APPLICABILITY OF VOLUNTEERED GEOGRAPHIC INFORMATION IN ASSESSING SUBJECTIVE QUALITY OF LIFE: CASE FROM ZANZIBAR

WAIRIMU NDUNGU

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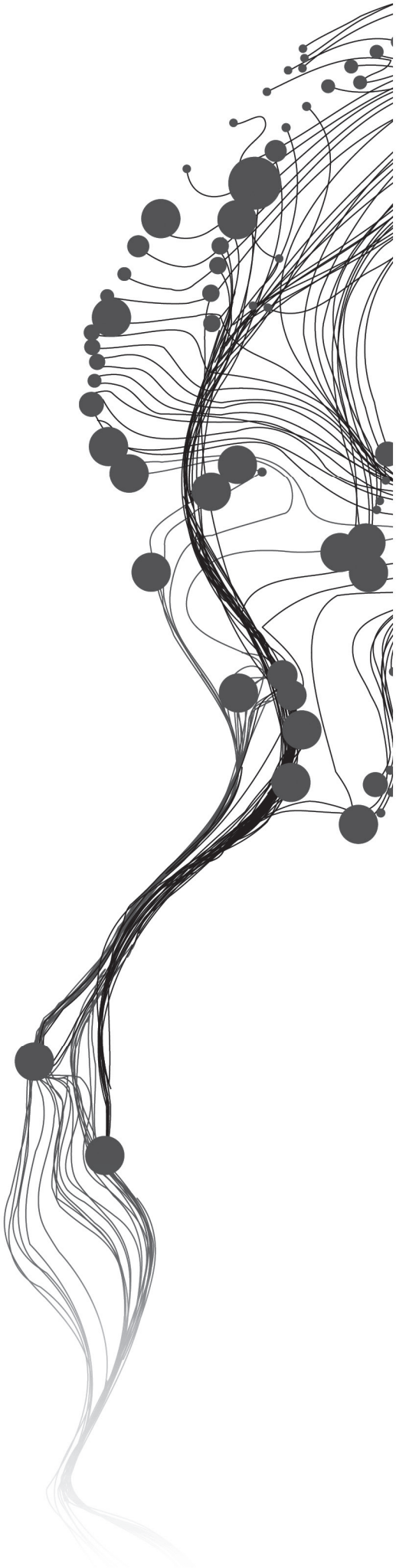

APPLICABILITY OF VOLUNTEERED GEOGRAPHIC INFORMATION IN ASSESSING SUBJECTIVE QUALITY OF LIFE: CASE FROM ZANZIBAR

WAIRIMU NDUNGU

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ABSTRACT

This study looks at the applicability of Volunteered Geographic Information, a participatory sensing approach that incorporates the locals considered as sensors in giving out geographic information and a shift from "traditional" methods such as use of government statistics like census reports and satellite images in assessing subjective quality of life in the Shehias of Mwanakerekwe and Mpendae in Zanzibar. This was based on primary data collected from stratified randomly selected households in the two study areas.

The findings of this study reveal that both study areas are homogenous in terms of residents' satisfaction with their quality of life and that there exists spatial variations in each area in which residents living in areas characterised by well planned, wider access roads and structured layout pattern of housing units perceived their quality of life to be good while those living in areas that exhibit irregular layout pattern of housing units with narrow access roads perceived their quality of life to be poor. The visualization of the residents' responses on the identified domains in ArcGIS showed there exist spatial clustering of households perceiving similar characteristics in terms of their quality of life.

Moreover the study shows that various traditional methods were and are still used as citizen complaints methods and in which the community leader, *Sheha* still plays a vital role when it comes to citizens' first point of contact when faced with problems of public concern. However results from the household survey reveal that the citizens in areas perceived as having good and poor quality of life are dissatisfied and mistrust the "traditional" complaint mechanisms and are willing to incorporate new approaches such as the volunteered geographic information which in this case was taken as the short message service with the hope that their needs will be looked into by the concerned public service providers. The increase in mobile phone ownership in Zanzibar and further mapping of self-expressed needs has self-empowered the citizens to speak out whenever they are faced with issues of public concern with the hope that this would bring in the pressuring component to the concerned authorities and in turn they would improve their service delivery in all areas.

In general, findings of the study reveal that despite the introduction of the short message service complaint system to monitor availability of water referred to as Human Sensor Web, the residents were not aware of it and this resulted in their low participation in sending complaints to Zanzibar Water Authority. Apart from the residents' willingness to report on availability of water, they also indicated they could do so in issues of crime and waste disposal in their neighbourhood. Their concern in using volunteered geographic information however is not based on the nature of the problems to report but rather on issues of anonymity and trust that come along with using the system.

Keywords: Subjective Quality of Life, Volunteered Geographic Information, Short Message Service

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Enschede, March 2012

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ACRONYMS

FGD	Focus Group Discussion
GPS	Global Positioning System
HSW	Human Sensor Web
ICT	Information and Communication Technology
KSEB	Kerala State Electricity Board
NGOs	Non-Governmental Organization
PGIS	Participatory Geographic Information System
QoL	Quality of Life
SIM card	Subscriber Identity Module
SMS	Short Message Service
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNIFEM	United Nations Development Fund for Women
VGI	Volunteered Geographic Information
ZAWA	Zanzibar Water Authority

1. INTRODUCTION

This chapter presents the background information regarding quality of life and the paradigm shift in its measurement from "traditional" approaches to incorporate new technology termed as Volunteered Geographic Information. From this, the problem statement and justification is derived.

1.1. Introduction

It is increasingly accepted that studies regarding citizens satisfaction with Quality of Life (QoL) have become a major input for policy makers to identify problem areas, causes of dissatisfaction and citizens' priorities in life (Massam, 2002). Similarly Campbell (1976) ascertains the same when she indicates that accessibility of data depicting the social condition of people makes it possible for decision makers to make informed and long term decisions. This she argues is as a result of using QoL studies to map the variability that exist within society and which identifies inequalities.

Quality of Life is mostly measured using objective indicators, subjective indicators or a combination of both. According to Campbell (1976, p. 118) objective indicators "*describe events, behaviours or characteristics of individuals that are reported through governmental institutions of one sort or another and do not depend on the individuals description of his own life*". On the other hand subjective indicators refer to perceptions and satisfaction of individuals regarding their urban living. In QoL studies, researchers have mostly advocated for the use of subjective indicators (Lee, 2008) hence its use in this study.

Most of the studies done on QoL used "traditional" approaches in monitoring and capturing QoL indicators. These included the use of government statistics such as census data to get the socio economic variables and also satellite images where the capture of geographic data was done by well trained specialists using the state of the art technology in order to evaluate QoL(Castelein et al., 2010). This has however been surpassed by time and currently more inclusive approaches are being used to create, assemble and disseminate geographic information provided voluntarily by individuals with diverse knowledge and this has been termed as Voluntary Geographic Information (VGI). This has also been acknowledged by Campbell (1976, p. 117) who reckons that "*During the years since Sir John's observations, nations throughout the Western world have indeed been using statistics 'to assess the condition of their people, and as time has passed these measures have become more inclusive, more sophisticated, and more important in their influence on public policy."*

A debate has however emerged amongst scholars in which they question the applicability of VGI in terms of technological, social and political opportunities, limitations and implications of this new approach (Castelein, et al., 2010). According to Elwood (2008, p. 173) in which she quotes (Zook & Graham, 2007), the debate is also on whether VGI "*exacerbates existing inequality and creates new form of social exclusion*".

In view of this ongoing debate, the current study looks at a case in Zanzibar where a similar system was initiated in 2009 to monitor availability of water and improve water supply through sending of text messages to the water authority. This was known as the Human Sensor Web (HSW)). The study looks at how the system was taken by the residents in comparison to their "traditional "approaches, their participation to it and also their willingness to use such an initiative in reporting other issues of public concern.

1.2. Problem Statement and Justification

Urbanization has been seen to take place at an alarming rate (UN Habitat, 2010). It is estimated that by 2030 all developing regions including Asia and Africa will have more people living in urban than in rural

areas. The rapid urbanization is however not at par with the local authorities' capacity to provide adequate basic services such as water supply, health, education, solid waste collection and disposal and many others to its citizens. This is the same case in Zanzibar where rapid growth coupled by worsening economic situation over the past two decades has put significant strain on all social services and infrastructure in general (Shah, 2003). This therefore results in inequitable distribution of public services and the poor remain the most affected (Ali & Sulaiman, 2006).

In a time when the rapid urbanization and transformation is taking place and affecting the environment where the citizens are living, it is necessary to assess the effects of the change on the living conditions of people (Lasnia et al., 2010). This is better identified by the local people themselves who experience the conditions of life within their environment and are better placed to provide the local knowledge (Martins & Marques, 2009).

In Zanzibar, in particular, there has been a mechanism developed for citizens to lodge complaints on public services particularly on availability of water to Zanzibar Water Authority (ZAWA). This is through sending of text messages to the service provider in case the water quality is poor or there is no water in an area. In this case the residents act as sensors and through their mobile phones report observations about the water supply. However this has attracted little scientific attention and no attempts have been made to quantify the applicability of the more advanced internet mapping tools, VGI in assessing QoL (Georgiadou et al., 2010). Accordingly little is known about the feasibility of using VGI to capture and monitor urban QoL of citizens. Furthermore, internet based mapping tools such as VGI has sparked a debate among different scholars and there is a dilemma regarding its applicability (Castelein, et al., 2010; Elwood, 2008). This creates more curiosity to conduct a research so as to come up with facts which will add to the existing knowledge gap of the issue under current debate. Therefore, studies aimed at generating empirical information on the importance of online geographic information particularly VGI, which would ultimately aid in designing and implementation of urban policies are pertinent.

The proposed research therefore, aims to address this gap in knowledge by taking the case from Zanzibar.

1.3. Research objectives and questions

1.3.1. Main objective

The main objective of the research is to evaluate the applicability of VGI in assessing subjective QoL conditions in Zanzibar. To achieve this objective the following specific objectives and research questions have been formulated.

1.3.2. Specific objectives and research questions

i. To identify and evaluate subjective QoL and satisfaction with domains in the study area
    a) What are the domains that constitute QoL as identified by the residents?
    b) What is the residents' satisfaction with the identified domains?

ii. To evaluate the spatial variability of subjective QoL in the study area
    a) How does subjective QoL vary between the Shehias?
    b) How does subjective QoL vary spatially within the Shehia?
    c) Is there clustering of households perceived to have good/poor QoL?

iii. To evaluate the potential of VGI tools in assessing subjective QoL conditions

a) What current mechanisms do the residents use to voice their concerns?

b) What are the residents view regarding the use of the available reporting methods?

c) Which domains of QoL are the residents willing to report using VGI?

1.4. Conceptual Framework

The conceptual framework shown in Figure 1-1 presents the approach used to determine the applicability of VGI in assessing subjective QoL. Quality of life is measured either using the subjective measures, objective measures or a combination of both. The scope of this study will only look at subjective measure and applicability of VGI in assessing them.

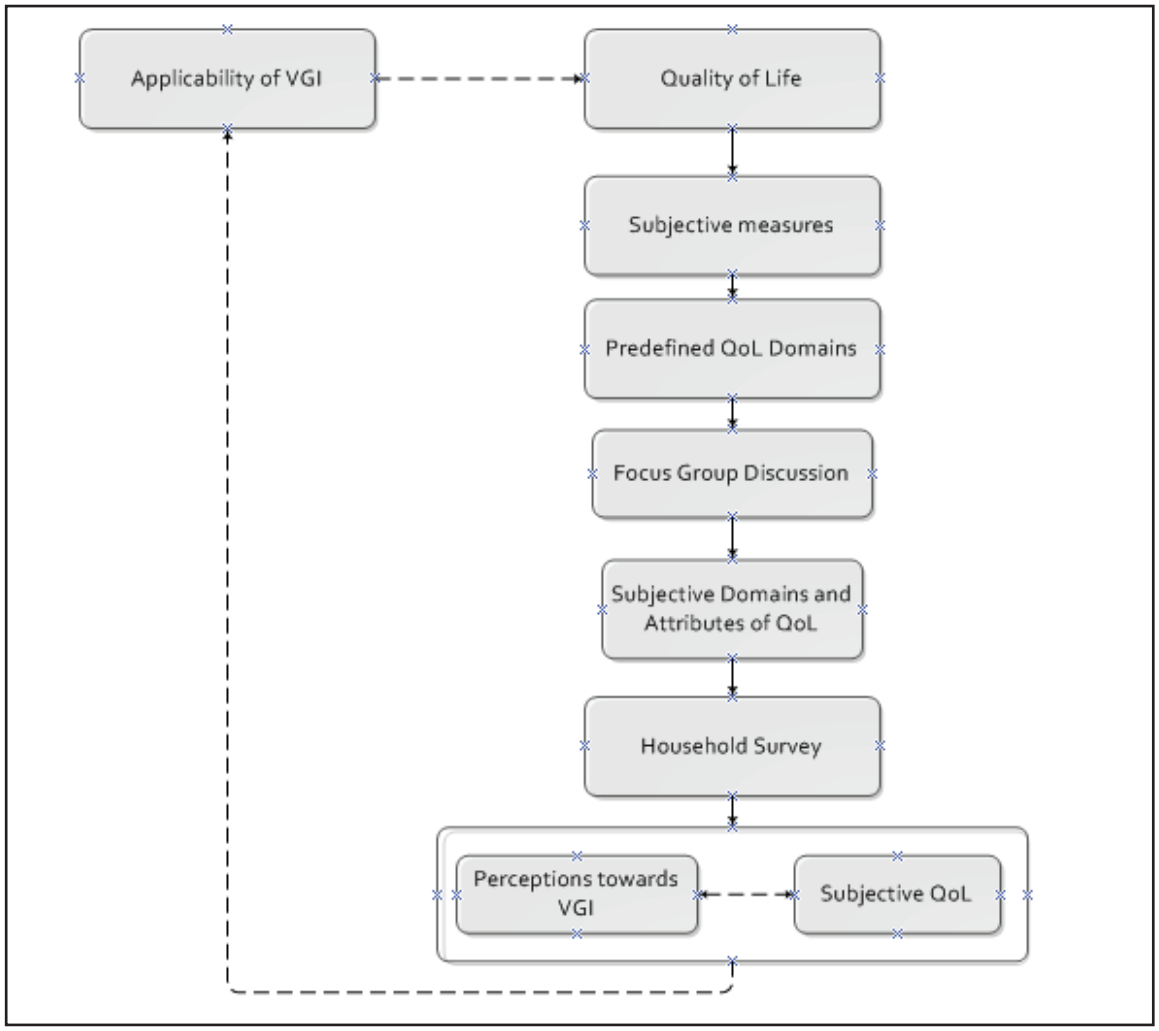


Figure 1-1: Conceptual framework

1.5. Research matrix

Table 1-1: Research matrix

No	**Specific objectives**	**Research question**	**Method for data collection**	**Input data**
1.	To identify and evaluate subjective QoL conditions in the study area	What are the domains that constitute QoL as identified by the residents? What are the residents' satisfactions with the identified domains?	Focus Group Discussions with area residents	Perception of various domains as identified by the residents
2.	To evaluate the spatial variability of subjective QoL within the identified domains	How does subjective QoL vary between the Shehias? How does subjective QoL vary spatially within the Shehia? Is there clustering of households perceived to have good/poor QoL?	PRA (Questionnaires)	Primary data (perceptions of various domains from the residents)
3.	To evaluate the potential of VGI tools in assessing subjective QoL conditions	What current mechanisms do the residents use to voice their concerns? What are the residents view regarding the use of the available reporting methods? Which domains of QoL are residents willing to report using VGI?	Focus Group Discussions/ HH survey with area residents Literature review Focus Group Discussions with the area residents	Perception of various domains as identified by the residents

1.6. Thesis structure

The study is organised in seven chapters as follows:

Chapter 1: Introduction. This gives a short introduction of what the research is all about and gives its justification. The problem statement, research objectives and questions are also laid down in this chapter. The research design and matrix that were adopted for this study are also accounted for here.

Chapter 2: The chapter reviews some of the literature done on QoL and also VGI and which are related to this study. This includes the traditional approaches that were used in evaluating QoL and also the current technologies which are more inclusive and carried out voluntarily by ordinary citizens. The approaches are also looked at in the case of Zanzibar.

Chapter 3: This includes a description of the study area, its geographical location and demography. Justification on the selection of the two Shehias is also given.

Chapter 4: The chapter discusses data used and methods adopted in their collection in order to address the intended research objectives. The chapter also details the sources of data, its preparation and analysis.

Chapter 5: This chapter presents the research findings under each objective. The research findings are based on the focus group discussions held and the household survey carried in the two study areas.

Chapter 6: The research findings are discussed in this chapter. The applicability of VGI which in this case was taken as the SMS complaint system is found only applicable in some of the domains. However the research found out that the applicability of VGI is not based on the specificity of the problem but rather on the issues of trust and anonymity to the system itself.

Chapter 7: The chapter presents conclusions and recommendations based on the results of the applicability of volunteered geographic information in assessing subjective QoL.

2. REVIEW OF RELATED LITERATURE ON QOL AND VGI

Quality of life studies have taken prominence in many countries and sectors due to its valuable input in identification of problems and possible solutions in societies. The QoL studies focus on domains considered vital in the daily human life and which leads to individual satisfaction. Such domains can include environment, safety, public services such as water, electricity housing, health care, education and also solid waste collection and disposal.

Quality of life is a broad term which encompasses notions of good life, a valued life, a satisfying life and a happy life (McCrea et al., 2006). Though numerous studies have been done on QoL, there is still not a clear definition as to what it exactly entails. This is also emphasized by Felce and Perry (1995, p. 52) in which they refer to (Liu, 1976) when she stated "*that there were numerous definitions of QoL as there were people*". They however note that researchers tend to focus on similar domains used for assessment of QoL conditions. The studies also vary in scale of interest since some are applied at a national level, some are at provincial level and very few are at local level. This study adopts the definition offered by Felce and Perry (1995) which views urban QoL as an evaluation of situations of individuals or groups satisfaction.

2.1. Measurements of QoL

Researchers often use either subjective or objective indicators, which are assumed to be distinct identities to measure QoL. Objective indicators represent individual's objective circumstances in a given setting that are often derived from secondary data (Diener & Suh, 1997). Subjective indicators represent individual's appraisal of objective conditions of life, and are derived from surveys of resident's perception, evaluation and satisfaction with urban living.

In his work Lee (2008) advocates for the use of subjective measures in evaluating QoL. He notes that previous studies focussed more on objective indicators and relied on statistical documents to derive social indicators upon which QoL was assessed. The author however has the opinion that evaluating QoL based on objective measures does not indicate the perceptions of people which are paramount for such studies. This he attributes to aggregation mostly done on objective indicators used for such studies and which tend to conceal the personal satisfaction.

In studies that have used both the subjective and objective measures the author argues that there are differences in analytical level whcih prevent the two indicators from being linked. Lee (2008, p. 1207) adds by saying that "*objective QoL indicators used to assess individual welfare are considered to have higher measurement reliability but lower efficiency, while subjective indicators are considered to have lower measurement reliability but higher efficiency*". The author therefore strongly advocates for the use of subjective measures in QoL studies. In this study subjective QoL is preferred since in this case VGI taken as the SMS system is seen as giving residents the freedom to participate in giving out information using their available resources. Thus people will opt to choose things that will most augment their QoL. Within the many developments and innovations defining today's emerging next generation of geospatial technologies, the perspective on real-time enabled applications is one of the most promising trends widening the scope of applied Geography and GIScience.

2.2. Relevance of monitoring QoL

Monitoring and evaluating inhabitants' satisfaction of QoL is very useful for proper design and implementation of urban policies that are geared towards improving the living standards of individuals. Besides, the effectiveness of government development interventions and strategies can also be evaluated

and monitored against the results from such studies (Ibrahim & Chung, 2003). Thus, quality of life studies have become a major input and reference for planners and policy makers to identify areas that need intervention while the service providers are able to improve on their service delivery to improve inhabitant's QoL.

2.3. "Traditional" and recent approaches used in monitoring and capturing QoL

Previous studies done on QoL mostly used "traditional" approaches in monitoring and capturing QoL indicators. For instance Li and Weng (2007) used census data to get the socio economic variables and satellite imagery (LANDSAT ETM) for the city of Indianapolis in the United States, while Tesfazghi et al (2010) and Woldetinsaye (2011) used subjective and objective measures to evaluate the QoL and its variability in Kirkos sub city in Ethiopia.

In Zanzibar, the Citizen Report Card (CRC) was used by the service providers to get citizens satisfaction with their delivery of services. This was done in the Urban West district, Unguja and Chake Chake in Pemba and where the CRC was viewed as a powerful tool that enabled service providers to get feedback of their services from their users. This thus enabled them to improve on their service delivery whenever the users were not satisfied. The method is argued to provide an "*empirical "bottom up" assessment of the reach and benefit of pro – poor services*" (Asian Development Bank, 2007, p. 150) and was useful in poverty reduction. This however entailed the random selection of the public service users whose response was aggregated and used as a basis for rating the services.

Apart from the use of the CRC in monitoring the satisfaction level of the public service users in Zanzibar, the community leaders commonly referred to as Shehas also play a big role in this. They act as intermediaries between the service providers and users and report whenever the users are not satisfied with the kind of services provided. However there has been lack of trust by citizens towards the community leaders in helping to solve their problems resulting to some of them not reporting whenever they are faced with issues of public concern. Lack of trust towards the community leader is attributed to their involvement in contentious issues of administration of voters registration and settlement of internal immigrants (Revolutionary Government of Zanzibar, 2003).

Despite the use of such approaches in evaluating the QoL of individuals which was mostly done by well trained experts there has been a paradigm shift from this approach regarded as "traditional" to new technologies which incorporates the locals in giving out information. According to Castelein et al (2010) citing Craglia et al (2008), the new approaches such as Web 2.0 platforms, Global Positioning System, (GPS) enabled cell phones have enabled the inclusion of citizens in collecting geographic data. This act of citizens' involvement in the creation, assemble and dissemination of geographic information has been termed as VGI (Goodchild, 2007a). This is an advanced participatory type of (internet) mapping tool where citizens are involved in sensing and documenting characteristics of their living environment that eventually outlines a pattern within their surroundings.

Several participatory sensing approaches exist. Goldman et al (2009) identifies three which include: Collective design and investigation in which a group of people collectively decide on the participatory approach and what to collect , where and why and come up with the data collection methods, how to interpret the information collected and use the results. The second sensing approach is Public participation in which individuals only collect data on behalf of an organization or individual and are not involved in why the data is collected. This approach enables the organization or the individual to collect data in large quantity. The last approach identified by the author is known as Personal use and reflection whereby "*Individuals log information about themselves and use the results for personal discovery*".

2.4. Debate on VGI and its use in monitoring and capturing QoL

The emergence of VGI has sparked of debates among scholars regarding its applicability, societal significance and whether it can be used as a new form of surveillance on social issues or whether it empowers marginalized individuals and social groups or serves to exclude and disempower them (Elwood, 2008). The discussions mostly focus upon the spatial data and the potential of the VGI tools to gather, visualize, produce and share information.

Arising from these debates, two schools of thought have emerged (Elwood, 2008). Some scholars view it as an opportunity that will lead to the increase in number and diversity of people and social groups that create data while others are of the opinion that the "changes in spatial data creation and dissemination will have implications for the access of individuals and social groups to information, as well as for the inclusion and exclusion of people and places from online spatial data". According to Schuurman (2000) cited in Elwood (2008), the societal significance of VGI is closely associated with the earlier debates of the mid 1990s on GIS and Society and whereby GIS was viewed by some as an instrument for the empowerment of marginalized individuals and social groups and criticized by others as a mechanism of exclusion and disempowerment of the marginalized.

Researchers viewing the emergence of VGI as a form of phenomenon leading to social exclusion of some groups base their arguments from the perception that it provides "*exclusion and under-representation of information from and about marginalized people and places in existing data records and is linked to the subsequent exclusion of their needs and priorities from policy and decision making processes*" (Elwood, 2008, p. 178). For instance in areas where individuals do not have access to some of the tools used to contribute to VGI such as internet connection and mobile phones, such are less likely to contribute information. Language barriers, fear and frequent moves by individuals may also impede their involvement even in explicitly participatory efforts to create data.

Similar sentiments are emphasized by Burrows et al (2005) cited in Zook and Graham (2007) where the authors used an example of internet based neighbourhood information systems to understand how the use of localized knowledge was impacting on the neighbourhood. They identified some of the advantages in that it enabled increase of public involvement but also contributed to exclusion of certain areas thus contributing to the process of inter neighbourhood segregation and intra neighbourhood homogenization that eventually lead to the segregation of deprived areas.

According to Obermeyer (2007) the emergence of spatial data is seen as an invasion of privacy and advocates for new approaches to address spatial data privacy to be developed. She gives an example of the tax records of property owners in Humble Vigo County, Indiana, which are available through an online search that provides names and addresses along with tax information.

On the other hand researchers advocating for applicability of VGI claim that it has created a platform which integrates local spatial knowledge and it seems ideal "*for advocacy and preservation of the environment*" (Obermeyer, 2007). The author however notes that it is important to ensure reliability of such information before using it. According to (Dunn, 2007) in which she refers to (McCall, 2003), PGIS under which VGI can be categorized, seeks not to privilege any one type of information but to allow equal validity to all. In this way indigenous technical knowledge can grant poorer groups an equivalent standing to outsiders. The author agrees that under the decentralization process, "PGIS which incorporates VGI could allow local priorities to feed into regional policy and planning if such priorities become more widely communicated".

2.5. Areas where VGI has been used in monitoring and assessing QoL

At present the rapid increase in the use of new technologies and online services has changed the way in which individuals produce, use, obtain and share geographic information (Elwood, 2008). Interactive geo-visualization interfaces such as Wikimapia, Open Street Map, Google Mapmaker or Microsoft's Virtual Earth are making it possible for individuals having access to an internet connection to share their own maps and geographic information. According to Goldman et al (2009, p. 3) the rapid increase in the use of the new technology commonly referred to as Web 2.0 has opened up the opportunity to the public in expressing their needs. This has been made possible with the rise in "*affordable personal computers and cameras; pervasive connectivity and consolidated data centers which are acting to create a public that can objectively record, analyze, and discover a variety of patterns that are important in their lives. Through the use of sensors (e.g., cameras, motion sensors, and GPS) built into mobile phones and web services to aggregate and interpret the assembled information, a new collective capacity is emerging one in which people participate in sensing and analyzing aspects of their lives that were previously invisible.*" According to Georgiadou et al (2010) the use of the new technology is viewed as an important media where citizens viewed as human "sensors" are able to express their needs as well as report failures of public service providers and make them to be more accountable.

The new technologies, internet based mapping tools have already been used in capturing and monitoring QoL in both developed and developing countries. Accordingly these new technologies have enabled Governments and also Non-Governmental Organizations (NGOs) including local activists to collect geographic information online from their citizens concerning their local needs and problems, (Elwood, 2008; Goldman, et al., 2009).

In the Netherlands, for example, citizens can lodge complaints directly to the local government through the use of BuitenBeter app and thus they act as human sensors reporting failures of public services via their mobile phones (http://www.buitenbeter.nl/english). In this case the citizens take photos of potholes, stray garbage, broken street lamps or any issue regarding their open space using their mobile phones then select the location and problem type before sending this directly to the city council. This therefore provides the council workers with information needed to resolve the issue reported.

In South Bronx, one of New York State's county a similar approach of participatory sensing was also employed by local activists whose aim was to reduce asthma cases by re-routing diesel trucks passing through a low income neighbourhood. This examined whether diesel truck traffic on residential roads posed environmental hazards and air pollution to residents in one of the area neighbourhood which was low income (Goldman, et al., 2009). In this case the residents would use their mobile phones to take photos of diesel trucks passing within their neighbourhood during the day and this would be visualized in a website that showed the geographic distribution of the diesel trucks and also traffic map of the neighbourhood in particular time. This method was seen to involve majority of the area residents and also widen the geographic reach. The information provided the community organization with strong evidence needed to make a case to the city council that "*diesel truck traffic on neighbourhood streets created unexpected "hot spots" of traffic near homes and schools*". In this the community was using the available resources which were their mobile phones to make a case for action. This participatory approach can be seen as one in which includes the collective design and investigation as identified by (Goldman, et al., 2009).

This rapid growth of the new technology is also being experienced in developing countries as well. Georgiadou et al (2010) reckons this and notes that "several innovative, indigenous African initiatives are under way in East Africa and elsewhere on the continent that resemble the global notion of a Digital Earth." This has been facilitated by the increase in mobile phone ownership and use in such countries where the internet and broadband sector has accelerated in recent years due to improvements in infrastructure, the arrival of wireless access technologies and lower tariffs (Molony, 2008). According to

Jurrens et al (2009) the rapid increase of mobile phones in developing countries has even surpassed the rate at which basis services such as water and electricity is being provided.

In India, the Short Message Service (SMS) complaint system by Kerala State Electricity Board (KSEB) was introduced to register complaints when power failure occurs. Whenever the consumers experience power supply disruption, they were expected to send an SMS to a certain number with the unique code for each area section and also their consumer number which was unique and the power company would respond to the complaint. Although this was done as a pilot project in Thiruvananthapuram Division, it was expected to be rolled out in many other places. The SMS system enabled people to avoid the difficulties in contacting KSEB when power failure occurred (Kerela State Electricity Board, 2011).

In Kenya a similar approach was used for crisis mapping after the violence that erupted after the 2007 presidential elections. This platform was known as "*Ushahidi*" Swahili word for "testimony" and it kept Kenyans, relief/rescue workers and security personnel up to date on the crisis through mapping of reports of violence in the country and which enabled peace efforts to be channelled to those areas (www.ushahidi.com). This was possible with the collaboration of the Kenyan citizen journalists and the communities who through their mobile phones and internet were able to submit reports which were aggregated in the platform.

With the success of "*Ushahidi*" initiative, the same was replicated in other areas and sectors such as health with the tracking of Swine Flu, the H1N1 virus in 2009, humanitarian emergencies such as the 2010 earthquake that struck Haiti and also Sri Lankan tsunami. As a result "*Ushahidi*" provided a way to "*capture, organize and share critical information coming directly from the people through social media and text messages. The traditional response system was seen as lacking the ability to prioritize data that came from outside sources*". The information obtained from such platforms has been used worldwide by activists, news organizations and also the citizens. According to the founders of this initiative, the platform is viewed as a tool for "*democratizing information, increasing transparency and lowering the barriers for individuals to share their stories*" (www.ushahidi.com). This enables information to be collected and visualized and it also supports interactive mapping.

In Egypt web 2.0, ZABATAK has also been initiated to monitor violations of buildings, corruption, missing persons, theft and also violence in the country (Abbas, 2011). The building violations is seen whereby agricultural land one of the country's heritage is being converted to residential areas and other use and thus posing great challenges in terms of sustainability development. With the increase in literacy level in ICT and also self-empowerment citizens can now assist local authorities by monitoring and reporting illegal activities mostly on various issues of public concern that are taking place in their area. This they hope that their reports will make a difference.

In Zanzibar, a pilot project on Human Sensor Web (HSW) was initiated in 2010 which was in line with UN-HABITAT theme of monitoring services to Inform and Empower communities (Jürrens, et al., 2009). In this case the initiative was monitoring availability and quality of water, one of the major challenges facing the island and the citizens were expected to report whenever they lacked water or when it was of poor quality. They would send an SMS to ZAWA through their mobile phones texting in the problem at hand i.e. no water or dirty water and the number of the standpipe which was displayed in the signboards near the standpipe. The information which was also visualized in Google map was both useful to the community and ZAWA in that the community would know beforehand which well was not having water and thus opt for other sources where water was available, while ZAWA would also know which areas were experiencing problems and fix them.

The above examples illustrate that VGI which in this case is taken as the SMS complaint system can be used to monitor various domains of life and has also been applied in both developed and developing countries. From the examples, it is seen that people are willing to give out information concerning issues of public concern to the concerned authorities without expecting any reward and through their reports they hope that this will make a difference. This is what motivates them to contribute to VGI.

2.6. Motivation to contribute to VGI

The sudden increase in use of VGI in many countries including developing has raised a lot of intriguing questions among researchers as to what motivates individuals to contribute to VGI. According to Goodchild (2007b), he sees the motivation as being altruistic where the individuals participate despite not receiving any reward and also not certain whether their contribution will be used. However other researchers argue that there is more to this than altruism and suggests that the motivation behind individual's participation is more complex (Budhathoki et al., 2010; Elwood, 2008). Budhathoki also sees the motivation to contribute to VGI varying among the VGI projects (2010)

A conceptual framework has been developed in which Budhathoki et al (2010) citing Coleman et al (2009) classify the motivational into intrinsic and extrinsic factors and also based on the literature from the sociology of volunteering, leisure studies and social production of knowledge which are important aspects of VGI. According to their framework the motivation to contribute to VGI is based from either an individual's personal, social or technological context which are further classified into intrinsic factors that are an individual's interest or enjoyment in the task or extrinsic factors which are based on the individuals reward at the end of the task and which also contribute to the decision making by focussing on how people interact and cooperate. Figure 2-1 shows the conceptual framework for the motivation to contribute to VGI.

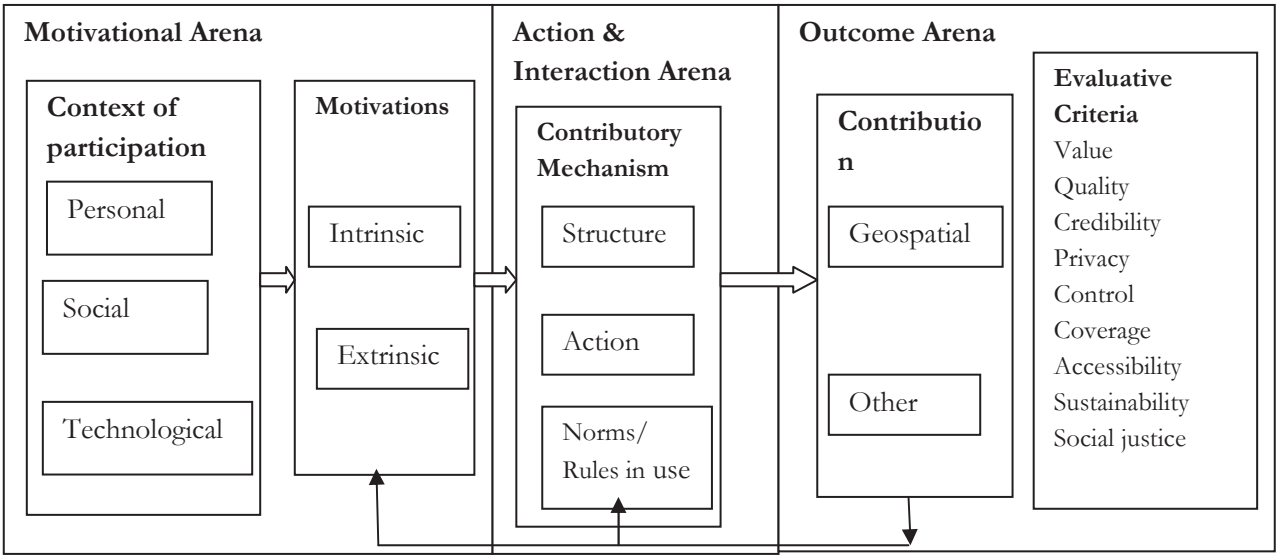


Figure 2-1: A conceptual framework for VGI, Adopted from (Budhathoki, et al., 2010)

On the other hand Coleman et al (2010) identifies the spectrum of contributors whereby individuals may fall in the following categories: Neophytes, who are individuals "with no formal background in a subject but possess the interest to give information on a subject", Interested Amateurs are those individuals "who have read some literature, consulted others experts and are now experimenting and gaining experience in

the subject", Expert Amateurs are those who are "familiar with the subject and practice it passionately on occasion but do not rely on it for a living", Expert Professional "are contributors who have studied and practised a subject and rely on the acquired knowledge for a living" and lastly the Expert Authority "who are individuals who have studied extensively and long practised a subject to the point where they possess an established record of providing high quality products, services or well informed opinions" . Their motivations to contribute have further been grouped into constructive and negative motivations. Constructive motivations include: Altruism, Professional interest, Intellectual stimulation, Social reward, Enhanced personal reputation, Outlet for creative and Independent self-expression and Pride of Place. The negative aspects of motivations include: Mischief, Agenda and Malice or Criminal intent. Figure 2-2 shows the spectrum of contributors by the authors

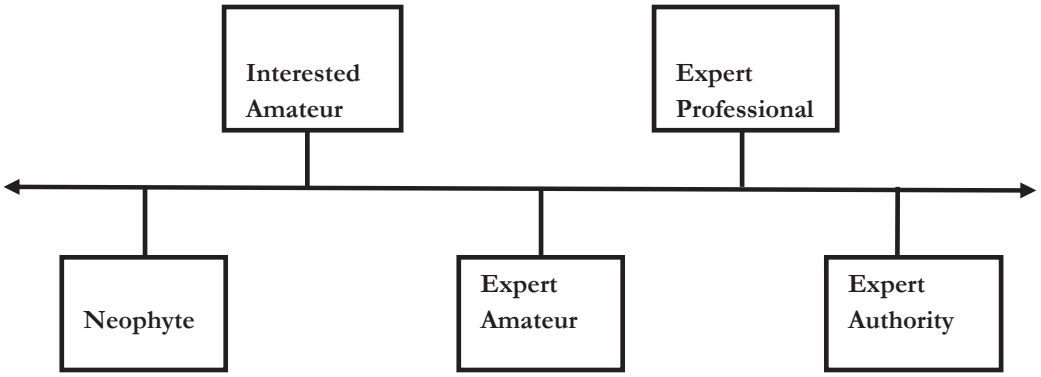


Figure 2-2: Spectrum of contributors adopted from (Coleman, et al., 2009)

3. CASE STUDY AREA UNGUJA, ZANZIBAR

This chapter gives some background information of Zanzibar including its demographic and geographical location in the African context. It further presents the reasons for selection of the two study areas, Mwanakerekwe and Mpendae.

3.1. Study area Description

The study was carried out in the Shehias of Mpendae and Mwanakerekwe located in the Urban West region of Unguja Island in Zanzibar.

Zanzibar, a semi-autonomous part of the United Republic of Tanzania in East Africa is located in the Indian Ocean about 40 kilometres off the East Coast of Africa. It falls between latitudes 5° and 7° south of the Equator and comprises of two main islands namely Unguja, which is the main island informally referred to as Zanzibar and Pemba and a number of islets which are uninhabited (Zanzibar Revolutionary Government, 1993).

Zanzibar covers an area of approximately 2,654 km² with Unguja having an area of 1,666 km². It has a population of 981,754 as per the 2002 census and a population density of 370 per km² (Zanzibar Revolutionary Government, 1993). Administratively, Unguja is divided into three regions: North, South and Urban West while Pemba has two: Pemba North and South.

According to the census report of 2002 the population of the study area was 33,632, with Mwanakerekwe having the largest population of 21,494. In both areas the population of the women is slightly more than that of the men.

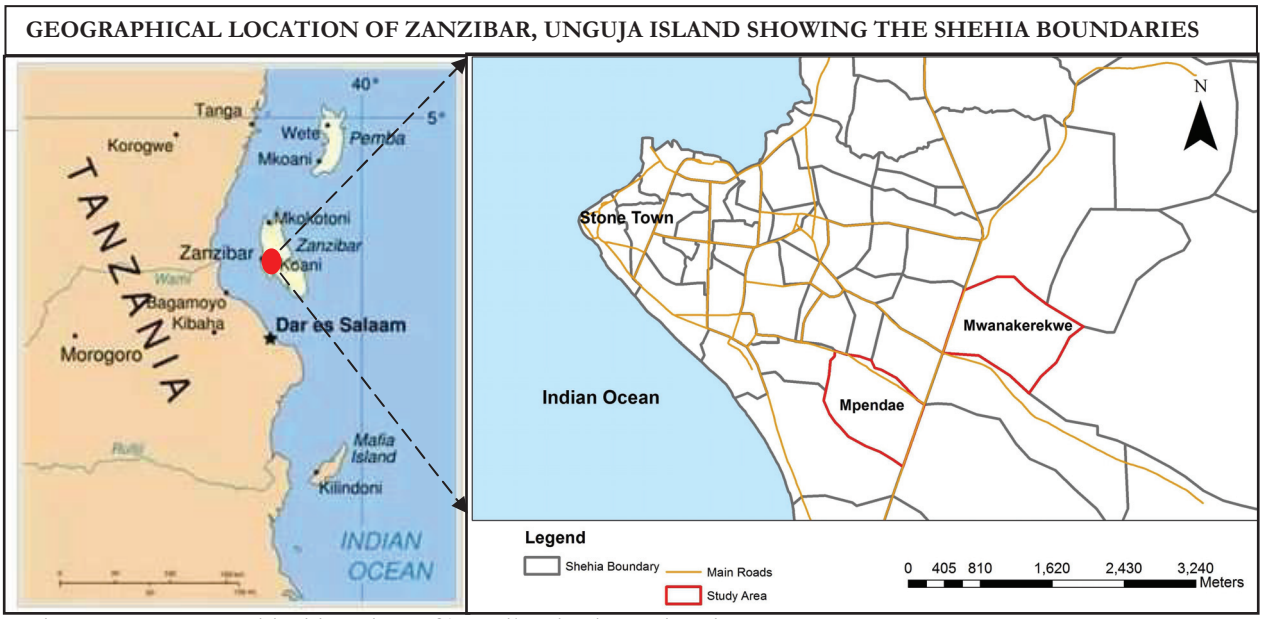


Figure 3-1: Geographical location of Zanzibar in the national context.

Source: World Atlas and own digitization

3.2. Criteria used in choosing the study areas

Shehias incorporated for the study were Mwanakerekwe and Mpendae falling within the Urban West region of Unguja Island. Based on the number of complaints submitted to ZAWA, the two areas indicated the highest and least number of complaints, 11 and 4 respectively in the year 2010 and they also fell among areas that the pilot project, HSW was implemented. Stratified random sampling was used to select households to be interviewed. Figure 3-2 shows the randomly selected households that were interviewed in the two study areas.

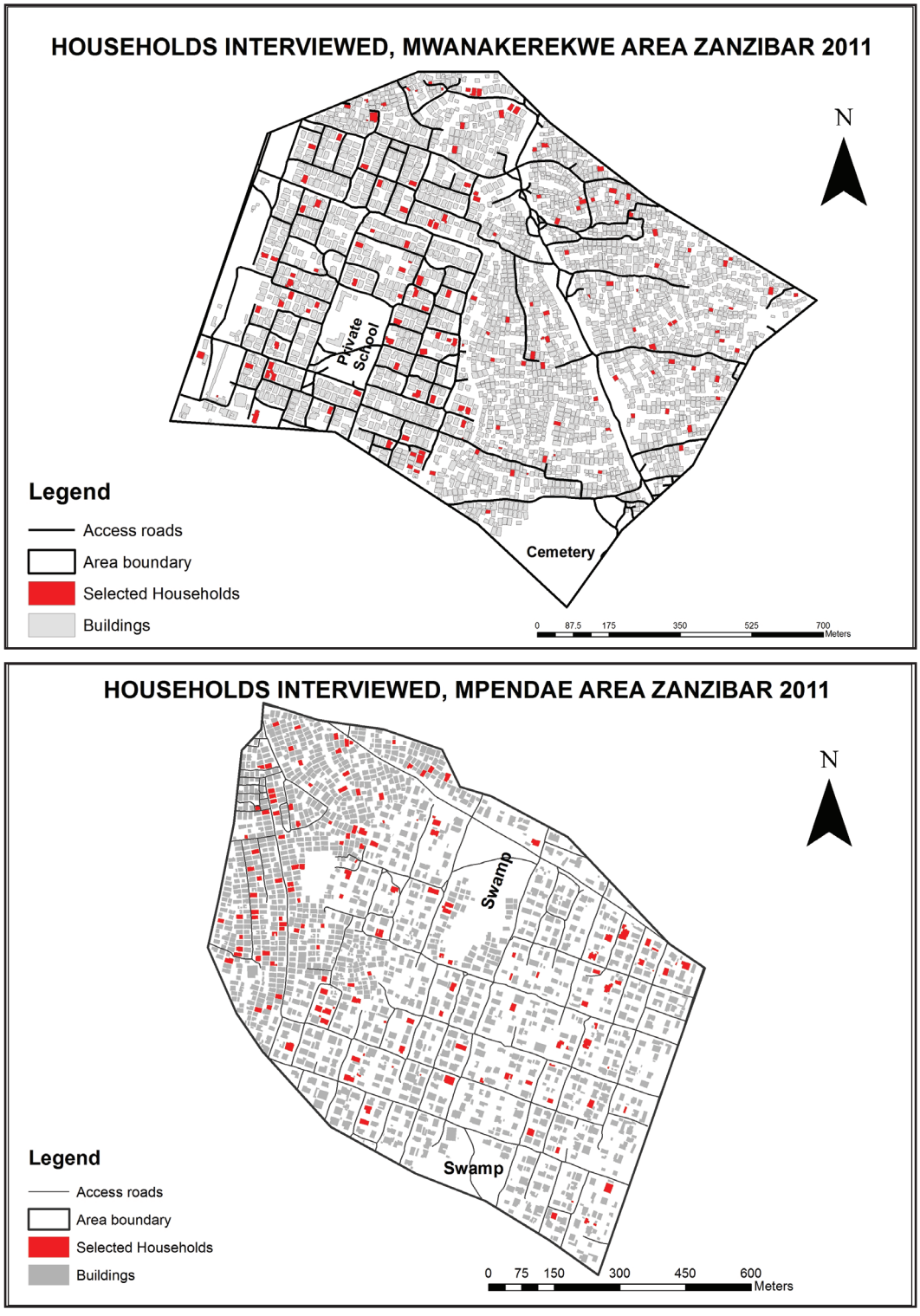


Figure 3-2: Randomly selected households for interview, Mwanakerekwe and Mpendae area

4. RESEARCH METHODOLOGY

This chapter identifies and discusses the data requirements and methods for answering the research questions aimed to meet the specific objectives. The study adopted a mixed method approach whereby both qualitative and quantitative data was collected and analyzed. The mixed method approach is gaining recognition among researchers since it enables one to benefit from the insights of both qualitative and quantitative methods combined. The work was carried out in three phases, the first being the pre field work phase where logistics were put in order before leaving for the study area, the second phase was the field work which entailed collecting qualitative and quantitative data regarding perceptions of residents towards QoL domains specifics in their area and their perception towards VGI which in this case was taken as the SMS system of complaint. Qualitative data was collected from the Focus Group Discussion (FGD) while quantitative data was collected from the stratified randomly selected households using both open and closed ended questionnaire that captured respondents' satisfaction level to the identified domains and also on VGI. This was afterwards analysed in the third phase, post field work so as to achieve the intended objectives.

4.1. Case study approach

The study adopted a case study approach. This offered a manageable scope for more focussed and in-depth analysis and helped execute the overall interpretative approach adopted. The choice of Mwanakerekwe and Mpendae was informed by the fact that the areas fell among those selected for the HSW project on monitoring availability of water and also the fact that they recorded the highest and least number of water complaints and were thus deemed to offer the kind of data required for the study.

The researcher however acknowledges that use of a case study approach as part of the research methodology traded off the capacity to make generalisations and also it has been criticised by some researchers on the ground that it offers no ground for establishing reliability of findings. However according to Soy (1997) researchers have continued to apply this approach with "*success in carefully planned and crafted studies of real life situations, issues and problems*".

4.2. Phase 1: Pre field work

This phase entailed an extensive literature review on studies that had been done on QoL, its domains and VGI. This formed the base for identification of the research problem and study objectives after which research questions were formulated. Based on the research questions household questionnaire, annexed to the report, was prepared in English and later translated to Kiswahili which is the local language. Since the scope of the research was only looking at the spatial variability of subjective QoL, the household questionnaire incorporated questions that only looked at the perceptions of the residents towards identified domains of QoL and their views on VGI.

A base map was afterwards prepared for the two study sites and the area stratified into planned and unplanned areas based on the proxy variables used to identify unplanned areas such as unstructured layout patterns of housing units and narrow roads. This was also affirmed by the officials at the Ministry of Water, Construction, Energy and Lands, Physical Planning department. Buildings under construction were excluded from the selection and proportionate stratified random sampling performed to select households to be interviewed which total 150 for each study area.

4.3. Phase 2: Field work - Data collection

Overview of Field Activities

The study was based on primary data collected through different approaches such as FGD and household surveys. These methodological approaches were employed to collect data pertaining to domain specifics in the area, perception and satisfaction level as well as on VGI and which domains the residents were willing to use it on. The following activities were planned and executed for the exercise:

- Field reconnaissance
- Pilot testing
- Focus Group Discussions
- Household survey
- Interview with ZAWA Public Relation Officer

4.3.1. Field Reconnaissance and pilot testing

Field reconnaissance was done on 30th September and was led by the Director of Physical Planning. This involved site visits of Stone town areas and its environs both planned and unplanned. The two study areas were visited on 3rd and 4th October 2011 so as to familiarize the researcher with the area.

Pilot testing was conducted in Mpendae to familiarize the researcher with the community entry strategy that was to be employed on the field during the actual household survey and to provide evidence to make necessary adjustments to the questionnaire before the survey began. Some revisions were made to the questionnaires to ensure that the questions were understood by the respondents and that they captured adequately what the survey was seeking to find out.. Questions which had not been captured earlier by the questionnaire were included such as mobile phone ownership which was an important tool in sending SMS to ZAWA. From the pilot testing it also emerged that the respondents were not aware of the SMS complaint system by ZAWA and were curious to know what happens after they send the message. It was thus felt that there was need to also print the Google map showing the complaints to better inform the respondents. Instead of listing down the complaints systems that were thought to exist in Zanzibar, the respondents were first asked whether they were aware of any complaint mechanism and to mention which they used.

4.3.2. Focus Group Discussion

Focus Group Discussions were held with area residents in order to identify QoL domains specific to the area. This was necessary so as to try and close any gap that might have arisen between the researcher's earlier perceptions of domains that might be applicable in the area and what the residents perceive to be important. Through FGD, more information was gathered that was not effectively captured during the review of the related literature. From the discussions it emerged that the participants were not aware of the SMS initiative by ZAWA and had not seen the ZAWA signboards in their locality.

According to Felce and Perry (1995) although several researches have been done on QoL there is still no clear definition given as to what it entails, the researchers tend to focus on similar domains used for assessment of QoL and these could include: housing, income, physical and social well-being, and safety. Thus, the primary objective of the FGD was to gain insights into citizens' perspectives of QoL on some of the above domains and any other that they felt contributed to their QoL.

The topics discussed were developed beforehand to provide broad themes for discussions and included questions such as:

1. What domains contribute to QoL of area residents?
2. What is the residents' satisfaction with the identified/additional domains?
3. What methods do the residents use to report problems they face?

4. How effective are these methods?
5. How do the members feel about the SMS complaint system by ZAWA
6. Which other issues are the residents willing to report on apart from water?

The participants' inclusion criteria was established upfront and also based on the purpose of the study. The criteria used was that it should be gender balanced where both sexes were comfortable discussing in a mixed gender group, age participants had to be adults and that participants had to come from both areas characterised by well structured and unstructured layout pattern of housing units. This was used as a basis to screen the participants and later discussed with the community leader who had basic information of his people and selected them. According to Revolution Government of Zanzibar (2003) the community leader is mandated by law to control immigration in his area of jurisdiction and therefore keeping records of the same. During the discussions both women and men participated freely after which they were able to map areas that they perceived to have good and poor QoL. The meeting was held at the *Shehas* office and participation was good in Mpendae where participants were 15 while in Mwanakerekwe only 7 turned up. During the meetings which were held in their local language, a tape recorder was used to gather information. This enabled the researcher to later transcribe these into thematic themes for analysis.

Figure 4-1: Focus Group Discussions held at Mpendae and Mwanakerekwe respectively

Source: Field Survey 2011

4.3.3. Household Survey

This was carried out in order to get the perceptions of the area residents regarding the domains of QoL and also their views on VGI which in this case was taken as the SMS complaint system. The questionnaire administered included both closed and open ended questions and it was based on a six point likert scale. To enable residents understand what VGI was, pictures of the ZAWA signboard showing the water tap and number to send SMS to was incorporated as part of the questionnaire. This is annexed to the report

The household survey was conveyed to the residents by the community leader, *Sheha* and his officers who requested the residents to cooperate and take part in the survey and this provided an easy entry into the community. A total of 150 households were selected. Figure 3-2 shows the selected households that were interviewed. The respondents had to be the head of the household or if not present an adult member. Six research assistants were employed for administering the questionnaires. Three in each Shehia and they were trained for two days for effective data collection. The team was selected from youths who were in colleges and universities and who had prior knowledge in research work.

4.3.3.1. Questionnaire Design

The household questionnaire was divided into three sections and these were:

Section 1: General information. This included information about the household characteristics, such as age of the respondent, gender, educational and employment status, number of living rooms and people staying in the house.
Section 2: Residents perception towards identified domains. Questions regarding residents satisfaction towards domains identified from the literature review and also ascertained during the FGD were asked in this section. This included both the physical and social aspects of QoL. The physical aspects included housing quality and built environment while the social aspect based on safety issues, affordability and accessibility of public services within the study area.
Section 3: Residents view to VGI which in this case was taken as the SMS of complaining. In this section questions were asked on the residents' former complaint method and after which the ZAWA SMS complaint system was asked to have an insight if the residents knew what it was all about, how to use it and their satisfaction with the method as compared to the earlier methods they were used to. The later part of the questionnaire wanted to know which kind of public services the residents were comfortable in using this method.

4.3.4. Interview with ZAWA Public Relations Officer

An interview was held with the Public Relations Officer from ZAWA, since he was well versed with the HSW project since its inception in Zanzibar.

The discussions mainly centred on findings from the household survey in which majority of the respondents were not aware of the SMS complaint system by the water authority despite the presence sign boards illustrating the same being in their locality in both Shehias. The main aim of the discussion was to gain an insight into the HSW project as well as moving away from just collecting data for analysis purpose but understanding why awareness and participation into the project was low.

Other data collected from the officer included the water complaint data from 2009 till October 2011.

4.4. Phase 3: Post Field work – Data processing and Analysis

In this phase, the data collected which included both qualitative and quantitative data from the FGDs and household survey was complied, organised, summarized and interpreted against the intended research objectives and questions.

The responses from the two FGDs were tape recorded having sought permission from the participants. This was later transcribed and coded. From the household survey, the responses gotten were transformed from qualitative into quantitative data using a 6 point likert scale and tabulated in SPSS for statistical analysis and ArcGIS was afterwards used for spatial analysis and visualization.

4.4.1. Data Analysis – identifying and evaluating QoL and satisfaction

QoL domain specifics were identified through FGDs where participants mentioned domains that they felt were valuable to their lives. Descriptive statistics in this case percentage of respondents in each level of QoL is used to evaluate residents' satisfaction level with the identified domains. A 6 point likert scale was used to measure the satisfaction level with 1 representing completely satisfied to 6 representing completely dissatisfied. The mean score was used to aggregate the variables for each domain of QoL per respondent and cumulative percentage used to indicate satisfaction level of the respondents.

4.4.2. Data Analysis – evaluating spatial variability of subjective QoL

In order to analyse the variation of subjective QoL between two study areas, spatial statistics which in this case is the coefficient of variation is computed. This is analysed as mean score of QoL domains over the standard deviation to show whether the 2 study areas are homogeneous or heterogeneous in terms of the identified QoL domains. ArcGIS is used to visualize the mean score per selected households to indicate the spatial variability within the two study areas. This also aids in identifying whether there are clusters of households that perceived their QoL to be good or poor.

4.4.3. Data Analysis – evaluating potential of VGI tools in assessing subjective QoL

Descriptive analysis which in this case is cumulative percentage is applied to evaluate residents' satisfaction with their current methods of complaining both in areas characterised by well-structured layout pattern of housing units and those areas that exhibit unstructured layout pattern of housing units. Content analysis was used to analyse the open ended questions and also participants' response during FGDs regarding their perception towards VGI which in this case was taken as the SMS system of complaint. This is through coding the responses on what motivates individuals to report using VGI and on which domains of life they are willing to use the system in.

5. RESEARCH FINDINGS AND ANALYSIS

This chapter presents findings from the research on the applicability of VGI in assessing subjective QoL. This is based on the research objectives as spelt out in chapter 1. The characteristics of the households interviewed are also given in this section.

5.1. Respondents characteristics

A proportionate stratified random selection of a total of 300 households was done for the two study areas in order to evaluate applicability of VGI in assessing subjective QoL. An analysis of the respondents' characteristics revealed the following: majority of them were female (56%) while the male were 44%. Their age which ranged from 19 – 86 years was grouped into 5 classes as indicated in the table where majority of them (38%) fell in between the ages of 31 and 40. Majority of the respondents (51%) had attained their secondary education while only a few (39%) had not attended school. In terms of employment, most of the respondents (39%) had their own business which they were relying for a living. Table 5-1 illustrates this.

Table 5-1: Individuals characteristics

Description	Category	Number	Percentage (%)
Gender	Male	131	43.7
	Female	169	56.3
Age	Less than 20	3	1
	21 – 30	63	21
	31 – 40	114	38
	41 – 50	59	19.7
	Over 50	61	20.3
Employment	Employed	82	27.3
	Not employed	93	31
	Self-business	117	39
	Student	4	1.3
	Retired	4	1.3
Education	Not educated	39	13
	Primary school	61	20.3
	Secondary school	155	51.7
	College	35	11.7
	University	10	3.3

5.2. Objective 1: To identify and evaluate subjective QoL and satisfaction with domains in the study area

This section presents findings from the two FGDs held in Mwanakerekwe and Mpendae that inform on the domains considered important to the residents of the two areas.

5.2.1. What are the domains that constitute QoL as identified by the residents?

As stated by Felce and Perry (1995) citing (Liu, 1976), numerous research have been done on QoL and which have indicated different perspectives on QoL. This has been because people differ in what they

consider important and contributing to their QoL. However, despite the numerous definitions and researches done on QoL, the authors concur that researchers tend to focus on similar domains and this could include housing, income, physical and social well-being, and safety.

During the FGDs, participants were first asked to explain what they understood by QoL and what it meant to them. This was important so as to enable them contribute to the topic effectively when they knew what it was all about. Afterwards they were asked to identify the domains that they considered playing a vital role and contributing to their QoL.

According to the participants QoL in an individual meant been able to maintain one's own basic needs and services such as affording payments of bills like electricity, water, health and also taking care of one's family in terms of provision of education for the children, good environment for their up bring.

Apart from the domains identified earlier from literature review including housing, built environment, neighbourhood safety, accessibility and affordability of public service, participants in both FGDs identified similar additional domains contributing to their QoL. These included: availability of street lights, dumping sites, children's playground and storm water drainage system. Majority of the participants were in agreement that the mentioned domains contributed greatly to what they would prefer to have incorporated in QoL.

The additional domains identified from the FGD were categorized under the existing domains as used in the numerous studies. This is indicated in Table 5-2.

Table 5-2: Additional domains of QoL identified by participants in FGD

Domains of QoL	Attributes
Built Environment	Availability of Storm water drainage system
	Availability of dumping sites
Accessibility to Public Services	Availability of recreational areas (children's playground)
Neighbourhood Safety	Availability of street lights

The additional domains by the respondents are an indication that future studies on QoL in the area could include these if present in the area.

5.2.2. What is the residents' satisfaction with the domains?

The residents' satisfaction with the identified domains was calculated as a mean score on those domains. This was based on a 6 point likert scale that was used to quantify the responses where 1 represented completely satisfied to 6 which represented completely dissatisfied. In Mwanakerekwe majority of the respondents were only satisfied with their housing condition and dissatisfied with their built environment, neighbourhood safety, access to public services and affordability of public services. The situation was different in Mpendae where majority of the respondents were satisfied with their housing, built environment, neighbourhood safety and access to public services while they were dissatisfied with the affordability of public services. See
Table 5-3 and Table 5-4. The mean satisfaction for each domain varied slightly from each other as indicated.

Table 5-3: Statistics for resident's domain satisfaction on various domains, Mwanakerekwe

Level of satisfaction	**Domains of life (%)**				
	Housing	Built Environment	Neighbourhood Safety	Access PS	Afford PS
Completely satisfied	1.4			0.7	
Very satisfied	20.9		5.4	7.4	10.1
Satisfied	48.6	33.1	27	36.5	25.7
Dissatisfied	24.3	46.6	59.5	39.2	58.1
Very dissatisfied	4.7	20.3	6.1	13.5	6.1
Completely dissatisfied			2	2.7	
Mean	**3.07**	**3.82**	**3.67**	**3.59**	**3.41**
Standard Deviation	0.77	0.66	0.75	0.88	0.76

Table 5-4: Statistics for resident's domain satisfaction on various domains, Mpendae

Level of satisfaction	**Domains of life (%)**				
	Housing	Built Environment	Neighbourhood Safety	Access PS	Afford PS
Completely satisfied		0.7			0.7
Very satisfied	32.7		8.7	2	5.3
Satisfied	46	51.3	49.3	52	43.3
Dissatisfied	19.3	44.7	34	44	46
Very dissatisfied	2	2.7	6.7	1.3	4.7
Completely dissatisfied		0.7	1.3	0.7	
Mean	**2.78**	**3.37**	**3.47**	**3.32**	**3.33**
Standard Deviation	0.74	0.62	0.78	0.54	0.8

The residents were completely dissatisfied with the other additional domains which included: availability of Storm water drainage system, dumping sites, street lights and recreational areas. This was because they were missing in both study areas. The lack of the additional domains was further affirmed in the study areas by observing stagnant water on the access roads after a heavy down pour. Figure 5-1

Figure 5-1: Mwanakerekwe, stagnant water on the access road also used as a playing ground. Source: Field observation

5.3. Objective 2: To evaluate the spatial variability of subjective QoL in the study area

5.3.1. How does subjective QoL vary between the Shehias?

In Zanzibar almost all the smallest administrative units exhibit similar characteristics. However studies to quantify these just like studies done on QoL are noticeably absent. Therefore, one of the studies specific objective was to evaluate the variability of the subjective QoL between the two study areas and thus in this way tell whether the Shehias are homogeneous or heterogeneous in terms of subjective QoL.

Table 5-5 shows the results arrived at after computation of responses from the household survey. The coefficient of variation (CV) was computed as standard deviation of the QoL scores divided by mean score of the overall subjective QoL and which indicates similarity between the two study sites which exhibited the same score of 0.17.

Table 5-5: Variability of Subjective QoL between the two study areas

Shehias	Mean	Variance	Standard Deviation	Coefficient of variation
Mwanakerekwe	3.54	0.35	0.59	0.17
Mpendae	3.26	0.29	0.54	0.17

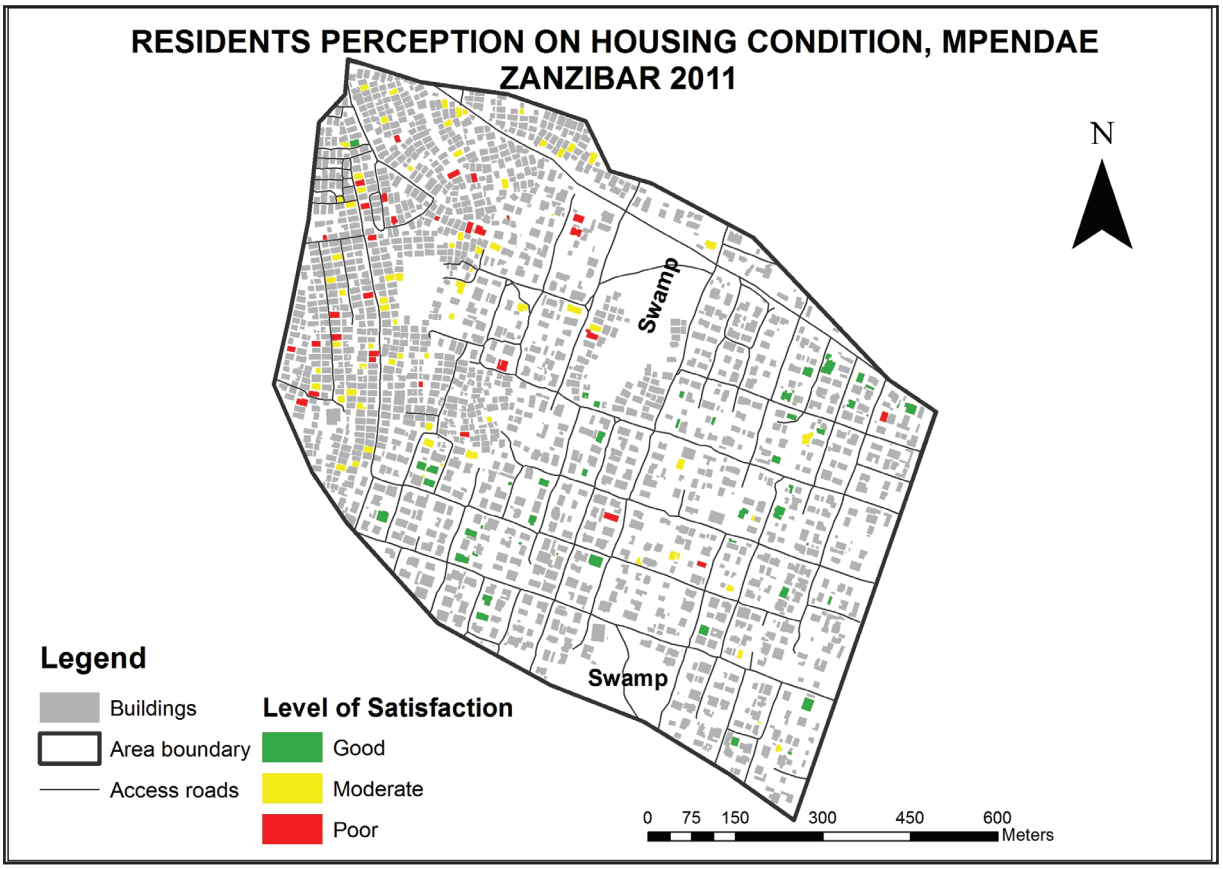
5.3.2. How does subjective QoL vary spatially within the Shehia?

In terms of the QoL domains identified by the participants in the FGD and results from the household survey, there exists a spatial pattern as shown in the Figure 5-3,
Figure 5-4, Figure 5-5 and Figure 5-7 in the two study areas. High QoL is experienced in the areas that exhibit well-structured pattern of housing units with wider access roads whereas low QoL is seen among areas that exhibit unstructured layout of housing units and narrow access roads. This is as a result of the mean arrived at for all the domains used for the study. Since the study used a 6 point likert scale, where 1 represented 'very satisfied' and 6 'very dissatisfied', households falling within the mean range of 1 and 2 were categorized to have good QoL, those between 3 and 4 to have moderate QoL while those falling between 5 and 6 were categorized to have poor QoL. Residents living in areas having well-structured layout of housing units exhibit good and moderate QoL while those living in areas having unstructured layout of housing units perceive their QoL to be poor.

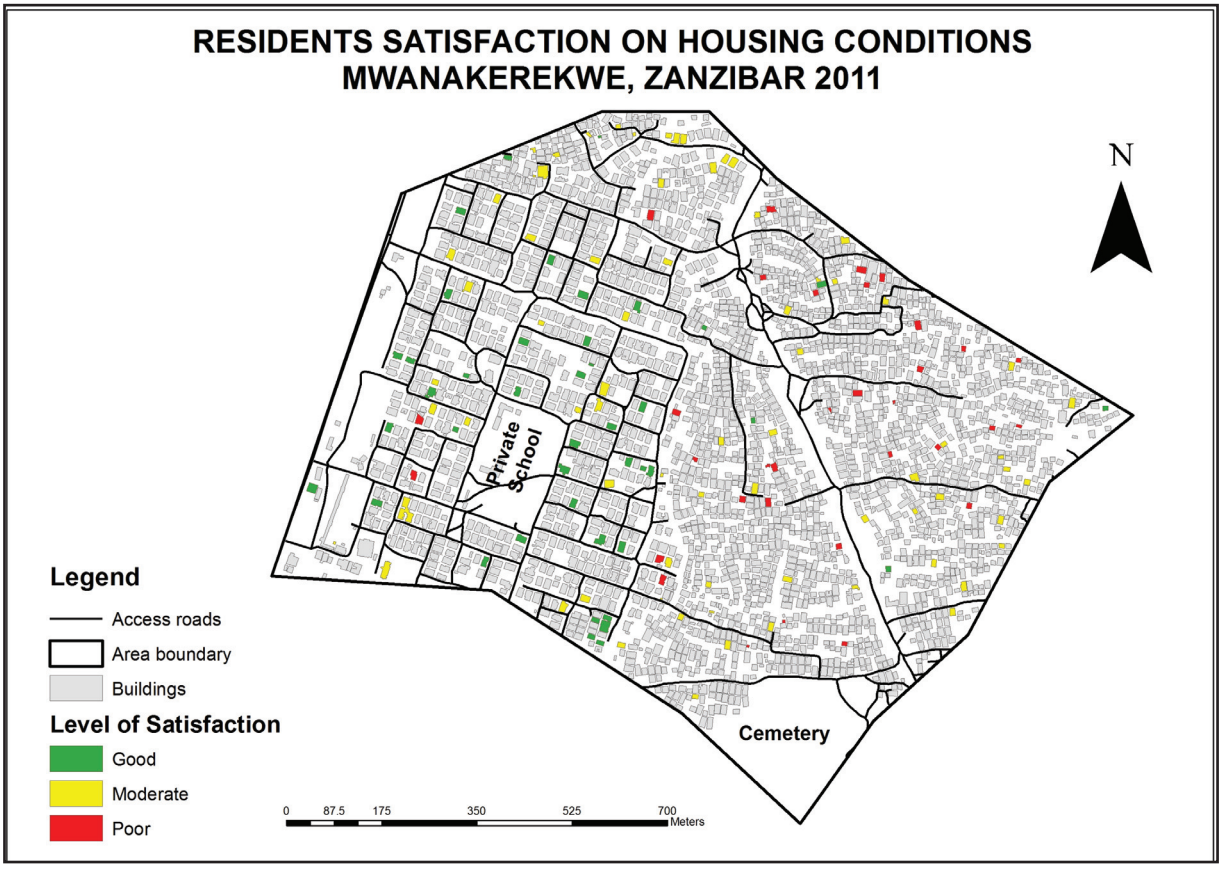
Housing Conditions

Urban housing conditions have been seen to be a global problem in the world but the situation has been viewed to be worse in developing countries with the rapid urbanization (UN Habitat, 2001). During the FGD, participants identified house ownership, affordability, size of rooms and housing condition as contributing to the domain of housing condition.

Findings from the household survey revealed that there was spatial variation in terms of residents' satisfaction with their housing conditions. In both study areas, majority of the residents living in areas that had structured layout pattern of housing units perceived their housing conditions to be good whereas those living in areas exhibiting unstructured layout pattern of housing units and narrow access roads perceived their housing condition to be poor. This was despite residents putting up their own housing units which were according to how much a person could afford. .Figure 5-2 a and b shows this.



(a)

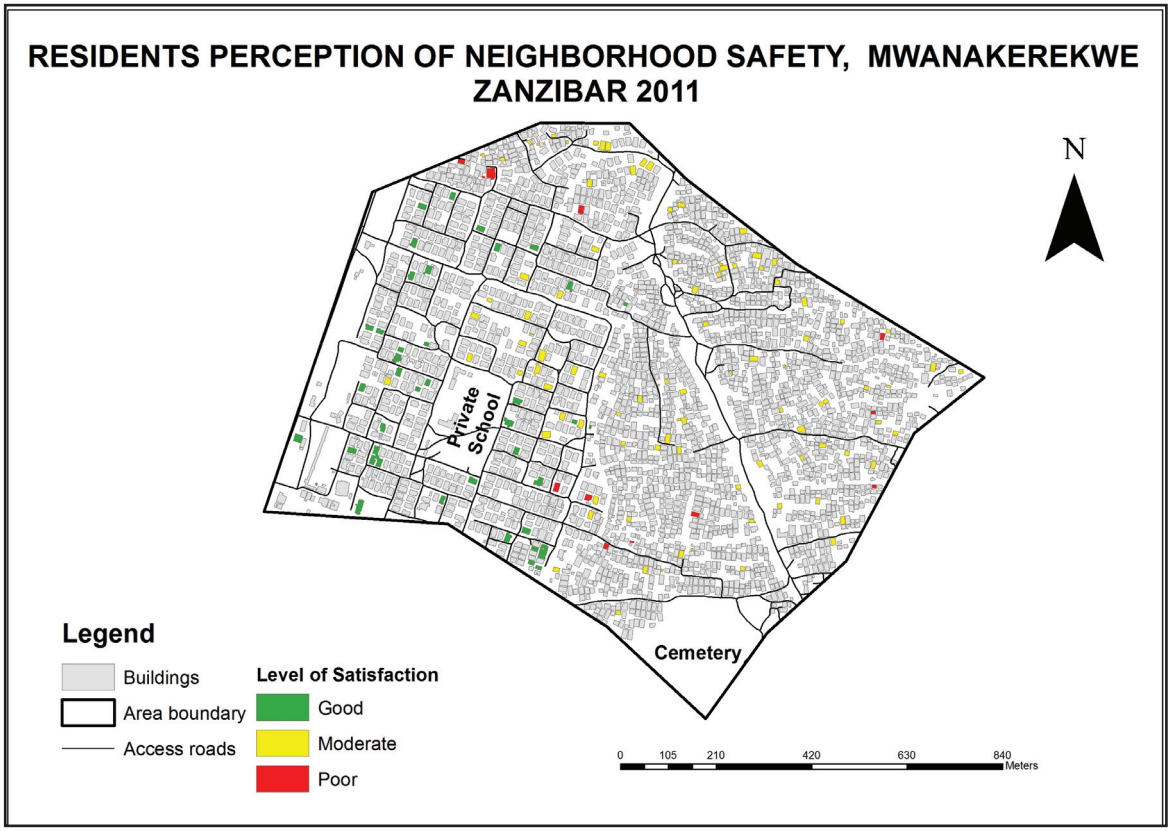


(b)

Figure 5-2: Spatial variation on residents' perception on Housing Conditions in the two study areas

Neighbourhood Safety

Majority of the respondents were concerned about their neighbourhood safety and the rising crime rate in their areas despite several interventions made in the areas including community policing. The attributes identified under this domain included residents perceptions towards crime rate, road safety and police protection within their neighbourhood. In Mwanakerekwe majority of the residents living in areas exhibiting unstructured layout pattern of housing units and narrow access roads expressed dissatisfaction to their neighbourhood safety compared to residents living in areas that were well planned and had structured layout of housing units where majority of them perceived their neighbourhood safety to be good. In Mpendae this was different as majority of respondents from both areas were dissatisfied with security issues in their vicinity. Figure 5-3 a and b illustrates this.



(a)

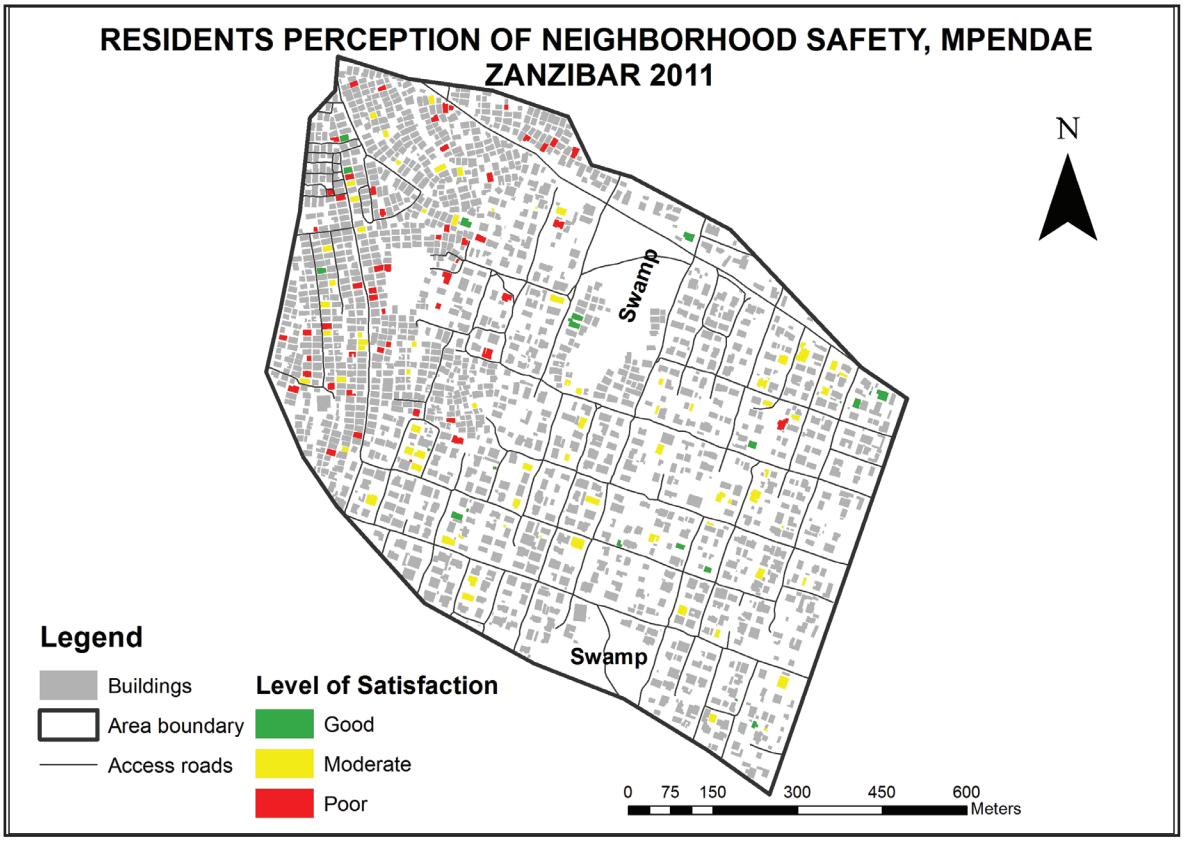


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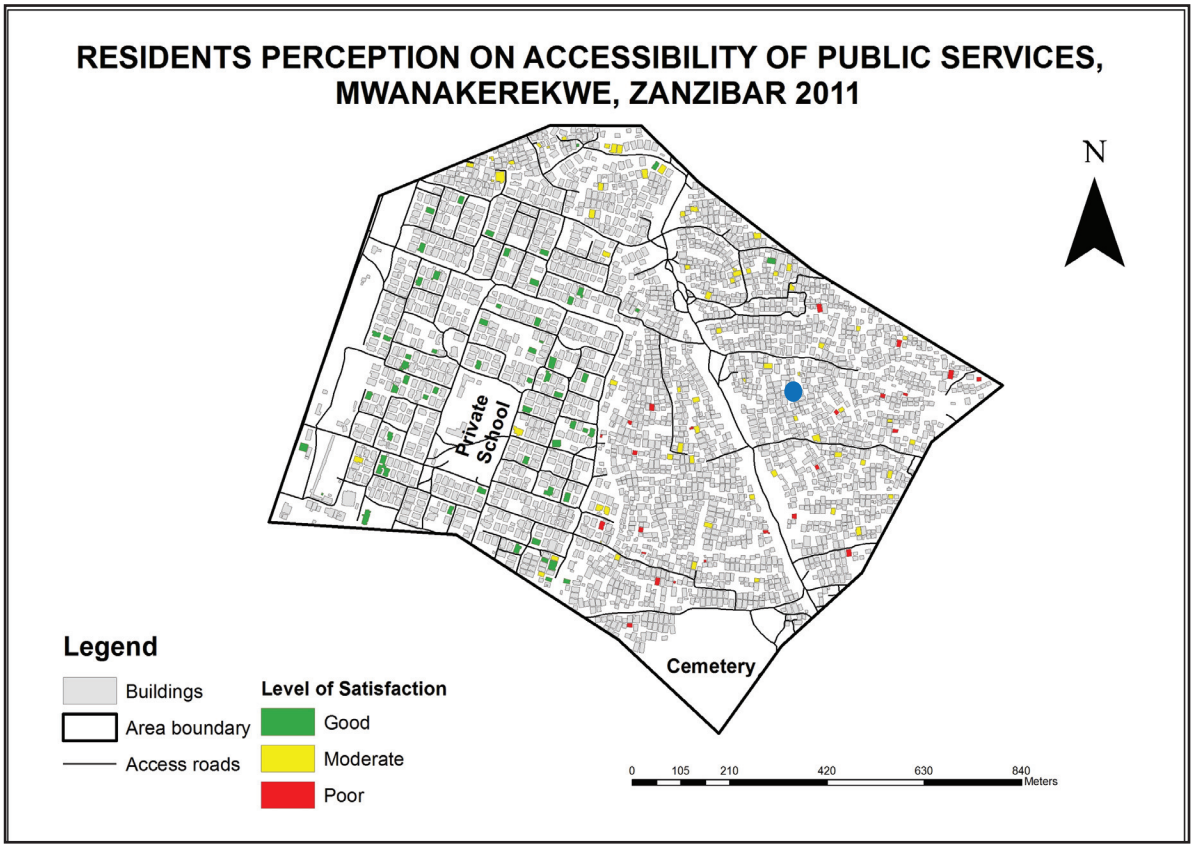
Figure 5-3: Spatial variation on residents' perception of neighbourhood safety in the two study areas

Accessibility of Public Services

In many developing countries accessibility of public services is seen as a major problem and in which the poor citizens are rendered worse off or pay higher in order to get the basic services (UNCTAD, 2006). The situation is made worse by the rapid urbanization taking place in such countries and which is not at par with the local authority's capacity to provide adequate basic services to its citizens. In this study the public services looked into include accessibility to primary and secondary schools, water, health facilities, police station, market and public transport. These were arrived at during the FGD where the participants mentioned these as domains of QoL important to their lives.

Findings from the household survey reveal that there is spatial variation in terms of residents' satisfaction with accessibility on the mentioned domains. In Mwanakerewe, residents living in areas that had structured layout of housing units perceived accessibility of public services to be good whereas those living in areas exhibiting unstructured layout pattern of housing units and narrow access roads perceived accessibility of public services in their area to be poor. In Mpendae area the situation was different in that in both areas residents felt dissatisfied with their accessibility to public services. However majority of those affected were those living in areas characterised by unstructured layout pattern of housing units and narrow access roads. Figure 5-4 a and b depicts this. Contrary to these findings, the research also established that there was a community hospital in Mpendae but still the residents expressed dissatisfaction in terms of health facilities.



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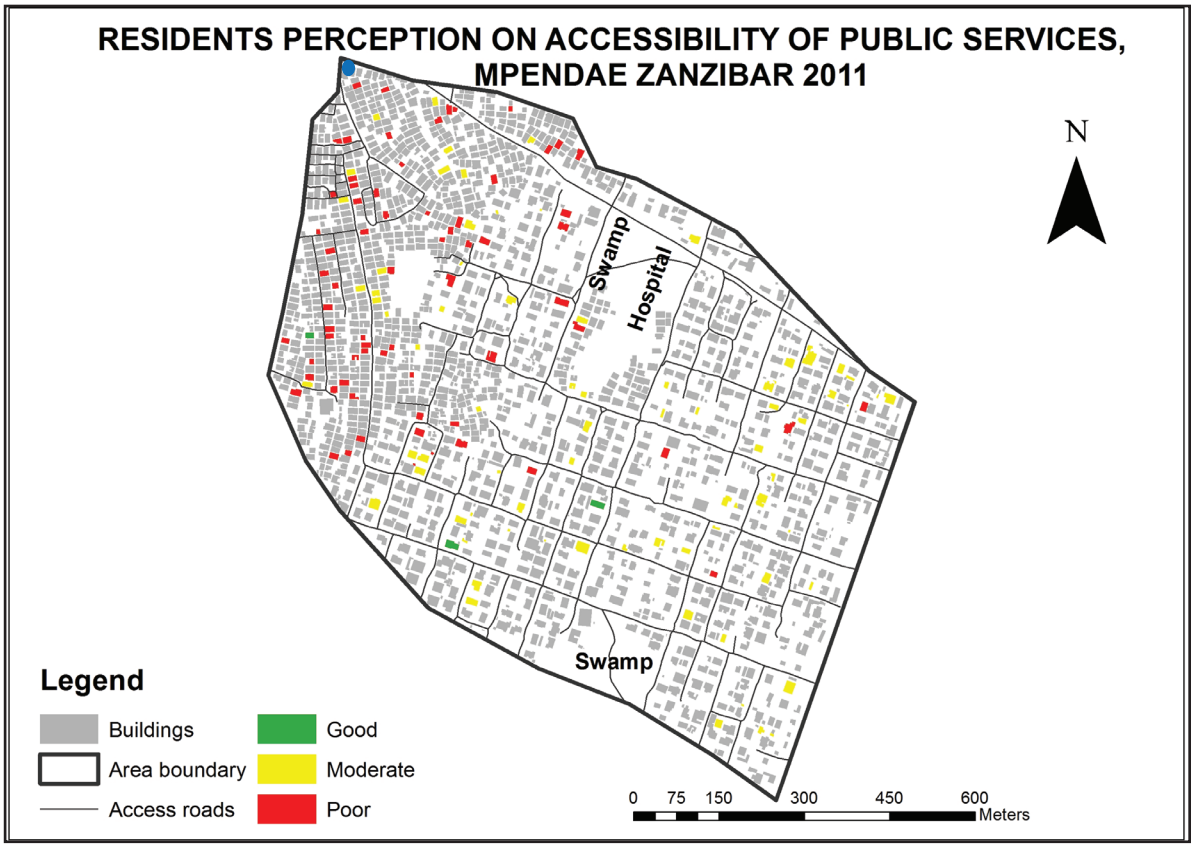

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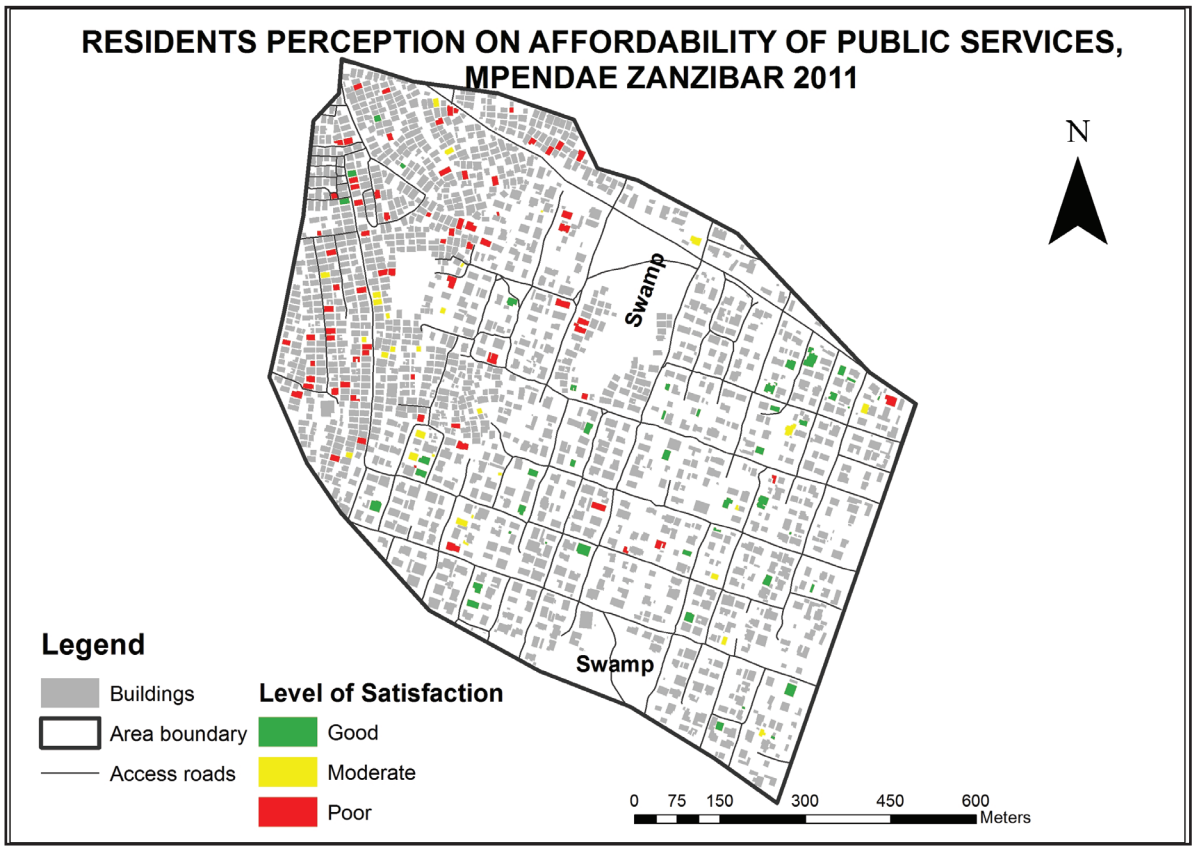
Figure 5-4: Spatial Variation on residents' perception of Accessibility of Public Services in the two study areas

Affordability of Public Services

Studies have shown that there often exists disparity between the willingness and ability of consumers to pay for public services and the prices of those services set by the service providers. According to Peters et al (2008, p. 165) the authors reckon that " *user fees, in particular, have been a contentious source of financing public services in low income country*". Although the authors were talking in relation to health services, the same applies to other public services as well. In some instances the poor especially those living in unplanned areas where public services are often not available or are minimal are made to pay more since they have to look for alternative sources which tend to be more expensive e.g. buying water from the water vendors. In this study affordability of public services looked into include: affordability of primary and secondary schools, water, health facilities, goods at the market and public transport.

Findings from the study reveal that residents living in areas exhibiting unstructured layout pattern of housing units and narrow access roads in Mpendae and Mwanakerekwe perceived public services not to be affordable. This is because some of the services were inexistent in their areas and when present they are inaccessible and this forced them to travel to other areas in order to obtain them. Both study areas have private primary and secondary schools but residents find them too expensive to take their children there. Public schools are found in other Shehias located quite some distance and this forces the children to use public transport to access them which in turns increases the cost of educating their children. Residents living in areas characterised by well-planned and structured layout of housing units perceive the cost of public services to be good. Figure 5-5 a and b shows the spatial variation in terms of resident's satisfaction with affordability of public services.



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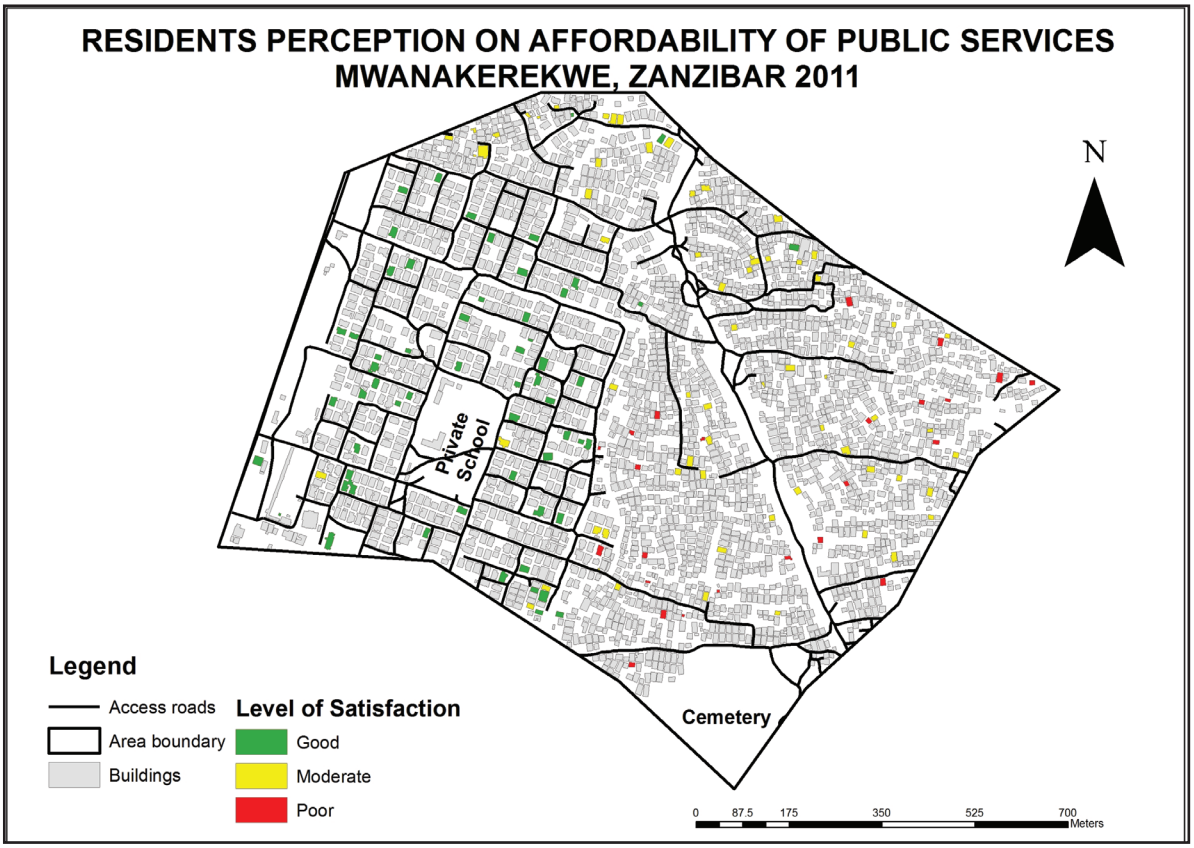


Figure 5-5: Spatial Variation on residents' perception on Affordability of Public Services in the two study areas (b)

Built Environment

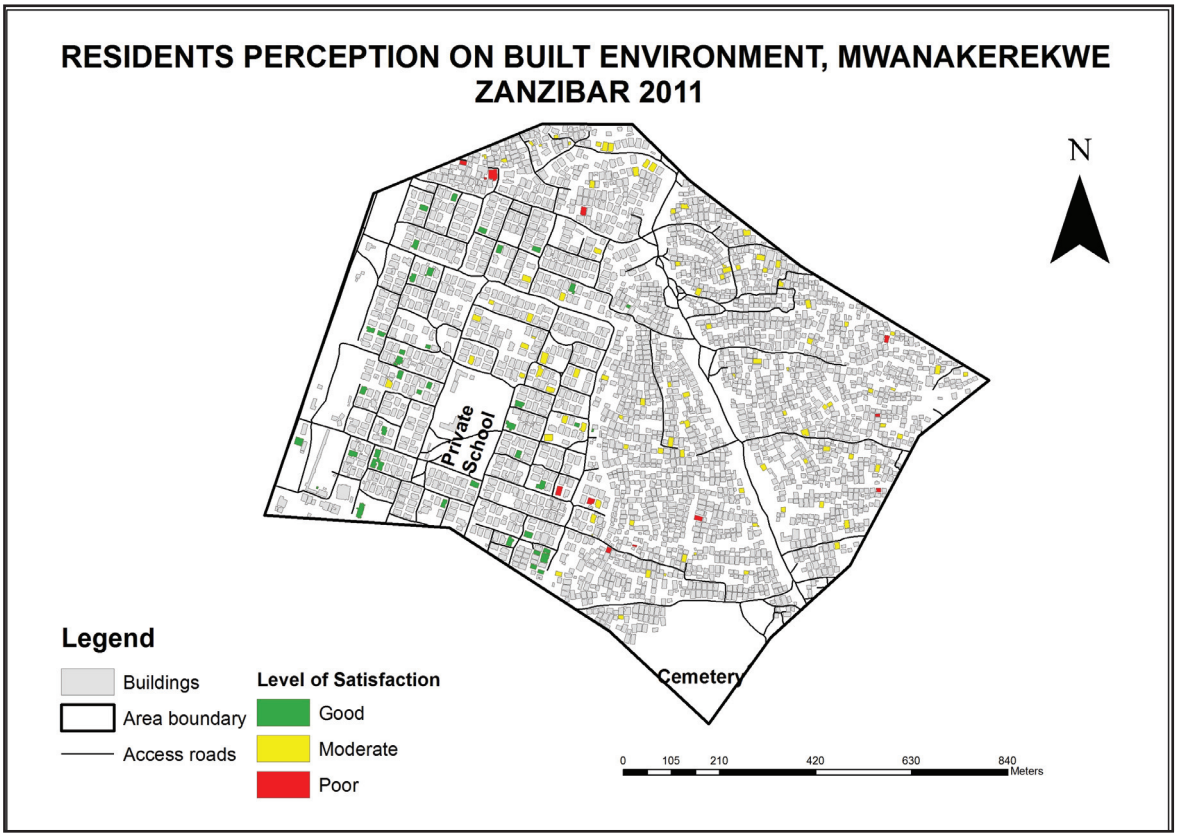
Built environment in this study incorporated attractiveness of the living place, suitability of the living place for raising children, cleanness of the neighbourhood, congestion of the neighbourhood, quality of roads in the neighbourhood and quality of sanitation in the neighbourhood.

The study assessed the spatial variations in terms of the built environment in the two study areas and it became apparent that in both areas, residents living in areas characterised by unstructured layout pattern of housing units and narrow access perceived their built environment to be poor whereas those living in areas exhibiting well planned areas having structured layout patterns of housing units perceived their built environment to be good. Figure 5-7 a and b shows residents' satisfaction with the built environment in the two study areas. According to residents living in areas perceived to have poor built environment, they had no system of waste disposal in their areas and would throw garbage in open plots that were not developed. In Mwanakerekwe this would also be done in the public cemetery within their area. They also complained that there was not sufficient space left between buildings resulting in their congestion and also blocking the access roads.

Residents were also concerned about recreational areas specifically children's playground in their areas and which were lacking forcing their children to play along the roads and which was dangerous. The state of the roads was not any better especially in areas perceived to have poor built environment which were rendered impassable during rainy seasons due to lack of storm water drainage system leading to flooding of the roads. Figure 5-6 depicts the situation in Mpendae showing narrow roads in areas perceived to have poor QoL and wider access roads in areas perceived to have good QoL.

Figure 5-6: Built environment, Mpendae Zanzibar

Source: Field observation 2011



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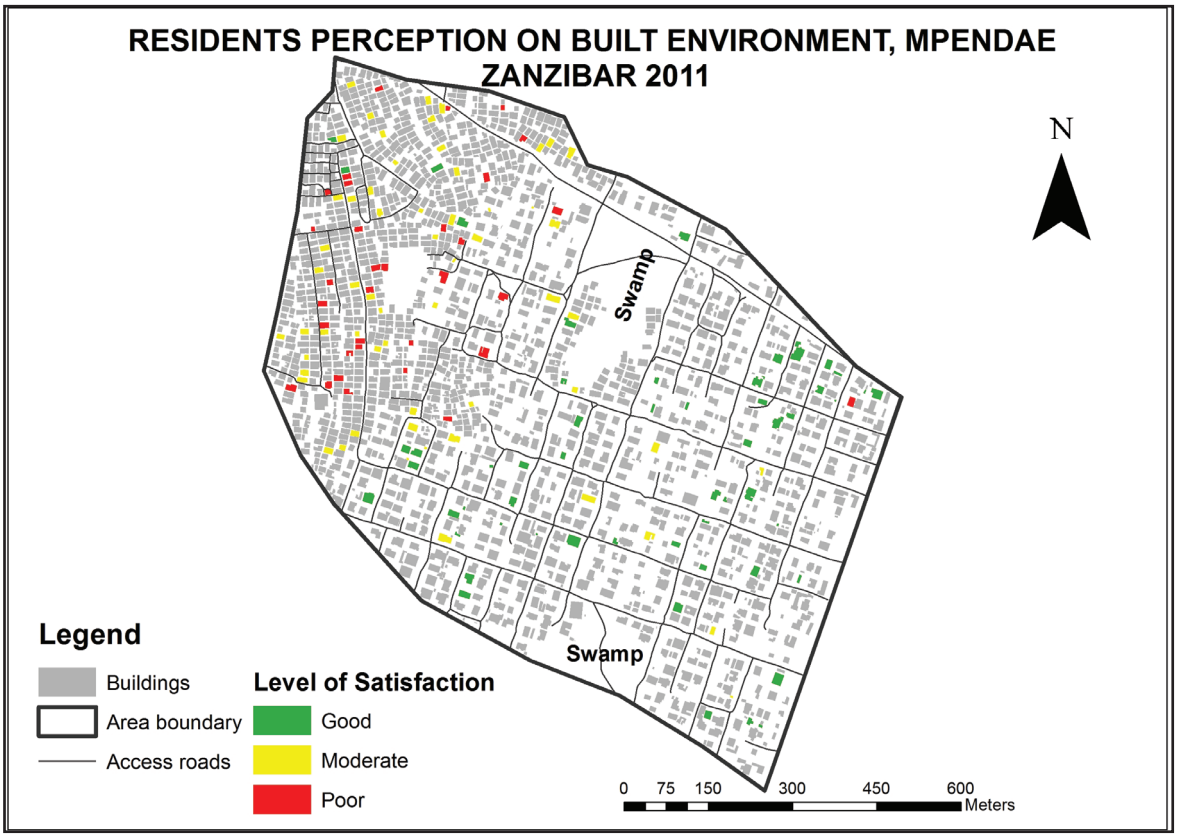

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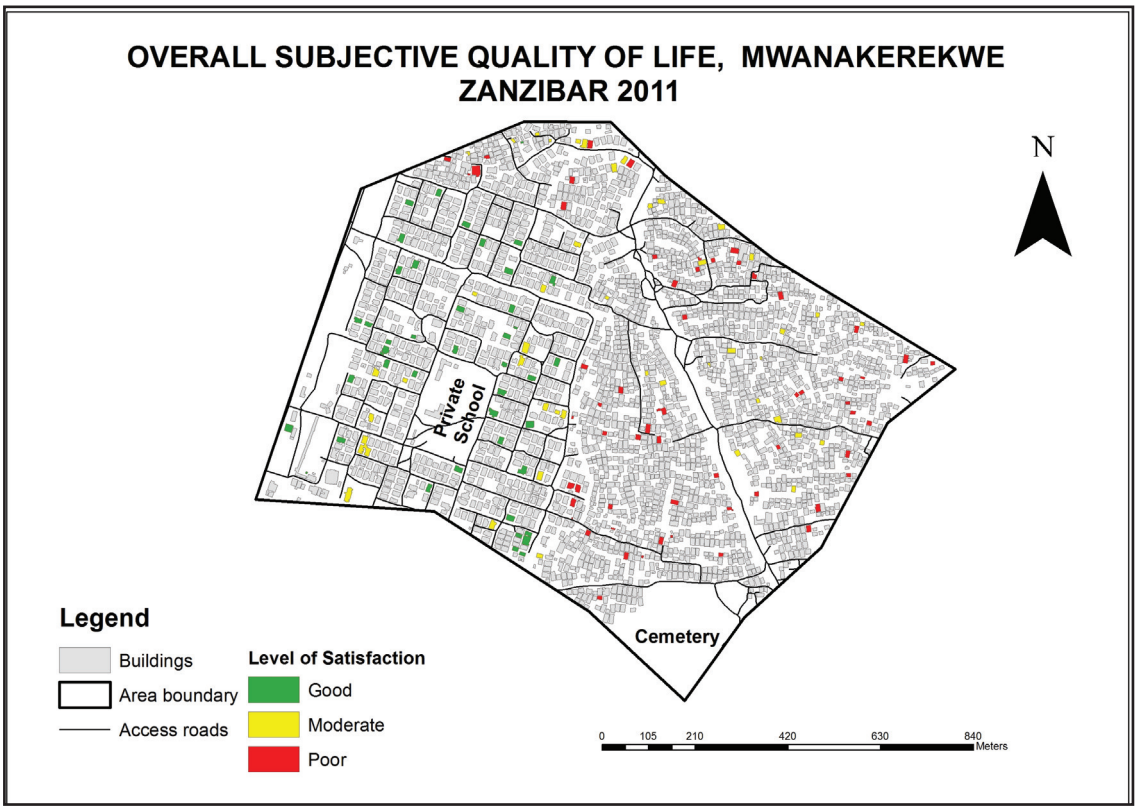
Figure 5-7: Spatial Variation on residents' perception with their Built Environment in the two study areas

The overall resident's satisfaction with the identified domains is as indicated in Figure 5-8



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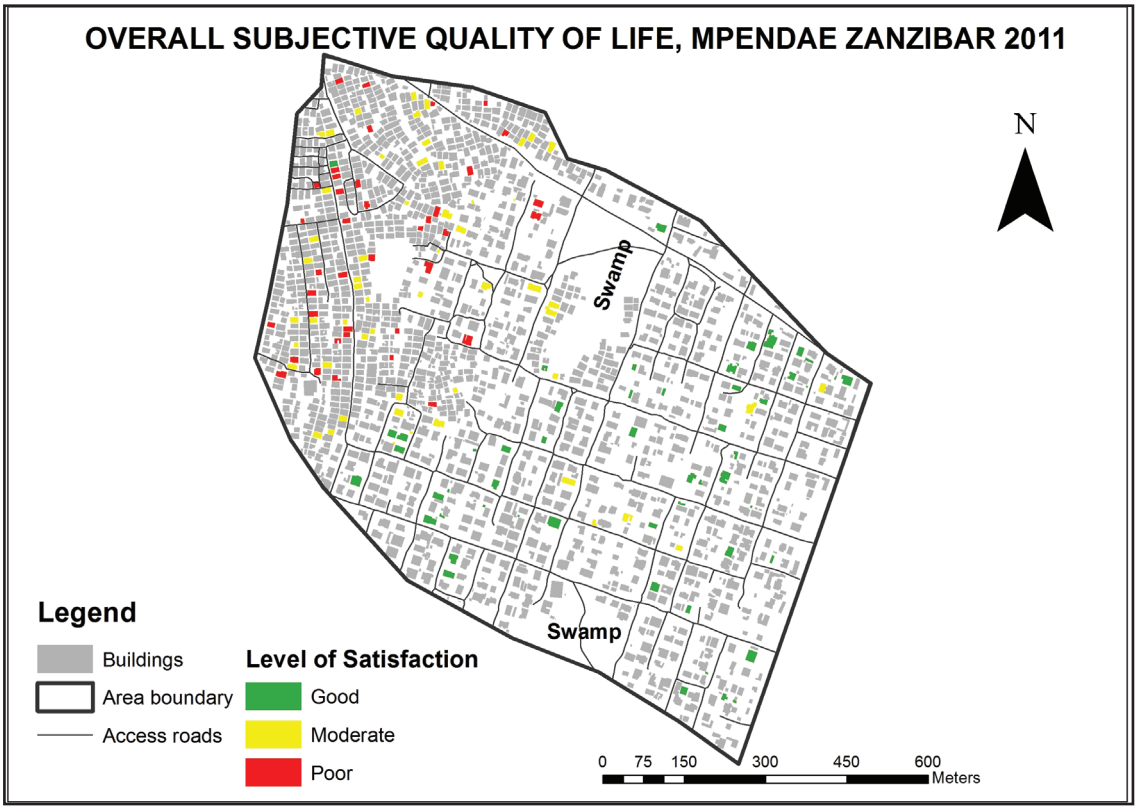

Figure 5-8: Overall spatial variability on subjective QoL in the two study area

Figure 5-8 shows the overall spatial variability and level of satisfaction of the identified domains of QoL for each household. The mean value ranged between 2.35 to 4.78. Lower mean value means the subjective QoL is good and higher mean value means subjective QoL is poor. The results from the two study area shows there exists heterogeneity within the study area. Good QoL is perceived by residents living in areas that exhibit well-structured layout pattern of housing units whereas poor QoL is perceived by residents living in areas characterised by unstructured layout pattern of housing units.

5.3.3. Is there clustering of households perceived to have high/low QoL?

Do households perceiving their QoL to be high or low found to be close to each other? Spatial clustering aims at establishing whether there exists spatial similarity or dissimilarity among households and which in this study looks at households' perception to their QoL. Such studies are useful in identifying areas seen as being poor in a society as well as targeting offers to the marginalized groups/ areas where their QoL is perceived to be poor.

As depicted from Figure 5-2, Figure 5-3, Figure 5-4, Figure 5-5, Figure 5-7 and Figure 5-8 results from the household survey indicate that there exists spatial clustering of households perceiving their QoL as being good, moderate or poor in both study areas. Households perceiving their QoL to be poor in terms of their built environment, neighbourhood safety, accessibility and affordability of public services are located in areas characterised by narrow access roads and unstructured layout pattern of housing units whereas those perceiving their QoL to be good are found in areas characterised by wider access roads and structured layout patterns of housing units.

5.4. Objective 3: To evaluate the potential of VGI tools in assessing subjective QoL conditions

5.4.1. What current mechanisms do the residents use to voice their concerns?

Descriptive statistics on complaints methods

A total of 150 proportionate stratified randomly selected households were interviewed in each study area. The study assessed complaints mechanisms that the respondents were aware of and used when faced with problems especially in relation to public services. Majority of the respondents when faced with problems were aware of what to do and where to complaint to. In Mpendae area 89% of the respondents reported when faced with problems while 11% did not report. In Mwanakerekwe 71% reported while 29% did not report. See Table 5-6

Table 5-6: Households that make reports to concerned authorities when faced with problems

Report when faced with problems	Mwanakerekwe	Mpendae
Yes	71% (106)	89% (133)
No	29% (44)	11% (17)
Total Households	150	150

Further analysis revealed that in both areas, majority of the respondents who did not report when faced with problems were those found living in areas perceived to have poor QoL.
Table 5-7 shows this.

Table 5-7: Distribution of households who do not report when faced with problems

Never report when faced with problems	Mwanakerekwe	Mpendae
Live in areas perceived as having poor QoL	31	13
Live in areas perceived as having good QoL	13	4
Total Households	44	17

The respondents who reported when faced with problems were asked to indicate where the reports were first made for action to be taken. It was apparent that majority of them in both Shehias first went to their Sheha, local community leader when faced with problems be it social or relating to provision of public services. This was followed by residents going in person to the service providers. This is shown in Figure 5-9. Further analysis revealed that majority of those who first went to the Sheha to report were residents living in areas perceived to have poor QoL. In Mwanakerekwe, 75% were from areas perceived to have poor QoL while 25% were from those areas perceived to have good QoL while in Mpendae 80% were from areas perceived to have good QoL whereas 20% were from areas perceived to have poor QoL whereas 20% were from areas perceived to have good QoL. The table below shows a summary of the different methods used to complain in the two study areas.

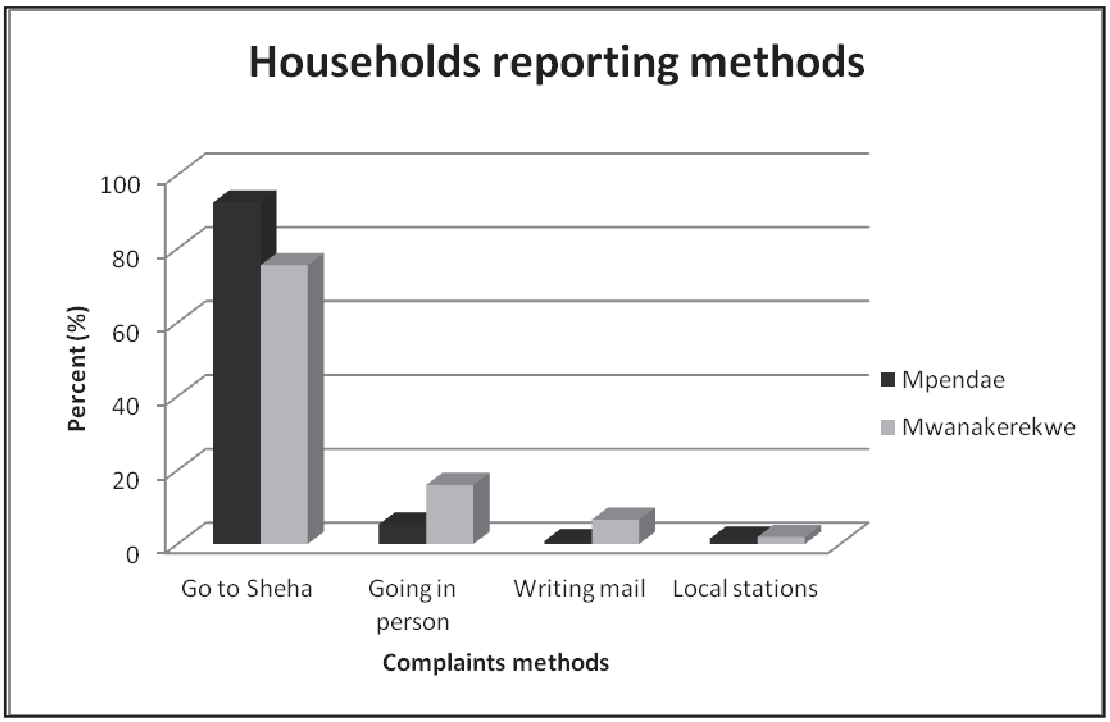

Figure 5-9: Households response through various complaint methods

Incidentally majority of the respondents were not aware of the existence of the SMS complaint system by ZAWA nor seen the ZAWA signboard situated in their area. The community leaders were also not aware of such an initiative despite being in the area a long time. In Mwanakerekwe only 9% were aware of such an initiative while in Mpendae only 13% of the total respondents interviewed were aware and had seen the ZAWA signboards. Table 5-8 shows this. Further analysis revealed that residents who had seen the signboards and were aware of the SMS initiative were those leaving in areas perceived to have poor QoL in both study areas.

Table 5-8: Households aware of SMS complaints system by ZAWA

Aware of SMS complaint system by ZAWA or seen ZAWA signboard	Mwanakerekwe	Mpendae
Yes	9 (6%)	20 (13.3%)
No	141 (94%)	130 (86.7%)
Total Households	150	150

Likewise this resulted in low participation of residents towards monitoring of water availability and quality using the SMS system. Despite the few respondents who had seen and were aware of the SMS initiative by the water authority, not all sent text messages whenever they had poor quality of water or it was not available. In Mwanakerekwe only 4 respondents out of 9 had sent the SMS while in Mpendae 6 had sent the SMS out of 20 who had were aware of the initiative. This was still residents living in areas perceived to have poor QoL.

5.4.2. What is the residents view on the use of the complaining methods?

Participants and respondents interviewed during the FGD and household survey expressed discontentment with their current channels of airing complaints. This was remarkable as majority of the respondents who complained whenever they were faced with problems in their areas were dissatisfied with the kind of response they received from the concerned authorities. In Mwanakerekwe the figure stood at 61% while in Mpendae this was 48% of the total number of households who reported whenever they had problems. Majority of those who were not happy with their current methods of complaining were those residents found in areas that were perceived to have poor QoL. For instance in Mwanakerekwe this stood at 61% those living in areas perceived as having poor QoL whereas 39% were from areas perceived to have good QoL. In Mpendae this stood at 66% for respondents living in areas perceived to have poor QoL while 34% were from areas perceived to have good QoL. Table 5-9 and Table 5-10 show this:

Table 5-9: Descriptive statistics on challenges in reporting mechanisms

Face challenges in current methods of complaining	Mwanakerekwe	Mpendae
Yes	65 (61.3%)	64 (48.1%)
No	41 (38.7%)	69 (51.9%)
Total Households	**106**	**133**

Table 5-10: Distribution of residents who face challenges when reporting

Distribution of those who faced challenges when reporting	Mwanakerekwe	Mpendae
Live in areas perceived as having poor QoL	25 (61%)	48 (66%)
Live in areas perceived as having good QoL	16 (39%)	21 (34%)
Total Households	41	69

The respondents faced challenges irrespective of which methods they used be it reporting to the community leader, writing letter or going in person to the service providers. From the response received from the household survey, these challenges were coded in to:

- Delay in response by the concerned authority
- Lack of response from the concerned authority
- Absenteeism of the concerned service providers or contact person when they go to report
- Bribery/ corruption by the concerned service providers in order to act on the issue reported
- Had to be registered with the community leader for him to help you

Though the residents expressed dissatisfaction in the method used, the proportion of challenges as given by the respondents differed as indicated in Figure 5-10.

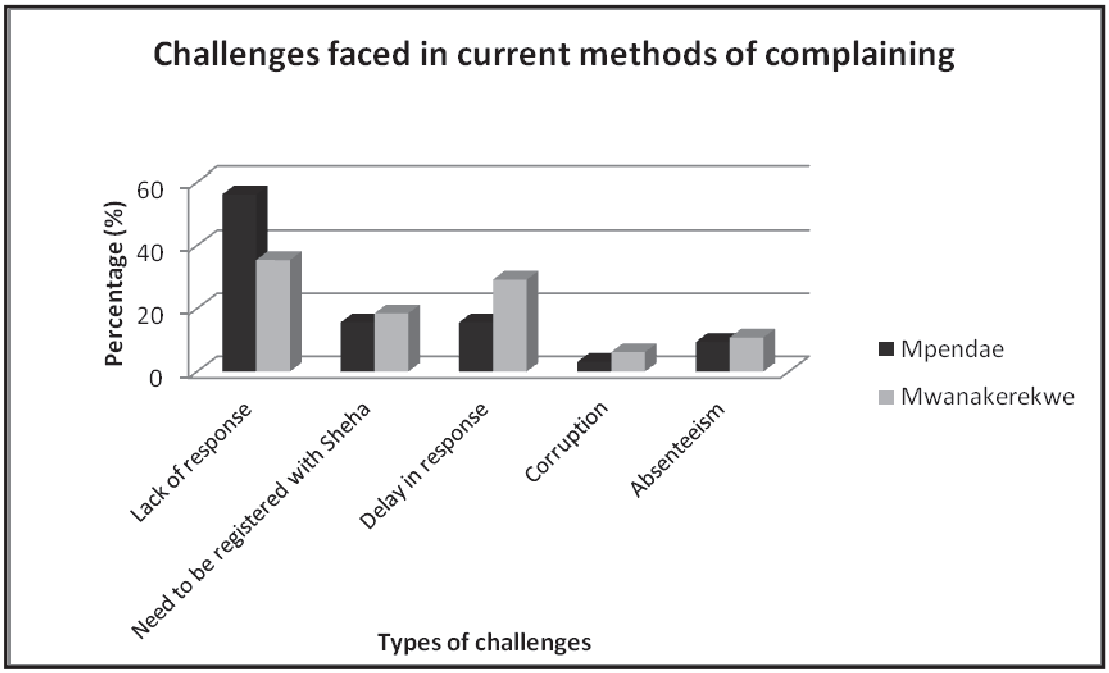

Figure 5-10: Challenges faced by respondents when going to report

From Figure 5-10, it emerged that majority of the respondents in both study areas reported lack of response being the major challenge they faced when they complained to the concerned authorities. This was followed by delay of response and the need to be registered with the community leader to verify that the resident lived in the area before any assistance could be given. In Mwanakerekwe the lack of response was higher than in Mpendae. Cases of corruption and absenteeism by the concerned service providers were however minimal as they recorded the lowest percentages.

In Mwanakerekwe 26% of the respondents acknowledged that action was taken by the concerned authorities when reports were made while 74% said no action was taken. Not much difference existed in Mpendae where 28% of the respondents said action was taken after reporting while 72% said no action was taken. Majority of respondents who acknowledged that action was taken were found in areas that were perceived to have good QoL whereas those who said that action was not taken despite the numerous reports made came from areas that were perceived to have poor QoL. Table 5-11 and
Table 5-12 show this.

Table 5-11: Interviewees response as to whether action was taken after making the complaints/reporting

Is there action taken after complaining?	Mwanakerekwe	Mpendae
Yes	28 (26.4%)	37 (27.8%)
No	78 (73.5%)	96 (72.2%)
Total Households	**106**	**133**

Table 5-12: Distribution of responses where no action is taken

Distribution of those who said No action was taken after reporting	Mwanakerekwe	Mpendae
Live in areas perceived as having poor QoL	55 (70.5%)	66(68.8%)
Live in areas perceived as having good QoL	23 (29.5%)	30 (31.2%)
Total Households	78	96

The lack of response from the concerned authorities even after the residents made the complaints did not deter the respondents from reporting whenever they had problems in their area. In Mwanakerekwe 86% of the respondents still reported whenever faced with problems regardless of there being no action taken over their earlier complaints. In Mpendae the figure stood at 66%. This is indicated in Table 5-13:

Table 5-13: Respondents willingness to report complaints even after no action is taken

Does no response from concerned authority influence on your reporting through the same method?	Mwanakerekwe	Mpendae
Yes	11 (14.1%)	33 (34.4%)
No	67 (85.9%)	63 (65.6%)
Total Households	**78**	**96**

Despite there being initiated an SMS complaint system by ZAWA to monitor water availability and quality, majority of the respondents including the community leaders were not aware of it as indicated in Table 5-8. In both study areas, respondents who knew about the SMS system of complaining were those living in areas perceived to have poor QoL. Upon explanation of what the system was and how it works, majority of the respondents from both areas perceived to have good and poor QoL were willing to use such a system in reporting issues of public concern. Table 5-14 shows this.

Table 5-14: Respondents response to preferring the SMS system

Prefer the SMS system of complaining	Mwanakerekwe	Mpendae
Yes	134 (89.3%)	118 (78.7%)
No	16 (10.6%)	32 (21.3%)
Total Households	**150**	**150**

Overall majority of respondents 85% interviewed in both study areas were willing to use the SMS complaint method when faced with problems while 15% did not prefer the method. In Mwanakerekwe the response stood at 89% those willing to use the method while 11% preferred their earlier "traditional" methods of complaining. In Mpendae this was 79% those willing to use the method while 21% did not prefer it. The reasons given behind not liking such the SMS method are indicated in Figure 5-11.

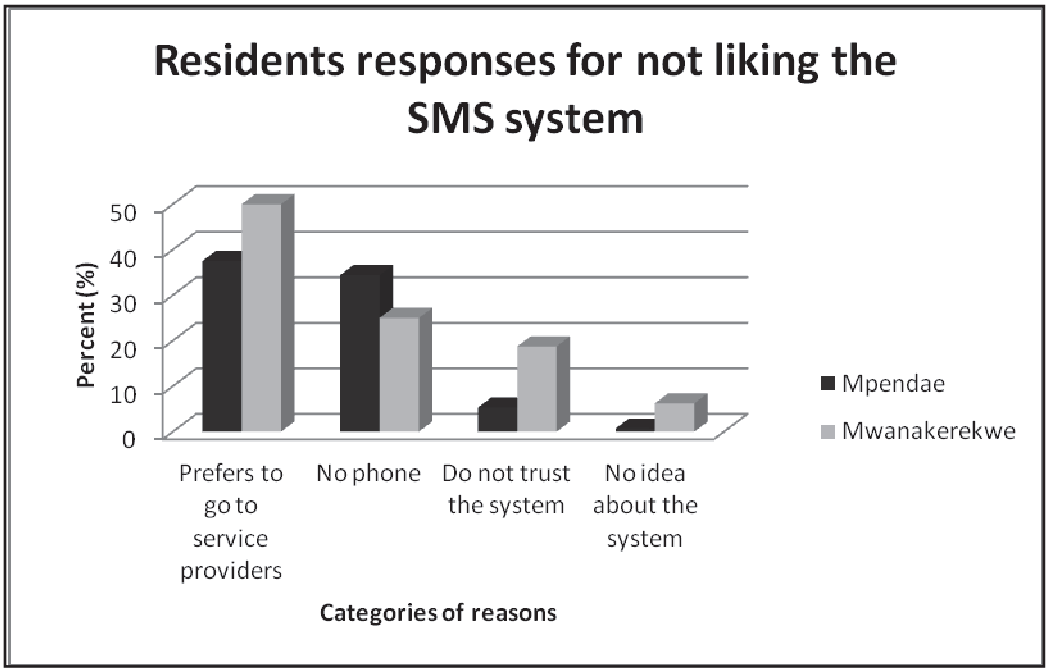

Figure 5-11: Respondents response to not liking the SMS complaint system

The analysis further revealed that majority of the respondents owned and had access to mobile phone, which was useful for one to be able to participate in sending of text messages. Of equal importance was the finding that majority of those who owned phones were women. This is indicated in Table 5-15. Majority of the residents living in areas perceived to have poor QoL owned phones in both study areas. In Mwanakerekwe this stood at 92% while in Mpendae the figure of those who owned mobile phones was 86%.

Table 5-15: Distribution of mobile ownership in the two study areas

Own/access mobile phone	Mwanakerekwe	Mpendae
Men	63 (43.2%)	59 (42.4%)
Women	83 (56.8%)	80 (57.6%)
Total respondents	**146**	**139**

An analysis of residents who did not prefer the SMS system of complaining revealed that majority of them were residents from areas perceived to have poor QoL. In Mwanakerekwe the figure stood at 69%. The situation was almost the same in Mpendae where 56% of those who did not prefer the SMS system lived in areas perceived to have poor QoL. Table 5-16 illustrates this.

Table 5-16: Distribution of resident's response to not preferring the SMS system

Do not Prefer the SMS system of complaining	Mwanakerekwe	Mpendae
Live in areas perceived to have good QoL	5 (31.25%)	14 (43.75%)
Live in areas perceived to have poor Qol	11 (68.75%)	18 (56.25%)
Total Households	**16**	**32**

5.4.3. Which domains of QoL are the residents willing to report using VGI?

Despite the participation of individuals in the process of VGI, there are still questions asked on what motivates people to give out information voluntarily and which also impacts on the quality of geographic information provided (Coleman, et al., 2009). This has also sparked series of research on the same in order to understand the characteristics of those who give out the information as well as the information itself and whether there exists disparities among them which may impact on the quality and reliability of information given out.

In the case of Zanzibar VGI has been seen to be applicable in monitoring public services. Research findings however revealed that the residents were only willing to use such a method of reporting in some of the public services and not all. In addition to these the respondents expressed certain conditions that would permit them to contribute to the SMS system of complaining. These included availability and reliability of public services and receiving positive response from the concerned authorities once the reports were made. According to majority of respondents they attributed the applicability of VGI to be first and foremost applicable only when the public services are available and reliable. According to them, they would report if such services were present and available in their areas since in so doing they would be assured that their complaints or reports would be acted upon. According to one of the respondents;

"The SMS system can be applicable if the public services are available and reliable because we know for instance water is a problem in most parts of Zanzibar, so even if you send the text message complaining there is no water, you know its normal and you do not expect any help from the water authority. So why bother sending the text message in the first place?"

Another factor was that of receiving a positive response from the concerned service providers. The residents would be motivated to send text messages if their reports were acted upon. This would encourage them to continue sending SMS whenever faced with problems since they were assured that action would be taken. For instance in the case of crime, residents expressed their concern that crime rate was increasing on a daily basis whereas they were not seeing any efforts been done by the concerned authorities. According to one of the respondents;

"*We do not hear of any arrests made by the police despite numerous reports made to them, so we now never report cases of crime to them. So what difference is it going to make when you send the SMS? Still nothing will be done and you now have to just find ways of coping with the situation by fencing your property and putting a gate with the belief that thieves cannot get you.*"

If the above concerns could be addressed the residents were willing to use the SMS system to report issues of crime, solid waste collection and disposal and also on water. The reasons for reporting on these issues are included in Table 5-17 and which were largely seen as a partial failure of the traditional methods of complaining such as going in person to the community leader or the service providers to help solve the reported problems. The residents thus felt that through their participation in the named issues of public concern the concerned authorities would be compelled to improve their service delivery through the pressuring component when their grievances are visualized in a virtual globe environment making the information public.

Table 5-17: Residents response on motivations to use VGI against identified domains of QoL

Motivation to use SMS system	**Crime**	**Environment (waste collection/ dumping sites)**	**Health**	**Roads**	**Water**
Anonymity					
Pressuring Component	✓	✓	✓	✓	✓
Efficiency (time)					
Efficiency (money)	✓	✓	✓	✓	✓
Transparent/Corruption Free (No bribes)	✓		✓		
Trust issue					
Community involvement	✓	✓			
Community leader needs not to know you	✓	✓			✓
Avoids Bureaucracy (Direct method)	✓	✓	✓		✓

The residents viewed the SMS system as being valuable because of the pressuring component that it would bring to the service providers who in turn would be compelled to improve on their service delivery. This method was also viewed as being efficient in terms of money saved since the service providers were located in Stone Town area located about 10 kilometres thus forcing residents to incur transport cost when they wanted to report to them. There was not a huge difference when the respondents were asked if they would still send the SMS if this was being charged. Majority of the respondents were still willing to use such a method whether the SMS were been charged or not. Other motivations given to the preference of the SMS system was that the community needed not to know you and it also provided a more direct method compared to going in person to the community leader who would then afterwards report to the service providers or going in person to the service providers.

Despite the residents willingness to use the SMS system, they were however concerned about the issues of anonymity and trust to the system. They expressed reservations in the use of the system fearing that those who complained could be traced and later on victimised. .

6. DISCUSSION

This chapter discusses the results and findings from the study as highlighted in the previous section and according to the set out objectives.

6.1. To identify and evaluate subjective QoL and satisfaction with domains in the study area

Domains of QoL vary from place to place and also what individuals perceive as important in their lives. Studies done on QoL have also revealed this and according to Martins and Marques (2009) the authors note that variations exist both in terms of physical conditions and public provisions within the city thus offering distinct life contexts to its citizens. It is due to these and many other reasons that researchers have advocated for inclusion of people in QoL studies so that they are in a position to identify which domains of QoL are specific to them instead of experts deciding on what they feel is important and contributes to their QoL.

Participants in the FGDs held in Mpendae and Mwanakerekwe identified similar domains perceived to contribute to their QoL. The domains identified and which were similar to those mentioned in the literature review included: housing condition, built environment, neighbourhood safety, accessibility and affordability of public service. Other attributes added by the participants included: availability of storm water drainage system, street lights, dumping sites and recreational areas especially children's playground. The need to include these additional domains was seen by the participants to impact also on the earlier identified domains. For instance the availability of street lights would enhance the neighbourhood safety which at the moment was perceived as being poor. Further the need to include storm water drainage system and dumping sites may be due to the current problems of those domains in their areas. Due to lack of them, residents would dispose garbage in vacant pieces of plots and this situation was worse in Mwanakerekwe where the residents' dumped waste in the nearby cemetery located near residents that perceived their QoL to be poor. In both study areas there were no recreational areas especially children's playground and this forced children to play alongside access roads posing danger to them. The additional domains were however not included in subjective QoL analysis as the participants and respondents reported them as missing in both study areas. Future studies on QoL in the areas could include them if present.

Domain satisfaction

Respondents during the household survey were asked to rate their satisfaction level on the identified domains. In Mpendae, majority of the respondents were satisfied with housing, built environment, neighbourhood safety and access to public service and were dissatisfied with affordability of the public services. In Mwanakerekwe, majority of the respondents were dissatisfied with their built environment, neighbourhood safety, access and affordability of public services. In both areas, residents were satisfied with their housing since they were responsible for putting up their own house also for renting purposes. This therefore meant that individuals put up their housing units depending on the amount of money that one had and thus resulting in their satisfaction with their housing units. Affordability of public services was experienced in both areas where residents felt that they spent much on them. This could be because some of the services were lacking in the areas and when available they were not reliable. For instance water supplied by ZAWA residents complained that it was never available from time to time and this forced them to buy water from those who had private wells and also from the water vendors who sold the commodity at a higher price.

Despite residents of Mpendae having a community hospital within their area, respondents were still not satisfied with its accessibility. As the researcher found out the respondents complained of the hospital not

having drugs from time to time and also it had few staff members including doctors. This forced them to travel to Stone Town about 10 Km to get to Mnazi Moja Referral Hospital. In this case, accessibility according to the residents meant more than just having the hospital within their surrounding but having it equipped with drugs and personnel at all times. This would prevent them from travelling to Stone Town to seek such services and therefore incurring more costs.

Residents living in areas characterised by narrow access roads and unstructured layout pattern of housing units were majority of those who were dissatisfied with the identified domains. This is because most of the services identified were missing in their areas and they were forced to pay more for such facilities. For instance water was an issue in that it was unreliable especially that provided by ZAWA and this forced them to buy from the water vendors thus inquiring more costs. Residents living in areas that were characterised by wider access roads and well-structured layout pattern for the housing units had organized themselves and sought services from private waste collectors and would pay 3000 Tz shillings (1.50 Euro) while those living in areas perceived to have poor QoL found such services expensive and ended up throwing waste in open plots. In addition to this, findings also revealed that the services of solid waste management done by the municipal council were not found in areas that were perceived to have poor QoL. This is also affirmed by Mathenge (2011, p. 79) whereby he notes "*The deputy director of ZMC revealed that their services of solid waste collection, at the time of conducting the research were not reaching the informal settlement areas.*"

6.2. Variations between and within the study area

Quality of life studies have mostly been done at the regional and country level with the purpose of comparing the variations within those levels (Tesfazghi, et al., 2010). According to the authors they reckon that "such comparisons can also be complemented with better knowledge on local variability of life" (Tesfazghi, et al., 2010, p. 74). In this study the areas selected Mwanakerekwe and Mpendae represented the smallest administrative units in Zanzibar referred to as *Shehias*. Research findings revealed there was no variation between the two areas in terms of the identified QoL domains. Both areas had the same coefficient of variation score thus being homogeneous and being perceived to have moderate subjective QoL.

However there existed spatial variation within the study areas where on overall areas that were characterised by wider access roads and well-structured layout pattern of housing units perceived their QoL to be good whereas those living in areas characterised by narrow access roads and unstructured layout pattern of housing units perceived their QoL to be poor. Residents living in areas perceived to have poor QoL complained of lack of public services in their areas and they were also forced to pay more for those services. For instance most of their areas were not connected with piped water from ZAWA and they relied on the water vendors to supply them with the commodity which was costly to them. In areas perceived to have good QoL, residents had access to the public services. Their fenced their properties and this helped in ensuring their safety within their neighbourhood. This however was not the case in areas perceived to be having poor QoL. This spatial variation of the identified domains resulted in clustering of households that perceived their QoL to be good or poor as they were located within the same neighbourhood.

6.3. Potential of VGI in assessing subjective QoL conditions

In order to determine the potential of VGI taken as the SMS system of complaint in assessing the subjective QoL, it was deemed necessary to first of all identify the existing methods that the residents used when faced with challenges and how satisfied they were with them. It was equally important to get the

perceptions of the residents on a similar initiative, HSW, which was used to monitor water in the area. This would also enable the researcher to determine how applicable VGI was in addition to the responses given by the participants at the FGD and household survey.

The research findings revealed that majority of the respondents when faced with problems especially related to provision of public services reported to the concerned authorities. Few of them never made the reports and these coincided with residents living in areas perceived to have poor QoL. The reason given for not reporting was that no action was taken by the concerned authorities to address the reported issues despite numerous reports being made and this therefore demoralised them from reporting. This was in addition to residents not trusting the system and fearing that their personal information would be used to victimize them. The residents had also found other ways to cope with their problems. For instance since they knew that water supplied by ZAWA was not reliable, they would buy from those with private wells. One of the respondents during the household survey shared this view in terms of not reporting on crime issues.

"*Even if you report, who listens to you? So it is better to be like a man and try to solve the problem your own way. And again by the time they come to assist you the thieves have already stolen and gotten away with the loot safely*"

With improvements in infrastructure, lower tariffs and the arrival of wireless access technologies such as the Undersea Optical Fibre Cable Network linking many African countries to Europe and Asia (Molony, 2008), this has resulted in dramatic increase in Africa's ICT development and in particular mobile phone ownership. According to a report by the African Partnership Forum (2008) it was noted that the increase in phone ownership had led to numerous applications of mobile phones in various sectors such as health, education and also in business and which looked promising in the continent citing examples from Kenya and South Africa which were leading the continent in the adoption of mobile banking solutions.

In Zanzibar, the research findings indicated majority of respondents owned mobile phones and were willing to use the SMS system to report issues of public concern. This was greatly supported by the findings that the residents were dissatisfied with their "traditional" methods of reporting such as going in person or writing mails to the service providers and also reporting to the community leader and were willing to embrace such an initiative with the hope that their problems will be solved by the concerned service providers. Equally important was the findings that residents who perceived their QoL to be poor had access to mobile phones and had even participated more in sending water complaints to ZAWA.

According to numerous studies done on mobile phone ownership, researchers argue that there is a digital gender divide in many developing countries and in which women have been shown to have little access to media, communication technologies and also the opportunity to build communities and share experiences which has been seen to provide powerful instrument for reducing poverty, promoting good governance and also facilitating human development (UNDP, 2004). In most cases men are seen to have access and control of most of the ICT devices including the mobile phones and thus limit the participation of women in public issues (Sung, 2010). Contrary to this, the findings revealed that in the two study areas, women who were majority of the respondents had access to and owned mobile phones and were also willing to use the SMS system in reporting issues of public concern. This was thus an added advantage on applicability of the SMS system in the area since it is "*women who have grievances to report because they are usually in charge of collecting water and thus issues of delays in sending reports and reliability of information do not exist in this case."* (Verplanke et al., 2010, p. 196).

Apart from using the SMS system to make complaints relating to water, the respondents indicated willingness to use such a system whenever they had issues to do with health, crime and waste disposal.

According to them, the earlier methods had proven futile in solving their issues and they hoped with the SMS system they would report failures in the service delivery by the service providers. With the public disclosure of those reports on the web and other mass media this they hoped would put pressure on the service providers to take remedial action also in areas that residents perceived to have poor QoL.

Despite the resident's willingness to use the SMS system to report on the above identified issues including water, this was however not depicted from the findings in which only a small number of participants had sent SMS to ZAWA. In Mpendae only 6 respondents had sent text message out of 20 respondents who had seen the ZAWA signboard while in Mwanakerekwe only 4 had sent an SMS out of 9 respondents who had seen the signboard and were aware of the initiative by the water authority. These were residents living in areas perceived to have poor QoL and also which coincided with areas where ZAWA sign boards were placed. This explains why the residents living in areas perceived to have good QoL were not aware and did not participate in the SMS initiative by the water authority. However despite residents living in areas perceived to have poor QoL having seen the ZAWA signboard, still not many were using the initiative in reporting problems related to water. This therefore raises an eyebrow as to why still there is low participation among them and also why not many residents were aware of this despite the signboard being within their locality. Could it be that they could not understand what was written on the signboard yet this was done in their local language or that they did not have the ability to read?

Characteristics of the respondents however revealed that majority of them had attained the primary and secondary level education about 70% and this meant that they could read. The lack of participation could thus be explained by the fact that sensitization and awareness by the water authority was poor in the area and this led to majority not having an idea about the SMS complaint system. The signboards were also placed not placed in strategic places, only one per *Shehia* and mostly in schools, mosques and hospitals where water was never rationed. Since this was not centrally placed within their neighbourhood residents would opt for other sources of water such as private wells to supplement that from ZAWA. In some cases they would even buy the commodity from water vendors who would bring it to their residence and this therefore resulted from their lack of knowledge on the existence of the SMS complaint system.

Despite the residents' willingness to use the SMS initiative to report on issues of water, health, crime and waste collection and disposal, they expressed reservations when it came to trusting the system. Since it was mandatory for all Subscriber Identity Module (SIM) cards in Zanzibar to be registered giving details of the owner, the residents felt that the information could be retrieved and used to track who was complaining and afterwards victimize them. Other issues raised by the respondents were that for the SMS system to work properly, the public services should be made available and reliable in all areas in the first place and action taken whenever the complaints were reported. These would motivate them to report more seeing that their reports were being acted upon. These issues need to be embraced by the concerned authorities for the SMS system to work properly. Such would help prevent failure of the initiative having also learnt lessons from Daraja's Maji Matone approach where the founders admitted the approach had not lived up to its expectations despite the institutional settings appearing to be better. The initiative received less number of SMS against the set target and one of the reasons they attributed the failure to was, "*Motivating people to take action is tough, especially when the promise of anything happening as a result is distant and unclear*" (Daraja, 2011).

7. CONCLUSION AND RECOMMENDATION

This chapter presents the conclusion and recommendations of the study carried out in Zanzibar which aimed at evaluating the applicability of VGI in assessing subjective QoL. The conclusion will be looked at per each objective.

7.1. To identify and evaluate subjective QoL and satisfaction with domains in the study area

Participants in the two FGD identified domains that were specific to their area. These domains were categorized into housing, built environment, neighbourhood safety, access and affordability of public services. However some attributes identified were omitted in the analysis as respondents reported them lacking in both study areas. These included availability of storm water drainage system, dumping sites, street lights and recreational areas especially children's playground.

The domains identified were used to analyze the satisfaction level of the respondents using a 6 point likert scale where 1 represented completely satisfied to 6 that represented completely dissatisfied. This was thus used to quantify the responses based on their satisfaction level. Majority of the respondents in Mpendae were satisfied with housing, built environment, neighbourhood safety and access to public services. They however expressed dissatisfaction with affordability of the public services. This was different in Mwanakerekwe where majority of the respondents were only satisfied with housing and dissatisfied with their built environment, neighbourhood safety, access to and affordability of public services.

7.2. To evaluate the spatial variability of subjective QoL in the study area

The domains identified were used to analyse the variability between and within the two study areas. The variability of the subjective QoL between the two study areas was evaluated using the coefficient of variation which was arrived at by computing standard deviation over the mean score of the domains of QoL. The results indicated that the variability in the two areas was close to each other with the standard deviation being 0.54 and 0.59 for Mpendae and Mwanakerekwe respectively. The coefficient of variation was similar being 0.17. The results therefore suggest that the two areas are relatively homogeneous in terms of the identified domains of QoL.

The spatial variation within the study areas revealed that residents living in areas that have well structured layout pattern of housing units with wider access roads perceived their quality of life to be good whereas those living in areas characterised by narrow access roads and unstructured layout pattern of housing units perceived their QoL to be poor in almost all the domains identified.

7.3. To evaluate the potential of VGI tools in assessing subjective QoL conditions

The major findings of the study in regards to evaluating the potential of VGI tools in assessing subjective QoL conditions was that the residents were willing to use the SMS system of complaint to report on issues of crime, health, water and solid waste collection and disposal. Their motivation to contributing in giving out information concerning their public services was however pegged on whether issues of trust or anonymity were present in what they had to report. As mentioned earlier, all SIM cards had to be registered and the residents felt that their information would be used to trace those who were complaining and thus victimise them. The applicability of VGI was thus not really based on specificity of the problems but rather whether issues of trust and anonymity were present in the system.

The residents felt that using the SMS system in reporting issues of public concern and through visualization of the same in virtual globe environment, this would put pressure on the service providers and in turn make them to improve their service delivery in all areas. The SMS system can thus be viewed as one in which it provides the citizens with an outlet for creative and independent self expression and thus seen as a move towards citizen's participation in bringing out change through self empowerment by pressurizing the Government and public service providers to improve on their service delivery in all areas. These findings were based on the responses from the respondents and are indicated below.

It was necessary to find out whether the respondents whenever faced with problems of public concern reported or not. Majority of them reported and those who did not attributed this to the lack of action being taken after the reports were made especially in the areas perceived to have poor QoL. Majority of the respondents reported to the community leader followed by going in person to the service providers. Despite there been initiated the SMS complaints system by ZAWA, majority of the respondents did not know about it. Of the few who knew about it, there were still a smaller percentage of those who had used it. Respondents, who attributed to knowing about the SMS initiative by the water authority, coincided with those who were living in areas perceived to have poor QoL. Upon further explanation on what the system was and how it worked through describing and showing of the Google images, majority of the residents were willing to use such a method in voicing out their grievances.

This was further supported by residents' dissatisfaction with the existing methods of complaining like reporting to the community leader who would in turn report to the service providers and also going in person or writing letter to the service providers. According to the residents they faced a lot of challenges such as lack of response by the concerned authorities; delay in response and in minimal incidence issues of corruption by the concerned authorities. The findings revealed that majority of those who faced challenges were residents living in areas perceived to have poor QoL and also where action was also not taken when reports were made. Despite the respondents not getting any response from the concerned service providers, this did not deter them from reporting whenever they faced problems of public concern.

Equally important was the findings on majority of the residents ownership of mobile phones and willingness to use them to make reports. Mobile phone ownership in this case plays an important role as it dictates whether residents will participate in giving out information. The findings revealed that majority of the residents including those who lived in areas that were perceived to have poor QoL owned mobile phones and were willing to contribute in reporting issues of public concern whether paying for the SMS or not. For those who did not prefer the SMS system this was because they said they could not trust the system and feared that they could be easily traced and victimised. In Zanzibar, the study found out that every SIM card had to be registered by the mobile service providers and this included details of the person who owned the mobile including where he/she leaved. The residents thus felt that such information could be accessed and used to see who was complaining and end up victimizing the sender. In as much as they were willing to report on issues of crime, health, water, waste collection and disposal, they still did not trust the SMS initiative and expressed fear in using it.

The findings of this study revealed that VGI which in this case was taken as the SMS complaint system was preferred by majority of the citizens. The citizens' perception towards their QoL whether good or bad, did not hinder them from contributing. This was further supported by their ownership in mobile phones. In this case it can be said that VGI does not create a new form of social exclusion as residents living in areas perceived to have poor and good QoL were willing to report on issues of public concern.

From the onset of the study, two areas were chosen as they indicated the highest and lowest number of complaints through a similar initiative known as HSW. The results however indicated there was no big

difference in terms of the responses from the interviewees from the two areas. In terms of residents being aware of the SMS initiative by ZAWA, in both areas only a few people living in areas perceived to have poor QoL were aware of it and only a few of them had used it. These results were unexpected given the fact that Mwanakerekwe had recorded the highest number of water complaints and this would therefore be taken that majority of the people were aware of the initiative compared to Mpendae where the number of complaints was minimal.

7.4. Recommendation

The study adopted the case study approach to look into the applicability of VGI in assessing the subjective QoL and in which two study areas were identified. It is thus imperative to underline that this was a context specific study with limited focus judging from the number of administrative units that took part in the inception of the HSW pilot project. It is therefore not possible to make generalizations based on the conclusions drawn from the two study areas as they might be unique only to the two areas selected. However the findings could be used in addition to similar studies so as to draw sufficiently generalizeable conclusions. Also a more representative study with a wider scope of the areas included in the pilot project for HSW could also be done not only to verify these findings but also to make wider claims on the study.

During the field survey, it was established that majority of the residents were not aware of the SMS complaint system by ZAWA. The water authority thus needs to find ways of creating and increasing awareness to the people through public meetings "*barazas*" with the inclusion of community leaders so as to sensitise them. In addition to this it emerged that there was still low participation among those who were aware of the initiative. The reason given by them was lack of trust and issues of anonymity. If this could be addressed and residents assured that their personal information would not be used to victimize them but rather demonstrate to them that their participation could achieve improvements in service delivery this could enhance the applicability of VGI in assessing subjective QoL. If such issues are not addressed, then the applicability of VGI not only in assessing water but also on other domains identified could be hampered and would suffer from similar initiatives such as Daraja's Maji Matone programme which according to its founders, "*has not lived up to expectations. In particular, despite considerable resources spent on promotional work - printing and distributing posters and leaflets, as well as extensive broadcasts on local radio - we haven't had the response from the community that we had hoped for"* (Daraja, 2011). According to the founders of Daraja they only received 53 SMS messages compared to their initial target which was 3,000 making them to "embrace failure, learn and share lessons from the experience, and to fundamentally redesign the programme".

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ANNEXES

1: HOUSEHOLD QUESTIONNAIRE

Applicability of Volunteered Geographic Information/SMS System in Assessing Subjective Quality of Life Conditions

I am a Masters of Science Student from University of Twente Faculty of ITC in the Netherlands undertaking the above study. This survey is about the subjective quality of life conditions according to the residents of this Shehia and the applicability of Volunteered Geographic Information/SMS system of complaining in assessing the same. Information obtained from the residents will be held confidential and will be strictly used for academic purposes

HOUSEHOLD QUESTIONNAIRE

Assessment of perceived attributes of domains of life

Name of Shehia……..

Household code……

Name of interviewer……..

General Information

1. Age of interviewee ……
2. Gender
   - Male ☐
   - Female ☐
3. What is the level of education of the interviewee?
   - Not educated ☐
   - Primary education ☐
   - Secondary education ☐
   - Vocational college ☐
   - University degree ☐
4. What is the employment status of the interviewee?
   - Employed ☐
   - Unemployed ☐
   - Self-business ☐
   - Student ☐
5. What is the ownership of your house?
   - Own ☐
   - Rent ☐
   - Others ☐
6. How many people are currently living in your household?.....
7. How many rooms are there in your house?.....
8. How long have you been living in this Shehia?.....

Overall life and domain satisfaction

9. What is your level of satisfaction concerning your life as a whole?
    1. Completely satisfied ☐
    2. Very satisfied ☐
    3. Satisfied ☐
    4. Dissatisfied ☐
    5. Very dissatisfied ☐
    6. Completely dissatisfied ☐
10. What is your level of satisfaction with the following domains of life?

    1 = Completely satisfied 2 = Very Satisfied 3 = Satisfied 4 = Dissatisfied 5 = Very dissatisfied 6 = Completely dissatisfied

Domains	**1**	**2**	**3**	**4**	**5**	**6**
Housing						
Built environment						
Neighborhood safety						
Access to public services						
Affordability of public services						

11. Taking all the domains of life above into consideration, how satisfied are you with your life as a whole at present?
    1. Completely satisfied ☐
    2. Very satisfied ☐
    3. Satisfied ☐
    4. Dissatisfied ☐
    5. Very dissatisfied ☐
    6. Completely dissatisfied ☐
12. Are there other domains of life you want to include?
    1. Yes ☐
    2. No ☐
13. If yes, Which ones?.....

Assessment of Quality of Life domains and there level of satisfaction

14. What is your opinion on the following domains?

Assessment of attributes	**Level of Assessment**					
Housing	1	2	3	4	5	6
Housing affordability	Extremely Low	Very low	Low	High	Very high	Extremely high
Level of home ownership you have	Completely satisfied	Very satisfied	Satisfied	Dissatisfied	Very dissatisfied	Completely dissatisfied
Crowding in your house	Not crowded	Very less crowded	Less crowded	Crowded	Very crowded	Extremely crowded
Housing condition	Extremely good	Very good	Good	Dilapidated	Very dilapidated	Extremely dilapidated
Assessment of number of rooms that you have	Extremely large	Very large	large	small	Very small	Extremely small
Built environment						
Attractiveness of your living place	Extremely attractive	Very attractive	Attractive	Unattractive	Very unattractive	Extremely unattractive
Suitability of your living place for raising children	Extremely suitable	Very suitable	Suitable	Unsuitable	Very unsuitable	Extremely unsuitable
Cleanness of your neighbourhood	Extremely good	Very good	Good	Satisfactory	Very poor	Extremely poor
Congestion of your neighbourhood	Not congested	Low congestion	Not congested	Congested	Very congested	Extremely congested
Quality of roads in your neighbourhood	Extremely good	Very good	Good	Poor	Very poor	Extremely poor
Quality of sanitation in your neighbourhood	Extremely good	Very good	Good	Poor	Very poor	Extremely poor
Neighbourhood safety						
Crime rate in your area	Not at all	Slightly low	Low	High	Slightly high	Extremely high
Road safety your area	Extremely safe	Very safe	Safe	Slightly unsafe	Very unsafe	Extremely unsafe
Police protection in your area	Extremely satisfactory	Very satisfactory	Satisfactory	Unsatisfactory	Very unsatisfactory	Extremely unsatisfactory
Access to public services						
Police stations	Extremely near	Very near	Near	Far	Very far	Extremely far
Primary schools	Extremely near	Very near	Near	Far	Very far	Extremely far
Secondary schools	Extremely near	Very near	Near	Far	Very far	Extremely far
Health facilities	Extremely	Very near	Near	Far	Very far	Extremely

	near					far
Living place is easily accessible to public transport	Extremely accessible	Very accessible	Accessible	Near	Very inaccessible	Extremely inaccessible
Market	Extremely accessible	Very accessible	Accessible	Near	Very inaccessible	Extremely inaccessible
Affordability of public services						
Primary schools	Extremely affordable	Very affordable	Affordable	Expensive	Very expensive	Extremely expensive
Secondary schools	Extremely affordable	Very affordable	Affordable	Expensive	Very expensive	Extremely expensive
Health facilities	Extremely affordable	Very affordable	Affordable	Expensive	Very expensive	Extremely expensive
Public transport	Extremely affordable	Very affordable	Affordable	Expensive	Very expensive	Extremely expensive
Market	Extremely affordable	Very affordable	affordable	Expensive	Very expensive	Extremely expensive

15. Are there methods used to report complaints in the area?
    1. Yes ☐
    2. No ☐

a) If Yes, which are they?.....

16. What methods do you use for reporting complaints in your area?
    1. Through the *shehas (*community leaders*)* ☐
    2. Through local radio stations ☐
    3. Through letters ☐
    4. Going in person to the service providers ☐
    5. Others ☐

    (Specify)……

17. Which issues do you normally report on?
    1. Public services ☐
        - Specify……
    2. Crime ☐
    3. Calamities ☐
        - Specify…….
    4. Others ☐

    (specify)……

18. Are there any challenges you experience with the above methods in articulating your complaints?
    1. Yes ☐
    2. No ☐
    a) If Yes, what are the short comings of the methods?.....

19. Is there any action taken by the concerned parties after you report the complaints?
    1. Yes ☐
    2. No ☐

a) If No, has this had an influence on your reporting through the same methods?

1. Yes ☐
2. No ☐

20. Are there any problems related to water in your areas?
    1. Yes ☐
    2. No ☐
21. If Yes, what are the problems you experience?.....
22. Do you have such a water tap here in your *Shehia*? (*Show the picture of sign board with water tap*)
    1. Yes ☐
    2. No ☐
23. Do you know what it is for?
    1. Yes ☐
    2. No ☐
24. Have you ever sent any message in regards to the availability of water via the system?
    1. Yes ☐
    2. No ☐
25. Was there any action taken by the concerned parties after you sent the message?
    1. Yes ☐
    2. No ☐

a) If No, has this had an influence on you reporting through the same methods?
    1. Yes ☐
    2. No ☐

26. Do you prefer using the SMS system to make reports?
    1. Yes ☐
    2. No ☐

b) If No, why would you not prefer using such a system?.....

c) Do you have a mobile phone?
    1. Yes ☐
    2. No ☐

27. Would you use such a system to report on the conditions of the following apart from water? (Tick the appropriate ones)
    1. Public Services
        I. Health care ☐
        II. Education ☐
        III. Sanitation ☐
        IV. Recreational areas ☐
        V. Electricity ☐
    2. Crime ☐
    3. Calamities ☐
    4. Others, (specify) ☐

    ……

28. What are your reasons for preferring the SMS system of complaint in reporting the marked issues?.....

29. Would you prefer using such a system compared to the other methods named in question 16 above?
    1. Yes ☐
    2. No ☐
    a) If Not, what are the reasons that would prevent you from using the such a method?.....

2: ZAWA SIGNBOARD PLACED AT THE WATER TAPS

Source: Filed observation