Arusha also presents some complex urban management challenges, such as sanitation infrastructure, which are under-researched. Eighty-six per cent of its city residents are currently living in informally developed settlements (Namangaya, 2014), 48 per cent use traditional pit latrines (National Bureau of Statistics, 2013) only 7.6 per cent of residents are connected to the city sewerage network (AUWSA, 2016) and there is a presence of non-state actors involved in sanitation co-production (Kumar, 2015; Kessy and Mahali, 2016).

5.3.4. Selection of cases and units of analysis

There is no direct demarcation between what constitutes a case and a unit of analysis, despite the case study research method being in use for decades (Grünbaum, 2007). With enlightenment from other scholars (Flyvbjerg, 2006; Grünbaum, 2007; Yin, 2009; 2014;), the next subsection delineates criteria for the cases that were selected for in-

depth study of urban sanitation infrastructure provision in Arusha and their main units of analysis.

Selection of cases

A case can be referred to as any study object which is similar to the unit of analysis. The decision regarding what constitutes a case remains in the authority of the investigators to choose anything to help them in exploring the designed research questions, and methodically analyse and compare the findings (Grünbaum, 2007). The major utility of a case is to facilitate the researcher's understanding of what he or she is studying. Thus, a case is utilised to achieve some sort of overall understanding of the research purpose (Grünbaum, 2007). Flyvbjerg (2011) points out that the strategic choice of case may greatly add to the generalisability of a case study.

Patton (1987) adds that case studies should be rich in information. He describes them as… "those from which one can learn a great deal about issues of central importance" (ibid. p.52). Putting an emphasis on the significance of picking an information rich case, Duminy citing Stake (1995) advises that "Often it is better to learn a lot from an atypical case than a little from a magnificently typical case*"* … (ibid. p. 243). In identifying the cases, investigators are advised to select cases that are information rich and adequately suited to answering the research questions. In Tanzanian cities and towns, government administration is divided into administrative wards. Therefore, the ward has been considered as the suitable 'case' for understanding the issues surrounding sanitation infrastructure. (Section 6.3.2 of Chapter 6 elaborates more on the place of a ward in Tanzanian urban government system).

Furthermore, using a single case for intensive analysis of governance challenges, socio-cultural complexities and co-production processes in sanitation infrastructure in the city of Arusha was not considered sufficient. Thus, a multiple case study design was adopted to supplement and make findings robust (Yin, 2009, p.53-63). The adoption of multiple case design was not only for comparison purposes, but specifically for a better understanding of the main case study (Duminy et al 2014). For that, two administrative wards were selected as they were deemed appropriate for this study, and these are Sombetini and Baraa. These two cases were purposively and

carefully chosen with the aim of making a stronger case study of the city of Arusha. Sombetini ward, hereby referred to as Case 1, was selected for its proximity or closeness to the Arusha Central Business District, with high population and land use density, high water table level, and high usage of onsite sanitation infrastructure. Sombetini has a population of 48,268. By contrast, Baraa ward, referred to as Case 2, was selected for its peripheral location, low population/land use density with a population of 12,498, the majority of whom use also onsite sanitation facilities (National Bureau of Statistics, 2016b).

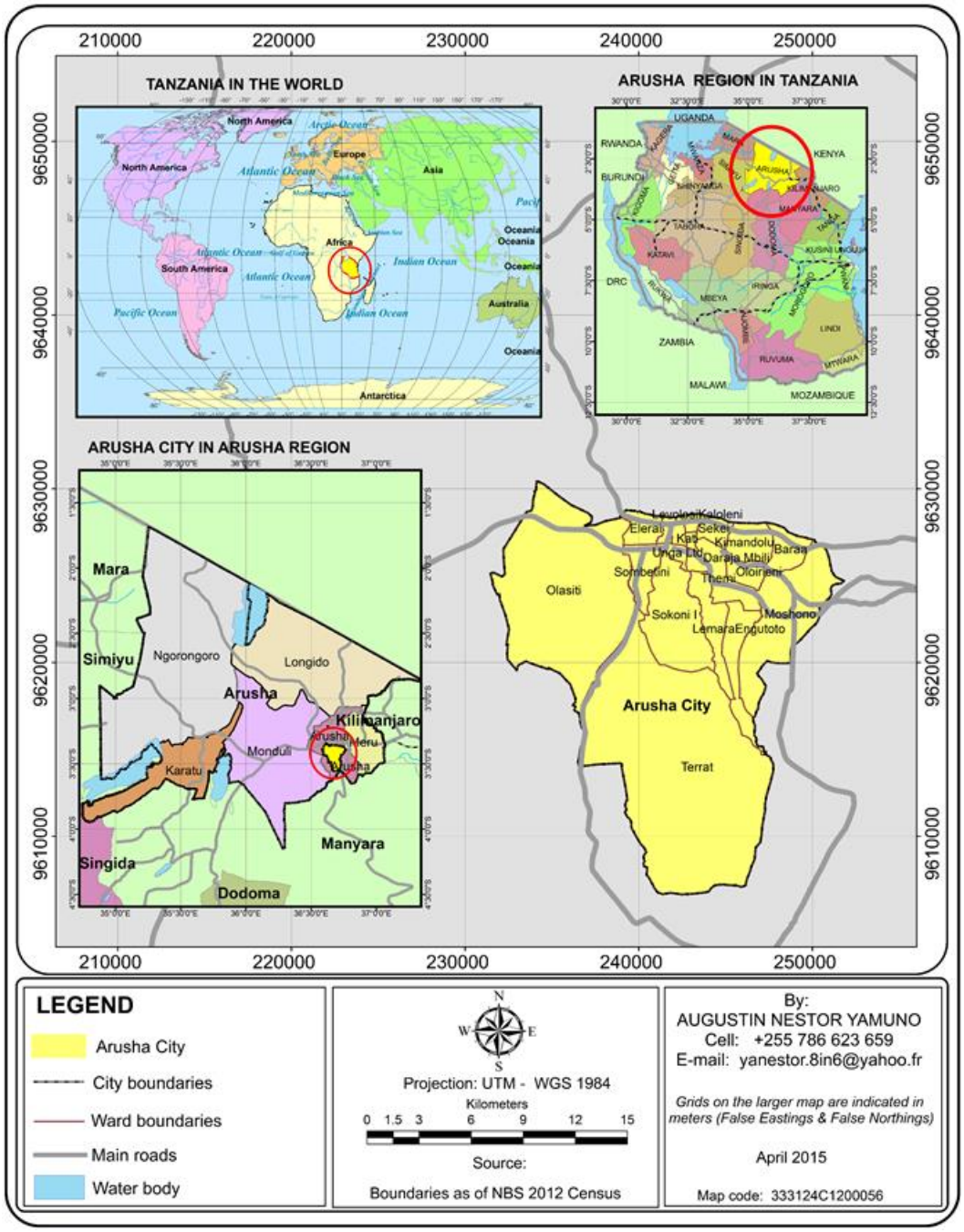

Figure 5. 1: Location of the case study: Arusha city
Source: own construct (with help from Augustin Yamuno, 2015)

Units of analysis: toilet facilities

The unit of analysis defines what this case study is focusing on, such as an individual, a group, an organisation, a residential property, a neighbourhood, or a city depending on the level and the purpose of the main study; (Grünbaum, 2007; Yin, 2014; Duminy et al, 2014). The unit of analysis is considered to be the "heart" of the study itself and is "identical with the knowledge that key informants can provide the researcher with" Grünbaum, 2007). For this study, the toilet facilities within Sombetini and Baraa informal settlements in the city of Arusha were considered as the units of analysis for this study. The main reason for selecting toilet facilities is for a deeper understanding of the complexities and examining disaggregate data on co-production processes in the entire sanitation supply chain: containment, emptying, transport, and disposal of human excreta. Toilet facilities are the 'heart' of this research.

5.3.5. Sampling techniques and process

The choice of sampling techniques occurs simultaneously with the design of research strategy and data collection methods (Kothari, 2004; Bradley, Curry and Devers, 2007). Miles and Huberman (1994) advise that "a researcher has to make decisions about certain phenomena that need to be followed up, to be observed and learned more about" (ibid. p.29). Therefore, fieldwork conditions and circumstances dictate that the investigator selects the setting and phenomena of interest as a fundamental aspect of the study that serve as a guide in further investigations (Kasala, 2013). Furthermore, the nature of the research problem and questions set in Chapter 1 determined the choice of respondents.

The process of selecting respondents at city and ward levels and other institutional actors presented a challenge. Purposive and multi-stage sampling techniques were employed in facilitating the selection of respondents. Purposive sampling, as non-probability method, was useful in selecting respondents based on their duties and responsibilities in the urban sanitation chain. The respondents were selected as follows:

- From the Arusha city council, respondents were selected from Health Department, in the Environmental Health and Sanitation section,

- From the Arusha Urban Water Supply and Sanitation Authority (AUWSA), in the department of Sewer Engineering,
- Pit emptying operators, and
- From an active local NGO/CBO: mainly Federation for the Urban Poor/ Centre for the Community Initiatives

In addition, a multi-stage sampling method fit best in selecting household interviewees from the ward and sub-ward levels. During the fieldwork, multi-stage sampling involved the process of sampling in phases and used a combination of sampling techniques. In this case, stratified and simple random sampling techniques were utilised as part of multi-stage techniques. With the aid of sub-ward leaders, information on the administrative subdivisions of each ward was collected first, then randomly selected respondents were interviewed in each of the sub ward throughout the process (Nachmias and Nachmias, 1996).

5.4. Research methods: data collection and fieldwork process

In 'casting the net wide' as advised by Duminy et al (2014), multiple sources and data collection methods were used in combination with triangulation techniques and feedback procedures for promoting the accuracy of the data and interpretations (Duminy et al citing Patton, 1987; Stake, 2006, pp. 33–38). Triangulation is a technique whereby two or more sources of data or methods are used, as a way of 'cross-checking' the accuracy and reliability of findings. By triangulating data, the aim was to provide "a confluence of evidence that breeds credibility" (Bowen, 2009 citing Eisner, 1991, p. 110). The examination of the collected information through diverse methods was helpful in corroborating findings across data sets and thus reduced the impact of potential biases. According to Patton, (1999), triangulation helps to guard against the accusation that a study's findings are simply an artefact of a single method, a single source, or a single investigator's bias. Data collected from household surveys were particularly supplemented and cross-checked with focus group discussions, document analyses, and interviews. Photographing and mapping were used for visual illustrations of toilet facilities and preparing location maps (Creswell 2014; Yin 2009; Duminy et al, 2014).

Data collection and fieldwork process were carried out in two major phases where quantitative (household surveys) and qualitative data (interviews and focus group discussions) were collected separately. Before the data collection exercise, a reconnaissance of the area of study was undertaken and discussions were held with Arusha city environmental and sanitation officials regarding the research project early 2014. During the same period, a pilot study was conducted to test the data collection instruments. The discussions with Arusha city sanitation officials helped in choosing the rich cases for in-depth study and household surveys and polishing the data collection instruments. Phase one, household surveys, was carried out between June and September 2014. Then phase two, which consisted of focus group discussions with community leaders in each of the wards separately, followed immediately with key informant interviews with city sanitation officials in February 2017. The second phase was conducted after running preliminary descriptive statistical analysis of the household surveys using Statistical Package for Social Sciences (SPSS) version 22. Documents were analysed throughout the process of data collection. All the data collection instruments were in Kiswahili, the national language spoken by everyone at least in the urban areas of Tanzania. The following sub-sections present each method and sources separately in detail.

5.4.1. Primary Research: Household surveys

As part of the case study method, household surveys were conducted to collect statistical data in the two selected cases of Sombetini and Baraa wards. Kitchen and Tate (2000, pp.47-48) cited in Silver, 2013, p.73 define a survey as:

> *A study which seeks to generate and analyse data on a specific subject from a particular sample population... In general, surveys use questionnaires to generate quantitative data from which they can calculate statistical information.*

A designed questionnaire was administered to 254 households of which 150 were in Sombetini and 104 in Baraa. Of these respondents, 72.4 per cent were women and 27.6 per cent were men (refer to Tables 5.1 and 5.2). The investigator was assisted by four research assistants (two male and two female) graduates of the Geography department at Mount Meru University in Arusha, Tanzania. The research assistants or enumerators received an induction and training on the use of the survey instruments

and participated in the pilot study. Each ward was officially divided in a number of sub-wards. Baraa ward is divided in four sub-wards: Solenyi, Kiroshi, Ofisini and Kwamrefu, while Sombetini ward is divided in five sub-wards: Kirika A, Kirika B, Osunyai, Olmoriak and Simanjiro. The four members of the research team were allocated in each sub-ward where households were randomly selected on condition that the respondent was the head of the household or an adult household member, or a tenant who has resided in the household for at least 12 months.

Surveys at Sombetini and Baraa focused on:

- property occupancy, land ownership and tenure;
- availability or coverage of sanitation facilities and water supply;
- existing human excreta-management practices
- part of the complexities shaping sanitation infrastructure

S/N	Name of the case	Number of households/ Respondents	Data collection methods used	Sampling techniques
Case 1	Sombetini ward	150	Questionnaires	Multi-stage
Case 2	Baraa ward	104	Questionnaires	Multi-stage
Total		254	-	-

Table 5. 1*: Household surveys and methods*

Ward			Frequency	Percent	Valid Percent	Cumulative Percent
Baraa	Valid	Male	29	27.9	27.9	27.9
		Female	75	72.1	72.1	100.0
		Total	104	100.0	100.0	
Sombetini	Valid	Male	41	27.3	27.3	27.3
		Female	109	72.7	72.7	100.0
		Total	150	100.0	100.0	

Table 5. 2 *Gender of respondents*

5.4.2. Primary Research: Focus group discussions

Focus group discussions have been defined as a “group of individuals selected and assembled by researchers to discuss and comment on, from personal experience the topic that is the subject of the research” (Silver, 2013, p.72 citing Powell et al, 1996: 499). Silver citing Krueger (1994, pp. 10-11) defines a focus group discussion as follows:

> *The focus group interview taps into human tendencies. Attitudes and perceptions relating to concepts, products, services or programs are developed in part by interaction with other people. We are a product of our environment and are influenced by people around us.*

The above definition by Krueger in Silver emphasises that focus groups rely on the interaction within a group to elicit rich experiential data. The method was very important in collecting data on socio-cultural issues and sharing sanitation infrastructure as these could not be well documented through questionnaires. Through group discussions, participants or community members shared their varied and shared experiences and views on the topic as shown in Figure 5.2. Similarly, Kitzinger (1995, p. 299 cited in Webb and Kevern, 2001) writes that:

> *The idea behind the focus group method is that group processes can help people to explore and clarify their views in ways that would be less easily accessible in a one to one interview… When group dynamics work well the participants work alongside the researcher, taking the research in new and often unexpected directions.*

In identifying individuals or participants of the group discussions, the ward executive officers from each of the two cases (wards) were asked to invite all the sub ward leaders, at least two ten-cell-unit leaders, two religious leaders (a pastor or a priest and Sheikh or Imam), two tenants, two landlords and one youth representative. Gender was also considered as women were represented in the discussions. The selected community members were believed to have history of the area and knowledge of sanitation issues (Silver, 2013, p.72 citing Kreuger and Casley, 2002;

75). The two focus group discussions conducted in Swahili language and facilitated by the investigator himself with the assistance of the two of the research assistants (one took notes and another one acted as time keeper). At the end of each focus discussion, participants were given drinks and bites as acknowledgement of their time and participation.

Figure 5. 2: Participants of Focus group discussion in Baraa ward
Source: Fieldwork, 2014

Figure 5. 3: Participants of Focus group discussion in Sombetini ward
Source: Fieldwork, 2014

5.4.3. Secondary Research: Document analyses

Documents are 'social facts' produced, shared, and used in socially organised ways (Bowen, 1997). Glenn Bowen stresses that documents contain text or words and images that have been recorded without an investigator's intervention. The documents analysed in this study included Tanzanian national policies and laws, country and city level reports on sanitation, Arusha city by-laws, NGO reports, and previously published studies. All the documents reviewed and analysed for this research related to sanitation infrastructure provision.

The process of document analysis necessitated a systematic procedure for reviewing both printed and online or electronic literature. The data retrieved from the various documents were examined and interpreted to produce meanings, gain understanding, and develop empirical knowledge (Bowen, 1997 citing Corbin & Strauss, 2008). Document analysis was used in combination with other qualitative research methods

as a means of triangulation -" the combination of methodologies in the study of the same phenomenon" (Denzin, 1970, p. 291 cited in Bowen, 1997). The aim was to draw upon multiple sources of evidence as dictated by case study research and to seek convergence and corroboration using different data sources and methods.

5.4.4. Primary research: Photographing and mapping

Photography and mapping constituted important supporting data collection methods that supplied a complementary means to collect information on geographic data and urban sanitation infrastructure in the city of Arusha. Photographs of state-of-the-art of toilet facilities were taken with permission of the owners or users. Collier and Collier (1986 cited in Silver, 2013) observe that:

> *Photography is an abstracting process of observation but very different from the fieldworker's inscribed notebook where information is preserved in literate code. Photography also gathers selective information, but the information is specific, with qualifying and contextual relationships that are usually missing from codified and written notes. Photographs are precise records of material reality (Collier and Collier,1986, p.10).*

Geographic data were manipulated and analysed through Geographical Information System (GIS) Software, particularly ArcGIS, to produce location maps for the study areas and the position of Tanzania in the world.

5.4.5. Primary Research: In-depth interviews

An interview has been referred to as "a conversation, whose purpose is to gather descriptions of the 'life-world' of the interviewee" concerning the interpretation of the meanings of given phenomena" (Alshenqeeti, 2014: pp.40-41). An interview can further be defined as an extendable conversation between an investigator and a respondent that aims at digging out 'in-depth information' on a specific issue, and through which a phenomenon could be interpreted in terms of the meanings that interviewees extract from it (Alshenqeeti, 2014:40-41 citing Schostak, 2006:54).

Hofisi, Hofisi and Mago, (2014: 60) note that:

> *At its heart, … an interview is a form of discourse. Its particular features reflect the distinctive structure and aims of interviewing, namely, that it is a discourse shaped and organized by asking and answering questions. An interview is a joint product of what interviewees and interviewers talk about together and how they talk with each other. The record of an interview that we researchers make and then use in our work of analysis and interpretation is a representation of that talk.*

The personal perspectives, experiences, and views on urban sanitation infrastructure and socio-cultural realities in Arusha were gathered through one-on-one in-depth interviews with purposively selected respondents. These included: three Arusha environmental and sanitation officers (one from the city headquarters, two in charge of the two wards - Sombetini and Baraa), one sewer engineer, one pit emptying operator, and two NGO leaders. As argued by Hofisi et al (2014), in-depth interviews are typical qualitative research interviews. The in-depth interviews method is predicated on the assumption that social reality is subjective and therefore requires the researcher to engage with respondents to get rich and detailed data with “new insights”. The method was useful for complex and sometimes emotionally laden issues while probing for sentiments underlying expressed opinion was also made easier with in-depth interviews (Hofisi et al, 2014). Table 5.3 presents respondents of in-depth interviews and their affiliation:

S/N	Institution	Role/position	Number of respondents	Tools/methods
1	Arusha city council	Environmental health and sanitation officers	3	Interview guide
2	AUWSA	Sewer engineer	1	Interview guide
3	Pit emptying operators	Driver/Vacuum truck operator	1	Interview guide
4	CCI / FUP	NGO leaders	2	Interview guide

Table 5. 3 *respondents for in-depth interviews*

5.5. Data analysis and presentation

The process of analysing the research findings followed the relational analytical framework adopted for this study as described in Chapter 4. The guidance of the ANT ontological stance and the case study method allowed the data to speak for themselves; which helped in generating answers for the research questions raised in

Chapter 1. The findings and final synthesis have been organised in the flow of the research questions, while the final theoretical analysis is based on the tenets of Actors/Actants, Actor-network, Agency, and Power. During data analysis, these tenets of Actor-Network Theory were employed as the analytical framework and the guide in extracting the theoretical meanings or interpretations of findings.

By organising the findings as explained above, this study diverges from other traditional approaches to case study research as it does not use the narrative form to report findings. In addition, the use of a mixed-methods approach has enabled qualitative and quantitative data to be merged for a rich complementarity of the research findings. The data from household surveys was processed and analysed using SPSS software (Statistical Package for Social Sciences, version 22). Descriptive statistical analysis was employed to extract information on household profiles and relationships, property ownership and tenure systems, and status of toilet facilities. The household surveys unearthed the coverage and status of sanitation provision in the case study and portrayed some excreta management practices which was later enriched by the qualitative data from two focus group discussions in the two selected cases of Sombetini and Baraa, and data from in-depth interviews and document reviews.

Though the two sets of data (quantitative and qualitative) were analysed separately, they were later merged and discussed side-by-side to deepen the understanding and knowledge of the research issues (Creswell, 2014; Creswell and Plano Clark, 2017; Creswell and Creswell, 2018). The qualitative data was analysed with the aid of Nvivo, a statistical software specifically designed for qualitative research. Interview transcripts were first translated from Swahili (the language of the interviews and focus group discussions), then transcribed in English. The transcripts were coded and analysed to reveal the dominant themes running through the interviews and discussions. There was no language barrier or need of language interpretation as Kiswahili was the native language for both research team and the participants/ respondents. Table 5.4 summarises research questions and types of data needed to answer the research questions, methods used to data collection, geographical

coverage of the data needed, and theoretical tenets of Actor-Network used for data analysis.

Research questions	Data required	Data coverage level	Data collection methods	Theoretical tenets from ANT
What is the extent of sanitation infrastructure coverage in Tanzanian cities?	Sanitation coverage, programmes/initiatives	Countrywide	Document analysis	Non-human actants
	Policy and institutional frameworks	Countrywide	Document analysis (Policy perusal)	Non-human actants
What is the status of urban sanitation infrastructure provision in informal settlements in Arusha?	Sanitation coverage in the city of Arusha, and the two selected cases of Sombetini & Baraa wards	Arusha city, Baraa & Sombetini wards	Document analysis, interviews, household surveys	Non-human actants
What are the existing human excreta-management practices in informal settlements in Arusha?	Pit emptying methods, Importance of toilet facilities, understanding of excreta-diarrhoea nexus	Arusha city, Baraa & Sombetini wards	Household surveys, focused group discussions, interviews	Non-human actants
What are the complexities shaping urban sanitation in informal settlements in Arusha?	Land ownership and tenure, tenancy, socio-cultural issues	Arusha city, Baraa & Sombetini wards	Focus group discussions, interviews, household surveys	Non-human actants
Who are the actors, what are their roles, and how are they related in co-producing urban sanitation infrastructure in informal settlements in Arusha?	Networks or groups of actors, roles, forms of co-production	Arusha city, Baraa & Sombetini wards	Interviews, focus group discussions,	Human actors, agency, power, actor-network
What are the institutional governance structures emerging from the multiplicity of actors in the co-production process of urban sanitation infrastructure in informal settlements in Arusha?	Based on the findings	-	-	Actor-networks,

Table 5. 4: Summary of research questions, data collection methods and theoretical tenets.

5.6. Reliability and internal validity

Reliability refers to the extent to which the research procedure produces similar results under constant conditions if the same research process is repeated. It concerns the degree of consistency that would exist if the research was conducted on different

occasions. To aid reliability, Yin (2003) suggests the use of two tools during data collection: the use of case study protocol and a comprehensive case study database.

Some of the important topics in the case study protocol include an overview of what is being researched, field procedures, case study questions and guide for the case study report. The two suggested tools were used so that reliability and internal validity could be assured at the end of the study.

Validity is about causal relationships, whereby certain conditions can be shown to lead to other conditions (Lupala, 2002). In other words, an investigator's subjective judgment in the data collection process may affect a study conclusion. So checks for validity are important (Yin, 1994 in Lupala, 2002). In this study, data validity was ensured through conducting field interviews in the study areas where residential properties and sanitation facilities were observed. Comparison of findings with reviewed cases and experience was also done to ensure internal and external validity. The main objective of establishing external validity was to confirm that the phenomenon under study, the processes identified, and the conclusions drawn could be generalised beyond the cases themselves and were also capable of being widened to include others (ibid.). The reliability and internal validity were ensured using multiple data collection methods to allow triangulation and crosschecking of findings.

Triangulation means that multiple methods are used to study a problem. It can be applied to many elements of research methods, including strategies, settings for data collection (these affect external validity), and sources of data (single versus multiple). The concept of triangulation is not new. Scandura, Terri A. and Williams, (2000, p.1249) were among the early advocates of triangulation. As Jick noted, the triangulation metaphor is taken from navigation and military strategy, which "use multiple reference points to locate an object's exact position" (Jick 1979, p. 602 in Scandura, Terri and Williams, 2000). In the social sciences, the use of triangulation dates at least as far back as Campbell and Fiske's (1959) development of the multitrait-multimethod matrix, in which a researcher assessed different traits using different methods to examine the discriminant and convergent validity of measures. Triangulation can also refer to the use of different data collection methodologies.

Finally, it is possible to triangulate Research Strategies. Increased triangulation should improve the confidence of researchers in drawing conclusions from their studies. The use of a variety of methods to examine a topic might result in a more robust and generalisable set of findings (higher external validity). Triangulation can therefore improve internal and external validity as the combination of separate research strategies in one study helps to counter the trade-offs inherent in others.

5.7. Ethical considerations

This study has complied with the extensive ethics requirements set out in the University of Cape Town (UCT) Ethics in Research Handbook and as required by the Faculty of Engineering and the Built Environment (EBE) Ethics in their Research Handbook. As it is stipulated in the UCT Code of for Research Involving Human Subjects and the Faculty Ethics Guidelines, this study adhered to the four principles of research ethics, namely:

- the principle of respect and protection;
- the principle of transparency;
- the principle of scientific and academic professionalism; and lastly
- the principle of accountability (UCT, 2012).

In so doing, the host population or the subjects under study had rights to informed consent in full knowledge of the risks and benefits of the study, the right to autonomy during the interview process and lastly the right to confidentiality and anonymity (Endacott, 2005).

5.8. Conclusion

This chapter has explained the philosophical perspective taken in this research and considered the appropriate strategy which guided the research process in finding answers to the research questions. Drawing from various scholars, the *multiple research design* was selected as the research strategy to make the research process robust, and hence enrich the conclusions. This was complemented by *mixed research methods* of both quantitative and qualitative approaches to draw data across the different levels of the city government and from the case study areas. *Multiple data*

collection methods were employed, and they consist of household administered survey questionnaires, focus groups discussions and semi-structured interviews with state and non-state actors. The results are presented in the succeeding Chapters 6, 7 and 8.

CHAPTER SIX

SANITATION INFRASTRUCTURE PROVISION IN TANZANIA

6.1. Introduction

This chapter will examine the broad picture of sanitation infrastructure and services in Tanzania, with particular emphasis on the five major gazetted cities. The chapter begins with the historical background of Tanzania as a union of two independent nations, then traces the trends of urban growth and population increase, followed by a review of urban development frameworks and the evolution of urban local government systems in the country. It also reviews relevant urban policies and laws as significant intermediaries in the provision of sanitation services and infrastructure and traces the various actors and national sanitation programmes. The purpose of the chapter is to probe and generate findings for addressing the first subsidiary research question which aims at documenting the extent of sanitation infrastructure coverage or provision in Tanzanian major cities. The data were collated from national laws and acts, project or programme reports, as well as published materials on urban sanitation in the country and key informant interviews.

6.2. Urbanisation and Urban growth in Tanzania

6.2.1. Tanzania country overview

Tanzania is the largest country in East Africa with an area of 945,087 Km^2; 60,000 of which are inland water. The country has a population of 44,928,923 as per the 2012 national population and housing census report (National Bureau of Statistics, 2013). The United Republic of Tanzania was born on 26 April 1964 after the Union of Tanganyika and Zanzibar Island which were merged shortly after their independence. Tanganyika got its independence from British colonial rule on 9th December 1961; while Zanzibar gained its independence on 12th January 1964. The political and administrative capital, as well as the seat of the parliament, are officially found in Dodoma, located in the heartland of the country. Dar es Salaam is its largest city and is the economic hub. Tanzania lies south of the equator and shares borders with eight countries: Kenya and Uganda to the North; Rwanda, Burundi, the Democratic Republic of Congo, and Zambia to the West, and Malawi and Mozambique to the South; and

Indian Ocean to the East (Zanzibar, 1963; Speller, 2007; Mccubbin, 2008; NBS, 2013; Minde et al, 2018).

Tanzania is experiencing rapid urbanisation and population growth. The urban population increased from 5.7 per cent of the total population in 1967 to 29.1 per cent in 2012. While population growth is 3 per cent per annum, the increase in the urban population is 5 per cent per annum. This makes Tanzania one of the most rapidly urbanising countries in the Eastern Africa region. By 2012, the number of urban centres increased from 32 in 1967 to more than 600 in 2012 (Wenban-Smith, 2014). Currently, there are 5 major officially gazetted cities in Tanzania, which are Dar es Salaam, Mwanza, Arusha, Mbeya and Tanga.

These increases are due to natural growth, rural-urban migration, and urban in-migration, and local urban authorities are largely unprepared for it. The result is an increase in unplanned and unserviced settlements where new urbanites must perforce find their own solutions to the lack of housing and infrastructure (Ooi and Phua, 2007). Informal and unserviced settlements accommodate between 60 to 75 percent of Tanzania's urban population, where they live without adequate basic services, tenure security, quality housing and proper sanitation infrastructure (UN-Habitat, 2009b). A 2010 survey of 19 urban settlements identified that 74 - 90 per cent of the population lived in informal settlements (Pauschert, Gronemeier and Bruebach, 2012) in the whole country, and it is estimated that 70 - 80 per cent of people in Dar es Salaam live in unplanned and un-serviced settlements (Ndezi, 2009; UN-Habitat, 2010a).

Security of land tenure is problematic in urban settlements developed through formal urban planning procedures. Many landowners have no certificates of title, and sometimes the land is under customary tenure. Others unlawfully occupy land in marginal or hazardous areas. Continued proliferation of informal settlements is one of the visible indicators of the failure of city governance in guiding urban development. National regulatory frameworks which appear not consider local realities, and are ostensibly still based on global Northern standards, lack of innovation and creativity, contribute to the continued development of informal and unplanned settlements in the country (Watson, 2009; Kironde, 2006; UN-Habitat, 2003).

6.3. Urban development and management frameworks

6.3.1 Urban Government tiers

The Tanzanian public administration structure is split into two government-tier systems: central government and local government (Kironde, 2006). The Constitution of the United Republic of Tanzania of 1977 (Cap.2), article 145, section 1, stipulates that: “There shall be established local government authorities in each region, district, urban area and village in the United Republic…”. The Constitution grants local government authorities the right and power to participate, and to involve the people, in the planning and implementation of development programmes. The article 146, section 1 of the Constitution states that: “the purpose of having local government authorities is to transfer authority to the people. Local government authorities shall have the right and power to participate, and to involve people, in the planning and implementation of development programmes within their respective areas and generally throughout the country” (Research on Poverty Alleviation, 2008; URT, 1977). This clause plainly demonstrates that the Constitution, which is the mother of all other national laws, policies and regulations, considers people or service beneficiaries as important actors in the delivery of development programmes such as the provision of basic services and infrastructure. This is also the core of co-production model (Alford, 2009).

The establishment of local government authorities was consolidated in two major pieces of legislation enacted in 1982. The first is the Local Government Act No. 7 of 1982, which deals with the establishment of district or rural authorities and these are village governments, township authorities, and district councils. The second is the Local Government Act No. 8 of 1982 enacted especially for the establishment of urban authorities which are composed of town councils, municipal councils and city councils were part of the re-establishment (Research on Poverty Alleviation, 2008). It is important to note that the Tanzanian local government system is grounded on the political devolution and decentralisation of functions and finances within the framework of a unitary state and is *holistic*, i.e. local government consists of multi-sectoral units with a legal status operating on the basis of discretionary, but general powers under the legal framework, and are constituted by the national legislation. Local governments constitute a unitary governance system all over the country, based not only on elected

councils and committees, but also a professional administration (Venugopal and Yilmaz, 2010; Mzee, 2008).

In Tanzania local government is a system of local administration with mandates for maintaining law and order, providing a range of social amenities, and encouraging cooperation and participation of residents towards the improvement of their living conditions (URT, 1977; Mzee, 2008; Research on Poverty Alleviation, 2008). However, the law is silent on the level, and stage when the people or service beneficiaries can get involved in the process of improving their living conditions or delivering the basic service.

On Tanzania's mainland (in Zanzibar, local government operates differently, but is not the focus of this research), a system of indirect rule operated from 1926 under British colonial rule; this meant that while under British rule, some decision-making that was local in nature, was devolved (by contrast, under a system of direct rule, all decisions were centrally made). Since then the system has undergone a number of modifications.

Between independence in 1961 and 1971, the government continued with the indirect system of local governance inherited from the British, which took on board chiefdoms (or chieftainship) and locally elected representatives to make it a more inclusive form of representative platform. However, most of the established local governments failed to meet beneficiaries' expectations due to limited financial and human resources. While some decision-making was devolved locally, budgetary control was not It is important to point out that the inherited *decentralised* / indirect arrangements did not address the core problem of the imbalance of resource endowment in local authorities which created huge disparities in basic service and infrastructure provision among the local governments. As a consequence, some local authorities performed better than others in the delivery of basic services and infrastructure, thanks to the aid of their chiefs and religious voluntary agencies. This success added credit to local level leadership vis-à-vis central government. Hence local government became a threat to the central government (Munishi, 1998; Kyessi, 2002; Mzee, 2008; Research on Poverty Alleviation, 2008; Venugopal and Yilmaz, 2010).

Consequently, between 1972 - 1984 the government of Tanzania abolished the system of local authorities, together with its supporting traditional institutions, and introduced instead a *deconcentrated* system, with regional administrations as field offices. Practically, the deconcentrated system was one of increased centralisation, which aimed at growing the ruling party's local support, its patronage and the legitimation of its authority. This changed local resource mobilisation from local-centric to centre-centric.

In this new phase, the government adopted socialism and self-reliance policies through the Arusha Declaration and the policies of *ujamaa* where the central government tier was the sole and the only provider of basic services and infrastructure. Beyond the political motive, the new policy move was intended to ensure the equitable distribution of basic services and infrastructure both socially and geographically. The self-reliance thrust of the new policy (through the Arusha Declaration) was construed by the local population to mean that efforts were to be made to construct the necessary structures for basic services provision. The party elected local councillors and members of parliament assisted in mobilising local resources to build the necessary structures such as school or dispensary buildings or laying water networks and the like. After that the central government was requested to supply the necessary inputs to produce the locally needed basic services. However, the central government was overwhelmed in this task, and the deconcentration system failed, resulting in rapid deterioration of, and regional or district inequalities in basic services and infrastructure (Munishi, 1998). Despite this failure, some sense of active involvement of local communities and service beneficiaries in the provision of their own services, had been established.

The failure of *ujamaa* necessitated a reconsideration of the system, and devolution of local government was reintroduced (Kyessi, 2002; Mzee, 2008; Research on Poverty Alleviation, 2008; Venugopal and Yilmaz, 2010; Kyessi and Lupala, 2016; Mcgranahan *et al.*, 2016). But it was only in 1996 that the country decided to embark on major reforms of local government (Tidemand and Msami, 2008) through the Local Government Reform paper of 1998 (URT, 1998). The intention of the local government reform was the improvement in local governance and service delivery, both of which

were considered critical to achieving Tanzania's poverty reduction targets in both rural and urban settlements (Tidemand and Msami, 2008).

The local urban government system is also governed by the Urban Planning Act No. 8 of 2007 which classifies human settlements based on population size, level of services, economic base and level of sustenance in annual budget. Thus, for any urban settlement to qualify as a town, at the least the following are required:

- Minimum population: 30,000 people
- Self-sustenance, at least 50% of the annual budget
- Level of services: at least a hospital, a secondary school, at least 50 licensed shops, and a police station, which should be a divisional headquarters.

For a town to be upgraded to a municipality, it should have a minimum population of 100,000 residents, its economic base should be at least 30% of employment in non-agricultural sector. It must have, also, at least one manufacturing industry and several small-scale industries. The town should have the ability to sustain its activities by 70% of its annual budget and should be a centre for higher order of services, cultural, and educational and health facilities which serve beyond the administrative region including universities, a referral hospital, and international conference facilities. In addition, it should have the administrative importance of regional or national administration or centre of multinational organisations (URT, 2007).

The power to bestow a municipality the status of a city is vested in the National Assembly, and the requirements are: a minimum population of 500,000 permanent residents; and the ability to sustain development activities at least 95% of its annual budget. Any municipality can be designated as a city if it has some symbolic importance in addition to the normal qualifications of a municipality. These include its historical significance, outstanding cultural importance such as a major tourist centre, seat of regional government, seat of international activities and any other symbolic value (ibid.).

6.3.2. The role of urban governance entities

The motive behind the establishment of urban local government is to facilitate delivery of basic services, as these entities are closer to citizens. The holistic principle of local governance in Tanzania implies that urban councils are the highest political authorities in their areas of jurisdiction within the national legal framework. Urban authorities have the overall responsibility for local government finance, local government administration, and basic service delivery. Urban councils may delegate the responsibilities of basic service and infrastructure provision and other activities to private contractors, boards and other executive agencies, but they retain the political and financial responsibility (URT, 1998).

To facilitate the everyday administration of a council, the local governance system on Tanzania's mainland is divided into urban and rural or district authorities. The urban authorities are made up of city, municipal and town councils; while rural authorities are made of district councils, divisions (or sub-districts) and township authorities. Urban authorities are then divided into wards, and sub-wards (*Mitaa*), while rural authorities are divided into wards, villages and hamlets (or sub-villages). Currently, there are 48 urban governments on the Tanzania mainland, of which 5 are cities, 21 municipalities and 22 town councils with 4,037 *Mitaa* or sub-wards. Rural authorities are constituted of 137 district councils, and 12,545 villages and 71 township councils (PO-RALG, 2016).

Councils	Number of Councils in 2010	Number of Councils in 2017
City	4	5
Municipal	17	21
Town	6	22

Table 6. 1: Summary of local urban government in Tanzania (Mainland)

Source: (URT, 2016).

Every ward falls under the administration of Ward Executive Officers recruited by the Council Director, while *Mtaa* leaders head the *Mtaa* administration and are elected by the residents of the area of jurisdiction. In Tanzanian public administration, the *Mtaa (Mitaa* in plural*)* or sub-ward is the lowest formal public administrative unit of an urban local government (Kyessi, 2002; Bahendwa, 2013). The area of jurisdiction of a *Mtaa varies* and can be divided into ten-cell units which are the smallest political-

administrative units designed during the mono-party era of Tanzania. Ten-cell units were established with the aim of ensuring party supremacy; mobilising the citizens for local development programmes; and ensuring, at least, popular support of the ruling party at the grassroots [Tanganyika African National Union, (TANU), now *Chama Cha Mapinduzi* (CCM)]. Initially, the ten-cell units were made up of ten houses only, but now the number may reach more than 50 housing units. This administrative approach was designed to make citizen participation in development activities compulsory (Bahendwa, 2013; Kyessi, 2002). See Figure 6.1 as an illustration of urban governance structure in Tanzania.

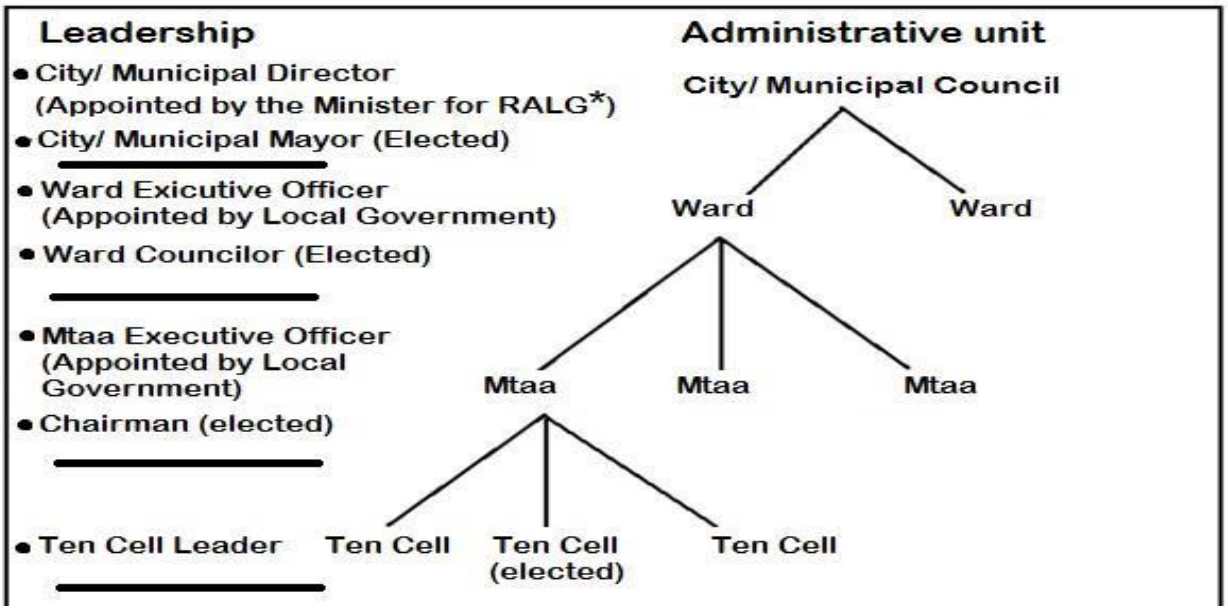

Figure 6. 1: Urban local government structure in Tanzania

Source: Venugopal and Yilmaz, 2010, p216; Bahendwa, 2013, 2016*, p.128; Kyessi, 2002, p.133*

6.3.3. Urban policies that impact on Sanitation Provision

Urban policies and laws are widely acknowledged as "important intermediaries for governing, planning, managing and financing urban areas and making basic services and infrastructure available" (Berrisford and McAuslan, 2017, p.2). UN-Habitat, (2014, p.5) urges that urban policies should aim at defining a vision, guiding principles and set of linked actions by governments to realise positive possibilities and to tackle problems arising from the concentrated growth of population and economic activity.

In Tanzania, there are several specific laws related to urban infrastructure provision and general city governance: the Tanzania Development Vision 2025; the National

Strategy for Growth and Reduction of Poverty; the National Sanitation and Hygiene Policy; the Water Supply and Sanitation Act No. 12 of 2009; the National Human Settlement Policy; the Local Government (urban authorities) No. 8 of 1982; the Public Health Act No.1 of 2009; the National Health Policy of 1990; the National Land Policy; the Urban Planning Act, Number No 8 of 2007. These are reviewed and summarised below from the perspective of whether they have key actors or roles in the provision of urban infrastructure and services in their areas of jurisdiction. The section intends to establish whether the urban policies, specifically those pertaining to informal settlements, contain features of the co-production model outlined above.

Tanzania Development Vision 2025

The Government of Tanzania has, since 1995, undertaken various initiatives towards poverty alleviation and the attainment of sustainable socio-economic development both in urban and rural settlements. All the development initiatives are instituted in the Tanzania Development Vision 2025; which describes the vision, mission, goals and targets for realisation by 2025. The overall goal of the Tanzania Development Vision 2025 is to: “awaken, co-ordinate and direct the people’s efforts, minds and national resources towards those core sectors that will enable the country to attain the development goals and withstand the expected intensive economic competition that lies ahead” (URT, 1995, p.v). The three principal objectives of the vision are: achieving quality and a good life for all; good governance and the rule of law; and building a strong and resilient economy that can effectively withstand global competition (ibid. p.x).

Vision 2025 emphasises pubic participation in the preparation and implementation of development initiatives which is significant in the co-production process of various urban development activities including urban service delivery. In achieving Vision 2025, Tanzania expects to be: “a nation whose people have a positive mindset and a culture which cherishes human development through hard work, professionalism, entrepreneurship, creativity, innovativeness, ingenuity and who have confidence in and high respect for all people irrespective of their gender” (ibid. p. 5). Vision 2025 insists that people must cultivate a community spirit that is appropriately balanced with respect for individual initiative.

Strategies for Vision 2025 include:

- to achieve a high-quality livelihood for its people (through improving access to quality primary health care for all and universal access to safe water);
- to attain good governance through the rule of law; and
- to develop a strong and competitive economy (through the provision of the physical infrastructure, specifically in the energy, water and telecommunications sectors).

On good governance and the rule of law, Vision 2025 acknowledges that: "governance must be made an instrument for the promotion and realisation of development, equity, unity and peace, strengthened by the rule of law and improving public participation". It emphasises that "good governance must permeate the modalities of social organisation, coordination and interaction for development; which can be achieved by an institutional framework capable for mobilising all the capacities in society and coordinating action for development" (ibid. pp. 22-23). One of the basic principles underpinning this institutional framework is the promotion of democratic and popular participation through:

- *"Improving public service delivery by ensuring that public servants are accountable to the people;*
- *Permitting a greater role for local actors to own and drive the process of their development. Local people know their problems best and are better placed to judge what they need, what is possible to achieve and how it can be effectively be achieved".* (URT, 1995, p.28).

This principle and the outlined ways to achieve it are clearly compatible with principles of co-production.

National Strategy for Growth and Reduction of Poverty II

The Tanzanian government published its National Strategy for Growth and Reduction of Poverty (NSGRP) in 2005. The first strategy was implemented between 2005/06-2009/10 and the second between 2010/11 and 2014/15. The second strategy (also known in the Tanzanian lingua franca, Kiswahili, as *"Mpango wa Pili wa Kukuza Uchumi na Kuondoa Umaskini Tanzania or MKUKUTA II"*), is the main vehicle for

realising Tanzania's Development Vision 2025, the UN Millennium Development Goals (MDGs) and the aspirations of the ruling Party's *(Chama Cha Mapinduzi* - CCM*)* Election Manifesto. The NSGRP recognises water supply and adequate sanitation as one of the drivers of socio-economic growth and poverty reduction (see page 15 in NSGRP). The Strategy paper is split into three main clusters, with cluster II focusing on: "improving the quality of social services (education, survival, health and nutrition, clean and safe water, sanitation, decent shelter and a safe and sustainable environment) and reach the majority of the poor and vulnerable groups". The Strategy paper points out that this cluster essentially targets the creation of human capital borne out of learning and healthy population (IMF, 2011, p. 63).

Cluster II's strategies to achieve these outcomes are structured under six goals, with goal number 4 aiming to increase access to affordable, clean and safe water; sanitation and hygiene. It is recognised that access to clean and safe water and good sanitation and hygiene practices are essential to promoting health and productivity of the population. The importance of sanitation and hygiene is appreciated, given the significant population increase, especially in urban areas, and these are acknowledged as critical for the prevention of the outbreak of diseases such as cholera. The first two operational targets in cluster II are: "access to improved toilet and functional hand washing facilities at household and public places, particularly schools, health facilities, transport facilities (improved toilets at household level increased from percent rural and 27 percent urban (in 2010) to 35 percent rural and percent urban) in 2015"; and "proportion of population with access to improved sanitation facilities increased". Tanzania has pledged to provide improved sanitation to 95% of the country population by 2025; however, there is little indication of how people residing in the unplanned or informal settlements will be reached. Furthermore, the strategy is silent on the mechanisms of making sanitation facilities accessible at household level.

Goal 5 of cluster II of the Strategy paper aims at: "developing Decent Human Settlements while Sustaining Environmental Quality. Decent human settlements guarantee public health, safety, and a comfortable living environment, which are crucial in attaining a healthy workforce for growth of the economy and subsequently

poverty reduction". This goal aims at enhancing efficiency in land and property management, thus enabling land to contribute to poverty reduction and the improved social well-being of the people. The first two operational targets of the strategy are: "Planned and serviced urban settlements with functioning town planning procedures, including improved solid and liquid waste management, use of sustainable transport and cleaner energy ensured"; and "Implications of rapid urban population growth on settlements addressed". The faithful implementation of this goal could see a reduction in the number of unplanned settlements. However, urban local governments lack the capacity to do so, and the result is a speedy proliferation of informal settlements with inadequate urban services – particularly sanitation facilities - due to rapid urbanisation.

The NSGRP recognises that problems in urban settlements may be linked to rapid growth of urban populations and consequent inadequate service provision. Therefore, when planning and servicing urban and peri-urban settlements, the cluster strategies must support Municipalities and Councils. This will occur through the preparation of integrated human settlement plans, surveys and gender-balanced issuance of land titles; scaling up the regularisation of unplanned settlements; building the capacity of local leaders and socially grafted institutions in enhancing security of tenure and protecting land parcels (IMF, 2011).

Cluster III of the NSGRP recognises that good governance and accountability are vital components in influencing a favourable environment for economic growth and poverty reduction. One of the broad outcomes for Cluster III is to ensure equity in accessing public resources and services. The second goal aims to improve public service delivery to all, especially to the poor and vulnerable. To achieve this goal, the operational targets include the following: "Capacities and management systems in service delivery improved"; and "mechanisms for targeting the poor and vulnerable groups introduced (cover 65 percent of the poor and vulnerable groups currently excluded from public service delivery)" (IMF, 2011). Though the strategy does not explicitly mention the settlement categories, it is expected that those living in informal or unplanned settlements will be reached through their urban local governments.

It is also important to note that the NSGRP identifies key actors and categorises them into primary, secondary and others. Primary and secondary actors are Government Ministries, Departments and Agencies and Local Government Authorities, since their interventions are prerequisites to achieving the desired strategy results. For example, the Ministry responsible for financing is charged with the mobilisation of required financial resources for implementing the NSGRP; while the Ministry responsible for local government deals with the coordination of the implementation of programmes at regional and local government levels. The Ministry also leads in the collection and dissemination of data from grassroots level to the national level and vice versa. Lastly it also is charged with mobilisation, allocation and monitoring of public financial resources made available to NSGRP II actors. This shows that local government authorities and their parent ministries are expected to play critical roles in achieving the NSGRP. The Strategy Paper requires Local Government Authorities to plan and implement programmes within their areas of jurisdiction, in collaboration with other actors, including communities and households through participatory process (IMF, 2011, pp.33, 105-198).

The other category includes all non-state actors, particularly in the private sector, Civil Society Organisations (CSOs), Faith-Based Organisations (FBOs), Development Partners, local communities and individual households. The private sector is recognised as playing an important and critical role in achieving poverty reduction outcomes because of its central role as the engine for economic growth. CSOs are expected to build local capacity and empower communities; participate in monitoring and evaluation at national and community level; and mobilise and enhance community participation as well as community resources for poverty reduction. CSOs are also expected to advocate for accountability of its members and government to the people and work closely with the government ministries and local authorities to ensure that cross-cutting issues are included and implemented in the sectoral and local plans. To improve the effectiveness of CSOs, there is a need to review and strengthen the organisational and management frameworks at national, regional, district and community levels. Development partners continue to work closely with government in addressing poverty and they use the existing agreed national system and processes to provide financial, technical and other support in the implementation. Development Partners also facilitate capacity building initiatives within the poverty reduction

framework as well as supporting monitoring and evaluation initiatives (Ibid. pp.33, 105-198).

National Sanitation and Hygiene Policy

Water and sanitation policies in Tanzania were developed in line with the country's Development Vision 2025 and the National Strategy for Growth and Reduction of Poverty (NSGRP I & II). The Draft National Sanitation and Hygiene Policy, which has already been approved at ministerial level, aims at strengthening the country's efforts to improve sanitation and hygiene practices and details harmonised definitions, the first step being to develop and implement an effective Monitoring and Evaluation framework for sanitation and hygiene in Tanzania. It reports on the challenges that sanitation infrastructure is facing, including low political and community profiling; inadequate coverage by the legal and institutional framework; weak inter-institutional coordination mechanisms; and a generally poor state of sanitation and hygiene in the country, coupled with inadequacy of requisite human and financial resources, as most of the activities are projects based and with little funding from central government ministries (URT, 2012; Kumar, 2015). However, it is unfortunate that this draft policy had not been approved by the Ministerial cabinet. The argument is that the Water Supply and Sanitation Act, (12 of 2009) suffices, otherwise it will need to be amended to incorporate new issues articulated in the draft policy. (*Personal communication with Amaniel Nsaa-lya Kuhunwa, 20 June, 2017*).

Water Supply and Sanitation Act No. 12 of 2009

The Water Supply and Sanitation Act No. 12 of 2009 aims at promoting and ensuring the right of every person in Tanzania to have access to efficient, effective and sustainable water and sanitation services for all purposes. The act takes into consideration a number of fundamental principles, including:

(f) the promotion of public sector and private sector partnership in provision of water supply and sanitation service;

(g) the establishment and enforcement of standards of service in water supply and sanitation services;

(h) the regulation of suppliers of water supply and sanitation services; and

(i) the protection and conservation of water resources and development and promotion of public health and sanitation (URT, 2009a).

The Act describes the responsibilities of government authorities involved in the water sector, establishes Water Supply and Sanitation Authorities (WSSA) as commercial entities and allows for their clustering where this leads to improved commercial viability. Section 21, article 1 stipulates that the general obligations of a Water Authority are to do all things necessary to provide water supply and sanitation services to the area falling under its jurisdiction. However, given the approach of laying pipes for water supply and wastewater disposal, WSSAs serve mostly the planned neighbourhoods and leaving the unplanned areas into the hands of the unknown.

National Human Settlement Policy of 2000

The National Human Settlement Policy observes that with the abolition of local authorities in the 1970, there was rapid deterioration of urban. Despite the reintroduction of local government systems in 1980s, these urban services have continued to deteriorate as a result of higher demand on them in a situation of reduced resources, rising operation and maintenance costs. The Policy's overall goals are to promote the development of human settlements that are sustainable; and facilitate the provisions of adequate and affordable shelter to all income groups in Tanzania. The Policy's main objectives include, making serviced land available for shelter and human settlement development to all sections of community including women, youth, the elderly, disabled and disadvantaged; improving the level of the provision of infrastructure and social services for sustainable human development; *promoting* and including the participation of the private and popular sectors, CBOs, NGOs, Co-operatives and communities in planning, development and management of human settlements. The objectives also encourage the development of housing areas that are functional, healthy, aesthetically pleasant and environmentally friendly. The Policy is clear on the participation or involvement of non-state actors in the provision of housing and basic services through concerted efforts of both state and non-state actors (URT, 2000).

Local Government (urban authorities) No. 8 of 1982

The Local Government (Urban Authorities) Act No.8 of 1982 enables the establishment of urban authorities for the purposes of local government and provides for the functions of those authorities and for other matters connected with or incidental to those authorities. Section 53 of the Act (Article 1), states that: “it shall be the duty of every Urban Authority to discharge the functions conferred upon it as such, and as a local government authority, by this Local Government (Urban Authorities) Act of 1982 or by or under any other written law, and for that purpose, an Urban Authority may, within the limits of the functions so conferred, either by its own officers or by duly appointed agents, do all such things and acts as are lawful and necessary for the performance of its duties” (p. 32). Article 2 of the same section stipulates that: “save where the contrary is expressly provided for or appears from the context of the function or duty to be permitted or intended, every function conferred upon an urban authority shall be exercised in respect of all persons within its area of jurisdiction or the category or description of persons within its area of jurisdiction as are concerned in relation to the function in question” (p. 32).

In addition, section 54, article 1 stipulates that it shall be the responsibility of each Urban Authority as a local government authority, to undertake the following roles:

(a) to maintain and facilitate the maintenance of peace, order and good government within its area of jurisdiction;

(b) to promote the social welfare and economic well-being of all persons within its area of jurisdiction; and

*(c) subject to the national policy and plans for rural and urban development, to further the social and economic development of its area of jurisdiction (*page 32).

The Act has stipulation that urban authorities should do everything and implement any lawful activities that are necessary for the performance of their duties without clearly pinpointing them. Besides, the Act is silent on the involvement of service beneficiaries and active non-state actors in the development projects undertaken in their areas of

jurisdiction. Lastly, the Act fails to take into account the differences existing between urban settlements, particularly those that are planned or unplanned (URT, 1982).

The Public Health Act No.1 of 2009

The Public Health Act No.1 of 2009 provides for the promotion, preservation and maintenance of public health with a view to ensuring the provisions of comprehensive, functional and sustainable public health services to the general public and to provide for other related matters in the country. A further responsibility concerns sanitation, housing and hygiene, both in urban and rural settlements where section 52 deals with nuisance, which is legally defined as a person by whose act, default or suffering causes nuisance to exist or continue to exist whether as the owner, occupier or as any other person. Poor sanitation could be defined as a nuisance in terms of this Act. This is clearly stated in section 53, which identifies "nuisance" in an urban setting as any of the following:

> *(c) any street, …water closet, earth closet, privy, urinal, cesspool, soak away pit, septic tank, cesspit, …drain, sewer, garbage receptacle, dustbin, dung pit, refuse pit, latrine, slop tank, ash-pit or manure heap, so foul or in a state, situated or constructed as to be offensive or likely to be injurious or dangerous to health….*
>
> *(f) any noxious matter or waste water flowing or discharged from any premises, wherever situated, into any public street, gutter, side channel of any street, any gulley, swamp, watercourse, irrigation channel or its bed not approved for reception of such discharge; …*
>
> *(i) any cesspit, latrine, urinal, dung-pit found to contain any mosquitoes' larvae;*

Section 55 clarifies the duties of the Authority (in the context of this study referred to Local Government Authorities), to maintain cleanliness. Article 1 of section 55 stipulates the duties and responsibilities of urban authorities as follows:

> *(a) take necessary practicable measures for keeping and maintaining its area to be in a clean and sanitary condition;*
> *(b) prevent and remedy the cause and occurrence of any nuisance likely to be injurious, hazardous or dangerous to health;*

(c) take legal proceedings and act against any person causing or responsible for the continuance of any nuisance or condition;

(d) regularly inspect its area by using the Environmental Health Practitioners;

(e) detect whether or not a nuisance is likely to occur, recur or exist;

(f) detect the cause of such nuisance;

(g) make follow up on implementation of measures ordered to abate nuisance;

(h) make an order for temporary or permanent closure of activities causing that nuisance;

(i) prevent over-crowding;

(j) prevent illegal construction, condition or manner of any factory or trade premises; and

(k) take proceedings against any person causing or responsible for the continuance of such condition.

With the exception of article 66, which exempts housing developers in informal settlements from securing approvals prior to erecting buildings or premises, the Public Health Act fails to consider everyday sanitation practices of people living in unplanned areas. Besides mentioning environmental health practitioners and the roles of an urban authority, the Act is silent on the participation of other actors in the sanitation chain. The Act does not describe the role of households in the sanitation chain, except the mere mention in section 174 (1) that a person shall not have natural call in areas other than toilets built for that purposes. It is not clear whether that toilet will be built by which actor: the government or the household themselves?

National Health Policy, 1990

The National Health Policy aims at improving the health status of all people wherever they are in urban and rural areas, by reducing morbidity and mortality and raising life expectancy. The Policy recognises that good health, i.e. physical mental and social wellbeing, is a major resource for economic development. As one of its elements of primary healthcare, the Policy clearly states that in order to attain adequate supply of water and basic sanitation facilities, the government, among other things, will encourage safe basic hygienic practices by families and promote construction of latrines and their use in all households (URT, 1990, p. 11). This explicitly shows that

the state views the responsibility of digging a pit latrine as lying in the hands of the household itself.

The National Land Policy, 1990

This is an important policy which gives full recognition and protection of informal settlements. The government acknowledges that the majority of its urban population reside in unplanned areas where they have no security of land tenure and lack access to sanitation facilities and other basic services. The Policy states that the government will take necessary measures to ensure that the urban population is provided with basic services that are essential to human health. In section 6.4.1 the government promises that efforts will be directed towards arresting the growth of unplanned settlements by:

(i) *Timely planning all potential areas for urban development in the periphery of all towns;*

(ii) *Designating special areas for low income housing with simplified building regulations and affordable level of services;*

(iii) *Existing areas will not be cleared, but will be upgraded and provided with facilities for adequate sanitation and other basic services, except unplanned housing in hazardous areas;*

(iv) *Upgrading plans will be prepared and implemented by local authorities with the participation of residents and their local community organisation. Local resources will be mobilised for financing the plans through appropriate cost recovery systems.*

The Urban Planning Act No 8 of 2007

The Urban Planning Act No 8 of 2007 is designed to provide for the orderly and sustainable development of land in urban areas, to preserve and improve amenities, to provide for the grant of consent to develop land and powers of control over the use of land and to provide for other related matters in areas of jurisdiction of urban authorities or urban local governments. Section 7, subsection 1 directs that every city council, municipal council, town council and township authority shall each become a planning authority in respect of its areas of jurisdiction. Section 7, sub section 5 (e)

explains that a planning authority shall in that capacity prepare general planning schemes, and detailed planning schemes for implementation in its area of jurisdiction.

Section 9 (1) stipulates that the purpose of a general planning scheme is to coordinate sustainable development of the area to which it relates in order to promote health, safety, good order, amenity, convenience and general welfare of such area as well as efficiency and economy in the process of such development. Section 9 (2) reaffirms that without prejudice to the subsection (1), the purpose of a general planning scheme be to improve the land and provide for the proper physical development of such land, and to secure suitable provision for transportation, public purposes, utilities and services, commercial, industrial, residential and recreational areas including parks, open spaces, agriculture and reserves and for the making of suitable provision for the use of land for building or other purposes.

With a view to giving effect to the fundamental principles of the National Land Policy and the Human Settlements Development Policy, the Act stipulates that all persons and authorities exercising powers, applying or interpreting the provisions of this Act shall be under the duty to, among others, improve the level of the provision of infrastructure and social services for sustainable development human settlements development; promote and include the participation of the private and popular sectors, CBOs, NGOs, co-operatives and communities in land use planning; promote capacity building of all actors involved in land use planning.

The Urban Planning Act is not particularly clear with regards to basic services and infrastructure provision in informal settlements. It is left to the third schedule of the Act to state that the planning authority should facilitate the construction of works to physical infrastructure including sewerage and wastewater disposal, water supply and other public utility services, allocating sites for use in relation to such services and providing for the conservation of land (see page 52 of the Act). This raises concerns that the main law pertaining to urban planning may not give adequate consideration to infrastructure in informal settlements.

To sum up**,** this section shows that the local government system in Tanzania has undergone a number of changes since 1926 that have impacted differently on service delivery endeavours. Despite the introduction, abolition and re-introduction of policies, tangible gaps remain. Encouragingly, the emphasis on public participation or involvement of citizens and other non-state actors has been maintained over the years. The Constitution declares that the essence of establishing local government authorities is to transfer authority to people and actively involve the service recipients in planning and execution of various development programmes. It has been noted that urban local governments are closer to the service beneficiaries as they are residents of their areas. This is important because non-state actors, particularly CSOs and citizens, can play an active role in producing public goods and services of consequence to them (Allen, Walnycki and von Bertrab, 2017). Recognition of non-state actors, specifically the beneficiaries of urban services, which has been pronounced in the constitution of the country, is fundamental pillar of co-production process. Further, the various policies appreciate the importance of sanitation and hygiene, especially in urban areas, as they are critical for the prevention of the outbreak of diseases. The policies pledge to provide improved sanitation to 95% of the country population by 2025. However, the burden of attaining this has been put on households, without tangible policy statement on their empowerment.

The review of urban policies seems to suggest that the Government of Tanzania is adept at making ambitious and strong urban policies and laws, which fall short of effective implementation strategies or mechanisms and strong monitoring and evaluation approaches. As it has been noted in the National Development Vision 2025 that *Tanzanians have developed a propensity to prepare and pronounce ambitious plans and programmes which are not accompanied by effective implementation, monitoring and evaluation mechanisms. As a result, implementation has been weak* (URT, 1995, p.11). In reality, there appears to be a lack of creativity and ownership of the national urban agenda, both from ordinary citizens and leaders, towards the attainment of the designed and expected outputs. Worse still, the policies have not set in place mechanisms to empower local communities and individual households to access improved sanitation facilities at an affordable cost. Ordinary citizens struggle on their own to put up toilet super structures (as stipulated in the National Health Policy of 1990) either because their lack of capacity or in the fear of government laws, in spite

their poverty burden. Despite the reported sturdy economic growth, the country still experiences high poverty levels as the Multidimensional Poverty Index reports that 64 per cent of mainland Tanzanians are poor and 31.3 per cent live in extreme poverty. This situation is further evidenced by the poverty profile which shows low living standards amongst many households. Moreover, 67 per cent of households in Tanzania live in dwellings with floors made of earth, sand, or dung, while 63 per cent of households have no access to piped water as the main source for drinking (UNDP, 2014, p. xvii; National Bureau of Statistics, 2013).

The existing urban policies and laws appear to be little more than policing tools or may even be seen as window dressing for attracting the attention of the donor community. In reality, these policies and laws can be related to what Susan Leigh Star calls 'bridges and barriers', where she refers to the way technocrats and policy-makers fail to deliver urban services in informal settlements (1999, p.388). Of greater concern is that poor urban sanitation infrastructure remains invisible most of the time, until there is an outbreak of cholera or diarrhoea. When that happens, both central and urban local governments are called on to deal with the disease outbreak. As Star puts it: *"The normal quality of working infrastructure becomes visible when it breaks"* (Star, 1999, p. 382).

The reviewed urban policies give little clue as to how people residing in the informal settlements will be reached with water supply and sanitation provision. The government promises to do this through Water Supply and Sanitation Authorities, which largely serve the planned neighbourhoods – where it is much easier to lay down pipes for a sewerage network. Furthermore, the policy is silent on the mechanisms of making sanitation facilities accessible at household level. Worse still, few, if any, of the policies mention the term 'informal' or 'unplanned' settlements, and hence no policy statement addresses the problems associated with these areas. The exception to this is the Land Policy of 1997 which has a section on unplanned settlements, declaring that they will not be cleared. The policy promises that these areas should be upgraded and provided with adequate sanitation facilities among others. However, the implementation of the policy on upgrading informal settlements is done piecemeal and at very low speed compared to the rate of urbanisation (Magembe-Mushi, 2018;

Kyessi, 2010; Sheuya and Burra, 2016; Kusiluka and Chiwambo, 2018; Gwaleba and Masum, 2018; Schmidt and Zakayo, 2018).

6.4. Governance frameworks for urban sanitation infrastructure

6.4.1. Sanitation institutional framework

For decades, Tanzania's sanitation institutional framework has been fragmented into several ministries, departments and agencies. The general responsibility for the protection of public health through the provision and promotion of adequate sanitation and hygiene falls under the day-to-day administration of the Ministry of Health, Community Development, Gender, Elderly and Children, commonly referred to as the Ministry of Health and Social Welfare (MoHCDGEC). Besides this, other vital players in the sanitation sector include the Ministry of Water and Irrigation (MoWI), Ministry of Education, Science and Technology and Vocational Training, (MoESTVT), and the President's Office-Regional Administration and Local Government (PMO-RALG). There are also other dedicated non-governmental and community organisation actors which are also working on the provision of urban and rural sanitation and hygiene services. In addition, the Water and Sanitation Act of 2009 gives power to Urban Water Supply and Sanitation Authorities for the provision of sanitation services in urban areas through sewer connection networks (URT, 2009; URT, 2012).

Traditionally, the MoHCDGEC deals with public health, both in built-up areas and public spaces. The MoWI is responsible for sewerage, and thus, much of aid finance for household sanitation is bundled together with finance for water supply that therefore flows through the Ministry's budgets. The MoESTVT is responsible for sanitation and hygiene in schools; and the PO-RALG oversees local urban governments, mainly city, municipal and town councils (Chaggu and Mashauri, 2002; URT, 2012; Thomas, Holbro and Young, 2013; Kumar, 2015). This fragmentation of responsibilities into diverse and multiple ministries, departments and agencies has resulted in an overlap of roles and responsibilities, with resultant complexities in achieving the desired sanitation outcomes.

Consequently, in 2009 the four main ministries, in collaboration with key active non-state sanitation actors and stakeholders, developed and signed a Memorandum of Understanding (MoU) outlining a coordinated governance structure to have a regular mechanism for discussing household sanitation and hygiene and school WASH and to contribute to three national sector programmes – Health, Water and Education. One of the remarkable achievements of the MoU was the formal placing of the sanitation sector under the Ministry of Health (MoHCDGEC) through the development of the National Sanitation and Hygiene Policy (NSHP). This Ministry is thus formally the *de-facto* and *de-jure* home of sanitation intervention in the country.

The draft NSHP introduces common definitions and clarifies institutional arrangements, including coordination. It also constitutes a first step towards increasing budget allocations for the sector. Acceptance by the Ministry responsible for Health as an institutional home for sanitation and hygiene policy is another significant development. Before the draft NSHP, sanitation was spread across a few related policies, including water (notably sewerage), health, education, and community development, resulting in fragmentation and little coordination (Kessy and Mahali, 2016).

6.4.2. Actors and their roles in the urban sanitation chain

While the Ministry of Health may be the institutional home for sanitation and hygiene policy, the institutional framework of sanitation infrastructure is complex and fragmented among various actors, as listed below: (Thomas et al, 2013; Mahali and Kessy, 2017)

- Central Government;
- Urban Local Governments;
- Public Utilities or Autonomous Government Agencies (Urban water and Sanitation Authorities, EWURA);
- Donor Community/ Multilateral and UN Agencies;
- International Non-Governmental Organisations;
- Civil Society Organisations;
- Research institutions.

- ***Central Government Actors:*** *Ministries in charge of sanitation*

Central Government of Tanzania forms the first group of actors in the urban sanitation chain. This group comprises of four ministries: MoHCDGEC; MoWI; MoESTVT; PO-RALG. The MoHCDGEC stands as the main coordinator of all other actors. Among other roles and responsibilities, the MoHCDGEC is charged with developing policy, guidelines, and strategies for sanitation, providing technical assistance to urban councils for sanitation, preparing acts, regulations, and standards for sanitation, monitoring, regulating, and providing support and advice to councils. This is because sanitation is part and parcel of public health issues that the ministry in charge of health matters should care for.

The MoWI is responsible for developing policy, regulations and strategies related to water and sanitation; overseeing the implementation of policies and strategies; coordinating and planning for projects of national importance; securing finance for projects of national importance; monitoring technical performance of Urban Water Supply and Sanitation Authorities (UWSA); appointing a chairman and members of the UWASSA Boards; appointing a chairman and members of the Energy and Water Regulation Authority (EWURA) Board; providing advice to EWURA in the formulation of technical guidelines and standards; and providing technical guidance to Councils. The MoESTVT deals mainly with sanitation infrastructure in schools, while the PO-RALG oversees the implementation of projects and programmes in the Urban Local Authorities.

In brief, the existing sanitation framework shows that the Central Government is fundamentally charged with ensuring that all the citizens of the country have access to infrastructure and basic services. In doing so, it creates the necessary architecture or framework which guides the delivery of infrastructure and basic services, and the allocation of resources in the country. The group of state actors are from the Ministries whose decisions are implemented in Urban Local Government tier such as Arusha city council.

Each Ministry deals with sanitation infrastructure differently according to its mandate. Generally, the role of the state actors at the central government level is observed at the policy and law-making level, financing and decision-making on urban affairs of national importance. While all the mentioned ministries are involved in one way or the other, the MoHCDGEC was found to be the main custodian of sanitation issues as part of its public health mandate.

Urban Local Governments

This group is made up of the urban local governments/authorities which include city, municipal and town councils. Regional Administration and Local Governments are both under the office of the President. These are mostly the implementers of the national policies and programmes at the grassroots level, as their chain of command is directly linked to the local communities, from city director to technical and professional staff of the council to the ward executive officers and sub-ward leaders. The next chapter will detail the roles and responsibilities of Arusha City Council as one of the urban local governments.

Public Utilities or Autonomous Government Agencies

The group of Autonomous Government Agencies is made up of UWSA and EWURA. The former is in charge of educating and providing information to the public on public health aspects of water supply, waste water disposal, water conservation and similar issues. It is also responsible for liaising with city council authorities on matters relating to waste water disposal. Other responsibilities are:

- Constructing and maintaining sewerage disposal works on any public and or land acquired or lawfully appropriated for that purposes.
- Constructing and maintaining public sewerage.
- Providing amenities or facilities which the Authority considers necessary or desirable for persons making use of the services or the facilities provided by the Authority.
- Setting water and sewage disposal tariffs.
- Collecting fees from customers for water supply and sewerage services.
- Advising on legislative proposals relating to water, water supply and sewerage and recommending their enactment to the Minister.

EWURA regulates all the urban water and sanitation authorities and approves tariffs before their implementation.

International Non-Governmental Organisations

The group comprises international Non-Governmental Organisations, which include Water Aid, ACRA Cooperiamp lo sviluppo, African Medical Research Foundation (AMREF), Bremen Overseas Research and Development Association (BORDA), Care international, Concern, German Development Organisation (GIZ), LVIA solidarieta e cooperazione Internationale, Oxfam, Plan International, Netherlands Development Agency (SNV), and Swedish International Corporation Agency (SIDA). Most of these organisations finance research and geographical area-specific projects.

Donor community and UN agencies

This group is made up of the Donor community, namely African Development Bank (ADB), French Development Agency (AFD), Belgian Development Co-operation, Danish International Development (DANIDA), Germany Bank for Reconstruction (KfW), Millennium Challenge Corporation (MCC), United Kingdom Department for International Development (DFID), United Nations Habitat Programme (UN Habitat), UNICEF, USAID, World Bank, and WHO. These agencies finance central and local governments on sanitation projects of national or local level importance.

Civil Society Organisations

The definition of a civil society organization is broad and includes groups such as CBOs, NGOs and Faith-Based Groups (Scott and Sansom, 2004). This group is made up of Private Foundations, namely the Aga Khan Foundation, the Ford Foundation, The Body Shop Family Foundation, and the Stone Family Foundation. *Faith Based Organisations* include World Vision Tanzania, and Tanganyika Christian Refugee Service (TCRS). CBOs form the largest group of local organisations. These include (Thomas et al, 2013; Kessy and Mahali, 2016):

- Agenda for Environment and Responsible Development (AGENDA)
- Agriculture, Water & Sanitation Education Training & Environment Conservation (AWSETEC)
- Community Based Health Care Council (CBHCC)
- Community Environmental Management and Development Organisation (CEMDO)
- Environmental Engineering and Pollution Control Organisation (EEPCO)
- The Desk and Chair Foundation (TDCF)
- Health Actions Promotions (HAPA)
- Indigo Women Links
- Joint Environmental Management Action (JEMA)
- Maji Safi kwa Afya Bora Ifakara (MSABI)
- Majina Maendeleo Dodoma (MAMADO)
- Sanitation and Water Action (SAWA)
- Southern Highlands Participatory Organisation (SHIPO)
- TAKA GUMU Group
- Tanzania Water & Environmental Sanitation (TWESA)
- Tanzania Water & Environmental Conservators (TESCO)
- Victoria Environmental and Fishery Development Association (VEFDA)
- Water and Sanitation for Community Development (WASACODE)
- Centre for Community Initiatives (CCI), and
- Tanzania Federation for the Urban Poor

Networks include Tanzania Water and Sanitation Network (TaWaSa) and the National WASH Coalition.

Research and Academic institutions: This group comprises of research-intensive institutions which include Ardhi University, University of Dar es Salaam, Nelson Mandela African Institution of Science and Technology, London School of Hygiene and Tropical Medicine (LSHTM), Sanitation and Hygiene Applied Research for Equity (SHARE), Swiss Tropical and Public Health Institute. Research and academic institutions are among the vital actors producing and disseminating knowledge on sanitation infrastructure in Tanzania. For instance, the Sanitation and Hygiene Applied Research for Equity (SHARE) Consortium, which was established in 2010 with funding from the UK Department for International Development, contributes to achieving

universal access to effective, sustainable and equitable sanitation and hygiene by generating, synthesising and translating evidence to improve policy and practice worldwide, Tanzania included. For nearly a decade, SHARE has developed research and synthesis on sanitation and hygiene that has contributed to changes in policy and practice at national and global levels. SHARE claims that their work has resulted in changes in sector investments, intervention approaches, and applied research by others, resulting in health, economic and development benefits. Though the role of research and academic institutions is not directly linked to the sanitation service chain, their work impacts all the stages of the chain indirectly.

6.4.3. National Sanitation Programmes

The National Sanitation Programmes are concerted efforts to achieve or implement some of the objectives and targets set in the National Development Vision 2025 and the National Strategy for Growth and Reduction of Poverty, particularly for sanitation infrastructure. The early efforts towards improving access to basic sanitation infrastructure were designed and launched in early 1970s, by the country's first President and the father of the nation, Mwalimu Julius Kambarage Nyerere, who initiated a very high profile sanitation campaign known in the Tanzanian lingua franca, Kiswahili, as *"Mtu ni Afya"* ("Man is Health") (Hall, 1978).

The campaign used different approaches, such as radio broadcasts/programmes, peer pressure and enforcement, to discourage open defecation and adopt individual household toilets. The campaign's focus was on community health, with a strong emphasis on preventative medicine. Specifically, the radio forums aimed at increasing urban and rural residents' awareness of how to live healthily and to take appropriate action; providing clear and simple information about the symptoms of specific diseases and their prevention; and encouraging those who had participated in the national health literacy campaign to maintain their skills by reading campaign materials designed especially for the newly literate. Unequivocally, the campaign succeeded in encouraging rural citizens to construct large numbers of latrines with their own resources (Hall, 1978; Sarzin and Raich, 2012; Kumar, 2015; Kessy and Mahali, 2016; Mcgranahan *et al.*, 2016).

Much of the campaign, as indicated earlier, focused on education and a large portion of the finance was spent on training of local leaders, the production of study guides and manuals, the production of radio programmes, publicity, research and post-campaign publications (Hall, 1978, p.71). However, many of the (then) constructed latrines no longer qualify as acceptable sanitation in terms of the JMP monitoring system standards, but at least an attempt was made to try to motivate residents to build a modest toilet facility for every household. Since then, no such concerted campaign has been run, and the government and other actors have adopted a top down and piecemeal approach, with no notable improvements on countrywide sanitation sector.

One such piecemeal project was implemented in Dar es Salaam in 2007 when the Government of Tanzania, jointly with the United Nations Human Settlements Programme, designed the 'Dar es Salaam Citywide Action Plan' which aimed at increasing the number of dwellers of informal and unplanned settlements serviced with basic sanitation infrastructure and solid waste collection from 30 to 60 per cent by 2020. On urban sanitation, the Citywide Action Plan aimed at conducting assessments on user needs, constructing 159 communal latrines, constructing three demonstration latrines and establishing a regulatory framework for de-sludging in Dar es Salaam. (UN Habitat, 2010; Thomas et al 2013). Other area-based projects have been designed and implemented by both International and national non-governmental organisations and agencies.

The Ministry of Health developed a National Environmental Health, Hygiene and Sanitation Strategy (NEHHASS) whose strategy includes community sensitisation of hygiene and health problems (Thomas et al, 2013 citing Hooks, 2008). In addition, another significant effort was that by the Ministry of Water and Irrigation which coordinates the Water Sector Development Programme (WSDP) 2006 – 2025. The WSDP has four major components, namely: Water Resources Management; Rural Water Supply and Sanitation; Urban Water Supply and Sewerage; and lastly Institutional Development and Capacity Building.

The sanitation and hygiene component of Phase II of WSDP is designed to tackle the urban and rural sanitation crisis in the country by stimulating demand for improved sanitation facilities and hygiene services. This component aims at decreasing open defecation and at ensuring both urban and rural households upgrade their latrines. The main approaches are strong behaviour change and the effective enforcement of laws, standards and regulations. (Thomas et al, 2013). The programme is funded by World Bank, African Development Bank (ADB), German Bank for Reconstruction (KfW), Netherlands Development Organisation (SNV) and French Development Agency (AFD) (URT, 12; Thomas et al, 2013). One of the objectives of the WSDP is to upgrade 2 million latrines across Tanzania (African Development Bank, 2011 in Thomas et al, 2013).

On urban sanitation, the Water Sector Development Programme is designed to organise promotional events for behaviour change in urban households. It aims at emphasising investment in on-site sanitation through the construction of improved and manageable sanitation options. In addition, hand washing with soap is an equivalent indicator to be promoted in the urban areas. Key strategies include advocacy and orientation of government and key stakeholders for sanitation and hygiene. Other designed strategies include enforcement of laws, guidelines and standards on sanitation and hygiene; and promotion of behaviour change on sanitation and hygiene at household and institutions (URT, 2014).

Since 2006 Tanzania has implemented a pilot project of the World Bank Water Sanitation Programme (WSP) which was funded by the Gates Foundation for 4 years. The WSP is employing Community-Led Total Sanitation (CLTS) to increase sanitation access to more households in 10 districts through campaigns, sanitation activities, and hand washing activities. The WSP programme aimed to complement the existing Tanzanian Government WSDP and NEHHASS programmes. The programme successfully reached 14.5 million people through mass media campaigns and hundreds of thousands were reached through direct consumer contact and interpersonal contact (Hooks, 2008; World Bank, 2008; World Bank et al, 2011; Coombes and Paynter, 2011 cited by Thomas et al, 2013). The Community-Led Total

Sanitation (CLTS) was basically rural oriented, however, the Ministry of Health is now adopting the manual for urban use (Mcgranahan *et al.*, 2016).

Another outstanding effort at addressing the national sanitation crisis covering all local governments was the National Sanitation Campaign (NSC) which originated from the National Rural Water Supply and Sanitation Programme (NRWSSP) and Water Sector Development Programme (WSDP) under the Ministry of Water and Irrigation. In 2010, the NSC was added as part of the Water Sector Development Programme and is implemented by the Ministry of Health (MoHCDGEC) in collaboration with the Ministries of Water, Education and the PO-RALG. The introduction of the NSC was considered a major milestone in the sanitation sector after President Nyerere's *Mtu ni Afya* campaign in the 1970s. NSC aimed to reach the entire country, both the rural as well as urban areas, and every household. This was a much more comprehensive approach compared to previous efforts. The campaign adopted the use of the Community Led Total Sanitation approach, sanitation marketing, and other approaches, as well as the engagement of national, regional, and local governments (Kumar, 2015; Kessy and Mahali, 2017).

In creating demand for improved sanitation and increased supply of sanitation facilities, the NSC used a 'triggering' approach, where community members are asked, in meetings, to determine the effects of open defecation on human health and to create cues to the action of constructing improved sanitation facilities. In the process, the communities were engaged in transect walks (where a community map is drawn of areas prone to open defecation) and the effects of open defecation was discussed. The campaign organizers also trained local artisans or *fundis* in the construction of toilet slabs which are used to enhance the unimproved toilet infrastructure. The campaign's success was founded on local community participation using available resources to build new toilets and make improvements to the unimproved toilets *(Interview with Arusha National Sanitation Campaign Coordinator, 24/02/2017).*

The campaign's first phase, implemented between 2011-2015, focused on improving sanitation infrastructure and hygiene conditions in household and school settings in rural settlements of Tanzania. The second phase runs from 2016-2020 and continues

with the same targets of the first phase. However, much effort is also directed towards improving conditions in urban areas, as well as in public facilities such as hospitals and health care facilities, whilst continuing to support rural settlements and school WASH improvements. The deliverables of the NSC Phase I included the following:

- 1.3 million households with improved sanitation facilities;
- 812 schools with access to improved sanitation and hygiene facilities;
- 600 villages with signed Open Defecation Free declarations; and
- 600 villages served by local service providers in their respective areas (SHARE Consortium, 2016).

The results of a recent evaluation of the NSC conducted by the Sanitation, Hygiene Applied Research for Equity consortium (SHARE) reveal that 61 per cent of the interviewed respondents confirmed that they had heard of the campaign in the 6 months prior to the evaluation; and 16 per cent of households claimed to have made improvements to their latrines. The same evaluation assessed the respondents' understanding of the social and health benefits of improved sanitation promoted by the NSC. The findings show that 86 per cent of the respondents recognised that using or building an improved latrine is good for one's health and safety and impacted on financial savings. Strong social norms of the clean and improved sanitation facilities were also reported by 97 per cent of the respondents. Open defecation was perceived as an intolerable and unacceptable practice by 90 per cent of respondents (SHARE Consortium, 2016)

However, SHARE reports that numerous bottlenecks and challenges were identified during the campaign's implementation. The major issues included systematic delays in fund disbursement from national to local governments, and limited budget management capacity within the rural district authorities. Consequently, 19 per cent of the budget was not disbursed by the final year of the NSC campaign. In addition, capacity gaps and lack of human resources and incentives at the local government level led to challenges in the monitoring of the campaign's expected outcomes and coordination of activities. For example, over 50 per cent of the quarterly monitoring and financial expenditure reports were either delayed or not submitted at all. Worse

still, many of the submitted reports were of poor quality, which prompts queries around the validity of the overall campaign output (SHARE Consortium, 2016).

6.5. State of sanitation coverage in the country

This section focuses on coverage of sanitation facilities available in the country with specific emphasis on the five largest cities of Dar es Salaam, Mwanza, Arusha, Mbeya and Tanga. It also presents the consequences of poor sanitation in Tanzania.

6.5.1. Sanitation coverage

Generally, 91 per cent of Tanzanian households have access to some form of toilet facilities. It is also reported that 19.1 per cent of households in Tanzania use improved toilet facilities, and that 64.5 per cent use unimproved sanitation facilities (including those who have no facilities or use bush and field) (MoHCDGEC-Tanzania Mainland *et al.*, 2016, pp. 23–32). This shows that Tanzania has relatively low national sanitation coverage compared to other neighbouring countries in the region, mainly Kenya and Zambia. In Kenya 22.7 per cent of households use improved toilet facilities, 30.1 per cent share with more than one household, and 47.3 per cent use un-improved facilities (Kenya National Bureau of Statistics *et al.*, 2015, pp.13-14) while 25.4 per cent of Zambian households use improved, 20.1 share and 54.5 per cent use unimproved toilet facilities (Zambia Central Statistical Office, Zambia Ministry of Health and ICF International, 2014, p.17). Nevertheless, Tanzania does seem to have a low number of households that do not have toilet facilities or practise open defecation in bush or fields, compared to Kenya and Zambia (9.9 and 16.2 per cent of households respectively).

As per WHO/UNICEF JMP definitions, unimproved sanitation facilities are those which do not ensure hygienic separation of human excreta from human contact. These include pit latrines without a slab or platform, hanging latrines and bucket latrines. Improved sanitation facilities are those which are likely to ensure hygienic separation of human excreta from human contact, and thus reduce the transmission of cholera and other diseases. They include the following non-shared facilities: Flush or pour flush (piped sewer system, septic tank, and pit latrine), Ventilated Improved Pit (VIP) latrine, Pit latrine with slab, and Composting toilet. Shared sanitation facilities are

classified as ‘otherwise acceptable’, but only if shared between two or more households. Only facilities that are not shared or not public are considered improved (WHO/UNICEF JMP, 2015).

The national coverage of urban sanitation facilities within the United Republic of Tanzania varies (Zanzibar included). It is estimated that on the Tanzania mainland, 35 per cent of urban households have access to improved sanitation facilities, 42 per cent share sanitation facilities with more than one household, and 23 per cent use unimproved including bush/field or no facility at all (MoHCDGEC-Tanzania Mainland *et al.*, 2016, p.32), while in (Tanzania) Zanzibar, 59 per cent of households use improved sanitation facilities, 27 per cent use unimproved facilities including bush/field or no access to any form of facilities, 14 per cent share facilities. This is interesting as it shows that Zanzibar leads in the coverage of households having access to both improved and non-improved sanitation facilities compared to its counterpart mainland. A scrutiny of urban households’ access to sanitation statistics by type of the facilities demonstrates that 50 per cent use traditional pit latrines, 42 per cent use flush toilets, 6 per cent use Ventilated Improved Pit (VIP) latrines, and that 2 per cent have no access to any form of sanitation in Tanzania mainland. In Zanzibar, 38 per cent use traditional pit latrines, 37 per cent use flush toilets, 8 per cent use VIP, but 17 per cent have no access to any form of sanitation facility. It should be noted that more often Tanzania mainland and Zanzibar (island) are used separately in the literature for stressing some differences in data between the two. However, if Tanzania stands alone, it represents the united republic where mainland and Zanzibar are combined.

	Percentage of households in Tanzania	
Type of Toilet facility	Mainland (%)	Zanzibar (%)
Traditional pit latrine	50	38
Flush toilet	42	37
Ventilated Pit Latrine	6	8
No facility/bush/field	2	17
Total	100	100

Table 6. 2: Percentage of Urban households per type of toilet facility
Source: MoHCDGEC-Tanzania Mainland *et al.*, 2016, p.32.

These are the national figures. An analysis of the major cities shows that urban sanitation infrastructure coverage differs from one city to another. There are five gazetted cities, namely, Dar es Salaam, Mwanza, Arusha, Mbeya, and Tanga. Sanitation statistics show that in Dar es Salaam, the principle primate city, 60 per cent of households use traditional pit latrines, 38 per cent use flush toilets, 2 per cent use VIP and 0.2 per cent have no facility (see Table 6.3). Mwanza, the second largest city, is split into two municipal councils of Ilemela and Nyamagana. The findings indicate that 54 per cent use flush toilets, 41 and 40 per cent of households use traditional pit latrines, 4 and 5 per cent use VIP, 1.3 and 1.0 per cents have no facilities respectively in Ilemela and Nyamagana municipal councils. In Arusha, which is the third largest city, it is reported that 48.3 per cent of households have access to traditional pit latrines, 46.2 per cent flush toilets, and 4.9 per cent VIP. In Mbeya, the fourth city, 54.5 per cent have access traditional pit latrines, 43.5 per cent flush toilets, VIP 1.9 per cent and 0.7 per cent have no facility and lastly Tanga 55.3 per cent traditional pit latrines, 38.9 per cent flush toilets, 1 per cent VIP, and 4.8 per cent have no facility as shown in Table 6.3.

	Coverage of urban sanitation facilities in the major cities (%)					
	Dar es Salaam	**Mwanza**		**Arusha**	**Mbeya**	**Tanga**
Type of Toilet facility		**Ilemela Municipal council**	**Nyamagana Municipal council**			
Traditional pit latrine	60	41	40	48	55	55
Flush toilet	38	54	54	46	44	39
Ventilated Pit Latrine	2	4.0	5	5.0	2.0	1.0
No facility/bush/field	0.2	1	1	0.7	0.2	5.0
Total	100	100	100	100	100	100

Table 6. 3: Urban sanitation facilities in the five major cities
Source: National Bureau of Statistics, 2016a

6.5.3. Cost and burden of poor sanitation

In most of the Tanzanian cities, there has been a high prevalence of environmental disease (cholera, malaria, lymphatic filariasis, dysentery and diarrhoea) associated with poor sanitation (Jenkins *et al.*, 2014). Redressing the consequences of poor sanitation costs the Government of Tanzania more than TShs 301 billion each year (US$206 million), while open defecation practices cost the Government of Tanzania US$46 million per year (Water Aid, 2012). Water Aid estimates that eradicating the

open defecation practice in Tanzania would need approximately one million latrines to be built and effectively used in the entire country.

The economic burden of poor sanitation falls most heavily on the poorest people. The average cost associated with poor sanitation constitutes a much greater proportion of a poor person's income than that of a wealthier person. It is also reported that Tanzania is among the 12 countries with the largest number of people without access to improved sanitation (WHO/UNICEF JMP, 2012).

Poor sanitation infrastructure is blamed for the high incidence of many diseases in urban wards, particularly those with the greatest poverty, population densities and percentages of informal residents (Jenkins et al, 2014 citing Penrose et al,). In most of the unplanned informal settlements, diarrhoea among children under five has increased markedly between 2004 and 2010 (from 10 to 18 per cent), surpassing the rate in Tanzania rural settings (Jenkins et al, 2014). It is estimated that out of 5,800 cases of cholera recorded yearly, 18,500 children under the age of 5 die from diarrhoea. Almost 90 per cent of these deaths are attributed to poor water, sanitation, and hygiene conditions (URT, 2014a; Kessy and Mahali, 2016). The Tanzanian Annual Health Statistics abstract of 2008/2009 reports that between 60 – 80 per cent of health facility outpatient department attendance is largely caused by diseases related to poor sanitation and hygiene. The same report indicates that in many rural and urban settlements diarrhoea is ranked third among the top ten diseases causing morbidity (URT, 2012).

6.6. Conclusion

The chapter has shown that *"Mtu ni Afya"* (Man is Health) and National Sanitation Campaign are the two concerted and outstanding central government efforts designed to facilitate access to sanitation infrastructure to majority of citizens throughout the country. Through these programmes, the majority of households (91 per cent) are reported to have gained access to some form of sanitation. However, it has been learned that only 19 per cent of the facilities can be regarded as improved to UN criteria/standards and that more than half of all toilet facilities in the major cities are

still traditional pit latrines. It seems that these two campaigns place great emphasis on toilet containment and ignore other components of the sanitation chain.

The chapter has shown that the pace of urbanisation and urban growth widens the service delivery gaps in the country, as the responsible government organs cannot meet the needs of the growing urban population. The incapacity of the government to guide urban growth has nurtured the proliferation of unplanned settlements where the network of basic infrastructure cannot be further stretched due to poor layout or lack of urban planning standards; and where majority of citizens own land under customary tenure systems. This will have obvious impact on sanitation infrastructure provision in informal settlements, given that most of the urban water and sanitation authorities in the country still stick to the traditional or conventional technologies of sewerage systems, hence widening the service delivery gap once more.

The Tanzanian constitution and key urban policies and laws promote active involvement of service beneficiaries and other non-state actors in planning and execution of various development programmes. The urban local governments are structured in such a way to be close to the service beneficiaries. Participation of non-state actors, particularly civil society organisations and citizens, is vital in co-producing urban infrastructure and services. Although the chapter also exposed the fragmented sanitation governance frameworks and explored the assemblage of vital actors and their roles making the sector an orphan within the government organs; one of the strengths of the policy framework is the recognition of non-state actors, which is a fundamental pillar in co-production process. Significantly, the chapter has shown that participation of non-state actors, including individual households, in urban development activities and basic services provision is central in key the Tanzania urban policy framework, which is the solid footing of co-production process in urban service delivery. Otsuki, Mungai and Gera, (2013) posit that non-state actors are considered as an important substitute for government services in most developing countries.

However, the reviewed Tanzanian urban policies and laws seem to ignore the reality of socio-spatial informality by failing to clearly indicate how citizens or households

residing in informally developed urban settlements will be reached. Even if the National Health Policy states that it the government will encourage construction and promote the use of pit latrines in all households, the policy is silent on the mechanisms of making sanitation facilities accessible at household level. There is a promise to do this through Water Supply and Sanitation Authorities which however serve largely the planned neighbourhoods due to ease of laying down pipes for sewerage network. Worse still, the reviewed policies rarely mention the term ‘informal’ or ‘unplanned’ settlements. The exception is the Land Policy of 1997, which promises that these marginalised and unplanned areas could be upgraded and provided with adequate sanitation facilities, among others. However, implementation of the policy on upgrading informal settlements is piecemeal and at a very low speed compared to urbanisation rate.

The chapter details the importance of sanitation and hygiene, especially in urban areas, as they are critical for the prevention of the outbreak of diseases and that the government has pledged to provide improved sanitation to 95% of the country population by 2025. However, the burden of attaining this goal has been put on the households’ shoulders, without tangible policy statement on their empowerment. This indicates that the government expects local communities and individual households to incur the cost of accessing improved sanitation facilities, despite the reported sturdy national economic growth, and citizens’ poverty levels. The policy frameworks look more like domination devices than tools for enabling the local communities. Some forms of community empowerment or subsidies could be of paramount importance in achieving adequate level of sanitation provision in informal settlements (Scott and Sansom, 2006).

The next chapter (7) presents findings from the fieldwork focusing on the main case study of Arusha city; while Chapter 8 will exclusively focus on the two cases of Sombetini and Baraa informal settlements.

CHAPTER SEVEN

URBAN SANITATION INFRASTRUCTURE IN ARUSHA

7.1. Introduction

This chapter presents empirical findings from Arusha as the main case study. The findings presented in this chapter were collected through both primary sources (key informant interviews) and secondary sources (various reports and documents from Arusha city council and Arusha Water Supply and Sanitation Authority, backed up by some published literature). The results presented in this chapter will contribute to answering subsidiary questions number 2, 5 and 6 respectively:

- What is the status of urban sanitation infrastructure and services provision in the informal settlements in Arusha?
- Who are the actors, what are their roles, and how are they related in co-producing urban sanitation infrastructure in informal settlements in Arusha?
- What are governance arrangements emerging from the multiplicity of actors involved in the co-production process of urban sanitation infrastructure the informal settlements in Arusha?

7.2 Arusha city overview

This section traces historical background of the Arusha as an urban local government from the colonial era and gives its geographical information. It also presents the administrative and governance structures, demographic and socio-cultural details as this is importantly related to sanitation practices in the informal settlements which will later be discussed in the coming chapters. The section ends with status of urban planning and unplanned settlements in the Arusha.

7.2.1. Background and geographical settings of Arusha City

Arusha, located in the north-eastern corner of the country, was declared as a Township Authority in 1948 when it had a population of only 5,320 inhabitants. In 1980, it was upgraded to Municipality status. On November 1st, 2012, Arusha Municipality was officially upgraded to city status by the then President of the United Republic of Tanzania, Honourable Jakaya Mrisho Kikwete. it's the area of the city had more than doubled in that time - its spatial boundaries had expanded from 93km^2 to 208 km^2.

Apart from being a city in its own right, Arusha is also the headquarters of the wider Arusha region and it is an important administrative centre for regional and international activities. Both precipitation and soil characteristics are of consequence to the provision of sanitation infrastructure. Arusha has distinct wet and dry seasons. There are two rainy seasons between October and January, and between March and May. Amounts of rains in these two seasons ranges between 500-1200 mm per annum with an average of 844 mm. The large portion of Arusha city soil is of volcanic origin especially in highland areas, while in the plains or valleys black cotton soil is dominant. (African Development Bank, 2007; Arusha Municipal Council and UWP Consulting, 2011; Arusha City Council and Space and Development Company, 2012).

7.2.2. Administrative and Governance structures

Administratively, the Arusha region is divided into seven local governments, of which Arusha City Council is the only official Urban Authority (in terms of the Local Urban Government Act Number 8 of 1982), while the rest are classified as rural or district governments. The rural local authorities are Monduli, Longido, Arusha, and Meru District Councils. It should be noted that Arusha City Council and Arusha Rural District Council are two different local governments. The Arusha City Council is the case study under investigation. During the fieldwork for this research, the City Council was divided into 19 wards as per the national 2012 population and housing census report. However, before the completion of this study, the city was further split into 25 wards which will not be considered in the reporting of the research findings.

The everyday management of the city council's affairs is led by a City Director seconded by professionally qualified heads of relevant departments who form the City Management Team. The City Management Team, which is charged with making decisions and implementing policies that enable the city to function and deliver to its residents, is split into twelve departments. The departments under the City Directorate are (i) Secondary Education, (ii) Planning, Statistics, and Evaluation, (iii) Administration and Human resources, (iv) Education and Culture, (v) Agriculture and Cooperatives, (vi) Water and Irrigation, (vii) Livestock and Fishery, (viii) Works and Fire, (ix) Urban Planning and Environment, (x) Community Development, (xi) Finance and Trade, and lastly (xii) Health and Cleaning, which hosts the section of

environmental health and sanitation and is responsible for implementing national and city level sanitation programmes. See Appendix E for detailed hierarchical organisation structure of the city council.

On political affairs, the City Directorate is overseen by a full City Council and Standing Committees made up of elected political leaders. The City Council is headed by a City Mayor and Deputy-Mayor as stipulated in the Local (Urban) Government Act No.8 of 1982, section (20) from sub sections 2 to 4. Lastly, sub section 4 of the Act sates that City Director (who is also the Head of City Management Team) shall act as the secretary of the meetings to full City Council and that he/she shall not vote any those meetings. In Tanzania, a City Director is appointed by the President of the United Republic, through the Minister in charge of Regional Administration and Local Government Affairs (URT, 1982).

Presently, the full City Council is led by an opposition political party. In the recent local government elections of 2016, the national opposition party, *Chama Cha Demokrasia na Maendeleo* (CHADEMA) won the majority of seats in the City Council's political leadership. The Council is headed by a City Mayor who is elected by the Full Council membership, comprised of 32 Councillors; 19 elected from each ward constituting the city administration, seven nominated councillors under special seats, one elected Member of Parliament and five nominated Members of Parliament under special seats for women (Cummings *et al.*, 2016). In addition, the city administration hierarchy goes down to the ward level, where the City Director recruits a Ward Executive Officers (WEO) to assist in the supervision of urban development and management at ward level. The City Directorate may also recruit professional staff members to assist in a number of areas such as environmental health and sanitation, community development and cooperatives at ward level. The political leadership of ward development is also headed by a ward councillor, assisted by sub ward leaders who are all elected by the citizens to work for the everyday ward development. It is worth noting that many of the sub-ward or *Mtaa* leaders in Arusha are from the national opposition party, CHADEMA.

With regards to financing urban development projects, Arusha, like other urban authorities in mainland Tanzania, is heavily dependent on the central government, despite the national devolution system. Its urban development plans and budgets are strictly controlled and overseen by the President's Office in charge of Local Government Affairs (Namangaya, 2014; Cummings *et al.*, 2016). Local governments are supposed to receive 100 per cent of funding via central government grants to meet their budget obligations. Thus, there is no true decentralisation since the City Council has no financial independence (UNDP, 2014, p. xvii).

7.2.3. Demographic and Socio-cultural settings

The inter-census population growth rates in Arusha seem to be higher compared to Tanzania's national growth rates which were 3.2%, 2.8%, 2.9% and 2.9% for 1967/1978, 1978/1988 and 1988/2002 and 2002/2012 respectively. The city's population has increased from 5,320 in 1948 (when it was declared a Township Authority) to 313,004 in 2002, and is currently 416,442 (National Bureau of Statistics, 2013). There are 103,377 households with an average household size of 4 people. Tables 7.1 and 7.2 illustrate the growth in city's population.

The Arusha regional socio-economic profile of 1998 describes the tribes residing in the city. The Maasai are the main inhabitants of Arusha City. However, due to the rural-urban and inter-urban migration, the city has also attracted members of other ethnic groups from different part of the country, but the majority comes from the regions surrounding the Arusha region. The main ones Warusha, Wachagga, Wapare, Warangi, Wairaqw, Wanyaturu and Wasambaa. Christianity and Islam are the main religions in the City. While other religions, such as Hinduism, are also present, there are many people, mainly of Maasai origin, who do not have any religious affiliation.

Year	1948	1968	1978	1988	1998	2002	2012
Population	5,320	46,362	85,553	132,861	202,747	313,004	416,442

Table 7. 1: Arusha city population growth, 1948-2012

Source: URT, 1998; 2000; National Bureau of Statistics, 2002; 2013; 2016

s/n	Ward	Population number			Average Household size	Sex ratio
		Total	Male	Female		
	Total	**416,442**	**199,524**	**216,918**	**4.0**	**92**
1	Kati	3,114	1,564	1,550	4.4	101
2	Kaloleni	9,591	4,490	5,101	3.8	88
3	Sekei	9,213	4,272	4,941	3.7	86
4	Kimandolu	27,649	12,911	14,738	3.7	88
5	Baraa	12,498	5,896	6,602	4.3	89
6	Oloirien	18,679	8,743	9,936	3.7	88
7	Themi	9,458	4,579	4,879	4.1	94
8	Lemara	19,564	9,573	9,991	4.2	96
9	Terrat	21,790	10,346	11,444	4.4	90
10	Sokoni 1	73,331	35,534	37,797	4.0	94
11	Daraja Mbili	19,491	9,375	10,116	3.7	93
12	Unga Limited	17,342	8,497	8,845	3.6	96
13	Sombetini	48,268	22,769	25,499	3.9	89
14	Ngarenaro	12,382	5,955	6,427	4.0	93
15	Levolosi	8,838	4,279	4,559	4.0	94
16	Engutoto	7,426	3,619	3,807	4.4	95
17	Elerai	40,749	19,244	21,505	3.6	89
18	Olasiti	36,361	17,883	18,478	4.5	97
19	Moshono	20,698	9,995	10,703	4.4	93

Table 7. 2: Arusha city ward population

Source: National Bureau of Statistics, 2013

7.2.4. Urban planning and informal settlements

Figure 7.1 shows the existing land use of Arusha where the residential area covers 76.2 per cent, industries 1.9 per cent and commercial 2.2 per cent of the total area within the city boundary (Arusha City Council and Space and Development Company, 2012). A recent study by Tanzania Cities Network reports that 80 per cent of the developed city's land is unplanned; and 86 per cent of the city dwellers are living in settlements developed outside the urban planning procedures, regulations and laws (Namangaya, 2014). This indicates that orderly and planned development can be found in pocket areas such as the Central Business District, plus few other areas scattered in other wards. The level of informality brings a lot of challenges not only to dwellers, but also to the city's governance apparatus with regard to the provision of municipal services, of which sanitation infrastructure is critical.

In an endeavour to reduce the spatial informality in the city of Arusha, the Government of Tanzania, through the Ministry of Lands, Human Settlements and Housing and the Arusha City Council commissioned Surbana International Consultants from Singapore to redesign and prepare a Master Plan to 2035. The plan envisages Arusha as the green tourism capital city of East Africa with a few key pillars guiding the physical

planning process. The first pillar is *Innovative Arusha,* focusing on diversity of the economy and inclusiveness, secondly *Mobile Arusha,* focusing on 'seamless connectivity', thirdly *Smart Arusha,* considering sustainable natural resource use and management, and lastly the *Resilient Arusha,* focusing on environmental stewardship.

The Arusha Master Plan 2035 proposes the reorganisation of the spatial city structure with new density redistribution and urbanisation models. Originally the Arusha Master Plan covered 278 square kilometres mapped within the City, but now an additional 330 square kilometres have been included from selected wards of Arusha Rural District and Meru District, thus boosting the precinct to a total of 608 square kilometres as a way of containing or curbing future informal urbanisation in the areas surrounding the city boundaries.

The strategies include, among other things, the upgrading of existing informal settlements, which will thus impact in one way or the other on the provision of sanitation infrastructure. While they are part of the Master Plan 2035, administratively, the adjoined areas will remain under in their traditional local authorities (The Citizen, June 27th, 2016; Arusha Times, December 12, 2015). Land tenure in Arusha is complicated, since there is little national data showing the status of land tenure in individual local urban government areas. Instead, the available data reports generally on whole rural or urban settings, which bring challenges in evaluating the tenure status in a particular individual settlement.

In the 2012 national population and housing census, members of households living in privately owned houses in both urban and rural areas of the Arusha region were asked to state their land rights. The report indicates that 14.4 per cent of the households in the entire region had no legal right over their land and that only 12.1 per cent of households had title deeds. Most of the land ownership (65.7 per cent) is customary. In comparing urban and rural land ownership in the region, the report shows that 34.4 per cent of households in urban areas had title deed for the land where their houses are built compared with six (6.4) percent in rural areas as presented in Table 7.3. (National Bureau of Statistics, 2016, p.107).

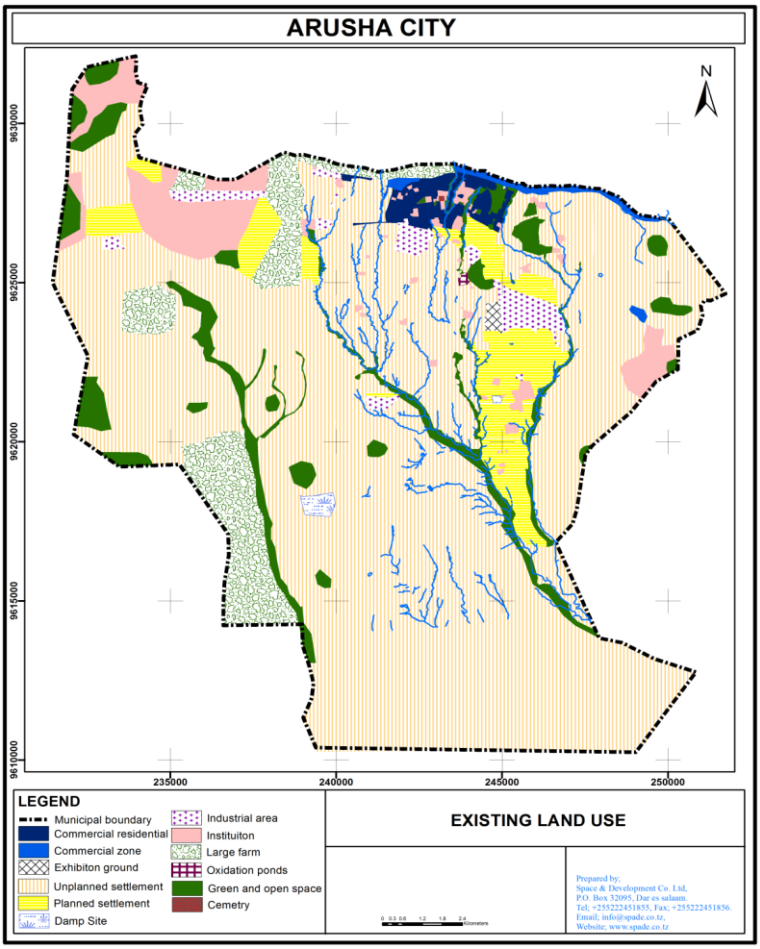

Figure 7. 1: Arusha city existing land use

Source: (Arusha City Council and Space and Development Company, 2012)

Area	Total	Title Deed	Residential License	Offer	Customary ownership	Land Sales contract	No legal papers
Arusha region	255,928	12.1	0.8	0.7	65.7	6.2	14.4
Arusha rural areas	203,060	6.4	0.5	0.6	74.5	2.2	15.7
Arusha urban areas	52,868	34.4	1.9	0.9	31.7	21.6	9.4

Table 7. 3: Status of Legal land ownership in Arusha region (%)
Source: URT, 2016

7.3. Urban infrastructure provision in Arusha

This section presents the findings on water and sanitation delivery in the city of Arusha and uncovers the landscape of actors and their networks formed in the co-production process along the sanitation chain. The section ends with an analysis of agency and power relations among the heterogenous actors.

7.3.1. Water and Sanitation delivery

Government reports show that in 2012, 94.6 per cent of Arusha's residents had access to improved water sources. This figure was split into 33.6 per cent piped water to the main dwelling units; 34.2 per cent piped water to yard or plot; and 20.8 per cent to public tap or standpipe, with 5.4 per cent of the city residents having access only to non-improved sources such as unprotected wells, unprotected springs, rain water collection, bottled water, carts with small tanks or drums, tanker trucks and/or surface water, as shown in Table 7.4 (National Bureau of Statistics, 2015; 2016; Cummings *et al.*, 2016).

The Arusha city sewer network, operated by the AUWSA, consists of sewer pipes of various sizes and materials; and inspection manholes. The sewer line is 44km long, the pipes are ranging from 100mm to 600mm diameter; made up of uPVC, cast iron and concrete. There are 593 manholes for inspection and access for cleaning. Up to December 2016, a total of 4,926 sewerage connections from categorised properties exist. The current service coverage is reported to be around 7.6 per cent which covers only the Central Business District (CBD) and scattered areas of both planned and unplanned settlements of the city. This is a very low coverage compared to clean water service provision level, hence the need for expansion of sewerage infrastructure in the entire city area. Sewer cleaning and blockage removal are done on routine basis. The total connections statistics are summarised in Table 7.5. There are monthly averages of 320 sewer cleaning and 230 sewer blockage removal occasions (*Personal communication with KI_06, February 2017*).

Reports on Arusha's sewerage system or network show that only 7.6 per cent of the city's population were connected in 2017. (*Personal communication with KI_06, February 2017*). In addition, government data in Table 6.3 of Chapter 6 show that 48 per cent of all toilet facilities are traditional pit latrines, 46.2 per cent flush toilets, 5 per cent Ventilated Pit Latrines and 0.7 per cent have either no access to any facility or use bush/open field (National Bureau of Statistics, 2016, p.119). Traditional pit latrines are viewed as unimproved sanitation services by the WHO/JMP. Arusha City Environmental Health and Sanitation Section within the City Health Department indicates that there are 39,691 households using traditional pit latrines, which are

considered as unimproved, and an additional 7,286 household without any toilet facility (*Personal communication with KI_01, February 24, 2017*). Tables 7.6 and 7.7 show the distribution of sanitation provision by type in Arusha City Council, urban areas in the Arusha region, the Arusha region generally and urban areas nationally. They show that the coverage of improved facilities in ACC is higher than urban areas nationally and regionally; this implies that many city dwellers in the country have poor sanitation facilities.

Area	**Total Household**	**Main Source of Drinking Water**													
		Improved Drinking Water Sources (%)							**Non-Improved Drinking Water Sources (%)**						
		Piped Water into dwelling	Piped water to yard/ plot	Public tap/ standpipe	Tube well/borehole	Protected dug well	Protected spring	**Total improved**	Unprotected dug well	Unprotected Spring	Rain water collection	Bottled water	Cart with small tank/drum	Tanker truck	Surface water (river dam lake etc.)	**Total Non-Improved**
Arusha City	103,377	33.6	34.2	20.8	0.8	4.4	0.8	**94.6**	0.9	1.4	0.1	0.4	2.1	0.1	0.4	**5.4**

Table 7. 4: Main Source of Drinking Water
Source: National Bureau of Statistics, 2016, p.112

AUWSA also manages the sewage treatment ponds. There are five ponds working in parallel and in series. The first pond is anaerobic, followed by two facultative ponds in parallel and finally two maturation ponds in series. Within the pond area there are two sludge ponds to treat septage from cesspit emptiers. The average daily flow into ponds is 4,350m^3/day. The effluent is ultimately discharged into the Themi River, which is mainly used for irrigation downstream. Wastewater sampling and analysis for monitoring of the pond's performance is done on weekly basis. (AUWSA, 2016; *Key informant interview KI_06*).

S/N	Customer category	Updated connections
1	Domestic	3,961
2	Commercial	676
3	Institutional	157
4	Industrial	128
5	Bottling companies	3
Total		4,926

Table 7. 5: Statistics of sewer connections as per December 2016
Source: AUWSA, 2016

	Improved toilet facility	Unimproved Or No facility	Flush/pour to piped sewer system	Flush/pour to septic tank	Flush/pour to covered pit	Other improved
Nationally-Urban	71.9%	28.1%	4.5%	10.8%	17.0%	39.6%
Arusha region	49.6%	50.2%	2.9%	6.2%	8.6%	31.9%
Arusha region-urban	85.9%	14.1%	7.0%	15.1%	18.0%	45.8%
Arusha city council	87.6%	12.6%	8.5%	18.0%	18.2%	42.9%

Table 7. 6: Arusha regional distribution of household toilet facility, 2012

Source: (Cummings *et al.*, 2016; National Bureau of Statistics, 2016b).

Total household		A. Improved Toilet Facilities							
		Flush/pour water to piped sewer system	Flush/pour water to septic tank	Flush/pour water to covered pit latrine	Ventilated improved pit latrine	Pit latrine with washable slab with lid	Pit latrine with washable slab without lid	Composting/Ecosan latrine	Total improved
Arusha City Council	**103,377**	8.5	18	18.2	4.9	12.3	25.6	0.1	**87.6**
		B. Unimproved Toilet Facility							
		Flush/pour water to somewhere else	Pit latrine without washable slab	Pit latrine without slap/open pit	Bucket	No facility/ bush/ field/beach			Total Non-Improved toilet facility
		1.5	6.7	3.7	0.1	0.6			**12.6**
		Grand total (A + B)							**100%**

Table 7. 7: Types of Toilet Facilities in Arusha City Council

7.3.2. Networks and actors co-producing urban sanitation infrastructure

This section explores those actors involved in the sanitation co-production process at city level. This process includes the entire sanitation chain: containment, emptying, transport, treatment and disposal. The everyday interactions of the identified actors will be analysed to identify networks that they form in the delivery of sanitation infrastructure.

The findings from Arusha show that there are many actors involved in the delivery and maintenance of sanitation in Arusha city, and these vary from the Arusha City Council, supplemented by other government agencies, donors and local NGOs. Referring to the Local Government (Urban Authorities) Act No.8 of 1982 as the principal law in urban governance affairs, Arusha City Council (ACC) is the central actor mandated and delegated by the central government to provide urban infrastructure and basic services for the functioning of the city. Others whose actions are observed on the ground are Arusha Urban Water Supply and Sanitation Authority (AUWSA), World Bank, Danish Government, African Development Bank, Pit emptying operators, and a national NGO and a CBO: Centre for Community Initiatives / Federation for the Urban Poor (CCI/FUP).

- ***Arusha City Council (*ACC)**

For easy delivery of urban infrastructure and services, the constitution of the United Republic of Tanzania has instituted the adoption of decentralisation model where urban local governments are delegated the power and responsibilities by the central government. One of the basic functions of ACC is the delivery of basic services to citizens or residents of its area of jurisdiction, and implementing any nationally designed projects whose effects must be felt at the local level. The ACC is particularly active in informal settlements through its Health Department. The council has deployed Environmental Health and Sanitation Officers in all its wards, where they provide health education, environmental education, awareness creation and enforcing national laws and city by-laws related to environmental health and sanitation. The department also conducts routine inspections of sanitary conditions in wards and sub-wards, going from house to house, where they inspect and control overflowing toilets and households de-sludging liquid wastes into open drainages. ACC owns and

operates few (2-3) vacuum tankers/trucks for pit-emptying services. (Key Informant interviews with KI_01; KI_02 & KI_03).

ACC is also the main implementer of the National Sanitation Campaign (NSC) at the local level. The campaign aims to create demand for improving sanitation infrastructure whereby local communities or city residents are motivated to either build or improve their toilet facilities through a Community Led Total Sanitation (CLTS) approach. In a meeting convened by the sub-ward leaders and facilitated by city and ward environmental health and sanitation officers, the city residents are sensitised through a 'triggering' approach which aims to foster a feeling of disgust in current insanitary habits. The triggering approach is a process of facilitating participatory exercises using different tools of CLTS, where a community realises the hazardous effects of open defecation or poor sanitation and decides to stop it through collective analysis of its sanitation and hygiene profile (URT, 2012). The triggering approach is built on the three pillars of shame, disgust and fear. Through the campaign's methods, the shame induced should create a consciousness or guilt for having done something which injures one's reputation in the community. The triggering tool kit also gives the environmental health and sanitation officials procedures to follow while conducting the campaign in the local community. These procedures include a sanitation or social map, transect walk, shit calculation and medical expenses, then flow diagram (URT, ibid. *Interview with KI_01*).

Figure 7.2 shows some of the pictures illustrating sample toilet facilities in Arusha. The picture on left was constructed by the city council in Murriet ward as model facility during the campaign of NSC while on right a toilet facility for one of the households in Sombetini ward.

Figure 7. 2: From left to right: a toilet built by Arusha city council at Murriet. A toilet in Sombetini. Source: Fieldwork, 2014

During the financial year of 2015/2016, ACC received the first allocation from the NSC of TShs 42,540,000/=[1] to be used for two main campaign activities: (i) rehabilitation of school toilets and sewerage system (SWASH); and (ii) household sanitation awareness creation. The latter was implemented by radio programmes, public education from a vehicle using a loud speaker, the production of posters, placards, enumerators' training and sanitation data collection, triggering activities and meetings with local communities, and building two model toilet facilities among many other activities. A large part of the campaign was directed to Murriet and Terrat wards, located on the periphery of the city (see Figure 7.2), due to their rural settings and high cholera rates in 2016. Mtaa leaders and ten-cell leaders were actively involved as they operate much closer to residents than any other political leaders. In turn, *Mtaa* or ten-Cell leaders also inspected sanitary conditions in their areas of jurisdiction to establish if there was any nuisance created by the residents.

These findings demonstrate that ACC is not directly involved in delivering sanitation infrastructure to its residents. Most of its resources are allocated towards environmental health education and controlling nuisance or sanitary conditions within its administrative area, as directed in the Public Health Act of 2009. The main role of

[1] Exchange rate: 1 US Dollar = Tanzanian Shillings 2340, Source: CRDB Bank as per March 31, 2019

city officials and sub-ward leaders (as stated in the national health policy) appears to be to visit citizen's residences to encourage the construction and use of toilets. This is done without much consideration of poverty level of the majority of the citizens living in informal settlements (Mitlin and Satterthwaite, 2012; UNDP, 2014). The direct provision of physical infrastructure and services is implemented by the AUWSA and is predominantly carried out in planned neighbourhoods of the city council. In informal settlements, ACC implements its policies and bylaws on public health through environmental health education. Despite the fact that national urban policies allow urban local governments to cooperate with private companies and non-governmental organisations in urban infrastructure and service provision, construction of toilet facilities at household level remains the sole responsibility of the household itself.

- ***Arusha Urban Water Supply and Sanitation Authority*** **(AUWSA)**

Through the unbundling and decentralisation process, the Government of Tanzania has decided to establish urban water authorities as an interface between central and urban local governments (Allen, Hofmann & Griffiths, 2008). The Water Supply and Sanitation Act of 2009 recognises urban water and sanitation authorities as autonomous commercial entities. AUWSA has been mandated to ensure that all urban residents get access to water and sanitation services in Arusha. AUWSA is therefore one of the most influential actors in water supply and sanitation provision in the city. As a legal entity or corporate charged with the overall operation and management of water supply and sanitation services within Arusha City boundaries, AUWSA was established under the auspices of the Water Works Ordinance Cap. 272 (as amended in February 1997).

AUWSA is not accountable to ACC, it reports to the Ministry of Water and Irrigation. It was declared a fully autonomous entity by order of the Minister responsible for Water Affairs in January 1998. The Water Works Ordinance was later amended to the Water Supply and Sanitation Act, 2009. Section 13, sub section 1 of this Act stipulates the obligation to provide water supply and sanitation services within the area of jurisdiction. It states that: "Notwithstanding any other law to the contrary and subject to the other provisions of this Act, a water authority shall do all things necessary to provide water supply and sanitation services to the area falling under its jurisdiction".

The review of various documents (AUWSA, 2012; 2014; 2015; 2016) and the key informant interviews indicates that AUWSA has the following roles and responsibilities related to sanitation infrastructure:

- Educate and provide information to the public on public health aspects of water supply, waste water disposal, water conservation and similar issues.
- Liaise with city authorities on matters relating to waste water disposal and the preparation and execution of plans relating to the expansion of water supply.
- Construct and maintain sewerage disposal works on any public and or land acquired or lawfully appropriated for that purposes.
- Construct and maintain public sewerage in, on, under or over any street or under or through any cellar or vault below the street.
- Set water and sewage disposal tariffs.
- Collect fees from customers for water supply and sewerage services.
- Advise on legislative proposals relating to water, water supply and sewerage and recommend their enactment to the Minister.

After the expansion of the city boundaries, the sewerage section of the technical services department of AUWSA was charged with extending its services to all additional areas, including those compacted and informally developed settlements. The AUWSA sewerage section works hand in hand with ward councillors and executive officers to find viable means of extending the sewer network to the unserved areas which show interest in being connected to the sewer network. AUWSA understands that the emptying of sewage by truck or vacuum tankers is expensive to many city residents, therefore, the extended services are subsidised and this is one of the strategies designed to attract more customers. Although the authority has its own plan of action for connecting the unconnected settlements, the Sewer Engineer explained the process for informal settlement customers to be connected to the central sewer system as follows:

- *Informal settlement dwellers organise themselves, sometimes through the ward councillors or ward Executive Officer or ward Environmental Health and Sanitation Officer to show their interest of being connected to the central sewer*

- *Then, one of the above-mentioned officers will contact the Sewer Engineer for submitting the interest and exploring the possibility of connections,*
- *Then the Sewer Engineer will visit the area and draw a map by following the area gravity*
- *Then the Sewer Engineer will design budget estimates for the main pipe and submit these to AUWSA management for approval. Once approved, the interested new customers must share the connection costs.* (Key Informant interview with KI_06)

AUWSA is overwhelmed by its task of serving the city population, particularly those living in unplanned areas. The results in this chapter have shown that only 7.6 per cent of the city population is connected to the city sewerage network. Of the city's population 86 per cent resides in informal settlements and 92.4 per cent use on-site sanitation infrastructure. This means that the large majority of residents rely on either septic tank, latrine pit emptying or onsite containment, storage and treatment. It is very unfortunate to see AUWSA planning to serve informal and planned settlements with the same technology. By virtue of its cost and space requirements, it has been argued that 'conventional sewerage' is an implicitly anti-poor technology (Paterson, Mara and Curtis, 2015). It suffices to speculate that, despite the funding from international communities, the sanitation infrastructure problem in informal settlements will not be addressed.

- ***World Bank Tanzania Strategic Cities Project***

Donor Communities have a long financing history in the development of Tanzania urban local governments (Nunan and Satterthwaite, 2001; Kumar, 2015; Cummings et al, 2016; Kessy and Mahali, 2017). Since 2010, the World Bank has been represented in Arusha through its financing of the Tanzania Strategic Cities Project (TSCP), with funding totalling $213 million with an additional $6 million from the Danish Government. The project is implemented in Arusha city and in Tanzanian's other growing mainland medium-sized cities of Tanga, Mwanza, Kigoma, Mbeya, Mtwara and Dodoma. With the Memorandum of Understanding (MoU) signed between the

Government of Tanzania and the donors, the Strategic Cities Project for Tanzania, and mainly in Arusha, has three main aims:

(i) expanding access to urban infrastructure and services in Arusha city both in firms and households;
(ii) strengthen the management and fiscal performance of ACC; and
(iii) supporting and preparation of future urban projects.

The sanitation infrastructure in the TSCP consists of the construction of storm water drainage and solid waste management; and includes solid waste collection trucks, solid waste management equipment for the Murriet landfill and the construction of an access road to the landfill site. Looking at the sanitation chain, the provision of toilets is not directly covered in the World Bank funding (Cummings, et al, 2016; *Key Informant interview with KI_01*).

- ***African Development Bank (AfDB)***

Unlike the World Bank, AfDB funding is significant for the sanitation chain in Arusha. The Government of Tanzania, through the Ministry of Water and Irrigation (MoWI) secured funding (TShs 476 billion) from the African Development Bank (AfDB) for supporting the extension and upgrading of water and sanitation in Arusha city through AUWSA. The implementation of this project is expected to alleviate the current water supply and sanitation problems arising from inadequate water supply and sanitation services coverage in the City.

Among other components contained in the Memorandum of Understanding (MoU), the project also aims at expanding the sewerage network of the city by improving existing WSP at Lemara; the construction of New WSP at Terrat and a new sewer pipeline network to serve Kimandolu, Olorien, Lemara, Themi and Engutoto Wards with a total length of about 44 Km; the upgrading and extension of sewer pipelines in the Central Business District (CBD); and the extension of sewer pipelines to serve Kambi ya Fisi, Mianzini, Kaloleni, part of Sekei, Sombetini, Sanawari and Sekei. The sewer pipelines to be upgraded in the CBD will be about 6.1 km long and sewer pipeline extension will have a total length of about 25 km with minimum diameter not less than 200 mm.

- ***Private vacuum operators / pit emptiers***

Private truck or vacuum tanker operators or pit emptiers are important actors in the delivery of sanitation services (Chaggu and Mashauri, 2002; Allen, Hofmann and Griffiths, 2008; Jenkins, Cumming and Cairncross, 2015). This is because the Arusha city government has failed to provide planned, surveyed and serviced land for housing. This research has shown that the largest part of the city area is covered by informal settlements, characterised by poor physical accessibility and non-compliance to urban planning laws and regulations. The majority of the households use on-site sanitation, and since AUWSA services are not extended to informal settlements due to difficulties in laying pipes in such areas, the pit emptying services market is dominated by private operators as. The city environmental health and sanitation department reports that 23 functional cesspit emptiers and 10 organised groups of community members and registered private companies work on liquid waste management in the city (*Interview with KI_01*). Private vacuum tankers charges are TShs 70,000.00 and above, but there is no fixed price. While acknowledging that the pit emptying business is profitable in Arusha and enables pit emptying operators to sustain their families, it was also noted that pit emptiers report resentment and disrespect from the community members including their own clients.

> *Our community disrespect us. Even the same people who invite us for desludging their own toilets, can lock themselves inside their houses while emptying their toilets. They think we are out of our mind* (Interview with KI_05).

A number of challenges were reported during the pit emptying exercise. Toilet users throw pieces of cloth or disposable diapers and menstrual pads into the pits, thus impeding the desludging process. Another challenge reported to the study was that people tend to call for the emptying service when the toilet is completely full. *"*They call us when all the toilet pipes are blocks*"* said private vacuum operator (KI_05). Most of the clients use traditional pit latrines and the challenge is that many households use little water for anal cleansing which results in the excreta turning into mud, which is difficult to de-sludge. Poor accessibility in most of the informal settlements, and landslides during the rainy season, cause further problems for pit emptiers. (Interview with private vacuum operator KI_05).

> *I don't understand why all the areas named Majengo and Uswahilini have poor accessibility. Not only in Arusha, even in other cities and towns.* Ask KI_05.

- ***Centre for Community Initiatives and Federation of the Urban Poor***

National NGOs and local CBOs constituted a strong group of actors which co-produced sanitation infrastructure and services closely with local communities (Nunan and Satterthwaite, 2001; Nance and Ortolano, 2007; McFarlane, 2008b; McFarlane, Desai and Graham, 2014; Cummings et al, 2016). Much of their work focused on research and advocacy (which impact or influence change in regulatory frameworks), or financing local communities (through sanitation microfinance schemes) to own toilet facilities. Since this involved many actors, the following section will only discuss the work of Centre for Community Initiatives (CCI) and Arusha Federation for Urban Poor.

The Federation for the Urban Poor (Arusha Branch) is an affiliate of the Tanzania Federation for the Urban Poor (TUPF) which is a network of small urban poor community groups living in informal settlements. The Federation is a member of the Slum Dwellers International network and currently has about 17,000 members in eight urban centres across Tanzania, including Arusha city. Many development activities of the Arusha Federation of the Urban Poor are supported and funded by the Centre for Community Initiatives (CCI). CCI is a national NGO established in 2004 to support poor communities to improve their quality of life through sustainable solutions. CCI's mission is to improve the quality of life for all Tanzanians - particularly women living in informal settlements and rural settings, by providing support to micro finance, community driven, land and shelter, water and sanitation, health and HIV / AIDS and other development activities. CCI supports the FUP by empowering them to undertake different development activities for improving the quality of their lives, as well as linking the groups with government and other development stakeholders. The federation leadership includes Chairperson, Secretary and Treasurer who are working together with five major committees; Auditing, Loan, Mobilization, Project, Enumeration and Advocacy (CCI, 2017; *Interview with KI_04*).

The Arusha Branch FUP was founded in May 2005 with the aim of economically empowering its members through weekly savings and contributions. Sanitation projects started in 2009. Prior to that, Centre for Community Initiatives (CCI) trained members on various issues around sanitation and environmental health. The first

toilets were built in 2009 through the credit system for toilet construction. The latest report shows that between 2009 - 2016, FUP facilitated the construction of 114 toilet facilities among which 82 toilets were constructed through the sanitation microfinance system for both members and non-members, while 81 toilets were of the *Msharazi* and 1 was built by Ecosan technologies as shown in Figure 7.2. The process for applying for toilet improvement or construction starts at the mtaa level where a member submits his/her request for toilet credit/loan to the group. After group level approval, the group chairperson forwards the request to the FUP office for further assessment. Once ten applications have been collected from all groups constituting the Federation, the project officer and research officer conduct site inspections and material needs assessment**,** before the applications can be submitted to CCI for funding. But recently, some group members felt that it was taking too long to complete the construction of the toilet super structure, and decided to start funding the complete construction of the toilet from pit digging, covering and super structure construction. The loan of TShs 400,000/= covers both building materials and charges for local artisanal or masons. Depending on the loan beneficiary's financial ability, loan repayment ranged between 6-12 months. Among all the actors in this group, CCI/FUP were directly engaged in the sanitation service chain (containment) by building of toilet facilities through micro loans. (*Interview with KI_04*).

Figure 7. 3: Samples of toilets built by Federation for the Urban Poor -Arusha

Source: Fieldwork

The FUP works with all levels of local urban government from *Mtaa* leadership to City Directorate. Interviews with key informants revealed that at first there was good cooperation with ten cell leaders, sub ward leaders, and ward executive officers. But politics changed the mood of cooperation. After new sub ward leaders and ward councillors were members of the opposition CHADEMA party, cooperation dwindled. It is alleged that local leaders became involved in a scheme to buy support from local residents. The FUP also organised meetings with community development officers and environmental health and sanitation officers jointly to discuss development issues. In interviews, they reported that collaboration with city management officials remained good, but that political leadership remained a problem (Interview with KI_04).

The above results show that these two actors, CCI and FUP, have demonstrated efforts to innovatively finance the most important components of the sanitation chain: containment. Given that most households lack or build poor toilet facilities due to lack of financial resources (Mitlin & Satterthwaite, 2012; UNDP, 2014), no other actors in the city of Arusha have empowered households to build and own a toilet facility. However small FUP may be, it has helped to address the root cause of sanitation problems at household level by designing the sanitation microfinance product. However, party micropolitics seem to interfere the organisation business.

Table 7.8 summarises the identified heterogenous actors and their roles in the co-production process. The roles and responsibilities have been extracted from the findings and various urban laws presented in this and the previous chapters.

Actor's	Roles and responsibilities in the sanitation chain
ACC	- Implement all national laws, policies, and programmes - Custodian of sanitation services and public health, - Coordinate and implement national sanitation campaign - Enforce national and local/city level by-laws related to sanitation infrastructure, - Inspect sanitary conditions in public spaces and households, - Make follow-up on implementation of measures ordered to abate nuisance - Take legal proceedings and actions against any person responsible for the continuance of any nuisance, - Maintain cleanliness and sanitary conditions, - Prevent/remedy cause and occurrence of nuisance likely to be dangerous to the public health - Provide limited emptying services through trucks/vacuum tankers - Register private companies for emptying services - Operate few (2-3) vacuum tankers/trucks for pit-emptying services
AUWSA	- Expand sewer network and connect new customers - Collect fees Build/construct and operate the city sewerage system - Treat waste water to approved national standards - Build and operate stabilisation ponds
Word Bank	- Finance the strategic Cities urban infrastructure and services including sanitation component in collaboration with Danish Government - Finance construction of stabilisation pond
Danish Government	- Finance the strategic Cities urban infrastructure and services including sanitation component in collaboration with World Bank - Finance construction of stabilisation pond
AfDB	- Finance the expansion of Arusha Sewer network system - Finance construction of stabilisation pond
Pit-Emptying or Vacuum Operators	- Register with city council for pit emptying business - De-sludge full toilets - Transport the de-sludged waste water to the stabilisation pond for disposal - Must ensure that the wastewater is poured into the designated pond
CCI/FUP	- Microfinance the digging and construction of the toilet super structure

Table 7. 8: Actors in the sanitation chain
Source: Based on the fieldwork findings

In summary, the findings have shown that there are multiple actors and institutions involved in the co-production process of sanitation infrastructure and service provision in Arusha city (Devas, 2001). The findings of this research show that the main actors at the city level are: the Arusha city council, AUWSA, World Bank, Danish Government, AfDB, operators of private vacuum tankers or pit emptiers and CCI/FUP. All these actors and institutions play a role in the co-production process. Given their roles, this section explored the interactions between the city government and other actors, coordination mechanisms in place, and the ways the city council steers or engages these actors in their inter-dependent activities (Rakodi, 2003).

Due to increased challenges brought by rapid urbanisation, and the low capacity of the urban local government or state to provide urban sanitation infrastructure and services, and as a way of implementing the national laws and urban policies, Arusha city has collaborated with other state and non-state actors in serving its city residents. Where possible, ACC coordinates the activities of other actors, mainly the non-state actors, operating in the informal settlements with limited or no state presence. For instance, the findings indicate that pit emptiers and FUP, which are local organisations/ non-state actors, are registered with the ACC prior to conducting their activities within the city boundaries.

In the process of co-producing urban sanitation infrastructure and services at city scale level, the ACC, through its various departments (mainly the environmental and sanitation section within health department) and sub-ward leadership, provides environmental education and awareness creation, and routine inspections of sanitary conditions in informal settlements. Where necessary, these state actors do either oblige a household to dig and build a toilet facilitate if they do not have one, or ask them to de-sludge or empty a full toilet. In the process, the officials can direct the concerned household to a pit emptier or the household can directly call for the service provider. The household is responsible for paying for both building the facility and emptying services whenever necessary. The private pit emptiers are responsible for both emptying the full toilet and transporting the sludge or human excreta to disposal ponds. Basically, this shows that ACC plays the role of coordinating non-state actors in the sanitation chain.

For those households who are directly connected to the city sewer network, the household is only in charge of establishing the containment or building of a toilet facility for themselves and paying for sewerage services on monthly basis to AUWSA. Whereas AUWSA is responsible, through its sewer pipeline network, for emptying, transportation and treatment of the human wastes to the ponds. In areas where CCI/FUP operate, group members are granted small loans or micro finance for digging and building toilet facilities or the containment. However, the loan beneficiaries are responsible for paying for emptying services once their own toilets are full. ACC and

AUWSA collaborate as government institutions, mainly on environmental education and jointly address pressing sanitation and health issues at city level.

At national level, ACC and AUWSA work hand in hand with the Central Government ministries on directives and policy issues. As the findings of this research show, ACC is legally accountable to the parent ministries, depending on the nature of directives. As has been reported elsewhere in this thesis, the main role of the central government ministries' policy and law making, financing and decision making on urban affairs is of national importance. It should be noted that the Central Government signs the MoU with international donors (World Bank, Danish Government and AfDB) on behalf of both AUWSA and ACC.

These working interactions among various legally autonomous institutions and actors at different scales and times, reveal two main types of governance arrangements; which are categorised here as formal and informal arrangements. The formal governance arrangement is observed between government institutions as it is rooted in national laws and policies from national to city level, and the donor community. It has been observed between the city government and the non-state actors (CCI/FUP and Pit Emptiers). Whereas, the informal governance arrangement has been observed between ACC and households, households and pit emptiers, CCI/FUP and their members. For instance, ACC works hand in hand with households, pit emptiers, and CCI/FUP on one hand. On the other hand, pit emptiers make their own arrangement with households for emptying services. Similar arrangements are also observed between CCI/FUP and households on financing mechanisms for toilet facilities.

As has been argued by Provan and Kenis, collaborative arrangements forged between and among different state and non-state actors have proved to have positive impacts in the efficiency of resource use, increased capacity to plan for and address complex problems, and better urban sanitation infrastructure and services provision for city residents. The effectiveness of these formal and informal governance arrangements is acknowledged in the achievement of positive outcomes that could not normally be achieved by individual institutional participants acting independently and outside of the network (Provan and Kenis, 2008, pp.231-232).

7.3.3. Emerging actor-networks

The findings show that there are various overlapping actor-networks that emerge among the identified state and non-state actors. These networks are:

(i) *Central Government Ministries - International donor community - and the Arusha City Council,*

(ii) *Central Government Ministries - Arusha City Council - and the household*

(iii) *Arusha City Council - Pit emptiers - and the household*

(iv) *Arusha City Council - and the household*

(v) *The pit emptiers - and the household*

(vi) *Arusha Urban Water Supply and Sanitation Authority - and the household*

(vii) *Federation of the Urban Poor - Arusha city council - and the household*

(viii) *Federation of the Urban Poor -and the household.*

The following section will analyse the formed networks individually and explore their interactions:

(i) *Central Government Ministries - International donor community - and the Arusha City Council.* This network was formed between the parent ministries in the central government who work or consult international donor communities with funding proposals for financing sanitation projects. These projects have direct or indirect impacts on household sanitation in the urban local governments. For instance, the Ministry of Health (MoHCDGEC) secured funding for the national sanitation campaign which was implemented within the boundaries of Arusha city. This network is formal as the government entered into agreement with funding agencies to ensure the success of the project at the local government level.

(ii) *Central Government Ministries - Arusha City council - and the household.* This network was based on the enactment of laws and

policies that ensure healthy living environmental conditions not only at the household level, but also within the entire city of Arusha. Most of the reviewed urban laws and policies had direct or indirect impact on the city and household living conditions. This network also included everyday administrative and financial interactions between central government and the city council on various directives which might impact on the household sanitation infrastructure.

(iii) *Arusha City Council - Pit emptiers - and the household.* Here the relationship between the Arusha City Council and the pit emptiers was a practical one that ensured that household sanitary conditions were environmentally friendly. Due to its own limited emptying capacity, the city council licensed private pit emptying companies for de-sludging full toilets within the city boundaries. The householder was responsible for paying all the expenses for emptying his/her full toilet and transporting the de-sludged wastes to the designated disposal site. However, there were times where the city council, through the environmental health and sanitation officers, enforced the laws by directly overseeing the emptying process where the household continued to use a full toilet which had become nuisance and hazard.

(iv) *Arusha City Council - and the household.* The Arusha City Council regularly deployed its officials at the ward and sub ward level to monitor/inspect environmental sanitary conditions at the individual households. These city officials (environmental health and sanitation officers, ward executives, and sub-ward leaders) were thus co-producers when policing the adherence to the public and city by-laws, while the householders became the end users of the policy outcomes such as benefits of public and good urban environmental health.

(v) *The pit emptiers - and the household.* There was found to be a business and co-productive relationship between pit emptiers and households. Whenever a householder saw that their toilet was full, they

communicated with pit the emptying operator for the emptying service, and they were ready to meet the cost. The co-production process between households and pit emptying operators was closely intertwined as they were both producers and end users of each other's services. On one hand, the household was a producer of human waste while the pit emptier was the end user by de-sludging a full toilet. On the other hand, the pit emptying operator provided transport and emptying services so that the household became the end beneficiary.

(vi) *Arusha Urban Water Supply and Sanitation Authority-(AUWSA) and the household.* AUWSA served Arusha residents through the its control over the formal sewer network, connecting new customers; and regularly collecting fees for services from the networked customers. More importantly, AUWSA was responsible for managing and treating the stabilisation ponds where all the human waste from various areas of the city were appropriately disposed. Basically, AUWSA provided sanitation services through its sewer network with the household as the end user. However, the household became a co-producer by applying for the connection, and by paying for the services. The household was also responsible for reporting to AUWSA any blockage of the pipes of the sewer system.

(vii) *Federation of the Urban poor (FUP) - Arusha City Council (ACC) - and the household.* The FUP was a network of members from several savings groups established in various informal settlements in the city of Arusha. It collaborated with the ACC in running its activities which included the provision of micro loans for sanitation infrastructure to its members. The federation was much closer to its members in the areas where it operated, since it facilitated access to micro loans from the Centre for Community Initiatives (CCI), which was their main funder. The co-productive role of FUP/CCI was vital as it empowered low income households, through their savings groups, to build toilet super structures. This in turn helped to eradicate open defecation in the city. In this chain,

the household was a primary end user, however, the city also benefited through improvements to public and urban environmental health.

7.4. Conclusion

The findings presented in this chapter have shown that Arusha's urban population has grown, but that the expansion of its boundaries has not gone according to planned and guided urban development. Today, 80 per cent of its area is unplanned while 86 per cent of its population resides in informally developed settlements. This unguided urban growth has had tremendous consequences both for urban planning and service provision, as the formal sewerage network cannot be stretched to informal settlements. Consequently, the city government sewerage infrastructure can only serve the planned neighbourhoods, leaving the informal settlements with the only option of on-site system.

The sewerage network covers only 7.6 per cent of the city population. With the funding received from the development partners (or donor communities), AUWSA has stated its intention to extend the sewerage network to informal settlements using the conventional sewerage system as in planned neighbourhoods. This suggests that AUWSA as a public utility agency does not fully appreciate the reality of socio-spatial informality and the practical implications of informal settlements currently existing in Arusha city. The findings of this study indicate that there is no evidence that AUWSA has adopted any pro-poor technological innovations appropriate to informal settlements.

The findings have indicated that the majority of the city population is using on-site sanitation systems, which means that most of the residents rely on pit latrine or septic tank emptying, or on-site containment, storage and treatment. Further, the chapter has demonstrated the wide range of actors involved in the co-production of sanitation infrastructure and services in Arusha and the networks of co-production created throughout the sanitation sector.

The findings have established that the active actors in the city are mainly Arusha city council, AUWSA, World Bank, Danish Government, AfDB, private vacuum operators or pit emptiers and CCI/FUP. Of all the actors, the FUP, financed by the CCI through revolving grants, is the only actor which directly finances the building of a toilet facility at household level. Though the FUP does not cover the whole city area, its impact is at the ward level where they run their activities.

The Central government is active in formulating regulatory frameworks which promote and encourage safe/healthy sanitation practices and in financing Arusha City Council in implementing its duties and responsibilities. ACC has the mandate to provide sanitation infrastructure and services to its citizens residing in its jurisdictional area. However, the translation of provision for the city council seems to focus on the provision of environmental health education, awareness creation, and enforcement of national laws and policies in addition to the city by-laws. The routine inspections of environmental sanitary conditions that are regularly undertaken in wards and sub-ward is seen as a form of 'policing'. ACC has done little to empower. The donor communities' main role is financing the ACC through the central government.

The everyday interactions and collaborative arrangements between and among the identified actors in the co-production network suggest different types of governance arrangements; and that their working produces outcomes that could not normally be achieved by individual institutional participants acting independently. These collaborative arrangements lead to formation of networks which bring all actors together in the sanitation co-production process.

These arrangements suggest both formal and informal governance arrangements. The formal governance arrangement is observed between government institutions as it is rooted in national laws and policies from national to city level, and the donor community. It has been observed between the city government and the non-state actors (CCI/FUP and Pit Emptiers). Whereas, the informal governance arrangement has been observed between ACC and households, households and pit emptiers, CCI/FUP and their members. For instance, ACC works hand in hand with households, pit emptiers, and CCI/FUP on one hand. On the other hand, pit emptiers make their

own arrangement with households for emptying services. Similar arrangements are also observed between CCI/FUP and households on financing mechanisms for toilet facilities.

To understand deeply local realities and sanitation practices, there is a need to go to the lowest units of the city administration and learn from the households themselves. The next chapter will present fieldwork findings from the two cases of Sombetini and Baraa informal settlements.

CHAPTER EIGHT

URBAN SANITATION IN SOMBETINI AND BARAA INFORMAL SETTLEMENTS

8.1. Introduction

This chapter presents the results of the two sub-cases which constitute the Arusha main case study of this research. The section illuminates on the ground issues and local realities around land acquisition and tenure status, and socio-cultural factors shaping sanitation provision. It also covers the extent of toilet facilities and pit emptying methods, privacy and human dignity, in addition to the availability of water services for domestic use. The household survey results are supplemented by the findings from focus group discussions and interviews. The purpose of this chapter is to present findings for answering subsidiary questions number 3 and 4 which respectively aim to explore the existing human excrement management practices, and examine the complexities shaping urban sanitation infrastructure in informal settlements in Arusha.

8.2. Property occupancy, land ownership and land tenure in Sombetini and Baraa informal settlements

8.2.1 Number of people and households living on the property

Since the utilisation of a toilet facility is closely related to the number of its users, the survey investigated the number of people and household members living on the same plot or in the same house and sharing toilet facilities in both wards of Sombetini and Baraa. The results show that 39.8 per cent of the properties in both wards accommodate between 1-5 people each, 33.5 per cent accommodate 6-10 people each and 15 per cent accommodate 11-15 people each. Moreover, the comparison within these two sub-cases shows that Sombetini appears to have a higher density than Baraa. Figure 8.1 shows that Sombetini houses from 6 to more than 21 people living on the same property (and sharing toilet facilities). While on the other hand, most of the respondents said they lived in houses accommodating 1-5 people. That difference could possibly be associated with the location of the two wards vis-à-vis the Arusha Central Business District (CBD). Sombetini is located close to the CBD, while Baraa is at the periphery of the city boundary as shown in the Figure 5.1.

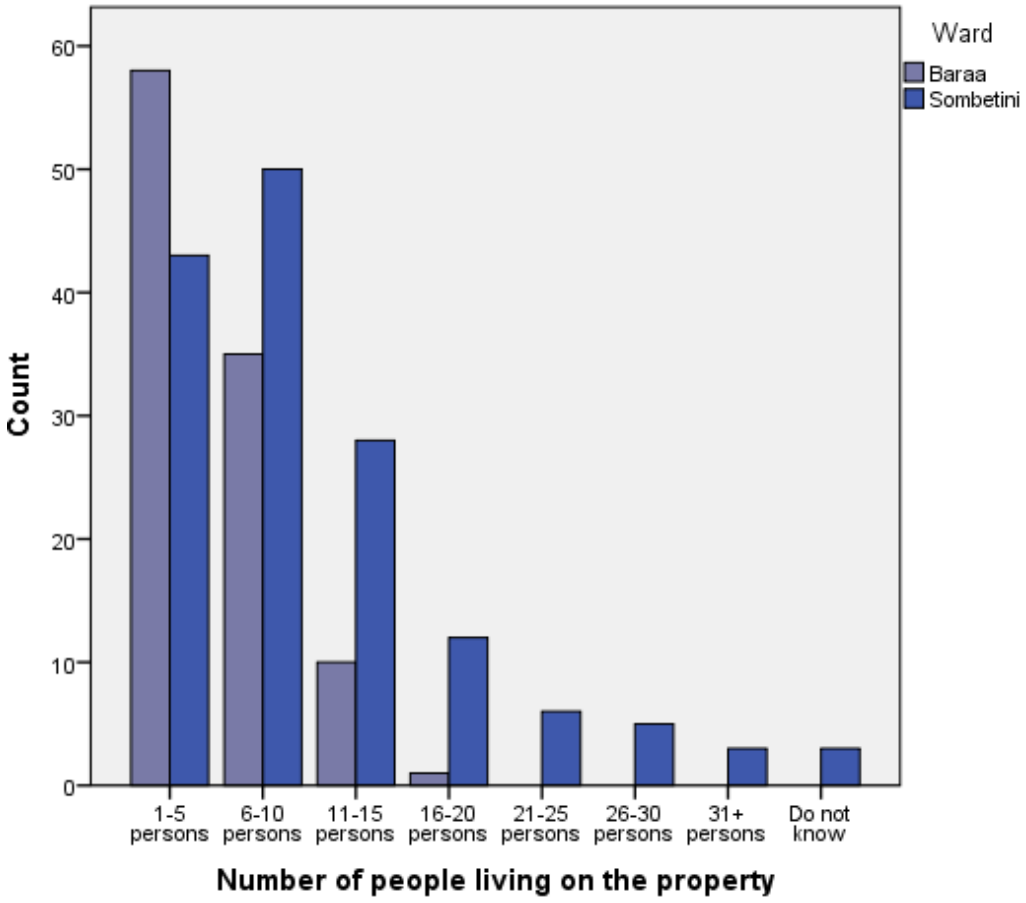

Figure 8. 1: Number of people living on the property
Source: Fieldwork, 2014

In addition, Figure 8.2 shows that on 64.6 per cent of the properties between 1-3 households are living on the same plot, 24 per cent accommodate 4-7 households, 8.3 per cent accommodate 8-12 households, 1.6 per cent 13-17 households, 1.2 per cent accommodate more 23 households. A close look at the same Figure 7.4 shows that Sombetini ward has the highest density of households, presumably due to its location as explained earlier. Still and Foxon, (2012a) argue that the number of toilet users can technically relate to the rate of toilet fill-ups since it is determined by the rate of amount of sludge getting into the pit. Although this research did not investigate the design and depth of a pit, it is logical that there is a close relationship between the number of users and the rate of the toilet fill-ups. Moreover, the use of a toilet by several people will need a discipline of the behaviour of the users.

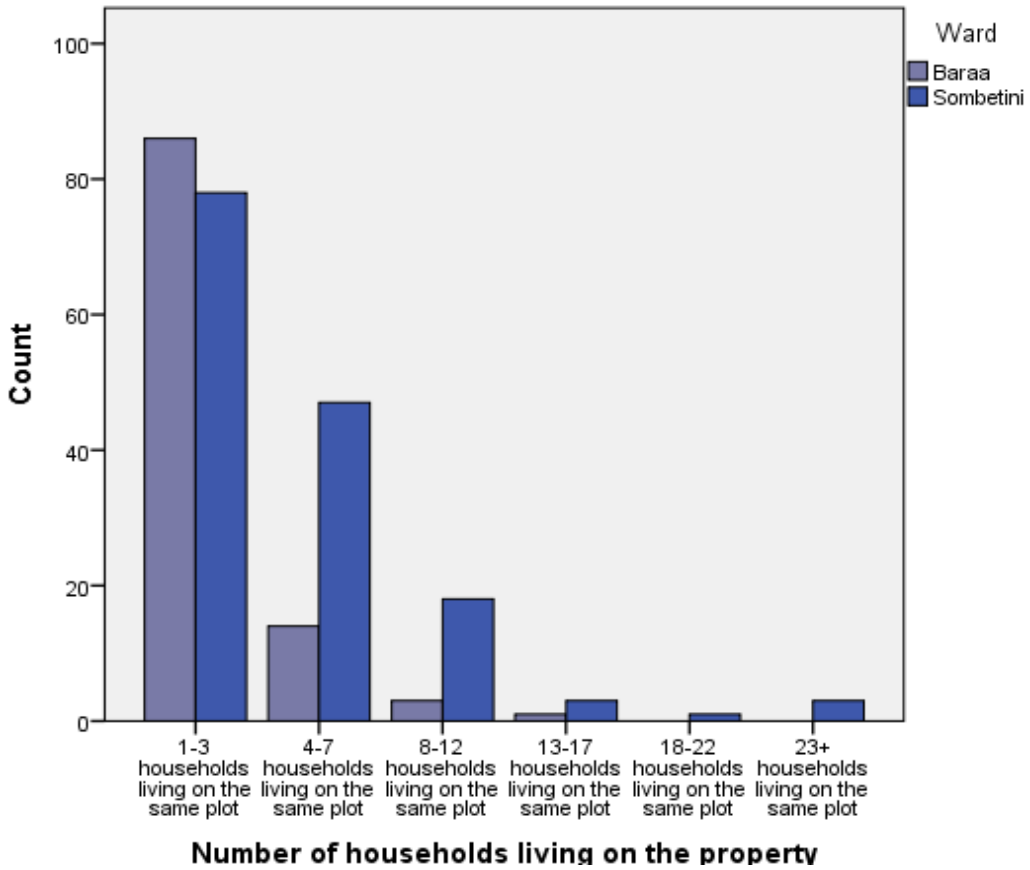

Figure 8. 2: Number of households living on the property

Source: Fieldwork, 2014

8.2.2. Land ownership and tenure

Security of land tenure is an important factor for this study. It can influence a person's decision and increase their confidence in investing in a piece of land, including building a durable and permanent toilet super structure. To obtain insight into this, tenancy data were gathered. The respondents were asked to state their relationships to the landlords/house owners or their relatives. The results reveal that house owners and their children (who do not pay house rents) represented 59.1 per cent and tenants, 38.6 per cent. Relatives of the landlords and others (who either do not pay or pay rents below market prices) represented 2.4 per cent as shown in Figure 8.3. Internal dissimilarities between the two wards show that Baraa has more landlords/house owners compared to Sombetini. Most of the residents in Baraa (73.1 per cent) are landowners and their children, while 50 per cent are tenants in Sombetini. With regards to the process of acquiring land, the results show that 47.3 per cent bought their land from private owners, 42 per cent inherited from either their parents or close relatives. However, the difference between the wards shows that 63 per cent of landlords/house

owners in Sombetini bought from private owners/ sellers while 58.4 per cent in Baraa inherited. See Figure 8.4.

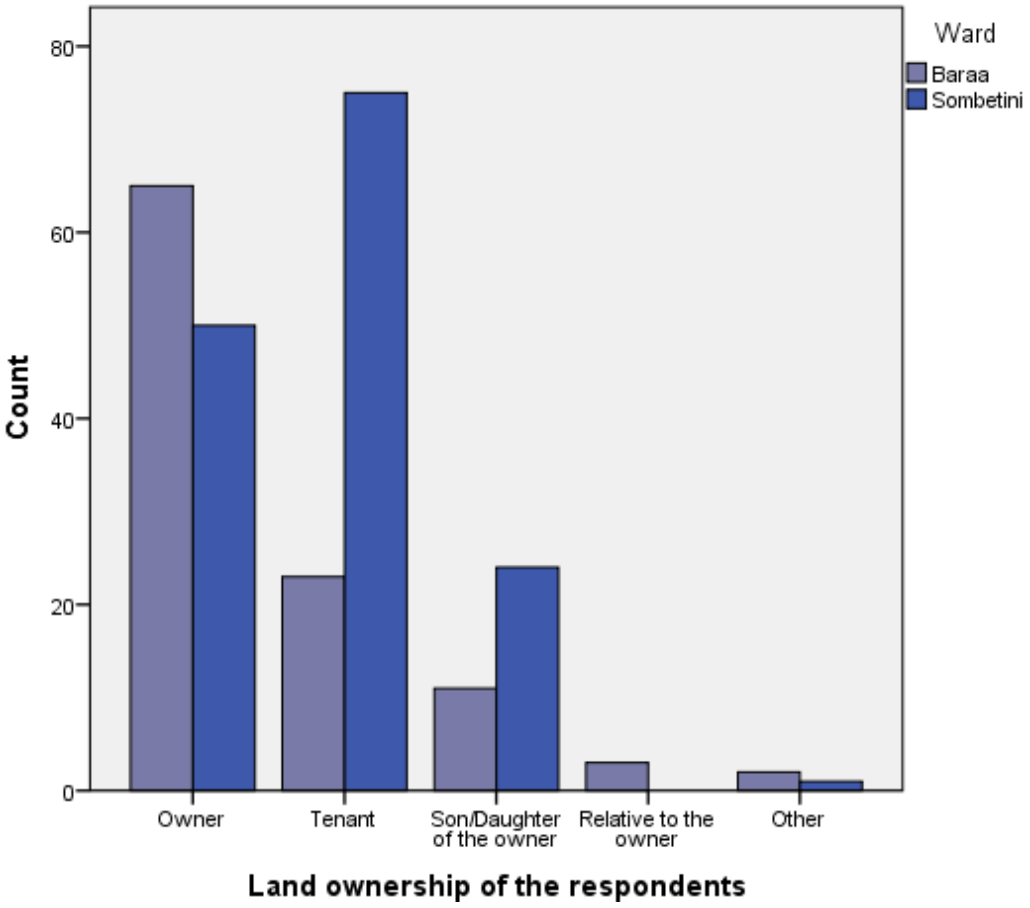

Figure 8. 3: Land ownership of the respondents

Source: Fieldwork, 2014

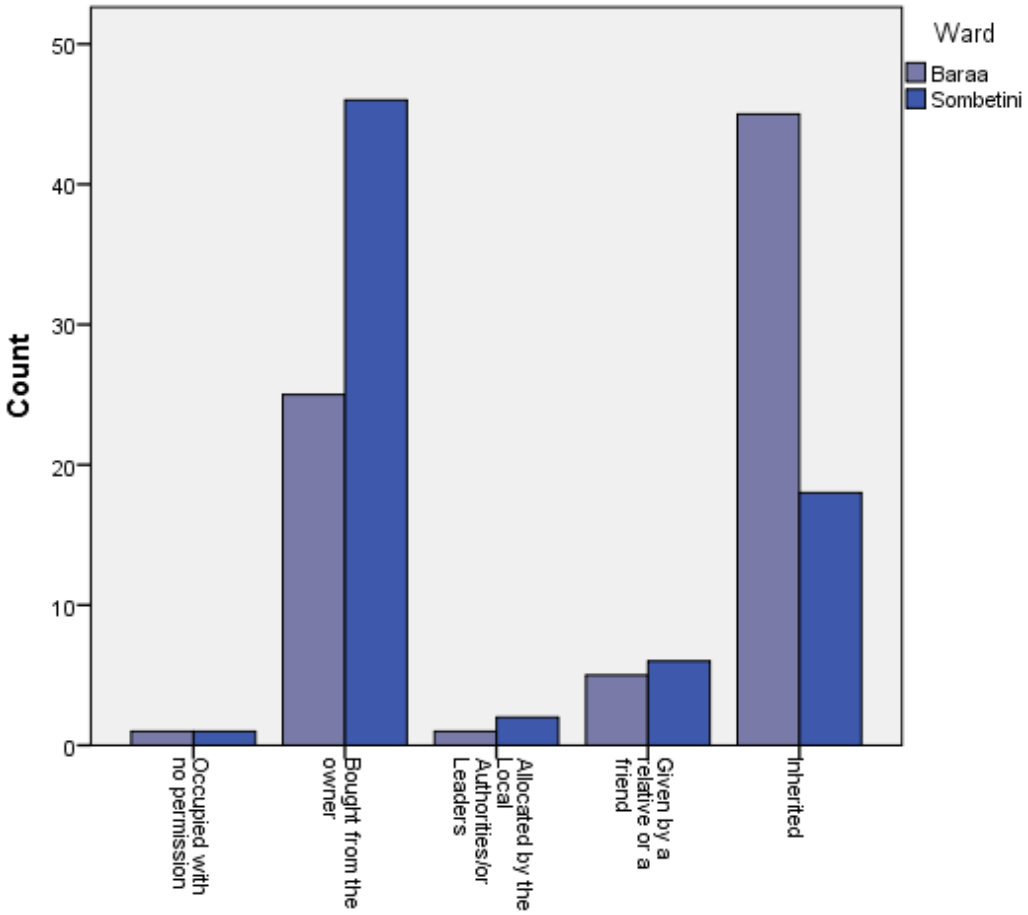

Figure 8. 4: Land acquisition process

Source: Fieldwork, 2014

On tenure security in both Sombetini and Baraa wards, the results show that 48.6 per cent have no legal papers guaranteeing their land ownership, 36.3 per cent have land sales contracts (signed between a buyer, seller and witnesses), 12.3 per cent have title deeds or certificates of occupancy, 2.7 per cent have residential licenses. The two latter arrangements are offered by the government. However, it is worth noting that Baraa leads in the lack of legal papers (60.8 per cent) while Sombetini leads in land sales contracts (44.4 per cent) as indicated in Figure 8.5.

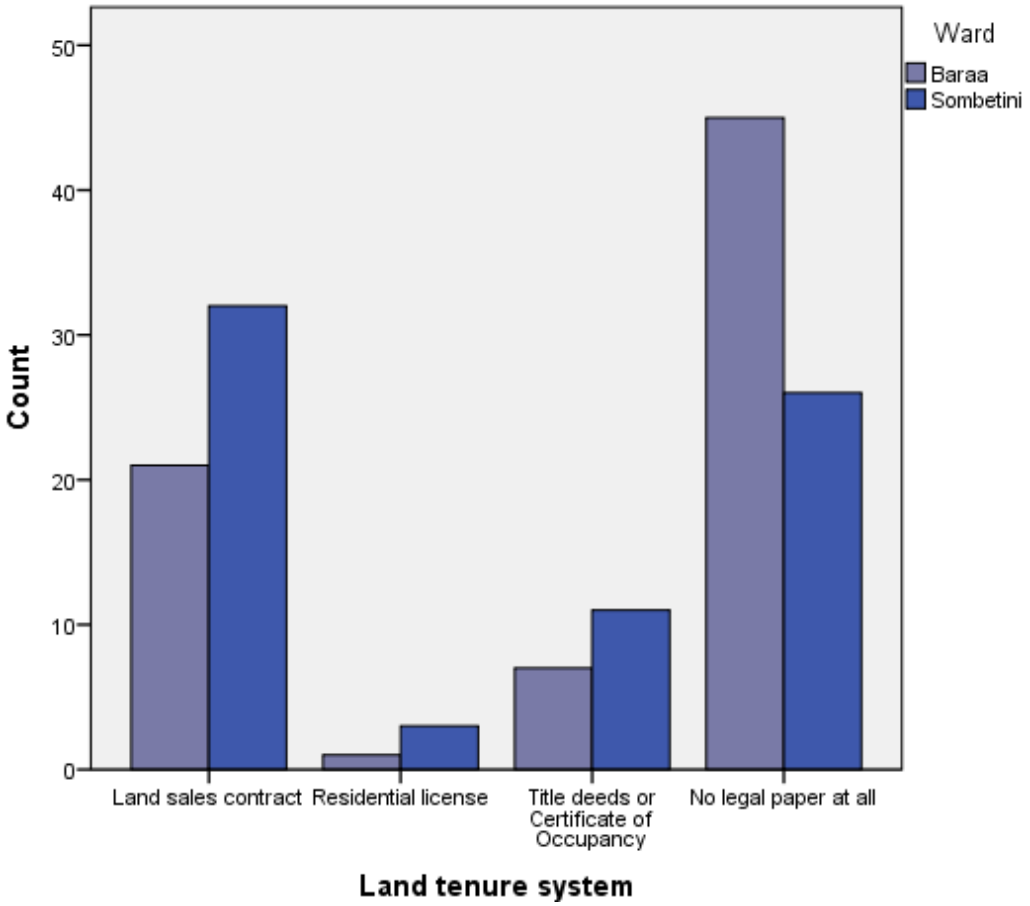

Figure 8. 5: Land tenure system
Source: Fieldwork, 2014

8.3 Coverage of sanitation infrastructure in Sombetini and Baraa informal settlements

8.3.1. Toilet facilities and toilet types used

This section presents the results of the household survey which gathered data on availability of toilet facilities and types of the toilets used in both wards. The aim was to locate the toilet facility whether it was built in or outside the main dwelling unit. The findings from Sombetini and Baraa show that 75.5 per cent of the properties had toilet facilities built outside the main dwelling units, 13 per cent had both in-the-house and outside toilet facilities, and 9.1 per cent in-the-house toilet facilities only. The survey also revealed that 1.2 per cent of respondents did not have a toilet in their residence, but they used their neighbour's, while another 1.2 per cent use either plastic bags, buckets or practice open defecation. See Figure 8.6

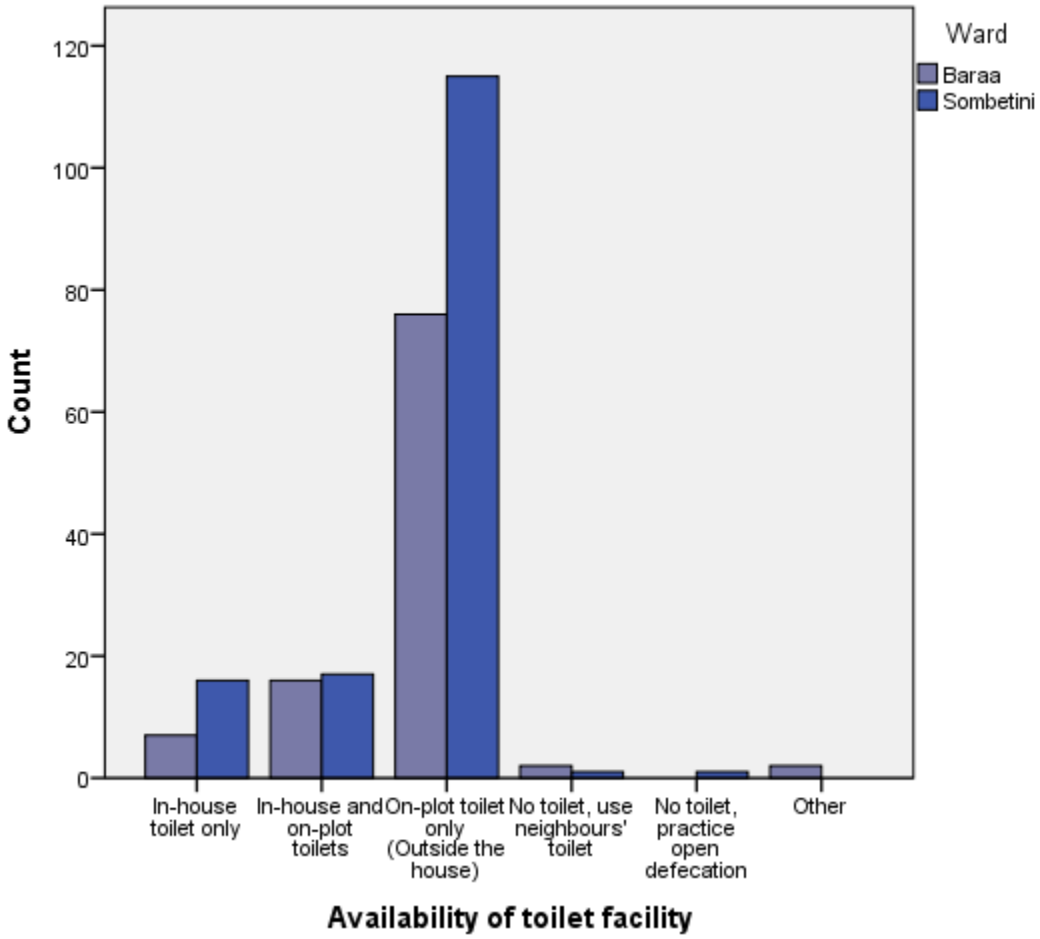

Figure 8. 6: Availability of toilet facilities on the property
Source: Fieldwork, 2014

The survey also gathered information related to types of toilet facilities used in the two wards. The aim was to find out whether the toilet facility was a flush toilet connected to a septic tank, a traditional pit latrine (a toilet which collects faeces into a dug hole in the ground) or a flush toilet connected to the city sewerage network. The results reveal that nearly half (46.9 per) were flush toilets connected to a septic tank, 21.3 per cent were flush toilets connected to a full covered soak pit, 20.5 per cent were traditional pit latrines, 7.5 per cent were ventilated improved pit latrines, and only 3.1 per cent were flush toilets connected to the city central sewer network as indicated in Figure 8.7. Moreover, these findings indicate that the majority of traditional pit latrines as shown in Figure 8.8 (34.6 per cent) were found in Baraa (located at the periphery of the city) and that but residents of Sombetini were more likely to have connections to the central sewer network/system (4.7 per cent).

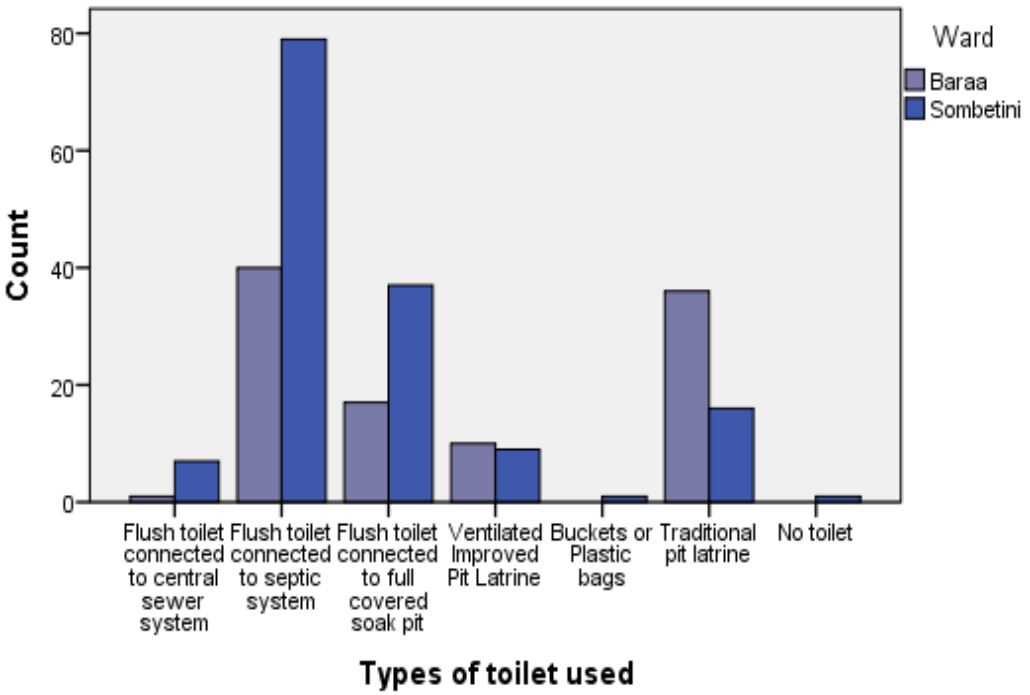

Figure 8. 7: Types of toilet facilities on the property
Source: Fieldwork, 2014

Figure 8. 8: Toilet facilities in Sombetini ward: Traditional latrine (left) and a flush toilet (right).
Source: Fieldwork, 2014

The narratives and voices that follow were gathered in focus group discussions with the aim of establishing the reasons that some households were living without any toilet facilities. Initially community members and leaders attending the discussions were asked whether they had their own toilet facilities and the reasons for having one, just as a 'warm-up' question to trigger the conversations. They all confirmed having the facilities, and showed a great understanding of the importance of each household owning a toilet facility. These answers from the group discussions prompted other questions. The participants were asked if they understood the importance of toilet facilities and why it was that some households had very poor-quality toilet super structures and others do not even have toilet facilities. One of the leaders confirmed that they knew of some households without toilet facilities, but due to their financial incapacity, they had no alternative but to accept this situation:

> *There are households we know without toilet facilities. Many of them have built their houses without toilet facilities, but many of them don't also have decent houses; their houses are dilapidated, the houses are almost falling. As a Mtaa or Sub ward leader, you keep telling such people to put up a toilet, but you will just be saying it for the sake of saying. We understand that the household has no capacity. Many of the people without toilet facilities own houses of mud and poles.* (Sombe09/10).

Another respondent added that:

> *I can confirm that these households without toilet facilities are there in our community. But some of them don't have the capacity to build even a standard dwelling unit, how will you force this person to build a toilet? Will that be sensitisation or undermining him/her?* (Sombe09/11).

It was noted that income poverty and age (old people living without relatives) were said to be the main factors behind the lack of toilet facilities as the following statements illustrate:

> *…But also, it depends on financial capacity of some people. Some people are well informed about consequences of poor sanitation, but they lack finances for constructing good facilities.* (Baraa09/05).

The Sombetini ward environmental health and sanitation officer also confirmed that there were residents in the community who were unable to either build or empty a full toilet due to their physical status, mainly old age and sickness. She said:

> *The other challenge is old and sick people who are living by themselves or who don't have people who can help them in emptying or digging toilets.* (Interview KI_02).

8.3.2. Toilet super structure: Wall materials

The survey collected data on the materials used to erect the walls of the toilet super structures in both Sombetini and Baraa wards. The results show that 80.6 per cent of toilet super structures were constructed of cement blocks, while 7.1 per cent were built using metal or pieces of corrugated iron sheets, 5.1 per cent using burnt bricks, 3.2 per cent using pieces of carton or sacks or bags, 1.6 per cent using mud and poles and 1.2 per cent were built up using timber and mud (sun-dried) bricks respectively. See Figure 8.9 and Figure 8.11.

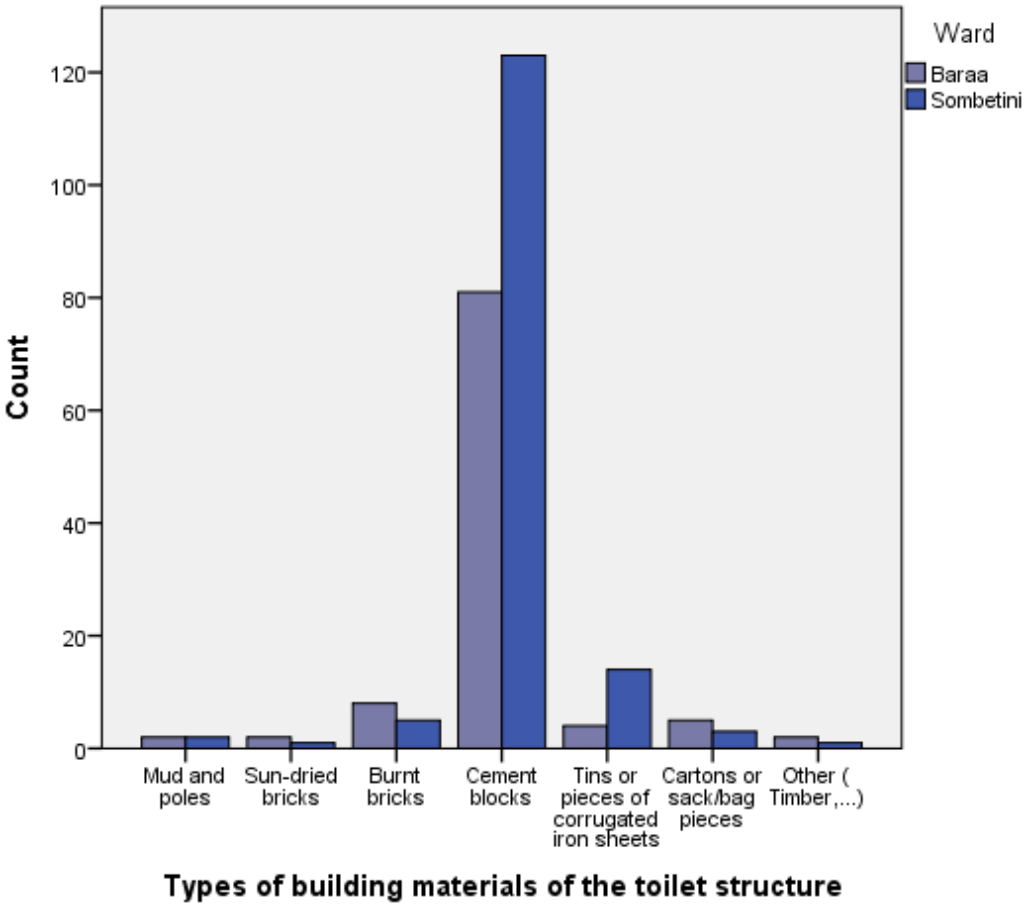

Figure 8. 9: Building materials for the toilet structure
Source: Fieldwork, 2014

8.3.3. Toilet super structure: Roofing and flooring materials

This section presents the survey results on the types of building materials used for roofing and flooring of toilet structures. It was found that 86.5 per cent of toilets were covered by corrugated iron sheets, 6.3 per cent flattened tins, while 5.2 per cent were uncovered or had no roof at all, and 0.8 per cent were covered by thatch or grass and roof tiles respectively as shown in Figure 8.10. On floor materials, the findings reveal that 65.2 per cent had a cement floor, 16.6 per cent tiles, 6.7 per cent had an earth floor, 7.9 per cent concrete floor, 2.8 per cent used logs only, and lastly 0.8 per cent had a burnt brick floor. See Figure 8.12.

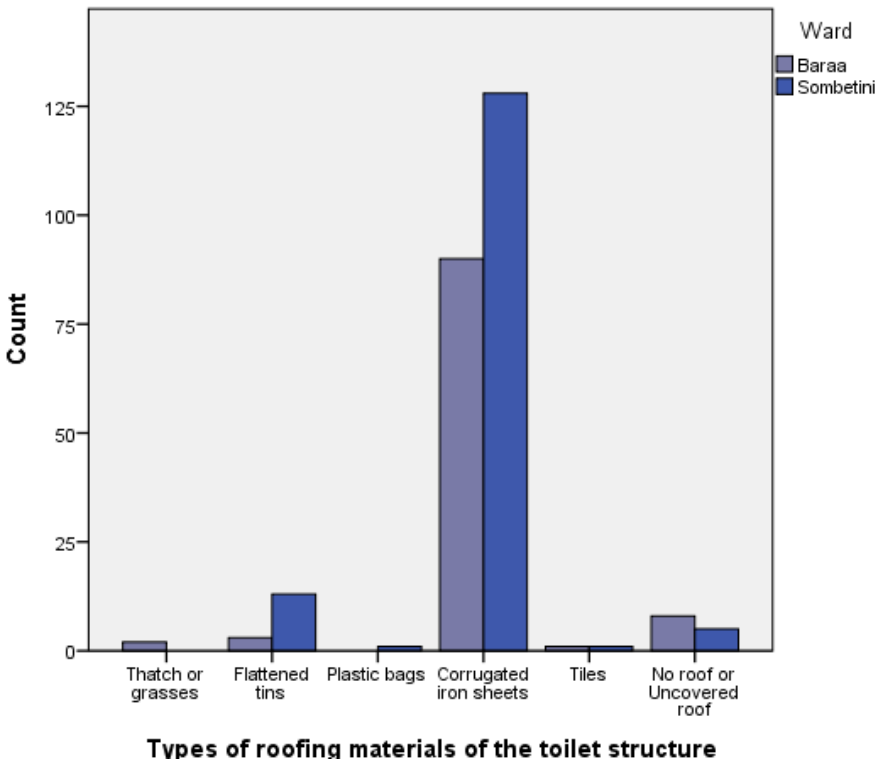

Figure 8. 10: Types of roofing materials for the toilet structure
Source: Fieldwork, 2014

Figure 8. 11: Some of the burnt brick and cement block structures in Baraa
Source: Fieldwork, 2014

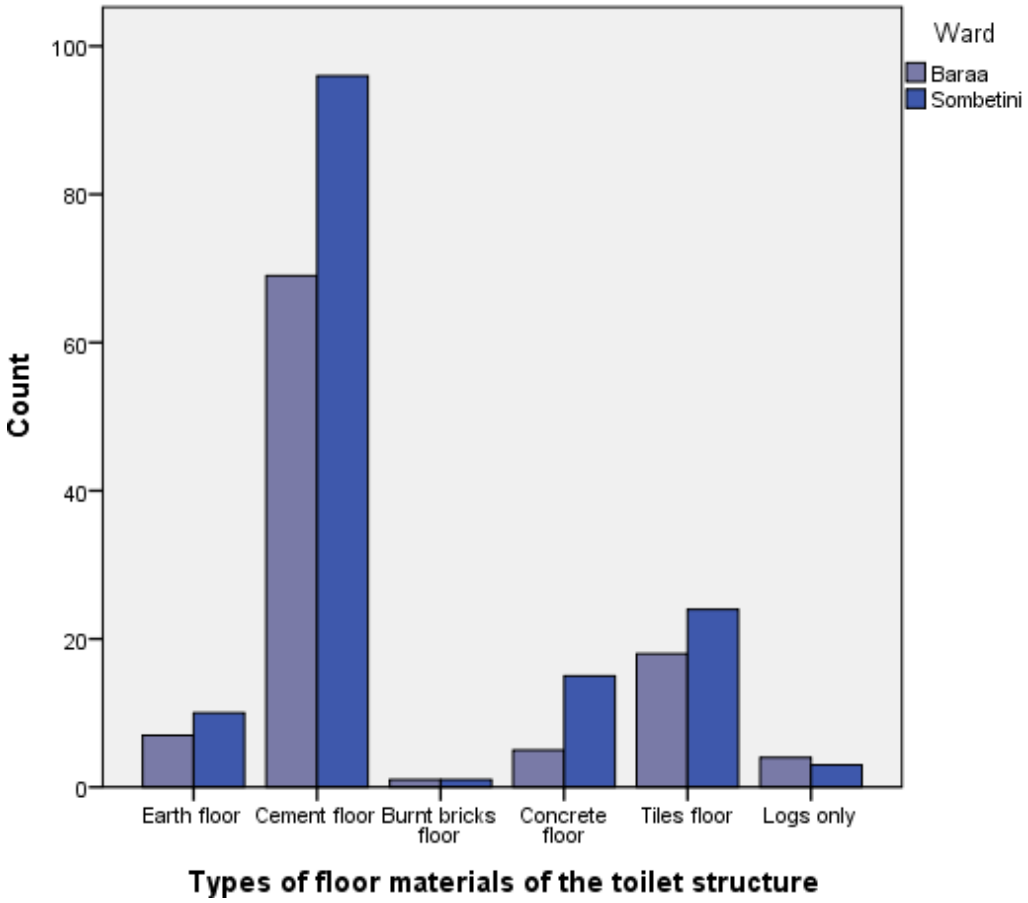

Figure 8. 12: Types of floor materials for the toilet structure
Source: Fieldwork, 2014

8.3.4Toilet superstructure and human dignity: Quality of *doors*

The survey gathered data on whether the toilet structures had doors which provided some privacy and/or human dignity, enabling a person to use the facility without fear of being seen or worried that someone might enter the facility without his/her knowledge, since many household toilet facilities are used by both men and women. With regard to this, the results showed that 75.5 per cent of toilet structures had standard and good doors, 15 per cent used flattened tins or iron sheets with a frame made of timber, 4.7 per cent had only curtains made of plastic bags or cartons and another 4.7 per cent had no door at all. See Figure 8.13 and Figure 8.14. Concerning the two case study wards, the survey results show that dignity and privacy were taken into account in 80.2 per cent of all the observed structures through the provision of a full door. 11.5 per cent were ‘half passport’ size (meaning that only the head and neck of a toilet user could be seen while they are using the facility), 5.9 per cent were considered poor or ‘full passport’ size (meaning a toilet user can be seen from the

chest to the head while they are using the facility), and 2.4 per cent provided no privacy at all (No structure around the pit). See Figure 8.15.

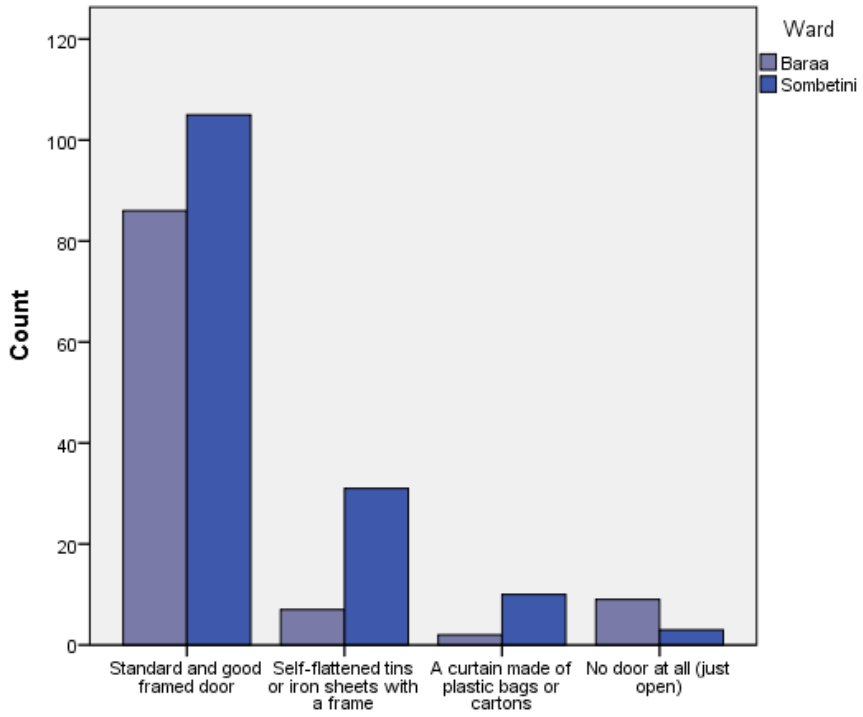

Figure 8. 13: Quality of the toilet door in relation to privacy/human dignity
Source: Fieldwork, 2014

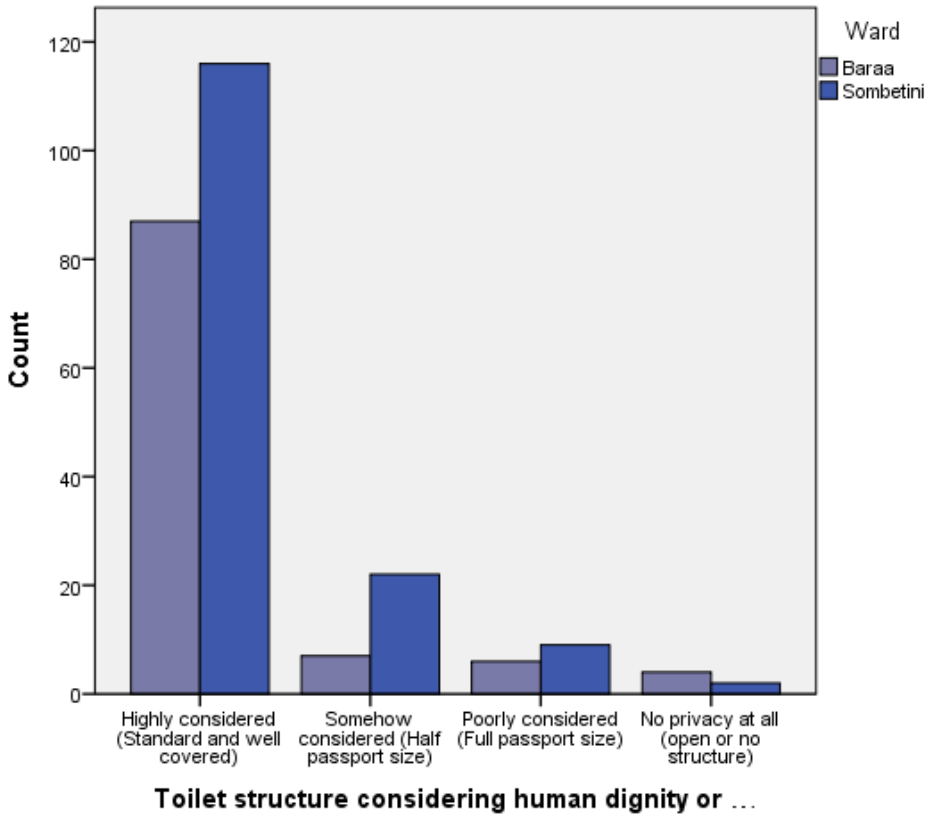

Figure 8. 14: Toilet structure considering human dignity
Source: Fieldwork, 2014

Figure 8. 15: Super structure made of sacks as walls, and raw timber for the base in Sombetini. Source: Fieldwork, 2014

8.3.5 Water supply on the property

Since water and sanitation are so closely allied, the survey gathered data on the main sources of water supply used by household members in Sombetini and Baraa. The findings reveal that 43.7 per cent of households had piped water on their plots only, while 26 per cent bought water from their neighbours. Fifteen per cent had piped water both inside the main dwelling unit and on their plots, 7.5 per cent had piped water inside the main dwelling units only, 3.9 per cent obtained water free of charge from their neighbours, 2.0 per cent owned bore holes or wells, and 1.6 per cent used community taps.

Figure 8.16 shows that Baraa residents had much better access to water supply than their counterparts in Sombetini. In general, 85.6 per cent of Baraa residents accessed water either inside their main dwelling, on the plot or both; while 43.3 per cent of Sombetini residents either bought from their neighbours, fetched for free from their neighbours or used community taps.

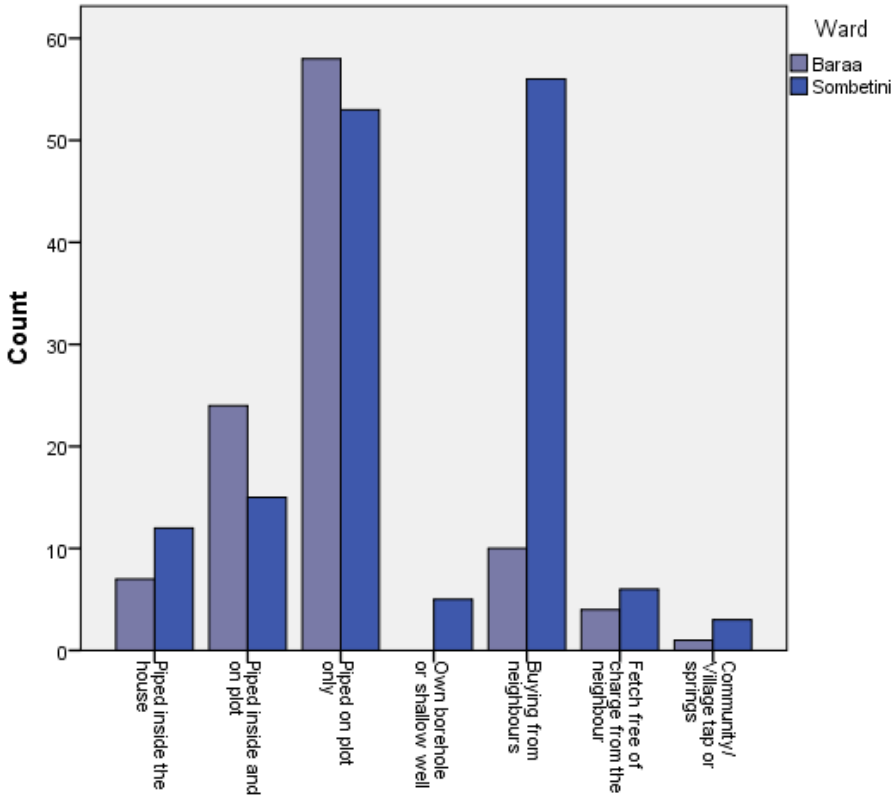

Figure 8. 16 Main source of water for the households
Source: Fieldwork, 2014

The poor quality of toilet super structure is a demonstration of poor living conditions and access to basic services. Poor toilet facilities have a negative impact on human dignity and privacy of users, especially women. They may also be an embarrassment for visitors and friends. During the rainy season such poor facilities may also become a risk to personal safety and a security threat for women and children, particularly when they need to use the facility at night.

These findings attested to the fact that access to clean water was less of a problem in the city of Arusha than access to sanitation. In general, urban residents are more comfortable sharing water access than toilet facilities. Yet water supply tends to receive more attention and a higher priority than sanitation from both the government and community members. The statistics from AUWSA (which facilitated much of the access to water) showed that the city's water supply network covered 94.6 per cent of the population, while the sewer network covered only 7.6 per cent. Monstadt and Schramm (2017,p.18) also confirmed that water supply was considered as the main

business of public utilities and that sanitation remained a low-ranking priority in the eyes of the government plans and investments.

8.4. Existing human excreta-management practices in Sombetini and Baraa

8.4. 1. Pit-emptying methods and costs

The survey documented the methods used by the residents of Sombetini and Baraa wards in emptying or de-sludging a toilet once it is full. The findings show that 61.7 per cent of toilets had never been full since their first construction, 28.1 per cent had been emptied through a truck or vacuum tanker, 4 per cent of toilets were demolished and new ones constructed, 4 per cent had been manually emptied and the sludge buried on-site, 1.2 per cent had been connected to the central sewer network of the city, 0.8 per cent had been diverted (pit-diversion), and 4 per cent had poured chemicals in to dilute the sludge (commonly known as pit additives). The findings show that the frequency of toilets getting full seemed to be lower in lower density Baraa, as 83.7 per cent had never been full since their first construction, while trucks or vacuum tankers were preferred and used in Sombetini by 41 per cent, as indicated in Figure 8.17. This intra-urban difference may be due to pit design, soil textures and level of water table.

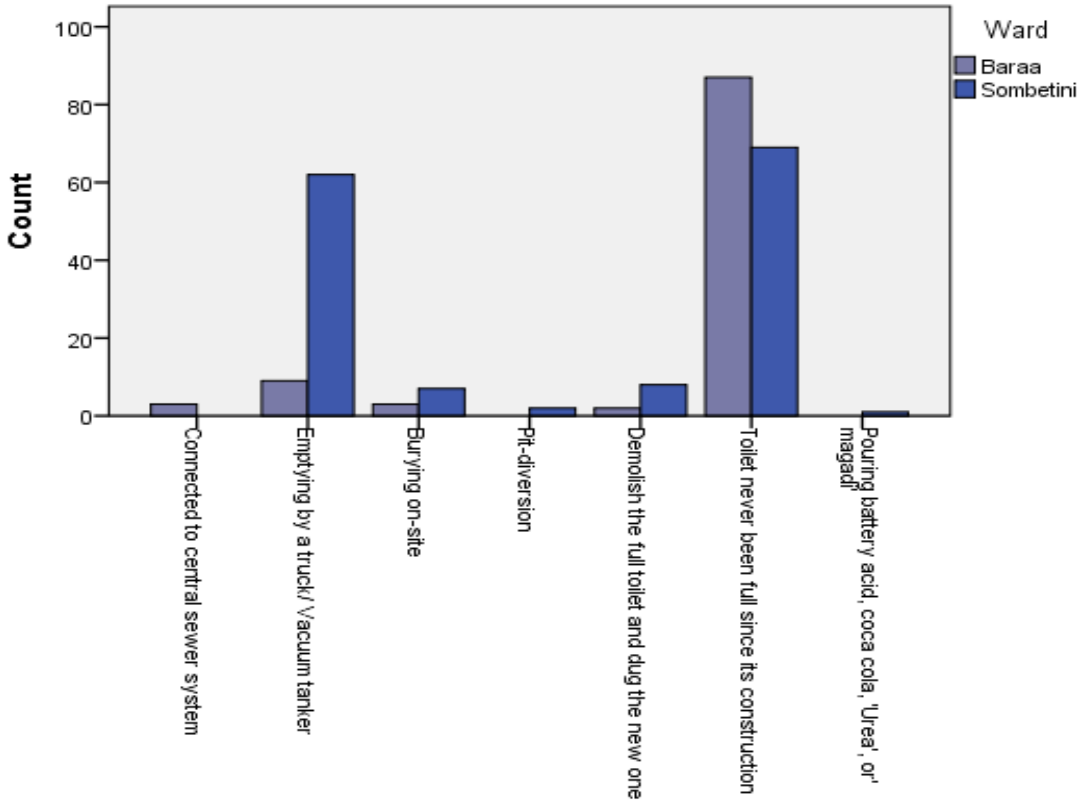

Figure 8. 17: Pit-emptying methods used
Source: Fieldwork, 2014

To supplement and enrich the household survey results on pit emptying methods in both wards, qualitative data were also collected through focus group discussions and key informant interviews with ward level environmental health and sanitation officers. To accurately present all the collated information, narratives and voices from Sombetini will be presented followed by those from Baraa.

The interview with the ward level environmental health and sanitation department revealed that various methods were used to empty a full toilet in the ward. The majority of residents use vacuum tankers for de-sludging their full toilets. In accessing vacuum tankers both in Sombetini and Baraa, it was been noted that there were several private companies engaged in the pit emptying business in the city. If a resident did not have the contacts of the pit emptying operators, they obtain them from the ward environmental health and sanitation office. Sometimes residents opt to pay for municipal vacuum tankers as private companies' charges are somewhat higher than the city's. Unfortunately, the city council owns only 3 trucks which cannot cater for the city's needs due to the high demand from the households who are not connected to the city sewer network (*Interview, KI_02 and KI_3)*. However, it was also revealed that other residents practice flooding-out and pit-diversions which are unhealthy for the city's built and natural environment (*Interview, KI_02).* The focus group discussions with the Sombetini and Baraa community members and leaders also reiterated the same.

Emptying by vacuum tankers

It was learnt that emptying cost in Sombetini ward varied from TShs 60,000.00/= to TShs 100,000.00/= as the following participants testify:

> *When mine was full I called Matokeo Truck and paid him TShs 75,000/=. Where he took the liquid wastes that is none of my business. (*Participant: Sombe09/02*).*

> *I paid TShs 60,000 for a private truck to de-sludge or empty my pit. (*Participant: Sombe09/12).

Similar views were expressed at the focus group held in Baraa and through the key informant interviews with the Baraa ward level Environmental Health and Sanitation Department. It was also revealed that the majority of residents use vacuum tankers for de-sludging full toilets which varies from TShs 60,000.00/= for city vacuum tankers to TShs 120,000.00/= for private companies (Interview with KI_03).

One participant said:

> *My toilet was constructed 4 years ago. It is 30 feet deep, and we are more than 20 users. I have four holes in same pit latrine. It was full and emptied 2 times using a private truck/ vacuum tanker which cost me TShs 120,000/=.* (Participant: Baraa09/05).

Another shared his story as follows:

> *… during dry season it does not get full, but in rainy season wastewater overflows rapidly. And I am compelled to de-sludge by calling a vacuum tanker driver.* (Participant: Baraa09/07).

Lack of accessibility was mentioned as the major challenge faced by vacuum tankers operating in Sombetini and Baraa wards. One of the environmental health and sanitation officers was concerned that when developing their land, the priority of many residents was just to put up a structure for their residence, and unfortunately most appear to do so haphazardly. Few appear to think of an access road for emergencies and even their own vehicular traffic. The interview with the ward environmental health and sanitation officer revealed that vacuum tankers do not easily reach all places for emptying full toilets. Baraa is low density settlement, but there are a few areas where accessibility had become a problem for vacuum tankers to reach as they do not have long pipes to empty the full toilets.

> *Informally developed settlements make many areas to be inaccessible. Many vacuum tankers don't have long pipes more than 60 meters.* (Interview with KI_03).

Flooding out as an emptying method

'Flooding-out involves intentionally releasing sludge into the neighbourhood by unplugging a drain pipe installed in an elevated or exposed portion of the pit, often timed with heavy rains' (Jenkins, Cumming and Cairncross, 2015, p.2590). Since Sombetini ward has a high water table, there is a need for more frequent emptying of pits. Some residents and community leaders were accused of practicing 'flooding-outs', to avoid the cost of emptying which is expensive for the majority of residents. One confident participant stood up and said:

> *…all those who have said that they have been emptying, they think that emptying by a vacuum tanker is a credit; however, they do not say that they also practice flooding-out. Given the high-water table level in this area, it is possible that a pit is emptied twice a month or more, most of the people who are present here in this group discussion cannot afford that cost. That is why they are used to flooding-out method but they are not saying it. (*Participant: Sombe09/13).

After that allegation, other participants agreed that the majority of Sombetini residents use vacuum tankers for emptying their full toilets, but they also confessed that flooding-out is practiced as one of the emptying methods in the ward.

> *…some people have big land parcels, others don't have: Let us say they only bought 10x10m land parcel/plot, so for those with shortage of land, there is no way out other than flooding-out*. (Participant: Sombe09/08).

In explaining why some residents practice flooding out, one respondent said this is because there is no possibility of emptying by using a vacuum tanker, due to poor accessibility in Sombetini ward (and house owners are not ready to demolish a bedroom for a new toilet). As the following participant said:

> *… yes, others do flood-out…The challenge is on frequent emptying; some go up to 3 times a month. Where will they get this money? Alternatively, they open*

> *the chamber and de-sludge into open drainage system.* (Participant: Sombe09/14).

The interview with the Sombetini ward environmental health and sanitation officer confirmed much of what had been said in the focus group: that the area has a high-water table which causes toilets to fill-up more frequently and that many residents become tired of frequent emptying their toilets. In some instances, tenants move regularly because of the condition of the toilet facilities. Sometimes toilets need to be emptied 2 to 4 times a month:

> *Sombetini is a high-water table area, it has much underground water, for that reason toilets get full frequently. Some people can de-sludge twice or thrice a month. When you ask the house owner to empty again, they will tell you, we emptied recently, and they will show you the receipts. They will tell you that they don't have money for emptying. So, they let toilets overflow and spread into the streets".* She added that it is even worse in some areas, where *"house owners can de-sludge their full toilets twice or quadruple a month.* (Interview with KI_02).

Another respondent added that is frequent emptying that makes some residents reluctant to invest in decent and acceptable structures for their toilet facilities:

> *That is one of the reasons for having decent houses with poor quality toilet facilities in Sombetini ward. In some cases, tenants have tried their best to empty the toilets, the landlords have assisted, but they get full frequently due to high water table. This is sometimes affecting rental housing business as tenants leave for finding other good places which don't have similar challenges. In such cases, you cannot blame the owner of the house, this is a soil problem. For that, we expect this research to come up with some solutions with regards to water table and frequency of fulling toilets.* (Participant: Sombe09/05).

However, it appeared that some house owners were also to blame as their buildings had encroached river banks:

> *But also, other people have built their houses close to river stream. Obviously, toilet will get full frequently.* (Participant: Sombe09/05).

Using full pit latrines as the only available option

It was thus learnt that poor accessibility is a serious challenge in the Sombetini area and hinders the use of vacuum tankers. The other challenge was high water tables and the frequency of a toilet getting full several times in a short period. For this reason, residents sometimes have no option but to continue using full toilets.

> *That is so because of shortage of space to construct new toilets due to densely packed houses in Sombetini ward which lead to poor accessibility in most of our areas for vehicle passage. It becomes difficult for de-sludging once a toilet is full. That is why, sometimes, some households decide unwillingly to continue using a full toilet, which makes it to lose its value.* (Participant: Sombe09/03).

Another participant supported this contention and said:

> *Just to add on what has just been said, we should know that there is a problem of high-water table in this ward, which makes toilet facilities to get full in a very short time. Just imagine you de-sludged a toilet today, then after a week the same toilet is full as if it has never been emptied for months, and this happens mostly in houses with many tenants. That is why people continue using full toilets as they don't have financial capacity to pay for de-sludging on weekly basis. (*Participant*: Sombe09/05).*

> *Some old people don't own toilets…and…many people don't have the financial ability to de-sludge their toilets.* (Interview with KI_03).

Demolitions of bedrooms as alternative methods

The voices and narratives from Sombetini also confirmed that demolitions of bedrooms for construction of new toilets seems to be another method used by some house owners due to poor accessibility which prevents vacuum tankers from reaching their areas.

> *…That's normal people to demolish a bedroom to get space for constructing a new toilet.* (All participants of the Sombetini focus group discussion).

It was also learnt that some people had bought very small plots which were then almost completely occupied by the main dwelling unit. Little if any space was left over for access roads for emergency services or for emptying trucks to reach their areas. Once their toilet is full, these residents have few options other than to demolish a bedroom (Interview with KI_02).

Use of plastic bags and pit diversion

It was also learnt that some households have no toilet facilities, and have to make use of their neighbours'.

> *Those without toilet use their neighbour's and others use plastic bags, mainly at night, then throw full bags in the street.* (Participant: Sombe09/02).

It was also mentioned that the use of plastic bags and buckets (for manual emptying) were among the methods employed by some informal settlement residents. Emptying a bucket manually is done after breaking or opening the slab to empty the whole full pit or just the top portion. Pit diversion involves slowly draining or flushing sludge into an adjacent temporary hole on the property after breaking open the side of the pit.

> *Another method they use, if they cannot call a truck due to poor accessibility in the area, they empty manually using buckets and dig a small hole and bury the sludge onsite just few inches from the full pit*. (Participant: Sombe09/14).

Use of pit additives as alternative methods

Due to cost of frequently emptying a full toilet, residents have come up with the alternative method of pouring pit-additives or chemicals into a full toilet. Toilet users, particularly in Sombetini, intentionally added a variety of products to the sludge pit to manage some problems associated with on-site sanitation systems, the most common being bad odours followed by insects. Wood ashes, caustic soda and salt were commonly used as pit additives in an attempt to reduce or suppress sludge volume in a pit so as they could avoid emptying costs.

Other people pour salt or caustic soda or wood ashes to make the excreta shrink. So, their toilet facilities never get full because of that method. (Participant: Sombe09/01).

Never full, never emptied pit latrines

Some residents reported that their toilets have never been full.

*…I wanted to say that unfortunately my pit has never been full since I constructed it, so I have never emptied it… (*Participant: Sombe09/13).

My toilet has never been full. I dug 25 feet in 2012. I didn't use stone in building it. But we are using enough water for anal cleansing, maybe that is the reason it is not yet full. (Participant: Baraa09/10).

Other house owners gave testimonies on toilets which have never been full:

My toilet has never been full and I constructed it in 2009. Some people make concrete floor at the surface of the pit and around the pit walls. But what I did, I had dug like 6 feet, then I constructed first six feet, surrounding it with stones to protect the pit from sliding and falling. Then I continued digging up to 30 feet. So, up to this moment, it is not yet full. I think it is not yet full because I did not put cement/concrete floor at the surface of the pit. We use enough water for anal cleansing, so in dry season, the soil absorbs the wastewater. (Participant: Baraa09/12).

Similarly, another participant shared that his toilet has never been full despite the number of everyday users:

My toilet has never been full too. I have many tenants using a toilet facility of 4 holes and doors. (Participant: Baraa09/07).

Moreover, it was interesting to learn that there were concerns over the lack of professionalism in toilet construction:

> *My toilets were getting full rapidly and I used to dig several times until I fell short of space for constructing new toilet facilities. So, recently I got a 'fundi' (mason) who constructed a new toilet for me professionally. Up to now, it is not full and we have been using it for 5 years now.* (Participant: Baraa09/08).

In brief, once a toilet is full, it is common for most of the residents in informal settlements to opt for either emptying, replacement, or using a full pit (Still and O'Riordan, 2012; Jenkins, Cumming and Cairncross, 2015; Grolle *et al.*, 2018; Odirile *et al.*, 2018; Gudda *et al.*, 2019). This section has shown that residents in both Sombetini and Baraa use various methods to de-sludge their toilets. Still and Foxon (2012, p.iii) explain that the "rate at which sludge accumulates in a pit is determined by the amount of material entering the pit, the rate and extent to which it degrades and the conditions in and around the pit allowing liquids and degraded material to exit the pit". Due to lack of city sewerage network in the areas, vacuum tankers were the leading methods had access for such trucks. Emptying trucks tend to be owned by private companies, with very few owned by the city council. When toilets need emptying, residents refer to ward environmental and sanitation officers to help them obtain assistance in reaching vacuum tankers. These ward environmental and sanitation officers thus play critical roles of coordinating households and the vacuum operator in the process of emptying a full pit. This co-productive relationship forms a network towards emptying a full toilet; where a household can easily reach a vacuum tanker via an environmental and sanitation officer or directly communicate the truck operator. This implies two things: pit emptiers, households and ward environmental and sanitation officers are in power relationships and are actors in ensuring that toilets are emptied. Secondly, truck operators are aware that these local officers do routine inspections of sanitary conditions, and once they find a full toilet it becomes easier for them to be reached for a business call.

However, given the informal spatial layout of unplanned settlements (and sometimes to avoid frequent emptying and the associated costs), some households opt for flooding out which becomes a threat to the public health as they intentionally de-sludge into open drains, mostly during heavy rains. Timing during rain is strategically intentional as it becomes difficult for neighbours to notice. Further, pit diversion is usually done by using a bucket to pour and bury the sludge into a temporary hole and

then cover it. This seems to be popular in Sombetini which has poor physical accessibility or households unable to pay for truck emptying. For those with extra space, demolition was found common. Unfortunately, a portion of households continued using full toilets due to lack of emptying options.

These findings indicate that vacuum tankers are the only safe and effective choice of pit emptying in informal settlements of Sombetini and Baraa where full pit latrines are easily accessible, and waste is fairly liquid and not mixed with solid wastes such as pieces of clothes or disposable diapers, and menstrual pads. But these findings evidence that not all full pit latrines are reached by vacuum tankers due to the undefined and unguided spatial layout of the settlements with narrow or no paths. As has been reported by the vacuum tankers operators in this research, many pit latrines contain unwanted domestics waste/refuse which can potentially block the vacuum hoses, making the job time consuming and messy. Other researchers have established that the use of pits for solid waste disposal dramatically decreased the life span of a pit (Still and Foxon, 2012). These results make clear that pit emptying in these two wards remain a critical challenge for many households, city officials and other actors to solve/address. Apart from the efforts of ward environmental health and sanitation officers, the results show that little is done by city government to tackle the challenges of pit latrine fill-ups. Pit diversion, manual emptying and using full pit undermine the intention of national campaigns on toilet construction, ownerships and usage.

8.4.2 The importance of toilet, and relationship between human wastes and diarrhoea

Participants in both Sombetini and Baraa were asked to rank the importance of a toilet facility. The results reveal that almost all respondents acknowledged the importance of a toilet in their lives, as 96.9 per cent ranked a toilet as very important. However, 0.8 per cent, mainly from Sombetini, avowed that they could live without having a toilet facility. This paved the way for a follow up question which explored the Sombetini and Baraa residents' understanding of the relationship between human excreta and diarrhoea. The results reveal that 65.4 per cent said there is a close relationship, 13.8 per cent moderate relationship, 7.5 per cent no relation, and 2.8 per cent little

relationship. These findings give a rough picture of the general understanding of the residents on matters related to human excreta management. See Tables 8.2 and 8.3.

		Ward		
		Baraa	Sombetini	Total
Ranking the importance of toilet by household members	Very important	98.1%	96.0%	96.9%
	Important	1.9%	2.7%	2.4%
	Can live without one		1.3%	0.8%
Total		100.0%	100.0%	100.0%

Table 8. 1: Ranking of the importance of toilet by household members
Source: Fieldwork, 2014

		Ward		
		Baraa	Sombetini	Total
Knowledge of the relationship between human wastes and diarrhoeal diseases	Close relationship	77.9%	56.7%	65.4%
	Moderate relationship	8.7%	17.3%	13.8%
	Little relationship	2.9%	2.7%	2.8%
	No relationship	5.8%	8.7%	7.5%
	Do not know	4.8%	14.7%	10.6%
Total		100.0%	100.0%	100.0%

Table 8. 2: Knowledge of the relationship between human wastes and diarrhoea
Source: Fieldwork, 2014

Narratives from focus group discussions confirmed the survey results. Participants of focus groups showed a good understanding of the need for each household to own a toilet facility. Their answers varied from protecting themselves from disease contamination to the role that a toilet plays in differentiating human beings from animals. One respondent in the focus group discussion said:

> *Toilet is part of life for any human being. Once you have eaten or drunk, you must go and release yourself. That is why there is saying: 'The value of a house rests in its toilet'.* (Participant: Sombe09/01).

Another respondent said:

> *In my opinion, a toilet facility helps in putting our surrounding environment clean. Thus, without a toilet facility, the surrounding will be unhealthy.* (Participant: Sombe09/04).

Intra-urban comparison between Sombetini and Baraa wards shows that Baraa residents have a higher level of understanding (77.9 per cent); while 26.1 per cent of Sombetini residents said there was either a little, no relationship or they had no knowledge of the relationship existing between human wastes and diarrhoea. It is important to also note that women constituted 72.4 per cent of all the household survey respondents (refer to Table 5.2 in Chapter 5); which indicate that most women and girls understand the importance of toilet facilities given the biological differences between them and men.

8.4.4 Smelling human waste odour and mixing faeces with household garbage

All the 254 respondents from Sombetini and Baraa who participated in the household survey were asked to share their everyday experiences as they go about their normal routines in their own streets/sub-wards and the entire wards. There are 4 administratively subdivided sub-wards in Baraa namely Solenyi, Kiroshi, Ofisini and Kwamrefu, and 5 in Sombetini: Kirika A, Kirika B, Osunyai, Olmoriak and Simanjiro.

Firstly, they were asked to tell whether they have ever smelled odour of human waste when walking around. Secondly, they were asked whether they were aware of residents who mix human waste with their general household garbage. This question aimed to gather residents' perceptions of people who may be either practising open defecation or mishandling human waste by mixing it with garbage which could signal a lack of an appropriate toilet facility within the household premises.

The survey results reveal that 68.9 per cent said they had never smelt odour or seen human excreta on the streets, 19.7 per cent said that sometimes they had smelt odour or seen human excreta on the streets, 8.7 per cent said they regularly smelt odour or saw human excreta on the streets, and 2.8 per cent were undecided. Regarding whether residents mix faeces with household garbage, the results reveal that 49.6 per cent said that no mixing occurred, 41.3 per cent said either sometimes residents did mix, or residents always mixed. See Figure 8.20 and Figure 8.21. The voices from focus groups discussions confirm some of these results from the household survey.

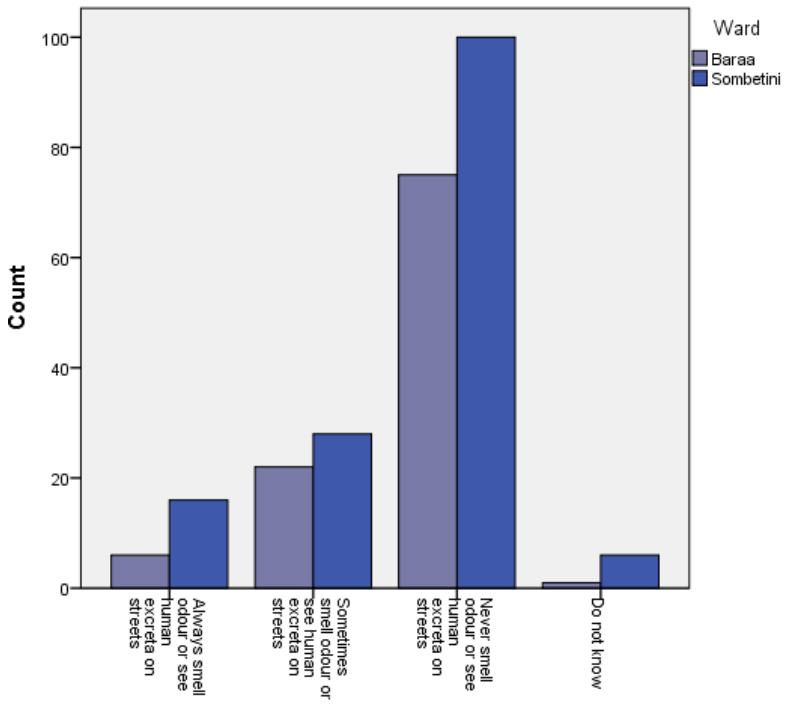

Figure 8. 18: Smelling of human waste odour in the sub-ward
Source: Fieldwork, 2014

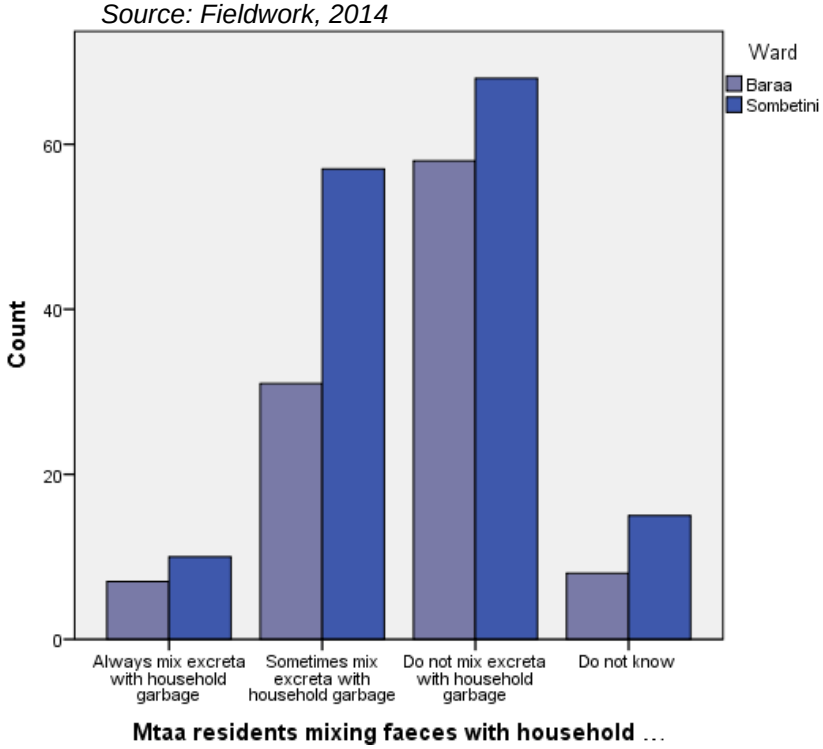

Figure 8. 19: Mixing human wastes with household garbage
Source: Fieldwork, 2014

Disposable diapers and menstrual pads

Many participants of group discussions expressed resentment and dissatisfaction regarding the behaviour of some of the residents who dump used disposable diapers and menstrual pads into pit latrines and open areas. This emerged as a particularly

stressful challenge, and participants were anxious that actions should be taken to address this.

> *…currently, women are mixing disposable diapers with infant excreta, they throw them on footpaths. That is the major challenge in this ward. Even here at Ofisini sub-ward where the office of the Ward Executive Officer is located, they do that very often. A woman can just dump disposable diapers here and goes. We do not really understand this new life style of throwing infant excreta in disposable diapers. Women fail to dispose infant poo in a proper way or burn them. She sees that this is expensive for her to take care of, she just throws it on the road/footpath. This has become a problem, a big problem. Truly speaking disposable diapers is serious problem in our settlement.* (Participant: Baraa09/06).

> *If it were within our authority, this company manufacturing disposable diapers could be banned for production. Once you throw disposable diapers on the roads/footpath, it does not rot, but it stinks. Even when our tenants throw disposable diapers into toilet holes, they don't rot. The company manufacturing disposable diapers should be banned, so that they can produce alternative products.* (Participant: Baraa09/01).

> *No one helps us. Dear researcher, if you can do something on disposable diapers, we would be more than happy.* (Participant: Baraa09/09).

The issue of the inappropriate dumping of children's disposable diapers and menstrual pads was also mentioned by the ward environmental health and sanitation officer.

> *Dumping clothes, disposable diapers, women menstrual clothing.* These are the principal challenges in Baraa ward. (Interview with KI_03).

Mixing human wastes with household wastes

It was noted that some residents in Sombetini and Baraa mixed human excreta with domestic solid wastes as another means of disposal. Several focus group participants

spoke out loudly against this behaviour, as nothing had been done by the relevant local authorities to address it.

> *I have resided for many years in Sombetini ward. I can say that it is true that our citizens sometimes mix domestic garbage with human wastes; and throw them either in the drain or on the footpaths or in abandoned houses* (Participant: Sombe09/04).

> *If these women cannot throw the disposable diapers into the toilet hole, she will then mix them with household garbage and then throw into the dust pit or else they pack them properly as a package and will pay a motorist to dump it anywhere in the neighbourhood. I have come to this ward office and to the sub ward chairperson several times, complaining about this behaviour. There is problem with regards to the misuse of disposable diapers*. (Participant: Baraa09/09).

> *I have small garden down there where I am practicing irrigation farming. People always dump human waste close to my garden. You can see piles of solid wastes dumped on the road or close to my garden, many of them! Sometimes, they pack very well and pay a motorist to dump the package in front of my compound at night. When I wake up in the morning I meet sometimes an unattended package, then you ask around who has brought this package here. The reply has always been, no one knows. You go and see it is full of wastes. So, our residents still need more education, they are yet to be civilized.* (Participant: Baraa09/07).

The results of both the household survey and voices from focus group discussions concur that some residents are still either using plastic bags as their toilet facility or mixing excreta with domestic garbage. Given the role of women in Tanzanian societies, and in particular in Maasai community, most of the blame was been addressed to women as the main actors of dumping domestic wastes mixed with human excreta on the roads or streets. Although women were present in the group discussion, male participants vocally and bitterly accused their female counterparts.

These testimonies are another evidence that gender roles are still a challenge within Tanzanian communities. This is evidence of gender-based power dynamics at household level among co-producers (Khanna and Das, 2016).

8.5. Complexities shaping sanitation infrastructure in Sombetini and Baraa

8.5.1. Status of people living on the same property, toilet sharing and cleaning

Various challenges and complexities shaping sanitation infrastructure were documented. When looking at ownership and occupancy, it was found that 44.5 per cent of residents were owner-occupiers (landlords/house owners only with no tenants), 30.7 per cent were tenants only (absentee landlords), 24.8 per cent were both landlords and tenants (live-in landlords/house owners) as shown in Figure 8.22. It was interesting to note from this Figure that Baraa had a majority of owner-occupiers living on the property (64.4 per cent), while Sombetini had a greater mix of occupancy.

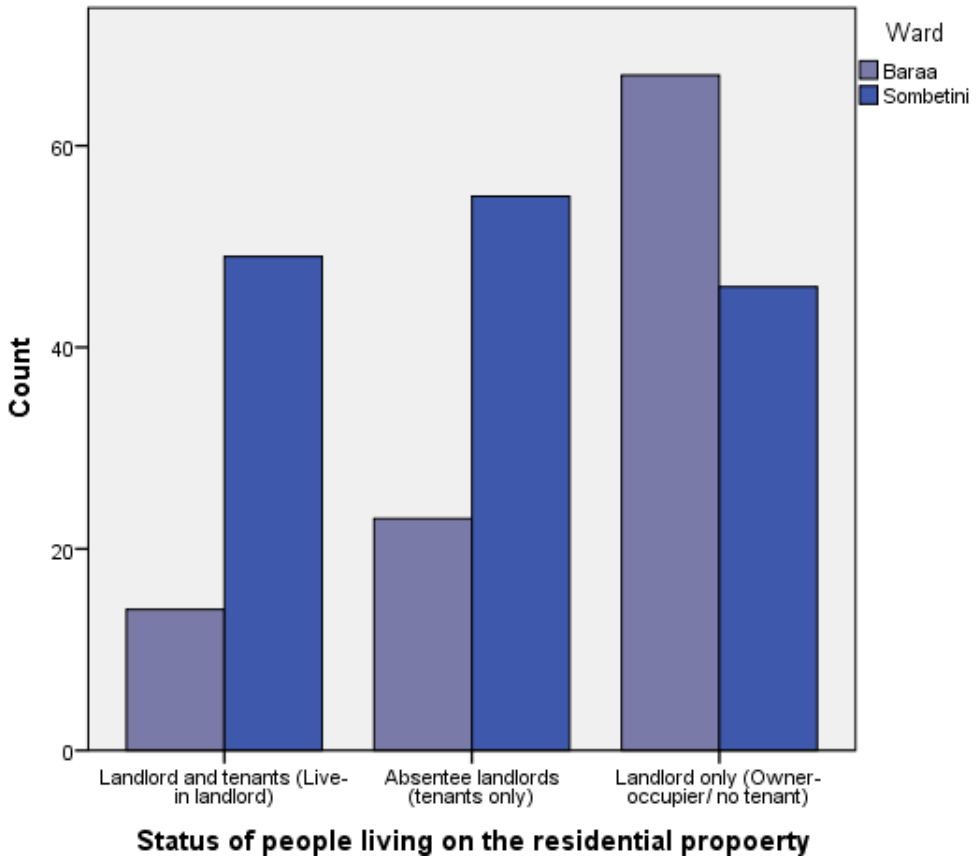

Figure 8. 20: Status of people living on the residential property
Source: Fieldwork, 2014

Respondents were asked who was the person responsible for toilet cleaning, and the responses varied; 49.8 per cent of the respondents understood that it was the duty of the landlords (house owners) to clean the toilets, 34.4 per cent said it was the tenants, 15 per cent said both landlords and tenants should be responsible for cleaning the toilets (See Figure 8.23). It is worth noting that men, women, young adults, old people, landlords, tenants were all among the respondents of the survey, but majority of them were women. These results indicate that there was some uncertainty among tenants and house owners as to who should take care of daily cleaning and maintenance of the toilet.

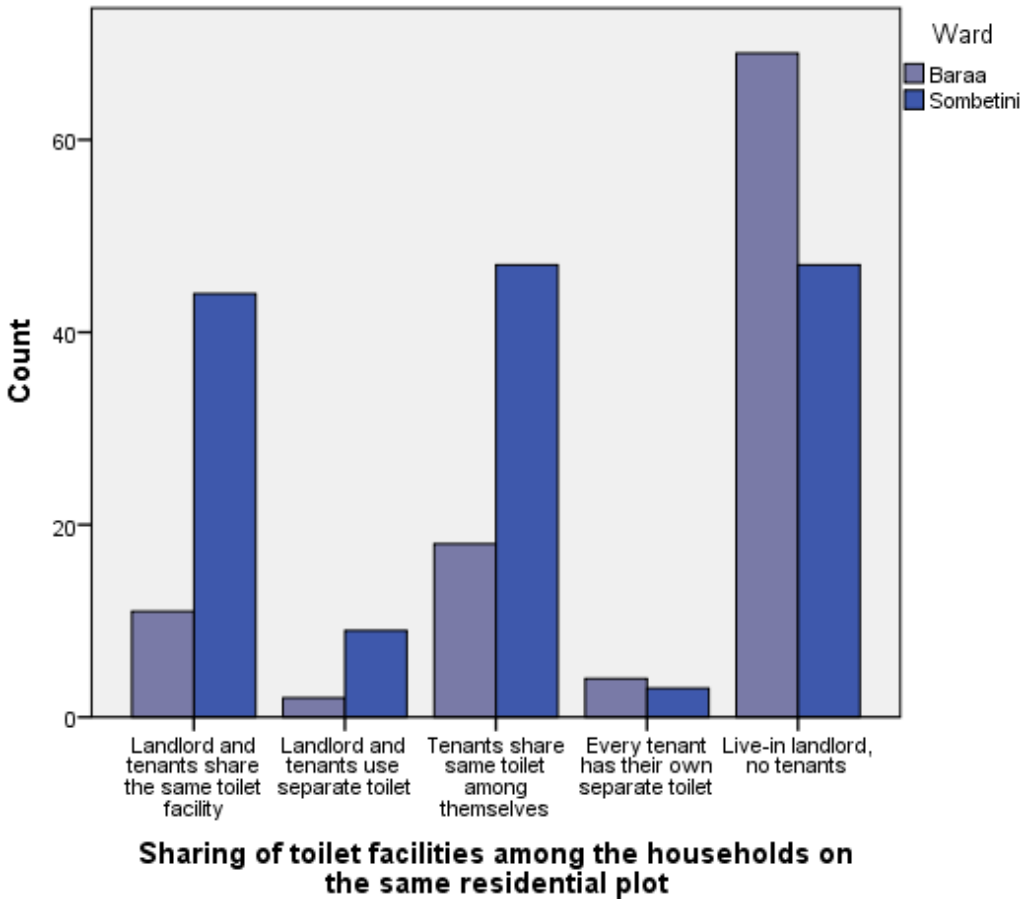

Figure 8. 21: Sharing of toilet facilities among households on same plot
Source: Fieldwork, 2014

8.5.2. Landlords-tenants' relations on toilet use in Sombetini and Baraa

One of the things investigated in the fieldwork was the relationship between landlords/house owners and their tenants. Overall, the relationship seemed not to be good. This was manifested in the discrimination by house owners not sharing toilet facilities with their tenants and each party blaming the other for problems. Several reasons were given as to why house owners do not like to share toilet facilities,

including a fear of disease contamination, poor hygienic behaviour of tenants, and a lack of cooperation on pit emptying costs and cleaning. Various contributions from Sombetini and Baraa focus groups show the hostile relationship between home owners and their tenants and the reasons advanced. Tenants were blamed for many issues: from toilet misuse, convenience, facility cleanness, to dumping of used disposable diapers and menstruation pads into the pit latrine.

Fear of infection

One discussant said:

> *For example, myself I have tenants. My tenants and I don't share same toilets because of avoiding communicable diseases and poor hygiene/cleaning, mainly Urinary Tract Infection (U.T.I.).* (Participant: Baraa09/07).

Another added that:

> *… is to avoid toilet misuse and transmission of diseases such as Urinary Tract Infection (U.T.I.).* (Participant: Sombe09/03).

Another participant explained that there were two reasons which discouraged landlords from sharing toilet facilities with their tenants, one being the carelessness of the tenants in cleaning the facilities, and the other being the avoidance of disease contamination due to multiple users. The respondent said:

> *There are two reasons why some landlords don't share toilet facilities with tenants: Firstly, some tenants are not civilized and don't care about environmental cleanliness of the facility. That is why some landlords decide not to share; and give tenants freedom to schedule the cleaning of the facility on their own. Secondly, given the number of tenants there is a high possibility of getting diseases easily through the sharing of the facility. Some are avoiding communicable diseases.* (Participant: Sombe09/01).

> *Many adult tenants are careless in using toilet facilities, and they are not willing to clean after they have used. Sometimes, if you enter the toilet, you cannot believe if that toilet was used by an adult.* (Participant: Sombe09/11).

One participant explained that there was no specific reason for not sharing with his tenants, other than convenience. He explained:

> *I have a pit latrine with 3 separate holes and doors but same toilet super structure. My family uses 1 hole/door and the rest 2 doors/hole are for my tenants. So, we don't share same toilet hole facility with tenants, just for convenience.* (Participant: Baraa09/01).

Another said that some tenants are smart, but others are stubborn and poorly behaved; for that they had to be closely monitored and supervised as far as environmental cleanliness is concerned.

> *…I have rental rooms, but don't share same toilet facility with my tenants. We use separate facilities. You know there are smart and stubborn tenants, if landlord is not careful in inspecting the cleanness of the toilet, they can make it dirty. You must always encourage them to clean the facility regularly.* (Participant: Baraa09/10).

Throwing unwanted waste into pit latrines

Another participant blamed tenants for the poor condition of pit latrines, accusing them of sabotaging efforts by house owners by throwing diapers or pads into the pit. This resulted in additional expenditure for the owners:

> *"Dumping or throwing children's used disposable diapers and menstruation pads…into toilets, makes toilet to get full quickly....Some tenants want landlords to not benefit from rents, they make sure you use all the money in de-sludging/emptying full toilets. Tenants can misuse toilet, electricity, water, just to make sure landlords spend much on that and they do not make profits from the rents.* (Participant: Baraa09/09).

> *Dumping or throwing children's used disposable diapers and menstruation pads…into toilets, makes toilet full quickly. The emptying cost is on the landlord.* (Participant: Baraa09/09).

Lack of cooperation

The focus group also discussed the sharing of toilet facilities by landlords and tenants. It was learnt that many live-in landlords do not share toilet facilities with their tenants for different reasons, including lack of cooperation from tenants when it comes to sharing emptying costs or cleaning the facility. One respondent representing rental housing owners said she did not share the toilet facility as she used the built-in toilet located inside her main dwelling unit, and her tenants used the facility outside the main dwelling unit. The respondent said:

> *I have a self-contained house (with toilet facility inside the house) and I also have housing units for tenants with their separate toilet facilities outside. I don't share the facility with them.* (Participant: Sombe09/011).

> *… many tenants are not cooperative when it comes to financial contributions to address a communal problem or issue, for example buying toilet disinfectant. To avoid these disturbances, most of house owners decide to separate their families' toilets from those of tenants.* (Participant: Sombe09/03).

Landlords' selfishness

However, some tenants blamed house owners for not taking care of their properties, especially toilet facilities. They were accused of loving money:

> *Some landlords or house-owners are just selfish. They only care about rent collection, not basic services for tenants.* (Participant: Sombe09/13).

Lease agreements and cleaning roster as a solution

Another participant added that in the past, they had no lease agreement between house owners and tenants, but now they have been introduced for binding both parties:

> *In addition, we have now introduced lease agreement system for rental housing. The lease stipulates the responsibilities of tenants with regards to environmental health/cleaning of the toilet and the space they are renting. So, tenants organise themselves and make their own schedules of cleaning the toilet and the common space. If anyone will fail to fulfil their responsibilities, fellow tenants will report to me as landlord, and I will inform him or her that s/he breached the agreement.* (Participant: Baraa09/04).

One house owner explained that he had created a timetable for rotational cleaning of the toilets by tenants, and tried to discourage the disposal of foreign matter in the pits:

> *… I always visit my rental property checking on environmental cleanness. Nowadays, there are disposable diapers and some tenants dump them into the toilet hole after use. Most of time, I am watchful, especially when other tenants report to me that there is tenant who does not want to clean the toilet. So, for avoiding disturbance and for easy supervision, we make schedule or timetable for every household day of cleaning the toilet. To also avoid the dumping of disposable diapers into toilet, I have designated a special bin for that".* (Participant: Baraa09/03).

The findings presented in this section have brought voices and narratives from the participants of focus groups to the discussion and provide a bigger picture of tense relationships existing between tenants and house owners. There is evidence that some home owners try to distance themselves from their tenants for a number of reasons ranging from health-related issues to disapproval of behaviour (such as carelessness in toilet use and throwing unwanted waste material into the pits, and lack of cooperation). Landlords hold the decision-making power in choosing which toilet facility should be used by tenants and which for their families.

In Tanzanian socio-cultural norms and traditions, women are tasked with taking care of the home environment. Even if someone else has misused the toilet facility, it is expected that a woman will clean the mess. This means that when house owners blame tenants for misuse of toilet facilities, they are indirectly blaming women of failing

to take care of the facility. In order to manage the situation between tenants themselves and between tenants and their landlords, some landlords / owners have introduced a schedule for toilet cleaning into the lease agreements. This is seen as a necessary step to help address the tense relations in the process of collectively co-producing a clean toilet facility for their households.

8.5.3. Socio-cultural issues shaping sanitation infrastructure in Sombetini and Baraa

Participants of the group discussions were community members and leaders. They included a ward executive officer, sub-ward leaders, ten-cell leaders, religious leaders (Christian and Muslim), tenants, landlords, women, elders and youth representatives. These community members were selected for the study to be representative and because it was believed that they had local knowledge of history of the area and local knowledge of sanitation issues.

All participants of the two focus group discussions from Sombetini and Baraa agreed that culture (mainly that of the Maasai people who are the dominant traditional inhabitants of Arusha) affects the sanitation chain management in their settlement. It is worth noting that other ethnic groups were present in the discussions, as well as those from the Maasai group. A number of themes emerged during the discussions on socio-cultural dynamics that shape sanitation practices in the two informal settlements; these are described below.

No need of a toilet

One participant said that some residents do not see the need for having a toilet, as they argue that the toilet is only used for a very short time of period which does not go beyond fifteen minutes. So, there are some Maasai people who think there is no need of having a toilet facility. Here is the statement:

> *Others say, they cannot spend a lot of money in a structure used for less than 15 minutes; even if they have enough space and capacity to build a toilet, they don't build.* (Participant: Sombe09/06).

Another respondent said*:*

> *…some years back, Maasai people were not willing to use toilet at all. But with time, and with awareness creation, they now understand the importance of toilet* (Interview KI_02).

Education and toilet ignorance

Social factors, mainly lack of education, have been cited as other reasons which induce residents either not to build durable toilet super structures or not to share toilet facilities. One respondent explained that lack of education is a major constraint to sanitation improvement in their area. The respondent said:

> *I think lack of education makes people ignore toilet facilities by building good residential houses, but with poor quality toilet facilities.* (Participant: Sombe09/06).

Another participant added that lack of education is the main problem within their settlement. The respondent said:

> *I support my colleague who said about lack of education, mainly on importance of toilet facilities. Some people have dug pit and erected the structure just using papers or sacks as their walls. So, there is a problem of lack of education.* (Participant: Sombe09/09).

On the social aspect of sanitation management, different reasons were put forward as to why some people did not share toilet facilities with others in Baraa. The key factors here were lack of education, poor hygiene behaviour, and health reasons. Another critical aspect emphasised by the ward environmental health and sanitation officer was that many local people still preferred traditional pit latrines (KI_03). Here are some of the statements from the participants:

> *In early years, we had no education and we had many bushes around our houses and many coffee plantations. Some people were saying that they could not share same pits with children, so they were going into bushes for toileting.* (Participant: Baraa09/03).

> *…lack of education has contributed to people of the area not invest in good quality and appropriate toilet facilities*. (Participant: Baraa09/06).

'Morani knows no call of nature'

'Morani' means Maasai young people. During the course of the study, it was learned that traditionally Maasai young men did not use toilet facilities when they had a call for nature (defecate). One respondent, who also claimed to be a Maasai community member, and was one of the sub-ward leaders, added that:

> *There is a Maasai culture which says 'Morani' does not answer a call of nature (defecate). When 'Morani' goes to toilet, he should not be seen by anybody, mainly women and children. That is what I knew when I was still young. Generally, this Maasai culture encouraged open defecation. These young men were using bushes when taking care of cattle in the grazing areas. And maybe that is why many of them don't see the value of having a toilet facility or improving even the super structure.* (Participant: Sombe09/07).

Heads of households discriminate against their own wives, children and tenants

The interview with the Sombetini environmental health and sanitation officer confirmed that there was also a tradition in Maasai culture where heads of families did not share toilet facilities, but this was beginning to disappear. She added that Maasai men used to discriminate against women and children on toilet use as they believed that:

> *Maasai man does not want to be known that he goes to toilet*
>
> (Interview with KI_02).

Another participant went on to say that some residents, mainly the heads of the families, separate their own facility from the rest of the family members, and tenants**.** The participant said:

> *…in other cases, they can have facilities for father, rest of the family and tenants separately.* (Participant: Sombe09/12).

Another participant said if someone had enough space or a big plot, they could willingly build separate toilet facilities which they could use for themselves, their wives and children, and in the case of having tenants, they could also have a separate facility for the tenants. The respondent said*:*

> *For those who have enough land or space, they can build big house with enough bedrooms and build outside toilet facilities where they can have a toilet for the father only and the mother and her children separately. And in other cases, they can have facilities for father, family and tenants separately.* (Participant: Sombe09/13).

One respondent accused those heads of families, who discriminate against their own wives and children from using toilet facilities, of 'colonial' type behaviour. 'Colonial' behaviour here means that heads of families wanted to be treated as masters or rulers.

> *…it is a colonial behaviour leading even to isolating their own wives and children when it comes to toilet use.* (Participant: Sombe09/07).

The situation in Baraa was not much different from Sombetini, as the majority of inhabitants were also Maasai people**.** Cultural factors have shaped sanitation practices in Baraa in many ways. This was evidenced by the contributions from the participants of the focus group discussion. One shocking belief revealed during the discussion was that a *'Maasai man does not defecate or does not use a toilet facility'*.

> *We know that culturally a Maasai man does not go to toilet. Going to toilet was an activity of women. It was right for women to go to toilet.* (Participant: Baraa09/01).

Another respondent explained that the Maasai culture binds them from sharing a toilet facility from others, particularly with their own women and daughters. To do would undermine respect among family members. He said:

> *It is a matter of respect. Just imagine knocking on a toilet door, and the person who is coming to toilet is your daughter. You meet at the doorstep when you are entering, and your daughter is coming out of the same toilet. What is that? Humiliation!* (Participant: Baraa09/09).

To the surprise of many participants, one discussant announced that he did not feel good using a toilet facility if he knew that women had seen him going to answer a call of nature:

> *… Myself, I cannot use a toilet if women are standing or sitting close to the toilet structure. I am ready to go and use a toilet at my neighbours. I don't like to be seen going to toilet, even today.* (Participant: Baraa09/02).

Age group and toilet exclusion

Maasai elders are traditionally highly respected and all these comments were explained as being Maasai cultural practices that were aimed at promoting respect among the different age categories and gender. Other narratives included that grandparents could not share with their grandchildren or fathers and their daughters or men and women were not supposed to share same toilets. All these cultural practices were explained as a way of showing respect among different relations or age groups, as one participant of the discussion explained:

> *There is a problem of people of different age categories. Some old people don't like to share toilets with younger ages. Some grandparents don't feel good to share toilet facilities with their grandchildren.* (Participant: Baraa09/02).

Another participant added that his elders or grandfathers do not like to be seen when they were going to use a toilet:

> *What I know is that grandpa does not like to be known that he goes to toilet. That is why Maasai build their toilets in backyard, so that people cannot see them when going or coming from toilet.* (Participant: Baraa09/04).

Many participants confirmed that old people maintained the Maasai culture of isolating women from sharing a toilet.

> *Old people don't like to meet with women on their way to or from the toilets as they feel like it is lack of respect. It is an embarrassment for them. So, to protect*

> *their respect, they normally decide not to share with women.* (Participant: Baraa09/08).

In addition:

> *Respect is embedded in our culture. That is why our grandparents were not sharing toilets with their children and grandchildren; and even their own wives.* (Participant: Baraa09/05).

No toilet sharing with in-laws

Another participant, who claimed not to be a Maasai community member, said his own culture did not allow him to use the same toilet facility with his in-laws. Before deciding to make use of the facility, the respondent must be assured that the mother in-law was not using the toilet, to avoid the two meeting on the way, and vice versa. The respondent says:

> *I am originally not from Arusha. But my culture does not allow me to share toilet facilities with my in-laws, but since I am a town resident now I have no option. We are all using the same pit. In my area, I cannot even share meals with my in-laws on the same table. But even if we are sharing toilet, we must play 'cat and rat game', before heading to toilet. I must make sure that I know none of my in-laws is using toilet at that time.* (Participant: Sombe09/02).

Another discussant from Maasai community explained that culturally in-laws are not supposed to share toilets, and for instance, *my father-in-law does not share toilet facility with me.* (Participant: Baraa09/02).

These narratives show that Maasai men or heads of households do not like to share toilet facilities with their wives, sons, daughters, in-laws and even those of different age groups like grandfathers and grandchildren. The narratives affirm that men believe that they are not supposed to be seen going to toilet, as that activity was traditionally regarded as something solely for women. The use of a toilet was shown to be embedded in different ethnic groups and is culturally a gender issue. Other men from

other ethnic groups confessed that they do not like to use a toilet facility when women are around or can see them going to toilet, and confirmed that in-laws do not also share toilet facilities.

The relationship between human and toilet is naturally bound. These findings indicate that men are responsible for digging or constructing toilet facilities for their families, yet they were found to discriminate others, particularly women, from using the same facilities. Traditionally Maasai men and young men did not use toilet facilities. The saying that ‘Morani does not use a toilet facility’ or not seeing importance of constructing a pit latrine just because it is used by someone else less than 15 minutes earlier, confirmed the contradictory views from the household survey that showed that 0.8 per cent of respondents claimed to live without a toilet.

8.7. Conclusion

A range of socio-cultural elements continue to affect whether family members use toilet facilities. These include relationships between landlord and tenant; poverty levels; and cultural norms, social and traditional values that prevent Maasai men and young men from using toilets. The findings of this research have revealed that there are critical reasons that some households choose to live without toilet facilities; these included income poverty or lack of financial capacity for some households as well as cultural reasons. Most of the houses of those households without toilet facilities are also of poor quality or dilapidated. This suggests that environmental health education and awareness campaigns are not enough in encouraging households to build and use toilet facilities, but that other root causes should be taken into consideration.

Although the findings of this research on toilet super structures have indicated that 80.6 per cent of all toilet walls were constructed of cement blocks both in Sombetini and Baraa, it is worth mentioning that there was a significant portion of them with poor quality structures that could undermine human dignity and privacy. Poor toilet facilities have a strong negative impact on human dignity of users, especially women and girls. These facilities may also become an embarrassment to visitors and friends. During the rainy season such poor facilities may also face a risk to personal safety and a

security threat for women and girls, particularly when they need to use the facility at night.

On pit emptying methods used by the households once their toilet facilities fill-up in the two cases of Sombetini and Baraa, the results of this research have revealed that vacuum tankers /trucks are the mostly used as the only available hygienic choice. However, given the lack of accessibility as one of the defining features of the informal settlements, not all toilet facilities could be reached by the vacuum tankers. Consequently, flooding-outs, pit diversion, the use of plastic bags (and then discarding them into open spaces), use of buckets for manual emptying and using full pit latrines were also practised as alternative methods to de-sludge full pits. These methods are not safe or hygienic; hence they undermine all the efforts and outcomes of adequate sanitation invested by state and non-state actors on toilet construction, ownerships and usage. These unhygienic practices present serious health risks not only to the households practising them, but also to the urban environment and public in general, due to the possibility of pathogen-infected faeces reaching the wider urban environment, contaminating drinking and cooking water and food via human flies and human hands.

Jewitt (2011, p.763) contended that most of the diseases spread by human waste are associated with faeces that contain germs, eggs, parasites and pathogens. Profoundly, the findings of this study suggest that encouraging ownership and construction of toilet facilities is not enough, actors need to go beyond that and work concertedly throughout the whole sanitation chain. The use of pit additives or pouring wood ashes, caustic soda and salt into a full toilet were among other methods used by the residents of informal settlements supress the volume of sludge. The latter might be used to avoid high emptying costs, especially in the high-water table area of Sombetini which make pits to fill up regularly.

The findings of this research have revealed that some households still mix faeces and disposable diapers with household garbage, despite the majority (96.9 per cent) showing good understanding of the importance of a toilet in their lives. Some 79.2 per cent of the respondents understood that there was either a close relationship or

moderate relationship between human excreta and diarrhoea. Yet the results also revealed that there is a portion of households who believe for cultural reasons that they could live without having a toilet facility. These findings demonstrate that there were still some factors holding some city residents from understanding the need for a toilet facility for themselves and their households, and pushing them to unhygienic sanitation practices.

This research has shown that tenants tended to be excluded by their landlords for a number of reasons, ranging from health-related reasons to lack of cooperation, carelessness in toilet use, and throwing unwanted wastes in the pit latrines. Landlords hold the power of decision making in choosing which toilet facility should be used by tenants and which for their families. In order to manage the situations, lease agreement and a schedule for toilet cleaning have been introduced by some landlords as an intermediary to help address the tense relations in the process of collectively co-producing a clean toilet facility for their households.

These narratives show that Maasai men or heads of households do not like to share toilet facilities with their wives, sons, daughters, in-laws and even those of different age groups like grandfathers and grandchildren. The narratives affirm that men were not supposed to be seen going to toilet as that activity was solely for women. The use of toilet is seen embedded in different ethnic groups and is culturally a gender issue. Other men from other ethnic groups confessed that they do not like to use a toilet facility when women are around or can see them going to toilet, and confirmed that in-laws do not also share toilet facilities. The relationship between human and toilet is naturally bound. These findings indicate that men are responsible in digging or constructing toilet facilities for their families, however, they are the one again discriminating others, particularly women from using the same facilities. Traditionally Maasai men and young men were not using toilet facilities. The saying that Morani does not use a toilet facility or not seeing importance of constructing a pit latrine just because it is used for few minutes confirmed the contracting views from the household survey of 0.8 per cent of respondents who avowed of living without one.

The next and last chapter commences with a reflection on the main focus of the thesis. Secondly, the chapter synthesises the key research findings. Thirdly, it analyses the findings in relation to the relational analytical framework built on ANT tenets as elaborated in Chapter 4. Fourthly, the chapter ends by concluding the thesis, and stating future areas of research generated from the thesis.

CHAPTER NINE

CO-PRODUCING URBAN SANITATION INFRASTRUCTUIRE IN ARUSHA: UNPACKING THE WEB OF RELATIONS

9.1. Introduction

The overarching aims of this thesis were: to examine the co-production arrangements of urban sanitation infrastructure provision that exist among multiple actors in informal settlements in the city of Arusha (Tanzania), and to interrogate whether the predominance of such arrangements were indicative of an alternative form of city governance.

In achieving this, the study was guided by the six specific objectives.

The first objective documented the extent of sanitation infrastructure coverage or provision in Tanzanian biggest cities. This objective was comprehensively covered in chapter 6. The chapter described contributors to the countrywide sanitation infrastructure, including the range of actors who are directly and indirectly involved service delivery, national sanitation campaigns, issues around urban growth and population increase, urban development frameworks and urban local government systems, and relevant urban policies and laws.

The second objective explored the status of urban sanitation infrastructure and service provision in the city of Arusha. This was covered in chapter 7 where the geographical settings of the city, its administrative and governance structures, demographic and socio-cultural settings, urban planning and informal settlements and urban infrastructure provision plus actors were explored.

The third and fourth objectives were covered in chapter 8. These objectives respectively aimed at exploring the existing human excrement management practices, and examining the complexities shaping urban sanitation infrastructure in the two case study areas of Sombetini and Baraa informal settlements.

The fifth objective (covered in Chapter 7) discussed the landscape of the actors, and their roles, and relationships in co-producing urban sanitation infrastructure in informal settlements in Arusha.

And finally, the sixth objective (Chapter 7) analysed the governance arrangements emerging from the multiplicity of actors involved in the co-production process of urban sanitation infrastructure.

The current chapter thus seeks to distil and bring together the key research findings for a more relational analysis and discussion and to explore the co-production arrangements forged by state and non-state actors directly and indirectly involved in the provision of sanitation infrastructure and services in the city of Arusha. These are then analysed from the perspective of Actor Network Theory, as outlined in chapter 4. The chapter concludes with some consideration of the implications of the research findings, including possible areas or future research.

9.2. Synthesis of key research findings

This synthesis is organised as follows: the field work, covered in Chapters 6, 7 and 8, are discussed in relation to the literature reviews in Chapters 2 and 3. In order to avoid repetition and enable synthesis, the content is organised in accordance with themes identified in the literature that are currently under-represented. The aim is to show how the research responds to these gaps in the literature, and also provides the base for a deeper analysis. Broadly, these revolve around informality, governance and co-production processes; and socio-cultural parameters shaping sanitation practices in informal settlements in Arusha.

9.2.1. Governance, Informality and Co-productive process in sanitation chain

Governance and Informality and co-production

The concept of co-production is not explicitly articulated in public policy (Moretto et al 2018), yet, these everyday practices in urban service provision include the active participation of service beneficiaries (end-users, or the citizens) and other non-state actors. Co-production serves a public function, but it is not recognised as such in Tanzanian public policy. In tracing the service delivery through the sanitation chain in informal settlements of Sombetini and Baraa and in the city of Arusha as a whole, a

number of co-producers were identified as having entered the either collectively as groups, or individually, to supplement the failure of Arusha city government. Thus, these actors play a powerful public role.

Actors with strong presence are Central Government Ministries, mainly MoHCDGEC, MoEST, MoWI and the PO-RALGs, the Arusha City Council (ACC), AUWSA, Donor Community: World Bank, Danish Government, and AfDB; the pit emptying operators, CCI/FUP, and individual households. All these actors play a vital role in the co-production process of sanitation infrastructure and services throughout sanitation chain which one single actor alone could not achieve. The exploration of their roles and interactions between the state and non-state actors, the coordination mechanisms in place, and the ways both Central Government and ACC steered or engaged these actors in their inter-dependent activities confirms Rakodi's point that (2003) the state is an important actor in co-production processes. Table 9.1 shows the extent to which actors examined in this research are involved in the urban sanitation chain.

Actors	**Regulatory frameworks**	**Financing**	**Containment**	**Emptying**	**Transport**	**Treatment**	**Disposal**
Central Government Ministries: - Health (MoHCDGEC) - Education (MoEST) - Water and Irrigation (MoWI) - PO-RALGAs	√	√	×	×	×	×	×
Arusha City Council	√	×	×	√	√	×	×
AUWSA	×	×	×	√	√	√	√
Donor Community- World Bank, Danish Government & AfDB	√	√	×	×	×	×	×
Pit Emptying operators	×	×	×	√	√	×	×
CCI/FUP	√	√	√	×	×	×	×
The Household	×	√	√	√	√	×	×

Table 9. 1: Co-productive roles of state and non-state actors in the urban sanitation chain
Source: based on the findings/Fieldwork, 2014

Central Government is mainly in charge of formulating national policies and engages external donors on behalf of ACC and AUWSA to secure funding for local sanitation

infrastructure and services in the city of Arusha. The study found that the main financiers are the World Bank, the Danish Government and AfDB, which have signed bilateral relationships and agreements by the Central Government. ACC and AUWSA both report to and work in close association with the Central Government ministries on directives and policy issues related to sanitation provision and other matters depicting a relationship of accountability. The ACC is legally accountable to a number of parent ministries, depending on the nature of directives, mainly to the President Office (PO-RALGs), while AUWSA is directly accountable to MoWI. While there are no clear functional boundaries in the service provision, it was found that ACC tends to deal with the provision of sanitation infrastructure and services in informal settlements, while AUWSA tends to focus on the more formal and planned neighbourhoods, which are served by the conventional sewerage system.

Both the Constitution of the United Republic of Tanzania and the policies and practices of the Arusha City Council place the involvement of residents at the core of co-producing services that impact on their lives (McMillan, Spronk, and Caswell, 2014; Brandsen and Honingh, 2015; Alford, 2009; Brudney and England, 1983). The findings of this study have shown that while the government may have promised to provide sanitation infrastructure and services to all citizens, in practice, individual households play a crucial role in co-producing sanitation. Yet there are no formal mechanisms to empower the citizens to access sanitation infrastructure and services. The policy statements on provision of sanitation infrastructure apply only in planned neighbourhoods and not to informal settlements.

In the process of co-producing urban sanitation infrastructure and services at city scale, the ACC, through its various departments (mainly the environmental and sanitation section within health department) and sub-ward leadership, provide environmental education and create awareness, as well as routinely inspect the sanitary conditions in informal settlements. Where necessary, these city actors may either oblige a household to dig and build a toilet facility if they do not have one, or asked them to de-sludge or empty a full toilet. In the process, the officials could direct the concerned household to a vacuum operators/pit emptier, or the householder could directly call for the service provider. But the householder remained responsible for

paying for both the building of the facility and the emptying services whenever necessary. Private pit emptiers were responsible for emptying the full toilet and transporting the sludge or human excreta to disposal ponds. Basically, this shows that ACC plays a role of coordinating non-state actors in the sanitation service chain.

For those households who were directly connected to the city sewer network, the householder was only in charge of establishing the containment or building of a toilet facility for themselves and paying for sewerage services on monthly basis to AUWSA. In these cases, AUWSA was responsible, through its sewer pipeline network, for emptying, transporting and treating the human excreta. In areas where CCI/FUP operated, group members were granted small loans or micro finance for digging and building toilet facilities. However, the loan beneficiaries were responsible for paying for the emptying services once their own toilets were full. ACC and AUWSA collaborated as government institutions, mainly on environmental education and in particular in pressing sanitation and health issues, such as the prevention of cholera.

This shows that there were interactions among various autonomous institutions and actors at different scales and times, each with the aim of improving the urban sanitation infrastructure and services in the city of Arusha, services which would normally fall within the everyday governance of city affairs. Such interactions lead to various arrangements of governance which may be divided into formal and informal arrangements.

The formal governance arrangement was observed between government institutions (seen in national laws and policies), the city council and the donor community, whereas the informal governance arrangement was observed between the city council and the non-state actors, and amongst non-state actors themselves. The ACC was seen to work hand in hand with households, pit emptiers, and CCI/FUP. But pit emptiers and householders made their own arrangements for emptying services. Similar relationships were also observed between CCI/FUP and households on financing mechanisms for toilet facilities.

As it has been emphasized by Allen *et al* (2006), governance plays a critical role in the process of providing urban infrastructure and services, and many cities and towns, particularly in sub-Saharan Africa, face a governance crisis rather than an urban infrastructure and service crisis. In light of this (see also Resnick 2014; McCourt, 2013); this research attempted to explore governance arrangements emerging from the multiplicity of actors involved in the co-production process of urban infrastructure and services in informal settlements in Arusha city. Provan and Kenis have argued that collaborative arrangements forged between and among different state and non-state actors have proved to have positive impacts in the efficiency of resources use, increased capacity to plan for and address complex problems, and better urban sanitation infrastructure and services provision for city residents (Provan and Kenis, 2008). This research confirms that the effectiveness of formal and informal governance arrangements is critical to the achievement of positive network-level outcomes that would not normally be achieved by individual institutional participants acting independently. The findings show that the majority of residents in the case study areas were able to access some form of sanitation facility, largely due to the governance arrangements that exist in the sanitation provision process and among actors (as summarised in Table 9.1) This is despite the traditional city governance structures remaining rigidly the same.

Moreover, the findings of this research show that government interventions in extending access to sanitation infrastructures and services to residents of informal settlements tend not to consider the nature of spatial informality of the settlements. ACC has adopted Community Total Led Sanitation, as a technology for promoting city residents to construct and use their own toilet facilities. However, the council appears to put little effort into excreta management once a toilet has filled-up. AUWSA apparently still plans to extend its sewerage network to informal areas using conventional technology, despite clear evidence of innovative pro-poor sanitation technologies in other parts of the global south that are better suited to informally developed human settlements (Mara, 1996; 2012; Nance and Ortolano 2007; Starkl *et al.*, 2015).

9.2.2. Individual and collective co-production arrangements

The findings show that there is a distinction between individual and collective co-production arrangements in the provision of infrastructure and services throughout the sanitation chain in Arusha. Based on the findings from the two cases, households actively participate in the digging of pits and in the construction of the super structure (containment). The households also participate actively in the emptying process by both inviting a pit emptier and paying for the service. The household also pays for the transport of the de-sludged human excreta to the stabilisation pond. Loeffler's refers to such behaviour as active or voluntary individual co-production (Loeffler, 2010). This study has shown that individual co-productive households play a vital role in managing the sanitation infrastructure at household level. The households contribute (in cash or kind) towards mobilisation of resources for constructing a toilet, while the ACC officials (sanitation officers or ward/sub-ward leaders) enforce the laws and by-laws relating to environmental health and sanitation in the city boundaries.

In Sombetini and Baraa informal settlements, residents participate actively without formal organisation and coordination, but the benefits are seen at both household and city-wide levels. This appears to contradict the claims advanced by Bovaird, Stroke, Loeffler, Jones and Roncancio (2016), and Brudney and England (1983) that aggregate benefits may be amassed at personal level or that the contributions made, and the benefits received, by citizens are felt at an individual level, with little at the city level. This study confirmed this, but went beyond their claim. The results of this research show that the accumulated value from sanitation facilities was noticed at individual household level, but that it affected the city environmental health as a whole. For example, it is obvious that if one or several households own and use toilet facilities in a sub-ward and that they do not manage them very well, the toilet facilities may cause nuisance not only to them and their immediate neighbours but the whole sub-ward or ward, hence causing a public health hazard to the entire city.

Moreover, the findings from the two cases of Sombetini and Barra revealed another sub type of 'captured' individual co-productive household which is, sometimes, forced to either dig, construct a pit latrine or pay for the emptying of their full toilets under supervision of the city council officials. This confirms Brudney and England's view

(1983) that these residents have no choice but to participate in the co-production process.

The second form of co-production arrangement revealed from the findings of this study was collective co-production. The collective co-production arrangement demands and emphasises direct involvement of citizens in the whole process of urban infrastructure and services provision. This was cemented in the Tanzanian urban laws which state that the provision of sanitation facilities rests in the hands of citizens themselves, while the government is only charged with the role of developing and enforcing the relevant regulatory frameworks.

The research results from cases of Sombetini and Baraa informal settlements have demonstrated that citizens were directly involved in the whole chain of urban sanitation provision by digging and constructing their own toilet facilities (containment), emptying or paying for emptying/de-sludging full toilets and transportation of the human excreta to the designated stabilisation ponds. The city government officials regularly inspected sanitary conditions at household residences and ensured that the citizens were aware of the consequences and benefits of sanitary conditions. In addition, the city government was empowered to take legal actions/proceedings against citizens who produced or caused nuisance and endangered public health. Moreover, central government formulated policies implemented by urban local governments and mobilised financial resources for national sanitation programmes and projects to be implemented in urban local governments. Donor communities released funding to urban local governments via the central government. The Centre for Community Initiatives (CCI) in collaboration with the Federation of Urban Poor (FUP) also participated by injecting revolving loans for the construction of sanitation facilities for their members. This shows that they were the only actors who financially enabled city residents to own a toilet facility (containment).

The benefits of collective co-productive activities accrued to the city as a collective, regardless of which actor participated in the service delivery process. The findings of this study confirm that, for a city to appreciate the benefits of sanitary conditions, the majority of citizens, if not all, should have participated in the process. This is because

of the nature of nuisance produced by poorly managed human excreta. For a city to benefit as a collective, the co-productive activities should be carried out in cooperation between the city council as the regular producer and the household as the service end user. However, the findings of this study showed that there were still a few households who did not actively and effectively participate in the co-production activities. This research found that there were some households who had no toilet facilities, others flooded out full toilets into open spaces or drainage. This study also documented city residents who continued to use full toilet facilities due to their lack of capacity to empty them. Such city residents became inactive co-producers since they could not contribute anything.

This study illuminates and sheds light on the forms of co-production arrangements which many other studies have only scantly covered (Sorrentino, Sicilia and Howlett, 2018); however, it has also been shown that not all citizen co-producers participate voluntarily or actively; others are either captive or inactive co-producers. Additionally, individual and collective co-productive arrangements in Arusha speak loudly to the changing and the nature of city governance (Devas 2001; Nunan and Satterthwaite, 2001; Otsuki, 2016; Galuszka, 2018). The findings of this study have shown that two forms of co-production arrangements engage a multiplicity of actors and institutions in the delivery of urban sanitation infrastructure and services. Drawing from Allen et al, 2006, emerging governing practices from the two forms of co-production reveal that joint efforts of various co-producers build greater capacity for collective action through new relations between the diverse multiple actors involved in the sanitation chain. this implies that the existing city governance structures need to appreciate or consider this multiplicity which makes the delivery of services possible.

9.2.3. Socio-cultural constraints shaping sanitation practices

Cultural identity, ethnicity and sanitation practices

There is enough evidence in this research to show that traditional *Maasai* culture had undermined the importance of sanitation infrastructure. The *Maasai* are among the few communities (tribes) in Tanzania who have strongly maintained their culture, norms, values, and traditions for centuries and feel very proud of it. *Maasai* socio-cultural traditions continue to affect the management of sanitation infrastructure and

to influence sanitation practices, particularly in informally developed settlements in urban areas of Arusha. For many years, *Maasai* men believed that they should either not be seen when going for toileting or should not share toilet facilities with any other person especially women, children and in-laws. This developed a belief that young people do not 'defecate' or do not use toilet facilities, but in reality, it meant that they were using open fields or bushes for toileting when herding their livestock. *Maasai* elders exclude everyone else, especially women, from access to the toilet facilities that they use. This tradition has affected the construction and use of toilet facilities among the community. As it has been indicated, education and awareness creation programmes play a crucial role in addressing the roots of the belief and many are now actively involved in building their own sanitation facilities and becoming actors. This illustrates that education plays a powerful role in addressing cultural practices within the network, and in engaging with them so that all actors can be brought into the process of co-producing sanitation facilities.

Gender, ethnicity and access to sanitation facilities

Women have historically been vulnerable and even victims of the *Maasai* socio-cultural practices in accessing sanitation facilities in Sombetini and Baraa as well as the wider city of Arusha. The use of a toilet has been shown to be embedded in culture. But it is also a gender issue. The Maasai community traditionally believed that going to toilet was a sole activity for women, (and children). Some men still do not feel comfortable to use a toilet when women are nearby and can see them going to toilet. Maasai culture also frowns upon the sharing of toilet facilities by in-laws.

The findings of this research indicate that while men are responsible for digging or constructing toilet facilities (it is extremely rare to see woman digging and constructing a toilet facility by herself), they continue to discriminate against their own families, particularly the women, since they are not allowed to use the same facilities. But it is the women and children who are most affected by this socio-cultural practice. Their privacy and dignity are at stake when they are forced to access poor sanitation facilities, particularly at night. Yet the research findings show that, due to gender roles in Maasai community, women appear to accept the practices.

Furthermore, decisions made by majority of landlords or house owners to exclude their tenants from using selected toilet facilities affect women generally. Landlords lament that most tenants do not clean toilets, that they are stubborn, cooperate poorly, are careless in toilet use, and throw unwanted waste in the pit latrines. Implicitly, women tend to be blamed, given the social norms and traditions of Tanzanian society where most of the domestic duties are reserved for women. The findings of this research revealed that lease agreements and a schedule for toilet cleaning have been used as an intermediary to bring down the tense relations between landlords and tenants in the process of collectively co-producing a clean toilet facility for their households.

These findings have added insights on the place of socio-cultural traditions in sanitation practices, complimenting what others (Akpabio & Takara, 2014; Zakiya, 2014; Tagat & Kapoor, 2018) have found. Specifically, this research has shed light on the peculiarities of the Maasai culture, norms, values and traditions and its impact on the management of sanitation chain. This study confirms the complexities of incorporating socio-cultural practices in sanitation facilities. The findings have confirmed existing literature that children and in-laws do not share toilet facilities with other household members (Ouma, Okeyo and Onyango, 2018) as well as the gender-based power dynamics (Khanna and Das, 2016). But the research has also added new insight: that the exclusion and isolation of women from sharing toilet facilities with fellow household members - especially men - encouraged men to defecate in the open. This study also differs from the existing literature in exposing the Maasai culture which believed that traditionally Maasai men does not go to toilet. It has also revealed the power of education and awareness-raising programmes in turning the socio-cultural tides around.

9.3. Empirical insights from the ANT relational lens in the sanitation co-production process

The synthesis above reveals a number of ways in which this research has added insights into co-production processes. The emergence of co-production as a practice is due mainly to the lack of ability of state-led systems to provide all citizens with adequate sanitation infrastructure. In Tanzania, and in particular Arusha, a gap exists between sanitation policy and the actual practices at household level. Highly

contextual and deeply relational systems of sanitation provision have evolved in response to this state failure. There are two questions that emerge in relation to the research questions of this thesis: what determines the efficacy of these co-production arrangements, and how do the structures of these arrangements relate to the actual material elements of sanitation? Answering these questions is crucial to gaining insights into whether these arrangements tell us something new about governance.

Using ANT as a framework for probing these questions means taking a relational perspective. It also involves using the principle of symmetry to give equal analytical value to material and non-material elements of the sanitation chain. This in turn gives insight into the efficacy of sanitation arrangements and by extension, how effective co-production arrangements are.

The first key concept therefore, is the actor-network. This is seen in the activities that emerge between human and non-human actors, or in ANT-speak, actants. Thus, the actor-network stretches across geographical scales, since what determines membership of the actor-network is not geography, but agency.

The actants enrolled into an actor-network, derive their agency from their roles and functions within the network. By analysing sanitation chains as actor-networks, their efficacy in enabling sanitation management emerges relationally, which provides insights into forms of governance that depart from conventional geographically-delineated definitions. It is evident from the research, that sanitation chains in Arusha do not follow governance conventions.

The differences between individual and collective co-production are revealed in the research and shows what works, and what does not. The intricacies of these relationships are complex and contextual. The concept of translation is important here, to give insight into how actor-networks are maintained, and new actors enrolled. Importantly, it also gives insight into why some arrangements fail, leading to the question, did translation occur and how did translation occur?

The underlying theoretical argument is that enrolment into actor-networks relates to agency. The efficacy of an actor-network is reliant on the agency generated and used towards maintenance of the actor-network. In other words, being part of the network depends on the ability to act or to make a significant contribution. Using translation as an analytical concept enables insights into why alternative sanitation maintenance and production chains have replaced the formal conventional arrangements advocated by policy. If the system breaks down - then the network either breaks down or alternative arrangements have to be made. In other words, in enables insights into alternative forms of governance.

One of the critiques of actor-network theory is that it is weak on structure. In this regard, using the ANT formulation of power is helpful, in that it views power as a dynamic and potentially productive concept. This research gives two important insights into how power operates within the context of infrastructure delivery and maintenance. One, it reflects on the efficacy of collective agency in confronting limiting structural conditions in service delivery; and two, it shines light on the power of cultural norms in determining the shape of sanitation chains in particularly contexts.

The notion of power as a dynamic form of collective agency provides a more nuanced reading of the relationship between traditional and conventional forms of governance. Furthermore, the notion of power, used together with an understanding of translations, provides insight into how the formation of actor-networks are determined by these highly contextual factors. This signifies an important contribution to the literature on co-production.

9.3.1. Actors/Actor-Networks and agency in co-producing sanitation

Several state and non-state actors (as they have been identified in this research and summarised in Tables 7.8 and 9.1) are associated with the process of providing urban sanitation infrastructure and services in the Sombetini and Baraa informal settlements as well as in the whole of city of Arusha, and they consequently formed networks in which they all became actors. In the co-production process, each of these actors dealt with one or more issues in the sanitation infrastructure chain. In ANT terms, these human and material elements of the actor-network are given equal importance, with the terms of translation used to stabilise the actor-network geared towards improved

sanitation access. The agency that emanates from enrolment into these actor-networks can be identified as the role played by each key actor.

In the subject under study, household sanitation is at the centre of all actions, from policy / law enactment and national sanitation programme implementation, to regular inspection of sanitary conditions at the household level. Although agency of non-human actors, particularly human excreta, differs from human agency (in lacking intentionality and that it is not organized around plans and goals (Jones, 1999), its status of causing nuisance (hazardous or dangerous) to urban public health make human excreta the focus of attention of human actors. It evokes action. And that is the main reason for all actants/actors joining hands to form actor-networks; the implications of the lack of sanitation infrastructure leads to intention. The analysis of actor-networks that emerge from the relationships between various actors/actants documented in this study is based on their co-productive roles in the urban sanitation chain. The findings show that there are various overlapping networks that emerge among the identified state and non-state actors.

One of the effective actor-networks with tangible outcomes on the informal settlements is that of *Federation of the Urban poor (FUP) - Arusha City Council (ACC) - and the household.* Here ACC plays the roles of coordination, if only by registering and recognising FUP. The co-productive role of FUP (which gets funding from CCI) was vital, as it empowered low income households, through their savings groups, to build toilet super structures. When examining this arrangement as an actor-network, the intention of households displayed in their use of savings, the international connections that enable the learning necessary to engage in the provision of sanitation infrastructure as community actors through construction, speaks to a governance arrangement that breaks convention. It does not exist as a solution in policy. It functions as an actor network whereby actants are enrolled in accordance with circumstances and health imperatives. It is indeed an alternative form of governance, but when reflecting on the play of agency we see that it cannot easily be duplicated.

The other strong working network was that of *pit emptiers - and the household.* The study was a business-like and co-productive relationship between pit emptiers and

households. Whenever a household saw that their toilet was full, they communicated with pit the emptying operator for the emptying service, and they were ready to meet the cost. This collaboration created agency which made things happen on the ground. However, the network *Central Government Ministries - Arusha city council - and the household* was focused on policy regulation. Unfortunately, most of the policies by the Central Government did not clearly articulate how the households in informal settlements were to access sanitation, making this a weak network. The only occasions where the network had agency was through imposition (by instructing residents to build a toilet), or coercion (by forcing them to empty a full toilet).

9.3.2. Agency, translation and power relations among the actors in sanitation co-production process

The interactions between and among the heterogenous actors in the co-production process and along the sanitation chain create actor-network relations that demonstrate agency. This agency materialises in action on the ground (Murdoch, 2001; Muller and Schurr, 2016; Ren, 2011). As illustrated in the discussion of the two actor-networks in the above section, effective agency is not a given. Certain conditions are required for the actor network to be stabilised. Translation is an important concept here, and the act of translation involves dynamics of power.

In addressing the sanitation problem in the city of Arusha, several actors are involved in power relations at different entry points. The results show that in the working between government actors and donor communities, there is a process of dialogue, negotiation, and shared power through the signing of MoUs, which not only guide the process of decision making, but also the implementation of the infrastructural projects in the city of Arusha. The same has been observed between ACC and CCI/FUP and vacuum operators. The local organisations need to be registered for them to work for the communities. Here translation and power relations seem to be associational as it acts more like a collective medium which facilitates the provision of services along the sanitation chain. In a co-production process with a multiplicity of actors in urban sanitation infrastructure and service delivery, this study has shown that power operate both upwards and downwards; power is largely about the reorganisation of scale in so far as it is redistributed to take account of proliferating sites of authority and reordered boundaries.

Based on the reviewed urban policies and the narratives from the city officials, the results have shown that the power relations between the government and the city residents are of an instrumental nature. Although the laws consider households as co-producers and that the responsibility of digging, using and maintaining a toilet remains in the hands of the households; the city government still possesses the capacity to influence its implementation. Based on these results, households co-produce their toilets facilities in the sense of obey the laws. ACC and its citizens are unequally related; there are power asymmetries in the sanitation co-production process. That power is utilised by ACC as capacity and it reflects its domination. This study has shown that ACC views power as instrumental for its officials to impose policies on citizens of informal settlements in the sanitation chain. This is a vertical relationship. This confirms what Allen (2003, p.26) said about the structural nature of 'power over' others, and that "relations of domination and subordination comprise a subset of power relations, where the capacity to act are not distributed symmetrically to all parties to the relationship".

ANT has been useful in this study in that it applies a sensibility that is deeply relational and contextual. It provides a vocabulary for uncovering relations between actors in co-productive arrangements. The analytical symmetry used in understanding how human and non-human actors are enrolled, tracing the networks, the chains of relations, and network associations forged by the multiplicity of actors in co-producing urban sanitation infrastructure, gives us a perspective on some of the more relational and less obvious insights into why some forms of governance simply do not work. It further assisted in diagnosing the heterogeneous and interrelated character of human and non-human components in the sanitation infrastructure delivery chain in the selected case studies, and hence enabled the unpacking of the complex webs of relations between households, state and non-state actors involved in the co-production of the sanitation infrastructure in the selected case studies (Ruming 2009; Callon and Law 1989). By reflecting on two of the actor networks in particular, the critical importance of a relational perspective becomes evident. It is important to note here that reflecting on the fieldwork in this chapter alone is not the only application of ANT. Throughout this research, this relational sensibility has been employed in uncovering the agency that emanates from heterogeneous associations.

9.4. Conclusions of the thesis

The study has established that individual and collective co-production arrangements play a significant role in the provision of sanitation infrastructure in Arusha; and that the existing governance structure needs to appreciate the forged actor-networks with the power relations observed. In the informal settlements of Arusha, the findings have indicated that provision of urban sanitation infrastructure and services, which the city government had failed to deliver, was successfully co-produced through networks, interactions and arrangements formed by the multiplicity of state and non-state actors involved. The functionality and metabolism of the city was noticeable, not through the actions of one independent actor, but through the outcomes of forged networks. The findings indicated that it is the co-productive activities and actions of the assemblage of actors that handled all the stages of the sanitation chain, and that contributed towards making the city liveable. Further, the findings of this study speculate an alternative form of governing city affairs through networks in the co-production process: co-productive networked governance. If these networks and interactions could be well coordinated and managed, more network-level outcomes could be co-produced.

9.4.1. Contributions to knowledge

This thesis has made the following contributions to the existing knowledge

- This study has expanded the existing knowledge on co-production process by exploring the Arusha case study within its local context and setting, so as to build a scientific body of knowledge based on its sanitation issues and it has illuminated the forms of co-production in sanitation infrastructure provision.

- The study has uncovered the broad landscape of actors and explored their co-productive roles in the sanitation chain, the various networks forged, and how they make things happen.

- The thesis has added new insights into the quality and conditions of toilet facilities in informal settlements and has unearthed the influence of Maasai social norms and traditions in excluding women from accessing sanitation facilities.

- This research has revealed a lack of consideration of spatial informality in government's intervention in extending sanitation infrastructure to residents of informal settlements.

- The research has contributed to the use of a relational approach in investigating governance relations.

The theoretical contribution of this work shows that the often-mentioned critique of ANT - that it does not pay attention to structural factors – is to some extent justified. The uncovering of the various actors involved in the co-production process in the two informal settlements through the conceptual lens of ANT, lessons could be drawn for alternative city governance. As the analysis here has shown, the strength of all the actors is seen their co-functioning as a whole, which in this study it has been speculated as a form of co-productive networked governance.

9.4.2. Study limitations and avenues for further research

Several limitations need to be highlighted. Initially, part of the methodology was designed to carry out an ethnographic study to explore everyday interactions of households with sanitation facilities, mainly to gain more information on socio-cultural factors hindering provision of sanitation infrastructure. But due to time and financial constraints, it was difficult to fulfil that plan.

In addition, given that Arusha is the stronghold of the national opposition party, it was envisaged to interview the top leadership of the city council which included the City Director, senior officials, the Mayor and ward councillors. But there was fear of not getting honest information because of political tensions and bias. As the findings have shown, the city directors and all the management team were appointed or recruited by the central government under the ruling party, CCM, while most of ward councillors and the Mayor were from the opposition party, CHADEMA. This created some tension. Further study might reveal greater insight into the flow of resources for urban infrastructure development projects in such a controversial urban political landscape.

This study has shown that networks and interactions are at the core of co-production of sanitation infrastructure in informal settlements. Future research needs to be carried out on how co-productive network governance could be integrated into the existing city governance structures and how the informal governance arrangement could be recognised. The findings have indicated the existence of individual and collective co-

production arrangements. Future research might investigate the efficacies of other services delivery chains. There is also a need to study rental housing and toilet sharing practices in the different income settlement groups.

Sombetini ward is highly affected by a high-water table that led to toilets filling up frequently and overflowing. There is a need to carry out a study on how to manage informal sanitation facilities in such settings. A mechanism for sanitation micro financing is another area for further research as well as handling of infant faeces and disposable diapers. Finally, given the predominance of Maasai social norms, traditions and culture in Arusha, it will be interesting to carry out a study to document the perceptions of women on their exclusion to access sanitation facilities.

It has been my desire to see the city governance and management apparatus work for the entire urban population, particularly marginalised groups in unplanned neighbourhoods. After growing scholarly evidence on governance failure, this doctoral journey was embarked on to investigate what the emerging concept of co-production might offer in addressing the service delivery gap in informal settlements of small cities in global South. This journey has further opened my understanding on the role of urban policies and governance practices in achieving the desire of Liveable cities in the global South.

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APPENDICES

APPENDIX A: DATA COLLECTION TOOLS

UNIVERSITY OF CAPE TOWN

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

SCHOOL OF ARCHITECTURE, PLANNING AND GEOMATICS

DRAFT

DATA COLLECTION INSTRUMENTS

FOR

FURAHA ABWE GERMAIN (GRMFUR001)

DOCTORAL STUDENT IN CITY AND REGIONAL PLANNING

PHD THESIS TITLE:

A WEB OF RELATIONS: CO-PRODUCTION ARRANGEMENTS IN SANITATION INFRASTRUCTURE PROVISION IN INFORMAL SETTLEMENTS OF ARUSHA, TANZANIA

AUGUST 2014 VERSION

TOOL NUMBER: ONE

INFORMATION SHEET AND INFORMED CONSENT

SCHOOL OF ARCHITECTURE, PLANNING AND GEOMATICS
University of Cape Town
Private Bag x3, Rondebosch 7701
Menzies Building, Level, Room 6.01.9, Upper Campus,
South Africa

UNIVERSITY OF CAPE TOWN

March 5th, 2014

RESEARCH INFORMATION SHEET AND INFORMED CONSENT

Dear Sir/Madam;

My name is Furaha Abwe Germain (GRMFUR001) and I am conducting an empirical research towards a doctoral degree in City and Regional Planning at the University of Cape Town in the Republic of South Africa. My research supervisor is Dr Nancy Odendaal.

My research is focusing on Sanitation infrastructure provision in Informal Settlements of Arusha, Tanzania. As a resident of this settlement (or an official of the city council), I have identified you as one of the key respondent/informant who can help me get the useful data and/ or information in answering my research questions.

I can promise that I will maintain both confidentiality and anonymity during or after our interview; thus, your name or your personal details will not be recorded and in any way they will not be revealed in my thesis or any publication I will produce later. There will be no risk in your participation in this research.

Please understand that your participation is voluntary; and I am afraid, I will not be in a position to compensate your time financially. If you choose not to participate or wish to withdraw at any time of the interview, you will be free to do so without negative effect. However, I am kindly asking you to assist me by allowing me to interview you. This will either be by taking notes or recording your answers.

The questions I ask are only for research and they cannot directly benefit you or your community.

Furaha Abwe Germain
--------- (Signed by the named student) ---------
This form is to be completed with your details filled in, and submitted with your ethics form

TOOL NUMBER TWO:

HOUSEHOLD SURVEY

Section A: Profile of the respondent

Ward name:		**Date of survey:**	
Sub-ward/*Mtaa* name*:*		**Household ID:**	
Starting time:		**Finishing time:**	
Interviewer's name		**GPS coordinates**	

1. **What is your gender?** Male (1) Female (2)

2. **What is your age?** (*circle appropriate number*)

Below 18	1
18 – 24	2
25 -34	3
35 – 44	4
45 – 54	5
55 – 64	6
65+	7

3. **What is your marital status? (***circle the appropriate number***)**

Single	1
Married	2
Divorced	3
Widowed	4
Separated	6
Other, specify:.....	7

4. **What is your highest education level?** (*circle the appropriate number*)

Primary Education	1
Form Four/Ordinary (CSE)	2
Form Six (ACSS)	3
Professional Certificate or Diploma	4
Bachelor	5
Masters	6
PhD/Doctorate	7
Other, specify:.....	8

5. **What is your occupation?**

Public or civil servant	1

Private sector employee	2
Informal sector	3
Casual labour	4
Retired	5
Jobless/remittance	6
Other, specify:.....	7

6. **How many households are living on this residential property**?

Number of households	

7. **What is the total number of people living (***spending night***) on this residential plot?**

1- 5 persons	1
6 - 10 persons	2
11- 15 persons	3
16 - 20 persons	4
21 – 25 persons	5
26 – 30 persons	6
31+	7
Don't know	8

8. **How many bedrooms are there in the housing units or houses available on this plot?**

1- 5 bedrooms	1
6 - 10 bedrooms	2
11- 15 bedrooms	3
16 – 20 bedrooms	4
21- 25 bedrooms	5
26 – 30 bedrooms	6
31+	7
Don't know	8

9. **What is your land ownership status on this house?**

Owner	1
Tenant	2
Son/daughter of the owner	3
Relative to the owner	4
Other, specify:.....	5

10. **How did you acquire this piece of land?** (*Circle appropriate number and* ***if tenant skip questions*** *11 and 12).*

Occupied with no permission	1
Bought from the owner	2
Allocated by Local Authorities	3
Given by a relative/friend	4
Inherited	5
Other, specify:.....	6

11. What type of land tenure do you have? ***(****Circle appropriate number****)***

Land sales contract	1
Residential license	2
Title deeds/ Certificate of occupancy	3
No paper at all	4
Other, specify:.....	5

Section B: Extent or coverage of sanitation infrastructure

12. Is there a toilet facility on this residential plot?

In-house toilet only	1
In-house and on-plot toilet	2
On-plot toilet only (outside the house)	3
No toilet, use neighbours' toilet	4
Use buckets or plastic bags	5
No toilet, practice open defecation	6
Other, specify:.....	7

13. What type of toilet facility exists on this residential property?

Choo cha kuvuta/kumwaga maji kwenda kwenye bomba la maji taka	1
Choo cha kuvuta/kumwaga maji kwenda kwenye karo la maji taka	2
Choo cha kuvuta/kumwaga maji kwenda kwenye shimo lililofunikwa	3
Choo cha hewa **(VIP)**	4
Choo cha Ekolojia	5
Ndoo au mifuko ya plastiki	6
Hukuna choo	7
Other, specify:.....	8

14. What are the wall (building) materials of the toilet structure?

Mud and poles	1
Sun-dried bricks	2
Burnt bricks	3
Cement blocks	4
Tins or corrugated iron sheets	5
Cartons or sack/bag pieces	6
Other, specify:.....	7

15. What are the roofing materials of the toilet structure?

Thatch or grasses	1
Flattened tins	2
Plastic bags	3
Corrugated iron sheets	4
Tiles	5
No roof (Uncovered roof)	6
Other, specify:.....	7

16. What are the floor materials of the toilet structure?

Earth floor	1
Cement floor	2
Burnt bricks floor	3
Concrete floor	4
Tiles floor	5
Logs only (wooden floor)	6
Other, specify:.....	7

17. How is the toilet door covered/framed?

(*Note to interviewer: observe the door of the toilet structure and answer the question by yourself*)

Standard and good framed door	1
Self-flattened tins or iron sheets with a frame	2
A curtain made of plastic bags or cartons	3
No door at all (just open)	4
Other, specify:.....	5

18. How is privacy or human dignity considered in the toilet structure? (*Note to interviewer: observe the toilet structure and answer the question by yourself*)

Highly considered (standard and well covered)	1
Somehow considered (half passport size)	2
Poorly considered (full passport size)	3
No privacy at all (open)	4
Other, specify:.....	5

19. What is the <u>main</u> source of clean water for your domestic use?

Piped inside the house	1
Piped on the plot	2
Own borehole	3
Own shallow well	4
Buying from neighbours	5
Small scale water vendors	6
Other, specify:.....	7

Section C: status of sanitation provision

20. **Are you satisfied with the current *Mtaa* environmental health and cleanness condition?**

Very satisfied	1
Somehow satisfied	2
Satisfied	3
Not satisfied	4
Don't know	5
Other, specify:.....	6

21. **When going around the neighbourhood or *Mtaa* do you smell human waste odour or do you see any human wastes in open spaces, or the footpaths?**

Always smell odour or see excreta	1
Sometimes smell odour or see excreta	2
Never smell odour or see excreta	3
Don't know	4
Other, specify:.....	5

22. **How often do this neighbourhood's residents mix human wastes with household garbage?**

Always mix excreta with household garbage	1
Sometimes mix excreta with household garbage	2
Don't mix excreta with household garbage	3
Don't know	4
Other, specify:.....	5

23. **Kwa wazazi ambao wana watoto wachanga, wanahifadhi wapi kinyesi cha watoto? Wanatupaje pampers zilizotumika?** (*Interviewer: probe*)

.....

.....

.....

.....

24. **How often do you wash your hands with soap after you have used a toilet?**

Always	1
Sometimes	2
Rarely	3
Never	4
Don't know	5
Other, specify:.....	6

25. Are you aware of the relationship between human wastes and diarrhoeal diseases?

Close relationship	1
Moderate relationship	2
Little relationship	3
No relationship	4
Don't know	5
Other, specify:.....	6

26. Have there been any cholera outbreak or diarrhoea cases in your household?

Always	1
Sometimes	2
Rarely	3
Never	4
Don't know	5
Other, specify:.....	6

27. Have there been any initiatives or interventions to educate the community on the safe mode of human waste disposal?

Yes	1
No	2
Don't know	3

*(Note to interviewer: If the answer to Question 25 is **NO or Don't Know** skip 26*)

28. If yes, who organised the initiatives or intervention(s)?

Arusha City council	1
Mtaa leadership	2
Religious institutions	3
NGOs/CBOs	4
Don't know	5
Other, specify:.....	6

29. Who has the responsibility of ensuring that the toilet is clean and usable?

Tenants	1
Landlords	2
Local government	3
Don't know	4
Other, specify:.....	5

30. What are the challenges related to the toilet cleanness and usability?

.....

.....

.....

.....

Section D: Complexities and dynamics of sanitation infrastructure chain

31. Who are living on this residential plot?

Landlord and tenants (*Live-in landlord*)	1
Absentee landlords *(tenants only)*	2
Landlord only *(owner-occupier: no tenants)*	3
Government property	4
Don't know	5
Other, specify:.....	6

32. How are the toilet facilities being used on this residential plot?

Landlord and tenants **share same** toilet	1
Landlord and tenants **use separate** toilets	2
Tenants share **same** toilet among themselves	3
Every tenant has **their own** separate toilet	4
Don't know	5
Other, specify:.....	6

33. If the landlord and tenants are living on the same residential plot, compare their toilet conditions? (*Note to interviewer: observe and answer the question***)**

Absentee landlord	1
Landlord's toilet is better than tenants' toilet	2
Landlord's toilet and tenants toilet are both better	3
Tenants' toilet is better than landlord's toilet	4
Tenants' toilet is very poor compared to landlord's	5
Not applicable to this case	6
Other, specify:.....	7

34. How important is a toilet to you and your household?

Very important	1
Important	2
Can live without one	3
Less important	4
Don't know	5
Other, specify:	6

Section E: Existing human excrement-management practices

35. How long have you been living on this residential property?

1 – 3 years	1
4 – 6 years	2
7 – 10 years	3
11 – 14 years	4
15 - 18 years	5
19 - 21years	6
22+	7

36. When was this current toilet built?

Toilet built in 1960s	1
Toilet built in 1970s	2
Toilet built in 1980s	3
Toilet built in 1990s	4
Toilet built in 2000s	5
Don't Know	6
Other, specify:.....	7

37. What pit-emptying methods do you use when the toilet is full?

Connected to Central Sewer system	1
Emptied by a truck (Vacuum tanker)	2
Vomiting out (Flooding out)	3
Burying on-site	4
Empting into open (river/street)	5
Pit-diversion	6
Other, specify:.....	7

38. How many times have you emptied your toilet?

Never emptied since its construction	1
Demolished the full toilet and dug a new toilet	2
Emptied **Once** since its construction	3
Emptied **twice** since its construction	4
Emptied **three times** since its construction	5
Emptied **more than four times**	6
Don't know	7
Other, specify:.....	8

39. How much did it cost you to empty the full toilet?

TShs 10,000 – 20,000	1
TShs 20,000 – 30,000	2
TShs 40,000 – 50,000	3
TShs 60,000 – 70,000	4
TShs 80,000 – 90,000	5
TShs 100,000+	6
Don't know	7
Other, specify:.....	8

40. What will you do when this current toilet is full?

Demolish a bedroom and dig a new toilet	1
Demolish the full toilet and dig a new one	2
Continue emptying as usual	3
Use central sewer system	4
Don't know	5
Other, specify:.....	6

41. How much are you willing to use biogas made from human wastes?

Very much	1
Somewhat	2
Little	3
Very little	4
Can't dare	5
Other, specify:.....	6

42. How much are you willing to use fertilizer made from human wastes?

Very much	1
Somewhat	2
Little	3
Very little	4
Can't dare	5
Other, specify:.....	6

43. Please explain the reasons behind your answers in questions 41 and 42

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.....

44. Do you have any question to us related to this research?

.....

.....

Thank you very for your participation in this research.

TOOL NUMBER: FOUR

KEY INFORMANT INTERVIEW SCHEDULE

Section B: Extent or coverage of sanitation infrastructure

B1. How many household do not have toilet the city (ward statistics)?

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B2. What types of toilet are dominant in the city?

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B3. Do toilet structures respect human dignity or privacy?

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Section C: Status of sanitation provision

C1. When going around the neighbour or Mtaa, do you smell human wastes odour or do you think people throw human wastes on open areas or spaces?

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C2. How often city resident mix human wastes with household garbage?

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TOOL NUMBER: FIVE

FOCUS GROUP DISCUSSION

1. **How important is toilet facility to you and to your household?**

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2. **If toilet is important, why do some people have good houses, but their toilet facility is poor (not good like their houses?**

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3. **What do you do when the toilet is full? What emptying-methods do you use when a toilet is full?**

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4. **Is there any group of people or persons which does not like to share toilet facility with other household members? If yes, Is there any socio-cultural practices inhibiting sharing of toilet in your community/household? Probe.**

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5. Is there a different use between in-built toilet and the latrine outside the house?

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6. **How much are you willing to use biogas and/or fertilizer made from human wastes?**

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C3. Which wards have ever experienced cholera outbreak or diarrhoea cases?

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C4. How do you intervention on toilet issues in the city?

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Section D: complexities and dynamics of sanitation infrastructure chain in Arusha city

D1. What are the critical challenges related to toilet and excreta management in Arusha city?

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D2. How do you deal with such challenges?

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.....

Section E: existing excreta management practices in Arusha city

E1. What disposal systems do most people use for human wastes from their toilets n Arusha city?

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E2. Has your office ever initiated any programme on safe mode of excreta disposal in Arusha city?

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Section F: Actors and their roles

F1. Who are the actors and what are their individual roles in co-producing sanitation infrastructure in informal settlements of Arusha? How are they related?

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.....

Section G: Institutional or governance structure in co-producing sanitation

G1. What are institutional governance arrangements / structures emerging among multiple actors involved in the co-production of sanitation infrastructure in informal settlements of Arusha?

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.....**...**

<u>Section H: The way forwards: what service provision model fit informal settlements?</u>

H1. What sanitation infrastructure provision approaches/models should be adopted in the informal settlements of Arusha?

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.....

UNIVERSITY OF CAPE TOWN

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

SCHOOL OF ARCHITECTURE, PLANNING AND GEOMATICS

DRAFT

DATA COLLECTION INSTRUMENTS

FOR

FURAHA ABWE

DOCTORAL STUDENT IN CITY AND REGIONAL PLANNING

PHD THESIS TITLE:

A WEB OF RELATIONS: CO-PRODUCTION ARRANGEMENTS IN SANITATION INFRASTRUCTURE PROVISION IN INFORMAL SETTLEMENTS OF ARUSHA, TANZANIA

RESPONDENTS: ARUSHA CC, AUWSA, PIT-EMPTIERS

FEBRUARY 2017 VERSION

TOOL NUMBER: ONE

INFORMATION SHEET AND INFORMED CONSENT

SCHOOL OF ARCHITECTURE, PLANNING AND GEOMATICS
University of Cape Town
Private Bag x3, Rondebosch 7701
Menzies Building, Level, Room 6.01.9, Upper Campus,
South Africa

UNIVERSITY OF CAPE TOWN

January 5th, 2017

RESEARCH INFORMATION SHEET AND INFORMED CONSENT

Dear Sir/Madam;

My name is Furaha Abwe and, I am conducting an empirical research towards a doctoral degree in City and Regional Planning at the University of Cape Town in the Republic of South Africa. My research supervisor is Associate Professor Nancy Odendaal.

My research is focusing on Sanitation infrastructure provision in Informal Settlements of Arusha, Tanzania. As one of the stakeholders of this city sanitation infrastructure, I have identified you/your institution to help me get the useful data and/or information in answering my research questions.

I can promise that I will maintain both confidentiality and anonymity during or after our interview; thus, your name or your personal details will not be recorded and in any way they will not be revealed in my thesis or any publication I will produce later. There will be no risk in your participation in this research.

Please understand that your participation is voluntary; and I am afraid, I will not be in a position to compensate your time financially. If you choose not to participate or wish to withdraw at any time of the interview, you will be free to do so without negative effect. However, I am kindly asking you to assist me by allowing me to interview you. This will either be by taking notes or recording your answers.

The questions I ask are only for research and they cannot directly benefit you or your community.

Yours sincerely,

Furaha Abwe

TOOL NUMBER: FOUR

KEY INFORMANT INTERVIEW SCHEDULE (AUWSA & CITY COUNCIL)

SECTION A: PROFILE

A1. Name of the Institution……....

A2. Main business of the institution……....

A3. Year of registration of the institution……

A3. Position of the respondent within the institution……

SECTION D: COMPLEXITIES AND DYNAMICS OF SANITATION INFRASTRUCTURE CHAIN IN ARUSHA CITY

D31/D32/D33. What are the challenges that emerge when tenants and landlords are living on the same property and when they share same toilet facilities?

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……

……

D34. What are some socio-cultural issues that you face/encounter in sanitation or toilet management?

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……

……

D35. What are other challenges that you face/encounter in sanitation or toilet management?

……

……

……

SECTION E: EXISTING EXCRETA MANAGEMENT PRACTICES IN ARUSHA CITY

E37. What pit-emptying methods do most people use when their toilets are full?

(Central sewer system, emptied by a truck or vacuum tanker, flooding out/vomiting out, burying on-site, emptying into open, pit-diversion).

……

……

……

E38/E40. What is the <u>frequency</u> of individual pit-emptying of most of the toilets in Arusha city? Which part of the city do toilets get full frequently? Why?

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E39: What are the costs of pit-emptying <u>a toilet</u> once it is full?

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E41: Do Arusha city residents use human wastes in urban agriculture?

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E42. What are the critical challenges related to toilet and excreta management in Arusha city?

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E43. How do you deal with such challenges?

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.....

.....

E44. What is the process for calling/inviting a truck operator to go and empty a toilet within the city?

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<u>SECTION F: SANITATION ACTORS AND THEIR ROLES</u>

F1. Who are other actors working on sanitation issues at city or ward level?

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F2. What are their individual roles? What are they EXACTLY doing at city or community level?

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……

F3. How is your department /Company working or collaborating with them? Who is doing what?

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……

……

F4. What are the boundaries of duties?

……

……

……

SECTION G: INSTITUTIONAL OR GOVERNANCE STRUCTURE IN CO-PRODUCING SANITATION

G1. Are there any formal institutional governance agreements / structures emerging among multiple actors involved in the co-production of sanitation infrastructure in informal settlements of Arusha?

……

……

……

SECTION H: THE WAY FORWARDS: WHAT SERVICE PROVISION MODEL FIT INFORMAL SETTLEMENTS?

H1. What do you think about sanitation infrastructure provision approaches/models that should be adopted in the informal settlements of Arusha? What should be done to improve the situation?

……

……

……*Thank you very much for your participation in this research.*

APPENDIX B: FOCUS GROUP DISCUSSION WITH COMMUNITY LEADERS IN SOMBETINI INFORMAL SETTLEMENT

Names	Position	Code used
1. Tareto n. Mollel	Sub-ward (Mtaa) chairperson	
2. Zubeda abdalla	Sub-ward chairperson- osunya	
3. Godfrey kitomary	Sub-ward chairperson	
4. Beatha gitacwo	Environmental health officer	
5. Lazaro l. Mollel	Sub-ward chairperson - Simanyiro	
6. Prosper mollel	Sub-ward chairperson kirika	
7. Issa rashidi	Imam	
8. Hassan amani	Sub-ward chairperson osunyai	
9. Doeenha mtinangi	Ten-cell leader	
10. George kimani	Ten cell leader	
11. Abdallah athumani	Elder	
12. Zephania nguyaine	Elder	
13. Fatuma hussein	Tenant	
14. Neema mwaipopo	Tenant	
15. Bernadeta mmasi	Landlord/house owner	
16. Dina lucas	Ten cell leader	
17. Christopher makala	Landlord/ house owner	
18. Surah nguma	Ward executive officer sombetini	
19. Mwamvua wahanza	Ward councillor – special seat	
20. Adamu athumani	Imam	

APPENDIX C: FOCUS GROUP DISCUSSION WITH COMMUNITY LEADERS BARAA INFORMAL SETTLEMENT -ARUSHA

Date 04/09/2014

NAMES	POSITION	Code used
1. Sigismund Moshi	Ward executive officer - Baraa	
2. Lidya Mboya	Environmental Health officer – Baraa	
3. Elibariki Andrea	Landlord	
4. Rashid Mussa	Resident/Tenant -Kiroshi	
5. Cosmas Moro	Resident Kwa-Mrefu	
6. Piniel s. Kivuyo	Ten-cell leader Kiroshi - sub-ward	
7. Bonifas Lazaro	Ten cell leader Sorenyi sub-ward	
8. Izack Loserian	Landlord	
9. Saiguran Loharu	Ten cell Leader	
10. Loakaki Lotha	Landlord	
11. Babu Loishiye	Ten-cell leader - Ofisini sub-ward	
12. Beatrice Elibariki	Female Landlord	
13. Alfayo Tauta	Ten-cell leader Ofisini	
14. Jacob Meja	Sub-ward chairperson Kwa-Mrefu	
15. Godson Meletaki	Sub-ward chairperson Kiroshi	
16. Lemali Levalanda	Ten-cell leader -kwa Mrefu sub-ward	

APPENDIX D: KEY INFORMANT RESPONDENTS

NAMES	ORGANISATION OR INSTITUTION	CODE USED IN THE THESIS
1. Allen	ARUSHA NSC Coordinator	KI_01
2. Beatha	Sombetini Environmental Health and Sanitation Officer	KI_02
3. Mugisha	Sombetini Environmental Health and Sanitation Officer	KI_03
4.	AUWSA Sewer engineer	KI_04
5. “Kijana wa Taka”	Pit Emptying Company	KI_05
6. Bi Hellen and ‘Mussa’	CCI/FUP	KI_06

APPENDIX E: ARUSHA CITY COUNCIL ORGANISATION STRUCTURE