TARGETING DEPRIVATION THROUGH QUALITATIVE AND QUANTITATIVE INDICATORS

Case study of Kisumu – Kenya

JULIO ROBERTO PEREIRA

March, 2011

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JULIO ROBERTO PEREIRA
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SUPERVISORS:
Dr. Richard V. Sliuzas
MSc, Ms Monika Kuffer

THESIS ASSESSMENT BOARD:
Dr. Richard V. Sliuzas (Chair)
Dr. K. Pfeffer (University of Amsterdam, External Examiner]

ABSTRACT

Despite the fact that poverty and deprivation have been used interchangeable, there are considerable differences on the concept and measurement of the two conditions. Unlike poverty which the main focus is the monetary dimension, deprivation approach overcomes the limitation of narrowing down poverty measurement to income by identifying deprivation as inability to afford items considered to be essentials.
There is a widespread agreement that deprivation is a multidimensional concept whose root cause is economic.
This paper provides a descriptive analysis of the intensity and distribution of deprivation at two different scales, household and area level by integrating spatial, physical and social aspects of welfare to measure Multiple Deprivation.
Recognising the value of public perception about there condition of deprivation, a participatory methodological approach was used with the inclusion of qualitative indicators combined with quantitative indicators to produce the Overall Index of Multiple Deprivation in Manyatta 'A'.
Beyond the statistical analysis, the study provides a better understanding of spatial concentration of the most deprived groups by identifying clusters of households suffering from specific and Multiple Deprivation as well as the degree and intensity of the condition.

The results indicate that there is a spatial concentration of deprivation and multiple deprivation in the study area to whom remedy polices should focus on. Aspects such as bathing facilities, safe water, employment ratio and monthly income are the indicators with more disparities in the settlement.
The inclusion of qualitative indicators on the overall measurement of deprivation shows that it increases the number of people experiencing deprivation while the quantitative indicators overestimate the degree and intensity of deprivation.
By providing a methodological approach to identify the most deprived groups, the research intends to be a valuable contribution to support decision makers in targeting the most vulnerable groups and contribute to the citizen's life improvement.

Key Words: Urban Governance, deprivation measurement, quantitative vs qualitative indicators, Index of Multiple Deprivation, spatial analysis.

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ANOVA	Analysis of variance
CIDA	Canadian International Development Agency
GIS	Geographical Information System
HDI	Human Development Index
HPI	Human Poverty Index
IMD	Index of Multiple Deprivation
ITC	Faculty of Geo Information Science and Earth Observation of the University of Twente
KNBS	Kenyan National Bureau of Statistics
KUB	Kisumu Upgrading Programme
KENSUP	Kenya Slum Upgrading Programme
LASDAP	Local Authority Service Delivery Program
MCI	Millennium Cities Initiative
MCK	Municipal Council of Kisumu
MFP	Ministry of Finance and Planning
MSP	Ministry of State for Planning, national Development and vision 2030
NGO's	Non Governmental Organizations
OFP	Office for national Statistics, UK
Pamoja Trust	Local Non Governmental Organization working in slum improvement
PCA	Principal Component Analysis
PQLI	Physical Quality of Life Index
PRSP	Poverty Reduction Strategy Paper
SPSS	Statistical Package for Social Science
UN Habitat	United Nations for Human Settlements Program
UNDP	United nations Development Program
WHO	World Health Organization

1. INTRODUCTION

More than half of the world's poor will live in cities by 2035, according to some estimates, and in the next two decades more than 95 percent of population growth in the world's poorest regions will occur in cities (Horwood, 2007).

In developing countries, still a large number of households live in poverty and suffer from deprivation. Since the deprived urban dwellers are the majority and the most vulnerable, measuring deprivation at the household level provide a useful insight of the degree, intensity and distribution of deprivation which in turn allows a better insight of the living conditions and formulation of remedial policies for targeting the ones who needs most.

Current measures of deprivation are often limited to monetary income distribution and most of them are non-spatial. Despite the widespread agreement that poverty and deprivation are multidimensional, recent studies have suggested that the operationalisation of the concept has not followed this development, as most studies are still primarily based on income (Dewilde, 2004).This fact leads to the omission of many other important characteristics of human well-being besides the economic ones that are not necessarily closely correlated with income. Ringen (1988) cited by Baud et. al (2009), argues that poverty is not only about low income, but also about deprivation and the emphasis on deprivation reflects in part, theoretical concerns that low income provides an indirect measure rather than a direct measure of poverty.

Deprivation measurement is often conducted using mainly quantitative data but studies have already proven that the inclusion of qualitative data can increase the accuracy of deprivation measurement. The two types of indicators are complementary and both are important for an effective measurement of deprivation.

This study intends to be a contribution to the academic debate and aims at developing a method to support decision makers to propose the necessary policies for alleviation of poverty and deprivation at the most appropriate decision making scale needed to meet different goals. Another stated purpose of the research is to identify through the integration of qualitative and quantitative indicators those groups which experience the greatest levels of deprivation which can then be used to inform targeting of regeneration programmes on their residential areas taking into account the scarcity of resources and the necessity of improving the provision of services.

> "A society cannot claim to be harmonious or united if large numbers of people cannot meet their basic needs while others live in opulence. A city cannot be harmonious if some groups concentrate resources and opportunities while others remain impoverished and deprived."
> (UNHabitat, 2008, p. IX)

1.1. Background and Justification

One of the main challenges of the post-independence local governments in many developing countries was and still is to keep up the pace of urban growth within cities. The inability to cope with the phenomena has led many urban environments to the proliferation of informal settlements and slums in the outskirts of the major cities. Those settlements with its socio economic problems have been seen as the most deprived areas and the face of poverty in developing countries.

Keeping up with this rapid pace of growth is one of the major urban challenges in today's world and given the present demographic trends, the majority of the future poor will be urban perpetuating the so called urbanization of poverty. Smith et al. (1994) argue that what comprises poverty or a state of deprivation is clearly relative, influenced by the level of economic and cultural development of the society concerned.

Since poverty and deprivation have spatial concentration particularly in developing countries, addressing them requires more information to understand its degree, intensity and spatial distributions for better targeting the most vulnerable groups. Sanusi (2008) argues that seeing poverty from the point of view of deprivation does not only portray the new approach to poverty definition, it also helps in proper understanding of the conditions of the poor.

The research was conducted in Kisumu, one of the poorest cities in Kenya and where recent approaches to address poverty have failed according to a recent study on poverty in the region where despite the anti-poverty policies implemented by the government, poverty has, instead, increased dramatically such that the average Kenyan was poorer in 1999 than at independence in 1963 (MFP, 2000).

1.2. Why focus on deprivation

There is a conceptual difference between 'poverty' and 'deprivation' but both terms have often been used in many occasions interchangeably. Despite the fact that both imply some deficiency or inadequacy in the material conditions of life, they demand different strategic approaches.

There is a classic definition of deprivation which appears to be widely accepted particularly among the academics [e.g. Nolan and Whelan (1998); Langlois & Kitchen,2001); Pacione (2009) and Martínez (2005)] which defines deprivation as a 'state of observable and demonstrable disadvantage relative to the local community or the wider society or nation to which an individual, family or group belongs' (Townsend, 1993). It refers to specific conditions, such as the lack of clothing, housing, household facilities, education and social activities, rather than resources, and is thus distinguished from poverty (Martinez, 2005).

Different approaches for measuring and quantify poverty and deprivation have been criticized due to the fact that many of them are focused on monetary dimension only. Saunders et al. (2009)argue that controversy over the setting of poverty lines and its narrow focus on income has undermined the influence of poverty research on policy while the deprivation approach overcomes these limitations by identifying deprivation as an inability to afford items that receive majority support for being essential. Furthermore, he argues that deprivation also provides a clearer differentiation between those who can and cannot afford specific necessities than a classification based on low income.

Sanusi (2008) argues that looking at household-based deprivations, poverty as relates to each household member could be observed. Deprivation manifests in different ways and if in a geographical area various forms of deprivation are present, then people will experience multiple deprivation (Townsend, 1993).

The focus of this research is deprivation and the rationale behind the approach is that by addressing deprivation, the gap between the best-off and worst-of reduces, promote more social justice and reduce poverty. The research also shares the concept propagated by Townsend by considering deprivation as the lack of housing, household facilities, education, employment, income, access to basic services and well-being. The concept of well-being adopted is related to satisfactory condition of existence.

1.3. Research problem

The increasing polarization between deprived and more affluent areas where the rich get richer and the poor get poorer has been subject of concern on the last two decades. Efforts to bridge the gap between the best off and worst off will be achieved successfully with information about the condition of the urban dwellers.
There is a growing consensus that better information is a crucial prerequisite for good governance and the latest can lead to a more efficient planning and decision making. The availability of information to assess intra-city deprivation is scarce particularly in cities in developing countries where most of them are aggregated at city or national level. Henninger (2002) acknowledge that spatial information disaggregated to the lowest level at which decisions on interventions are made within cities could contribute to improving local governance. Baud, et al.(2009) highlight that quantitative data at national and state-level, cannot provide sufficiently disaggregated data to plan effectively at the city or within-city level leading to an under-estimation of urban poverty, and city planning based on incomplete information. This makes difficult to take actions and implement anti-poverty policies effectively.

Methodological approaches to measure and quantify poverty have been subject of study in the last two decades and they are mostly originated from western society where the most widespread approach is the use of composite index to assess deprivation. There are a variety of deprivation indices currently in existence, which were developed to meet different objectives. The discussion on their relative merit, particularly regarding the best selection of indicators or methods of construction has yet to be achieved. This is even more delicate when it comes to assess deprivation in the less developed countries where the majority of the urban population suffer from deprivation and the pattern of development and the standard of living are very low compared with the developed countries.

There is still a scarce literature on measuring urban deprivation using an integrated approach where qualitative and quantitative indicators are combined into a composite index of multiple deprivation. The research will seek to identify spatial concentration of deprivation and multiple deprivation through a multidimensional approach.

1.4. Objectives and research questions

The Objective of the research is to identify household multiple deprivation which can be used to support decision makers in targeting the most deprived.

To achieve the proposed objective, several sub-objectives have been set and research questions have been asked:

Table 1-1: Sub-objectives and research questions

	Sub Objectives	Research Question
1	**To identify the key Dimension of deprivation**	1.Which are the most relevant indicators to assess Deprivation in Manyatta 'A' ?
		2.Which dimensions of deprivation require more attention to support pro-poor actions?
2	**To measure and quantify Multiple Deprivation in in the area of Study**	1.How different dimensions of deprivation can be integrated to assess physical, spatial and social aspects of welfare?
		2.How different dimensions of deprivation correlate with each other?
		3.How Principal Component Analysis can be used to identify the most relevants indicators to assess deprivation?
3	**To evaluate the effect of qualitative indicators on the Measurement of Deprivation**	1.How the insights from qualitative indicators can feed into the improvement of the overall multi-deprivation analysis?
4	**To extract and map the spatial clusters of Household Deprivation in Upper Manyatta**	1. Are there spatial clusters of deprived and multi-deprived households?
		2.How homogeneous is the spatial distribution of public facilities in the area of study?
5	**To identify the most appropriate scale for police making in the local context**	1.What is the most appropriate scale for policy making?
		2. Which criteria's are used for prioritization of resource allocation?

1.5. Conceptual framework

Urban planning and management is crucial if our cities are to become the forefront of socio-economic change and sustainable development.

The challenges of urban management especially in developing countries starts with good governance and public policies which promote economic development and resources allocation based on the fulfilment of the needs of urban dwellers irrespective of their socio economic conditions and the place of residence.

The involvement of the public authorities in producing and managing cities influences city dwellers living conditions and economic development by providing infrastructure and services.

Municipal services enable initiatives to improve people's access to resources but they can also generate economic and social inequality. These disparities are the result of heterogeneous urban planning and inconsistencies in distribution of capitals between communities and socio economic groups (Jaglin, 1993).

In Africa, due to their condition, people who are worse off in socio economic terms are forced to live in poor built environments characterized by poor living conditions and lack of basic urban services and infrastructure. Poverty and inequalities lead this group of people to the most undesired places due to their lack of resources to afford for basic urban services and what is worse, the inability of the local authorities to provide infrastructure and services giving room to the slum formation.

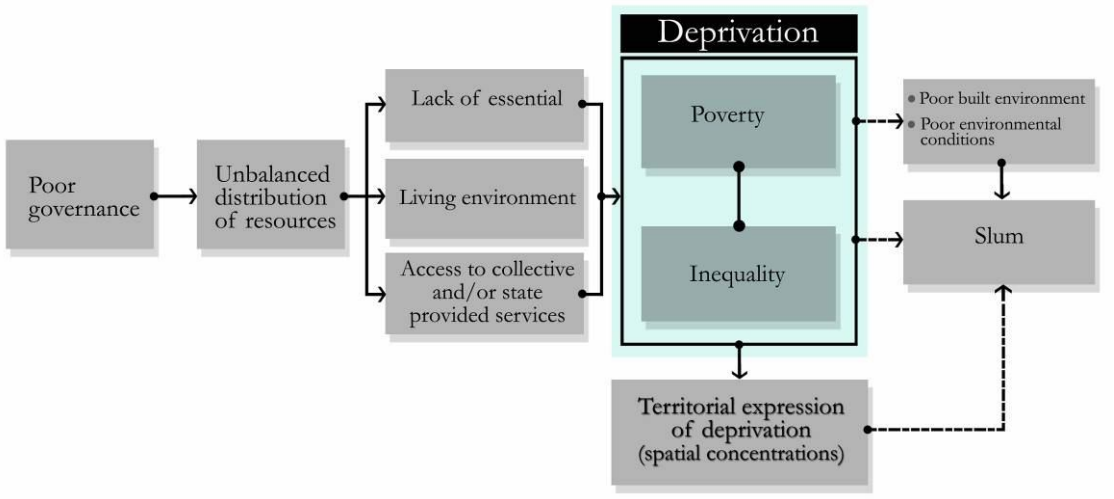


Figure 1-1: Conceptual framework

Deprivations are linked to the ways households live and work, their degree of access to collective and/or state provided resources, and the extent to which poor households can make their needs heard politically or can organize collectively (Rakodi & Lloyd-Jones, 2002). The majority of the slum dwellers is prevented from, or restricted in, the fulfilment of their basic needs because of their socio economic status

1.6. Research design

The challenge of measuring deprivation is to produce a fair and robust index of multiple deprivation taking into account the specific characteristics of the study area, the choice of the most appropriate indicators and methods to measure and quantify deprivation.

This task has been seen as something left to the experts to whom Hayati et all (2006) calls 'outsiders' while those living in poverty or 'insiders' have little role in the process (Satterthwaite, 2004). Hayati et al. argue that having an appropriate strategy to combine both ''insider'' and ''outsider'' views can improve the measurement of poverty and promote the inclusion of those defined as 'poor'. Another advantage of qualitative approach to measure poverty and deprivation is that it enables causality to be introduced between variables.[1]
As stated above, this research followed the approach which sick to consider the inclusion of qualitative methods to assess deprivation in Manyatta 'A'. Within the framework, much relevance is given to the lifetime welfare rather than current income.[2]

Principal component analysis combined with multivariate statistical techniques using urban indicators were used to measure household deprivation. The identification of clusters of spatial

[1] For more information on the causal processes, see strengths of the qualitative approach (Carvalho, 1997)
[2] See (Klasen, 2000) for details on lifetime welfare

concentration of specific and multiple deprivation were also part of the analysis using spatial statistic techniques.

The conceptual framework is divided in to 3 phases, collection and preparation of data, data analysis and processing and explanatory and prescriptive analysis as shown in the diagram bellow.

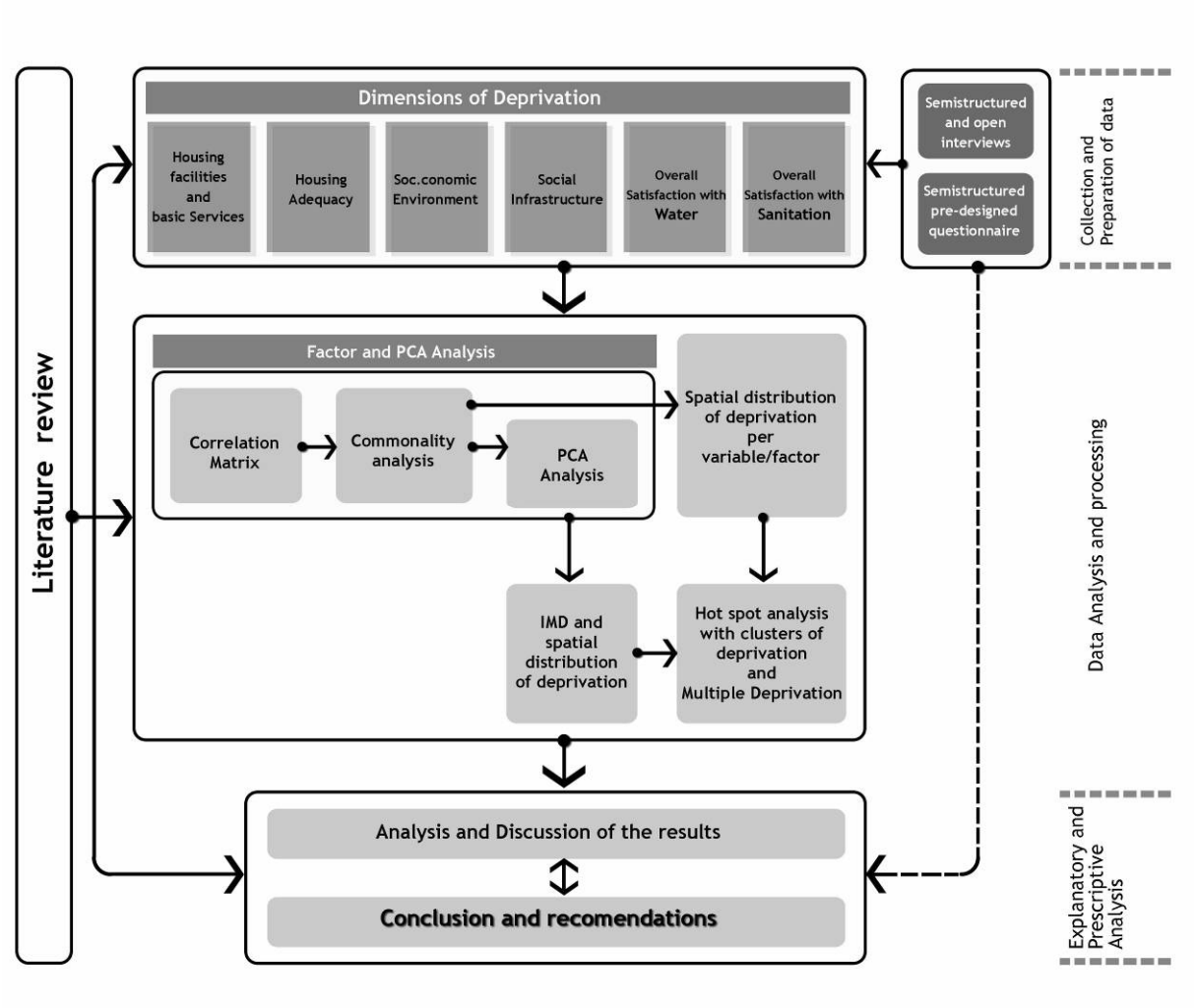


Figure 1-2: Research design

1.7. Background of the study area

The area chosen as object of study is among the 7 peri-urban areas of Kisumu characterized by informal settlement and is the most densely populated among them. Due to the lack of spatial data for the entire Manyatta 'A', the research was carried out on the upper side of the settlement and for the purpose of the study will be denominated 'upper Manyata' which comprises three units, Kondele, Metameta and Konambuta.

1.8. Limitations of the research

The main limitation of the research is the lack of spatial data covering the entire area of study which limit the scope of the spatial analysis and a better understanding of spatial distribution of specific and multiple deprivation. Another limitation is lack of a qualitative indicator which assesses the overall satisfaction with the neighbourhood environment to allow a better comparison with the overall IMD.

1.9. Kisumu city in context

Kisumu, the third largest city in Kenya, is the headquarters of Kisumu district, and Nyanza province. The city is situated at Kavirondo gulf and has developed progressively from a railway terminus and internal port in 1901, to become a commercial, industrial, communication and administrative centre within the lake Victoria basin an area that negotiates three provinces of Nyanza, Western and western Rift Valley.

With an estimated population of 500.000 and an area of approximately 417 Km² (UN-Habitat, 2005), Kisumu is one of the fastest growing cities in Kenya with an urban growth rate estimated at 2.8% p.a. and belongs to one of the poorer regions in the country.

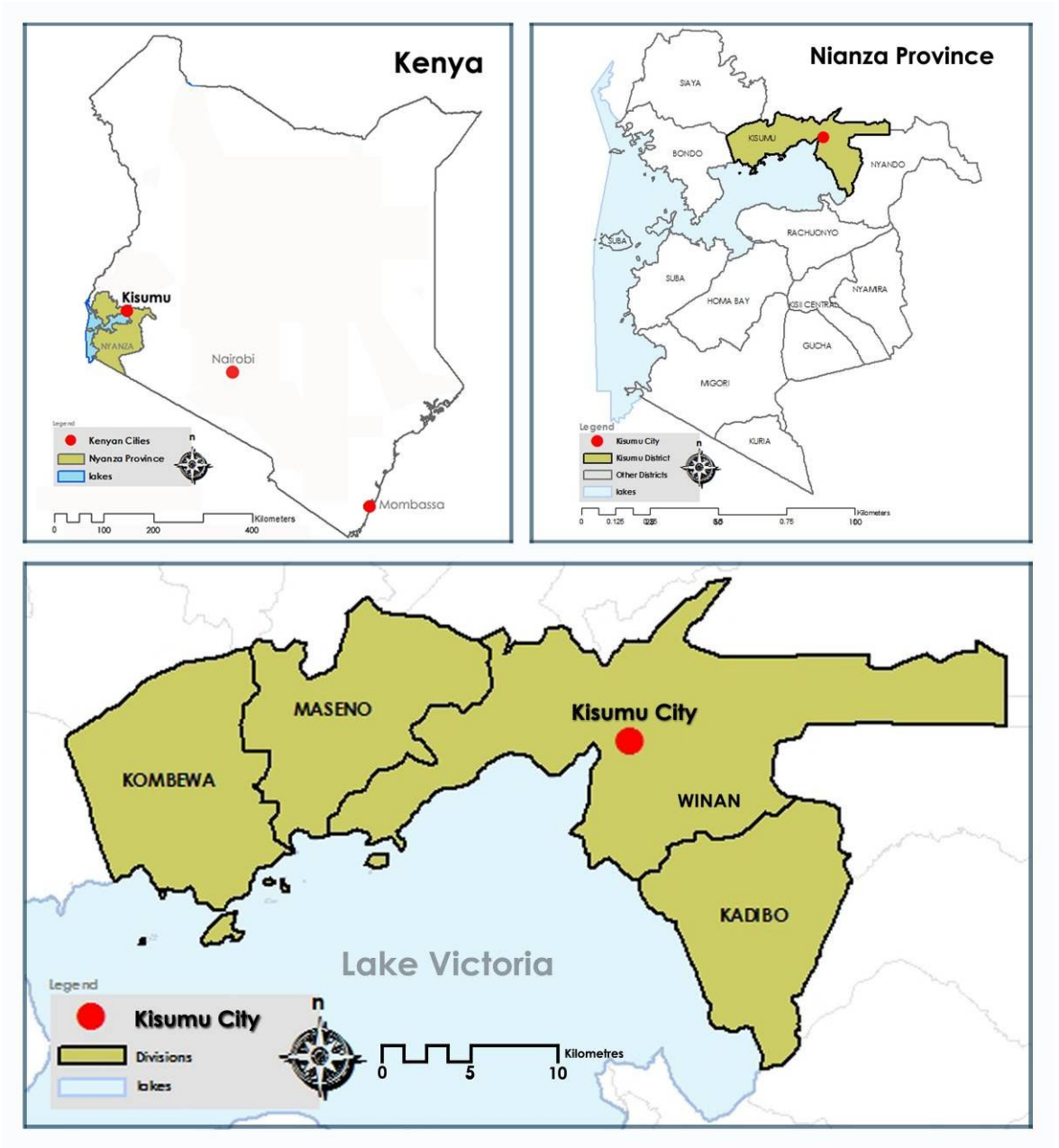


Figure 1-3: Geographical location of Kisumu City

1.10. Poverty and deprivation in Kisumu

There is a considerable spatial variation in poverty in Kenya. The incidence of National poverty appears to be the highest in Kisumu with an average of 48% against a national average of 29%. In this context, Kisumu has been identified as the poorest city in the East Africa region.
Acknowledging the fact, national and international organizations have been focused their attention on alleviation of poverty in Kisumu District and as a result of those efforts, programs and projects have been developed for poverty alleviation in the region particularly in Kisumu Municipality but many of them failed during the implementation phase.
According to (Awange & Onganga, 2006), the reasons of failures in tackling poverty in Kisumu lies in implementation rather than design of plans. Furthermore, he resumes the reasons of failures in four main problems: a) The difficulty of comprehending fully and unambiguously the concept of poverty; b) The measurement of poverty; c) The policies adopted for poverty eradication and d) The government commitment, or the "political will", to eradicate poverty.

Another important element on tackling deprivation is to make sure that the most vulnerable groups and areas are prioritized through pro-poor actions but the experience shows that there is still an unbalance on resource allocation.
A recent example in Kisumu is the LASDAP project where the resource allocation scheme is based on the 'equal share' to all wards while the problems and shortage on the ground are different.

1.11. Study area description and justification

The settlement of Manyatta 'A' was selected as the study area duo to the current on going projects taking place in the neighbourhood and availability of data from previous studies as well. Manyatta 'A' is one of the seven unplanned settlement in Kisumu located five kilometers from Kisumu city centre, off the Kisumu-Nairobi road. Manyatta 'A' covers an area of about 2.4 km^2, and is in Kolwa west location of Winam division in Kisumu East District.
According to the 2009 population census, Manyatta 'A' is the area with the highest population in Kisumu, with 48,004 people. They constitute more than a quarter of the population in the unplanned settlements of Kisumu city.
The settlement is characterized by a socio economic diversity brought to the neighbourhood by the different segments of the society living there. Despite the fact that the area belongs to the Kisumu slum belt, the average income of the settlement is higher than in the other slum areas, as indicated by the quality of the living environment and the basic framework for slum improvement (UN-Habitat, 2005).

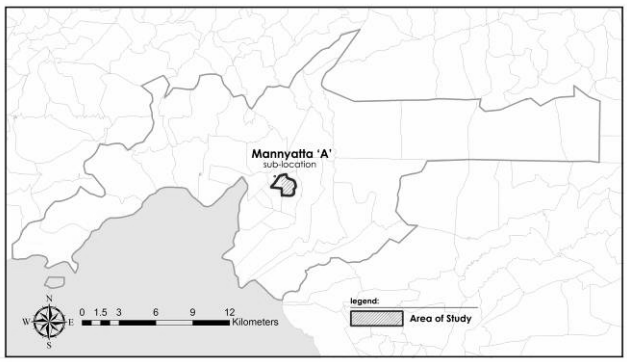


Figure 1-4: Study area, Manyatta 'A' sub-location

The poverty reduction strategy paper indicates that poverty is manifested in Kisumu among others by a) poor infrastructure, b) high rates of illiteracy and school drop outs, c) Inadequate foodstuff, d) unsanitary and dilapidated buildings/structures specially in slum areas, e)high mortality rate, f)congestion in available shelters (overcrowding) and g)high crime rates.

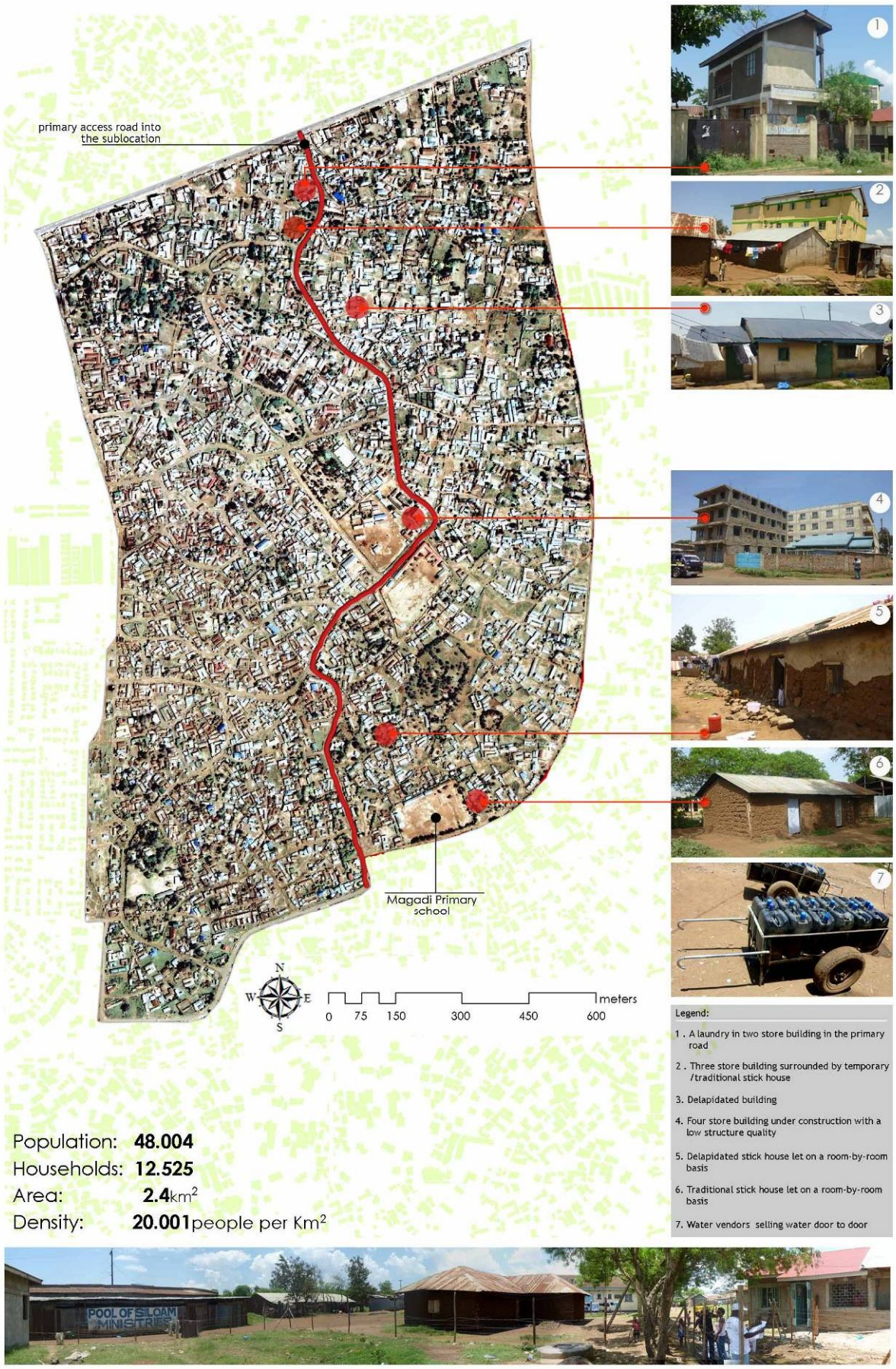


Figure 1-5: Manyatta 'A' sub-location+

1.12. The challenge of improving urban governance

The determination to address poverty and inequality require more and better information about the location and magnitude of deprivation suffered by the poor.
An informed policymaking is an essential element in tackling deprivation. The 2010/11 state of the world's cities report (UNHabitat, 2008) emphasises the relevance of informed governance referring that, lack of clear institutional coordination, ill-informed policymaking contributes substantially to municipal failure in addressing urban issues.
The service delivery and infrastructure provision should take into account the need of the people prioritising the ones who need most bridging the gap between the rich and the poor, between "haves" and "have nots".

Such actions can only be effective when we have enough information about the condition of the citizens, its spatial location and the magnitude of deprivation. Those are the pre requisites for successful pro-poor actions to improve citizen's conditions of life.
Raithelhuber (2003, p. 3) emphasized that "to be able to improve the living circumstances of the slum population it is required to identify, quantify, and locate slum dwellers at a detailed spatial level, analyse this information and formulate evidence-based urban policies and programmes".

The emphasis on pro-poor approach is due to the fact that the most deprived groups can not afford to pay for services or infrastructure provision while the wealthy can easily mobilize resources and political willingness to support their cause. A survey conducted by the UN habitat (UNHabitat, 2008) shows clearly how the best off have influence in resource allocation for urban reforms.

Table 1-2: Who benefits most from urban reforms, 27 cities(percentage of respondents agreeing with each option)

Region	The Urban Reach	The Urban Poor not living in Slums	The Urban Poor living in Slums	Politicians and Bureaucrats (due to corruption)	No particular interest group
LAC	59	23	19	39	11
Asia	69	15	19	61	0.9
Africa	71	0.5	11	77	0.6

Source: *UNHABITAT, City Monitoring Branch, Policy analysis 2009*
**Multiple responses not adding up to 100 per cent.*

The table 1-2 shows how urban reform programs does not really benefit the poor and deprived groups particularly in Africa where the urban reach and politicians are the ones who benefits most rather than the ones who really needs, the poor.

> ..."Many countries continue to focus the resources and opportunities on those already privileged. Across a range of countries, public health and education spending is routinely concentrated on providing services for the better‐off, reinforcing the divide. By the principles of rights, it is an imperative to reorient resources towards the marginalized so that long‐standing and systematic discrimination is overcome"
>
> [UNDP, 2000, p. 96 cited by Martínez(2005)].

1.13. Thesis structure

The current research is composed of six related chapters. Its structure has been organised as the figure below shows:

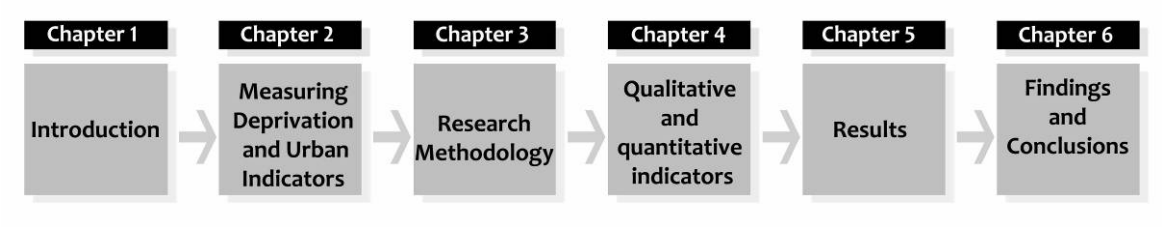


Figure 1-6: Thesis structure

Chapter 1

This is the introductory chapter where the background information of the study subject and study area is given, the purpose, objectives, the relevance and the limitations of the study are also approached.

Chapter 2

This chapter highlights the theoretical overview of the main subject of study-deprivation and its relationship with concepts such as poverty, inequality and slums. Furthermore, the chapter discusses the spatial dimension of deprivation, its measure and quantification ending up with the concept of multiple deprivation index.

Chapter 3

The third chapter deals with the research methodology where the research process, research design, case study approach, data collection techniques and data processing and analysis are discussed.

Chapter 4

This chapter presents an overview of key components to the index development from a deprivation perspective. It also discusses quantitative and qualitative indicators on measuring and assessing deprivation ending up with the advantages and disadvantages of a combination of the two approaches.

Chapter 5

The chapter five presents the main findings of the research starting from the analysis of the current housing situation followed by deprivation and multiple deprivation analysis in the settlement using diverse techniques to infer about the socio economic conditions of the people living in the study area.

Chapter 6

The chapter presents the findings and conclusions of the research, the contribution to the science and recommendations for further studies on deprivation.

2. MEASURING DEPRIVATION AND URBAN INDICATORS

The chapter discusses theoretical background and studies on measuring deprivation starting by the definition of the concept and its relation with poverty and inequality. Furthermore, different approaches related to the analysis of deprivation are brought to the discussion with a particular focus on the combination of qualitative and quantitative indicators to produce a robust index of multiple deprivation

2.1. Deprivation, poverty and inequality

To set a common ground in the subject and demystify the concept it is important to clarify the definition adopted to deprivation and related issues based on its theoretical concepts.

Townsend (1993) defines 'deprivation' as a 'state of observable and demonstrable disadvantage relative to the local community or the wider society or nation to which an individual, family or group belongs. To him, 'people can be said to be deprived if they lack the types of diet, clothing, housing, environmental, educational, working and social conditions, activities and facilities which are customary, or at least widely encouraged or approved in the societies to which they belong' which means that deprivation is the inability to 'participate' in this style of life.

Despite the conceptual differences among the three correlated conditions, ***poverty*** is a part and in essence, a consequence of ***inequality*** and a key element in the multidimensional problem of multiple ***deprivation***.

Deprivation, poverty and inequality are distinct but overlapping concepts. A person can be poor but not deprived or deprived but not poor but the person can experience simultaneously the two conditions or even three conditions.
Despite the fact the three concepts have been used interchangeable, the focus of this study is deprivation and the rationale behind is based on the fact that "poverty should not be narrowly conceived based on financial resources, but seen as a multidimensional shortfall which is better described by the deprivation index" (Klasen, 2000, p. 36).

2.1.1. Deprivation and poverty

Deprivation is consequence of poverty. Baratz and Grigsby (1972) see poverty as a condition involving severe or pronounced deprivation, while according to Pacione (2009, pp.310) 'poverty is a central element in the multidimensional problem of deprivation'.
To highlight the difference and the linkage between poverty and deprivation, Townsend (1993) argues that people may experience one or more forms of deprivation without being in poverty. But poverty and deprivation are clearly related conditions and he concedes that people experiencing several forms of deprivation are likely to have very little income and few other resources. Another relevant difference between the two concepts is that while poverty emphasizes more on income, deprivation is more about resources.

2.1.2. Deprivation and inequality

Bárcena-Martín et al.(2007) argue that deprivation refers to the feelings that arise due to the sense of inequality, understood in its broadest sense¸ existing within a group.
While deprivation is the lack of resources, goods and services inequality is the relative sharing of the economic and social output taking into account a social justice perspective.

2.1.3. Deprivation and slums

The UNHabitat acknowledges the fact that slums are the worst manifestations of urban poverty, deprivation and exclusion in the modern world (Tibajuka, 2009). This confirms the widespread perception that slums are the face of poverty and deprivation in the new Millennium.
The statement makes sense due to the fact that slums hosts the urban poor and in its majority, it is characterised by the deprivation of basic needs and what is worst most of them live in live-threatening conditions of deprivation and environmental degradation. However deprivation or multiple deprivations are not only concentrated in slum areas but are also in planned residential areas.

According to the UNHabitat (2008), slum household consists of one or a group of individuals living under the same roof in an urban area, lacking one or more of the following five amenities: (1) durable housing (a permanent structure providing protection from extreme climatic conditions); (2) sufficient living area (no more than three people sharing a room); (3) access to improved water (water that is sufficient, affordable and can be obtained without extreme effort); (4) access to improved sanitation facilities; and (5) secure tenure. Thus, if an household or group of individuals lack one or more of the above mentioned amenities they are considered deprived and the place of residence is consequently considered slum.
In slums, large sections of society are frequently excluded on grounds of predetermined attributes over which they have no control at all, socio economic status or over which they have very little control, such as where they live or what they own (UNHabitat, 2008).

> "Creating 'urban' places without adequate infrastructure for the resident population densities is a recipe for slum cities."
> (UNHabitat, 2008)

2.2. Measuring deprivation

According to Eroğlu (2007), two questions are central to debates concerning the measurement of poverty from a deprivation perspective: What are those standards of living whose absence indicates deprivation, and how can we decide upon the relative value of each standard of living? The measurement of deprivation is based on the amenities considered to be essential in a particular community but it is important to mention that it varies from country to country and when measuring deprivation the focus should be more on indicators which are considered to be essential but not everyone has. Related to that Saunders et al. (2007) highlight that when the item is widely accepted as essential and everyone has them, the preference cannot be used to differentiate between those who are deprived and those who are not.
Deprivation measurement mostly employs the concept of domains of deprivation and a matrix of measures to allow comparisons between areas.
Three different measures of deprivation in order to reflect the complexity of spatial patterns of deprivation are discussed by Robson (1994): degree, intensity and extent. The first has to do with the sum of deprivation scores for each area; the second is related to the average score of the worst areas while the third is the proportion of the population living in 'deprived' areas.

2.3. Scale of deprivation measurement

The availability of data to understand deprivation at sub city level constitutes a serious constrains to measure and monitor intra-urban deprivation.

The latest census data recently launched in Kenya provides socio economic data at the level of city which does not allow a better insight of the deprivation magnitude at the smallest unit. "Aggregation of data at the city level hides the stark contrast of income and living conditions between better-off urban citizens and the urban poor by providing just a single figure" (Turkstra & Raithelhuber, 2003, p. 36).

In general, deprivation measures are based on geographic areas, rather than individual circumstances despite the fact that 'not all deprived people live in deprived wards, just as not everybody in a ward ranked as deprived are themselves deprived' (Townsend, 1987). This point is reiterated by Sloggett and Joshi (1994) who note that 'deprivation indices may be gainfully used to identify areas of relative concentration of disadvantage, in the absence of data at the personal level, or where the fact of geographic concentration is pertinent'.

2.4. Individual, household and area based deprivation

The area based approach on measuring deprivation is the most widespread technique used so far to illustrate differences in deprivation based on administrative units. However, the method has been subject of discussion among scientist about the loyalty of the spatial illustration technique taking into account that normally the census data which has been the major source of the studies rely upon large administrative units leading to the misinterpretation of the deprivation magnitude. Baud et al.(2010) illustrates that the IMD does not show heterogeneity within ward hiding pockets of deprivation by an overall low or moderate deprivation. They also show that in cities where only larger aggregate boundaries are available, the use of more disaggregated data would benefit the outcome of the study.
Another argument against spatial analysis and spatial targeting of policies is that because of ecological fallacy, resources may be directed to areas in which a substantial percentage of residents do not require public assistance (Pacione, 2009).
Researchers have found that the use of small spatial areas diminishes the extent of measurement error [Martinez(2005), Crayford et al.(1995) and Hyndman et al.(1995) cited by Salmond & Crampton(2002)].

Noble et al. (1999) argue that measuring different aspects of deprivation and combining these into a local index raises a number of questions about the links between different forms of deprivation at the individual, household and area level. The question raised is how far do individuals and families experiencing deprivation in fact cluster together geographically, and how far are other individuals and families who are *not* experiencing deprivation affected by the overall level of deprivation in their area? The area based approach combine deprivations experienced by many *different* groups living in the same territorial unit. Noble et al.(1999) end up the discussions by saying that there are several forms of deprivation that may be difficult to attribute on a precise geographical basis.

Deprivation measurement has been based into two different approaches: individual or household deprivation and area based deprivation. In essence, people within a territorial unit experiencing deprivation give that particular characteristic to the area.

Sanusi (2008) in his study on measuring deprivation using household based deprivation focus on four basic household-based measures of welfare where each of them comprises a group of indicators related to the particular dimensions. At the end, spatial distribution of deprivation is

displayed based on geographical units. Martínez (2009) in his research uses census track as the spatial unit of study through which the spatial patterning of inequalities are displayed.

Noble (2007) explain that the area itself is *not* deprived, but the presence of a concentration of people experiencing deprivation in an area may give rise to a compounding deprivation effect – this is still *measured* by reference to those individuals or household. Having attributed the aggregate of individual experience of deprivation to the area, it is possible to say that an area is deprived in that particular dimension.
The main element of deprivation measurement is household status based on their socioeconomic characteristics which in its turn attribute the specific characteristic to the area of living according to the local geographical or administrative boundaries.
The approach is supported by Sawicki et al. (1996) cited by Trisusanti (2008) who highlights that geographic indicators play a special role, more important than that of subject area indicators because policy is administrated through geographic units and because neighbourhoods and cities themselves affects the quality of people's life.

2.5. Spatial dimension of deprivation

There is a growing consensus that poverty and deprivation have spatial concentration particularly in developing countries where the best off cluster themselves in 'gated communities' and the worst fringe of the society occupy the lowest part of the city in hazardous areas which are mostly environmentally sensitive. The geographic variation in the incidence and magnitude of poverty is often due to factors with spatial dimensions, such as natural resource endowments, and access to services such as health care and education (Henninger, et al., 2002).

The problem of spatial dimension of deprivation raises the question deprived people or deprived places where a person can be deprived but living in a not deprived place or not deprived and living in a deprived environment.
Another point to make is that the spatial concentration of poverty can also favour the development of poverty across generations. Kazemipur (2000) argues that spatial concentration of poverty does not affect only the morphology of a city. It also triggers some far-reaching social processes that go well beyond the immediate problems associated with living in poor neighbourhoods.
In other words, a high level of spatial concentration of deprivation can lead to the perpetuation of deprivation. Furthermore, he argues that people do not make a serious attempt to change their living arrangement so long as it is considered normal and unchangeable because of the deprivation or poverty condition of the area.

2.6. Studies on deprivation in Africa

Three similar studies in three different African countries have been found. The first by Klasen (2000), uses a household survey to compare standard expenditure-based poverty indicators with broader multi-component measures of deprivation in South Africa where he concludes that the current approach used by policy makers to address poverty is not the most appropriate because it only focus on raising income while they suffer from many other deprivations.
The major common point with the current research is the inclusion of qualitative indicators to measure deprivation where safety and well-being were the qualitative indicators used to assess poverty and deprivation. While in this study due to its particular relevance to the context the

author uses safety and level of well-being, the current research focus on the overall satisfaction with sanitation and water, two of the major concerns in the settlement.

In the research of Raithelhuber et al. (2003) the main focus is slum identification at the sub-city level through the use of GIS and Satellite images supported by physical and socio economic indicators. The research presents two case studies, Addis Ababa and Nairobi in Ethiopia and Kenya respectively and raises awareness on the need of disaggregated data to measure poverty and deprivation at the city level. In the particular case of Kenya, he discusses the dilemma urban versus rural, the incidence of poverty and the challenges faced by urban and rural dwellers where the aggregation of socio economic data led to the misinterpretation of the outcome.

In the third research Sanusi (2008) focuses on household-based deprivation in Minna, Nigeria, using the human development index, a composite index adopted by the UNDP since 1990.
He examines housing facilities, housing adequacy, housing space and solid waste disposal as part of issues that affect human development. Housing facilities and adequacy were also used in the current research but the indicators to assess them were different regarding the use of the indicator as such and the measurement adopted.

The above studies carried out in African countries measure poverty and/or deprivation at territory al units but the limitations of the data availability for better analysis also limits the depth and a very clear spatial location of the most deprived groups.

2.7. Dimensions and indicators for deprivation measurement

Many studies on deprivation in developed countries rely mainly on variables identified by Townsend and other authors [see ONS, (2010)] where the most relevant indicators are: income deprivation, employment deprivation, health deprivation, education deprivation, and geographical access to services. The assumption in developed world is that all the households meets the basic requirements of a decent house, namely facilities, space and quality of housing while in developing countries, the majority of people living in cities lack those basic facilities. See poverty as absolute is inadequate in the third world context because they lay too much emphasis on financial capability (Olanrewaju, 1996). Deaton (1997), argues that in the context of measuring welfare in developing countries, there is a very strong case in favour of using measures based on consumption and not income. The standard argument is that consumption is a better measure of lifetime welfare than is the current income.

2.8. The Index of Multiple Deprivation

An index consists of a set of indicators which are compiled in order to produce a composite measure.

In general, 'deprivation indices measure the proportion of households in a defined small geographical unit with a combination of circumstances indicating low living standards or a high need for services, or both' (Blane & Bartley, 1994).

The measurement of deprivation or poverty can be seen as consisting of two distinct though interrelated exercises: The identification of the poor and the subsequent aggregation of the statistics regarding those identified as poor to derive an overall index (Sen, 1976). Most of the existing index of multiple deprivation are constructed in two steps. First, the deprivation with respect to a particular item or domain is computed. Then, these deprivations are aggregated to form a summary index of the overall deprivation through the combination of different domains.

It is important to highlight that the IMD is not simply a combination of specific forms of deprivation, which themselves can be more or less directly measurable. It is not a sum of their parts additively but the parts interact with each other.

Different spatial units are ranked according to the incidence of Multiple deprivation from most deprived to least deprived. The IMD is normally used to support decision making on resource allocation through prioritisation of the most deprived neighbourhoods.

Several attempts have been made to measure poverty and deprivation in this broader sense using different Index and different methodologies where the ultimate goal is to produce a composite Index[3].

Speaker (2004) cited by Spickeret. al (2007) outlines the main issues of an Index as:

Validity:

Indices have to measure what they are suppose to measure, and cross validation is difficult.

Reliability:

Indices which are reliable within a particular social context or at a certain period are not necessarily transferable to other circumstances.

Quantification:

The construction of indices tends to presume linear mathematical relationships.

Inclusion and exclusion of relevant factors:

Exclusion leads to important issues being ignored. Over-inclusion can lead to excessive weight being given to particular factors; The high level of multicollinearity in social phenomena related to deprivation makes multivariate analysis difficult.

Weighting:

Factors have to be given appropriate weights, which depends on appropriate quantification.

[3] Human Development Index (HDI), Human Poverty Index (HPI)by UNDP or the Physical Quality of Life Index (PQLI). [see by Klasen(2000)]

3. RESEARCH METHODOLOGY

The chapter presents the research process, design, the case study approach, data collection techniques, data processing and analysis. The sampling strategy is also discussed in this chapter as part of data collection techniques.

3.1. Research process

The research was conducted using a case study methodology exploring the problem from different angles combining quantitative and qualitative indicators to answer the research questions.

The deprivation Index was generated based on data collected from quantitative and qualitative research methods. Merging the two methods using a convergent validation or what has been called 'triangulation' allows enhancing the validity of the results.

Qualitative methods such as focus groups were used to refine the list, and quantitative methods were used to measure deprivation. The research also had the benefit of secondary data from Pamoja Trust which cover several domains of welfare.

The research follows two approaches discussed above by Carvalho (1997) combining qualitative and quantitative indicators on measuring deprivation and enriching the information from quantitative analysis with qualitative data through triangulation methods to examine, explain, confirm and eventually refute the outcome.

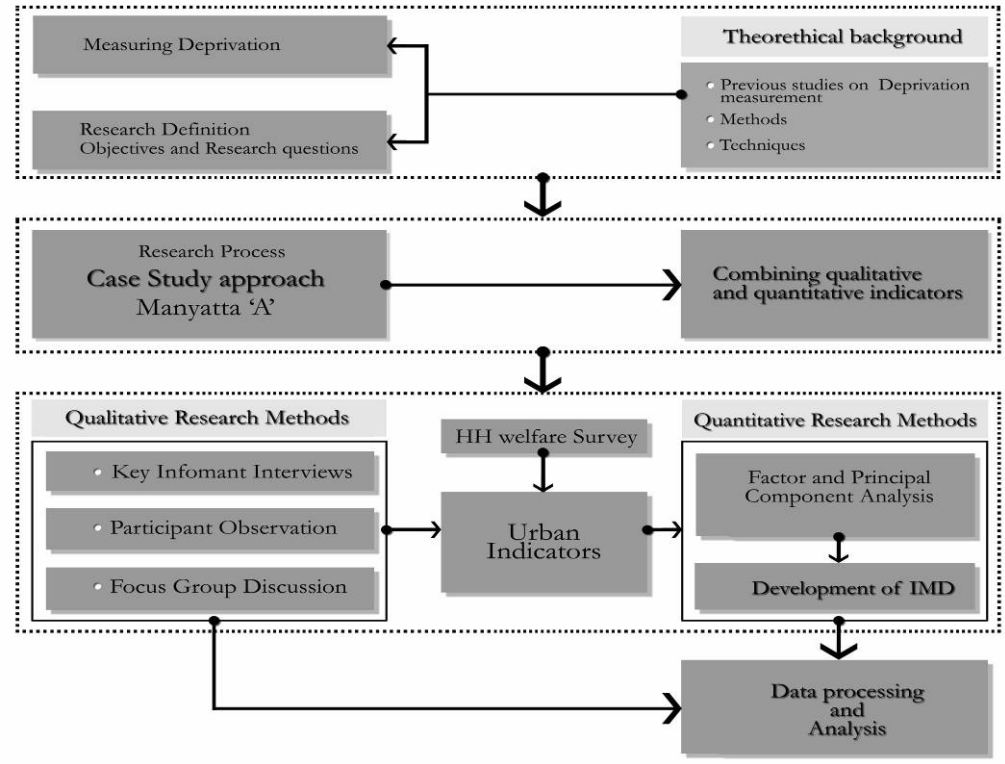


Figure 3-1: Research process

3.2. Research design matrix

Different methods and techniques were used to measure, quantify and illustrate visually deprivation in Manyatta 'A'. The main source of data is the Pamoja Trust socio economic data supported by primary household survey conducted in the field by the researchers. Secondary data from several sources including previous MSc students [Muchai(2009) and Okonyo(2008)] who carried out their research in Kisumu were also used in the research.
Descriptive statistics and statistical inference will be used for data analysis and GIS tools will be used to operationalise the analysis.

Table 3-1: Research design matrix

nr.	Research question	Data requirement	Method of data analysis
1	Which are the most relevant indicators to assess Deprivation in Manyatta 'A'?	Group interviews with Municipal Staff and local experts	Literature review and triangulation
	Which dimensions of deprivation require more attention to support pro-poor actions?	Primary Household survey, Key informants Interview and Focus Group discussion	descriptive Statistics and GIS Spatial analysis
2	How different dimensions of deprivation can be integrated to assess physical, spatial and social aspects of welfare?	Pamoja Trust Household survey and Primary Household survey	Literature review
	How different dimensions of deprivation correlate with each other?	Pamoja Trust Household survey and Primary Household survey	Analysis of variance (ANOVA)
	How Principal Component Analysis can be used to identify the most deprived groups?	Pamoja Trust Household survey and Primary Household survey	Factor Analysis and PCA
3	How the insights from qualitative indicators can feed into the improvement of the overall multi-deprivation analysis?	qualitative and quantitative data from household survey	Literature review and Descriptive statistics
4	Is there any cluster of spatial multi deprived households?	Pamoja Trust Household survey and Primary Household survey	Cluster / Hot-Spot Analysis
	How homogeneous is the spatial distribution of public facilities in Manyatta 'A'?	Pamoja Trust household survey and public facility location	Descriptive statistics and visual interpretation
5	What is the most appropriate scale for policy making?	Key Informant Interview and Primary Household survey	Descriptive statistics and Key Informant Interview
	Which criteria's are used for prioritization of resource allocation?	Key informants Interview and Focus Group discussion	Key Informant Interview and Focus Group Participants

3.3. Case study approach

The ethical need to confirm the validity on the research conducted requires techniques and methods that's fits best to the object of study. In this particular case, the approach used is based on the case study approach where triangulation supported by multiple sources of data were used to measure deprivation in Manyatta 'A'.

Yin (1994) cited by Okonyo(2008), notes that case study is a viable research strategy when the following matches the research environment:
1) The research questions are explanatory;
2) The focus of the research is on contemporary events; and
3) Behavioural events within the research environment occur within a real world context and are outside control of the researcher.

Taking into account that the current research fulfils the above conditions the approach adopted follows the procedures of a study case. These were supplemented by quantitative and qualitative research methods comprising of household survey, key informant interviews, participant observation and focus group discussion.

3.4. Data collection techniques

The study is based on both primary and secondary sources of information. Primary data was collected through Key informants, Participant Observation, focus group discussion and Household Survey while Secondary Data was collected from local authorities, Institutions working on the improvement of quality of life in the settlement and Governmental Institutions. The sources used to collect secondary data are presented in the table 3-5.

It is important to note that during the preparation for fieldwork and the fieldwork phase, the researcher was able to benefit from a collaboration with a fellow student Lilliane Mupende which facilitated maximisation of resources available and allowed for a bouncing board for ideas on how to execute the data collection. As a result, sections of the fieldwork reporting are thus acknowledged as shared data sources and processes and will therefore be comparable.

3.4.1. Limitations of data collection

Generally speaking we had no constrains on primary data collection. Luckily we had the fully support of the community leaders and the security members of Manyatta 'A' from the very beginning.

The household deprivation analysis was initially planned to be carried out in all Manyatta 'A' but the available information provided by Pamoja Trust from 2010 household enumeration has only a spatial data of Konambuta, Kondele and Metameta which forced a shift from the entire area to the above mentioned units. Even in these Units, there are still structures without spatial link to the socio economic data which made difficult the spatial analysis of deprivation.

3.4.2. Key informants interview

Key Informant interviews were specifically beneficial in providing further insight into the study area, revision of the selected case study areas and redesigning of the questionnaires. The selection of the appropriate informants was carried out using the non-probability method of snowball sampling technique. In this approach all referrals were initiated from our first point of contact-Mr. Ben Obera of Millennium Cities Initiative (MCI). The choice of the Interviewers always took into account the research questions.

The range of experts interviewed are from the most diverse spheres of activity, from the academia to local practitioners, NGO's, District and Local Authorities Officers.(See Table bellow).

Table 3-2: Key Informants contacted

Key Informant number	Title / Position	Institution
Key Informant 1	Social Sector Specialist	Millenium Cities Initiative / Urban Matters
Key Informant 2	Deputy Dean	Maseno University / Faculty of Urban Planning
Key Informant 3	Deputy Head	MCK, Housing Department / Kisumu Upgrading Program
Key Informant 4		Pamoja Trust
Key Informant 5	Town Planning Officer	MCK, Town Planning Department
Key Informant 6		MCK, LASDAP
Key Informant 7	District Doc.Centre Officer	District Documentation Centre
Key Informant 8	Urban Matters Coordinator	CORDAID

The Key Informants interviews were conducted simultaneously by two researchers focusing on different aspects of welfare in the settlement. As far as the deprivation analysis is concerned, the researcher raised questions around the following points:

- General Background of the Informal Settlements;
- Main necessities of the slum areas in Kisumu city and Manyatta 'A' in particular;
- Budgeting Process and Scale for resource allocation and;
- Ongoing Projects targeting the improvement of life quality in the settlement.

3.4.3. Participant observation

The researcher was able to benefit from participant observation in two main forums:

- The "Water task force" meeting where members of the community gathered together to discuss problems related to water provision and treatment in their community;
- Secondly, the "Ward consultative" meeting where the local community participated in identification of priority areas for resource allocation. This is done through a participatory approach conducted by the Local Authority Service Delivery Action Plan, LASDAP.

3.4.4. Focus group discussion

Focus group discussions with Village Chiefs, Elders and Security officials served a multi-purpose function in our fieldwork process:

- Provided a forum for verification of information obtained from the key informants as well as collection of further information on initiatives at the village level;
- Enabled to confront ideas and to understand the main necessities in the community;
- Enabled recruitment of interviewers who worked as enumerators in the Pamoja Trust slum mapping and enumeration process;
- Ensured full cooperation and security from the local leaders in the household survey exercise.

On the first Group discussion, 9 participants were present while on the second 12 people participated as the table shows.

Participant position	Unit	nr. of participants Foc.Group 1	Foc.Group 2
Assistant Chief		1	
Village leaders	Kondele, Conermbuta, Metameta, Magadi, Flamingo and Gonda		6
Village elders	Kondele, magadi, Conermbuta and Gonda	4	
Enumerators	Kondele, Conermbuta, Metameta, Magadi, Flamingo and Gonda		6
Chief of res. association	Flamingo	1	
Security members	Flamingo and Gonda	2	
Community officer for children and welfare		1	
	Total of participants	9	12

Table 3-3: Participants of the group discussion

The focus groups were structured around three questions based on the original survey questionnaire.
The first was *"What do you believe are the main necessities and their prioritization in Manyatta 'A' today?"* This was an open question, which allowed for general brainstorming. At this stage they had no previous contact with the indicators prepared to assess deprivation.

The second question of the focus groups consisted of a *presentation of each of the 19 indicators initially proposed to assess deprivation. Focus group participants were asked which of the items presented to them stood out as important, if any, and why*.
The last question was *what is the best scale for decision making on budget/resource allocation*.
The outcome of the focus group discussion can be seen in (chapter 5.4).

Figure 3-2: Participants of the focus group discussion in the Kosawo social hall and interviewer during the interview in Magadi respectively

3.4.5. Primary household survey

The household interviews were conducted primarily in English and the people involved in data collection were inhabitants of each of the 6 sub units of Manyatta 'A' enhancing ownership of the process. A total of 90 household were interviewed based on the sampling strategy described further.

The household survey questionnaire

The questionnaire combines qualitative and quantitative measurement techniques and it was divided in three main sections: 1. Identification of the respondent, 2. questions related to the dimensions to be measured and 3. An open ended question where the interviewer could comment about the welfare conditions in the settlement.

In order to motivate participation, the questionnaire followed the techniques advocated by Huber & Power's (1985) cited by Schmitt (2009)namely:

1. Emphasis to the academic nature of the research project. With a clear indication of the academic institution.
2. Acknowledge the key informant's participation regarding the success and quality of the research.
3. To ensure strict confidentiality and anonymity.
4. To indicate the required time to complete the questionnaire.

Quality control checks

A careful attention to quality at each step of the primary data collection, from the design of the sample and development of the instruments through sample preparation and data collection to the cleaning and editing of the data were taken into account to make sure that the quality of the output is the most reliable possible.

1. Given the sensitive nature of the information sought the process of selection of helpers to administrate the questionnaire took into account there previous experience with Pamoja Trust enumeration household survey which were kindly proposed by the village elders.
All of them were submitted to an intensive training process on how to administrate the questionnaire thus minimising the potential for misinterpretation.

2. According to Churchill et. al(2005), in general a first draft of a questionnaire usually does not result in a perfect, applicable questionnaire. In order to avoid any confusion or ambiguity, each question should be reviewed by testing the performance of a questionnaire under actual conditions of data collection, this is the pre-test phase, a vital moment for questionnaire's quality.
For each of the sub-unit, the three first questionnaires were administrated together with the researcher to make sure that the interviewers understood clearly the scope and nature of the survey. The quality of the data collected was guaranteed by working closely with the data collectors in a systematic way. The reality showed that some questions were misinterpreted and had to be replaced to make easy the work of the interviewers and them during the processing phase they were adjusted to fit the indicator.

3. All the data collected was checked again for completeness and internal consistency and some of them were object of clarification with the respondent.

Sampling strategy

In order to obtain a representative sampling a stratified sampling was used as the sampling design method to make sure that all the subunits are represented in the sample and only the residential buildings were object of study.
The process of sampling design follows the structure below:

1. Divide the sub location in small administrative units following the local structure of territorial administration resulting in 6 sub units namely Kondele, Metameta, Konambuta, Flamingo, Magadi and Gonda.

2. Decide on the sample size per sub-unit based on the sampling frame.
N = 15 samples per sub-unit in a total of 90 in all Manyatta 'A'

The sampling frame varies according to the sub unit while the sample size is the same for all the sub units.

3. List the sampling unit per sub-unit based on the order of the enumeration numbers or building/structure in GIS data base from the Pamoja Trust.

The sampling units were extracted from the Pamoja Trust enumeration in the case of unities where the spatial link was already available and in other cases it was based on the number of the structure taking into consideration that for each structure there is one household.

4. Determine the width of the interval. The total population dived by the sample size per unit gives the width of the interval to be considered as the constant value to separate one sample unit from another. **(k) = Total population/sample size**

5. Choose randomly the first sample point from the list of enumeration numbers and proceed to the next based on the same interval until reaching the desired sample size per sub-unit.

While the first sample point is chosen randomly, the others are separated from one another at the same numerical distance based on the (k) value.

5. Display visually in GIS the spatial distribution of the sampling points.
Knowing the numbers of the buildings based on its enumeration number or number of structure, the next step was to visualise the spatial location of the structure. In some cases due to the absence of the head of household the process continues by moving to the next structure in the immediate vicinity.

6. Interview the head of household of the selected sampling points based on the structured questionnaire.

Figure 3-3: An illustration of the sampling strategy for Flamingo sub-unit with a indication of the sampled households

Purpose of the household survey

Household survey was conducted in 6 unities of Manyatta 'A' through structured questionnaire (see Annex A) administrated by trained interviewers during 4 days, the questionnaire covered aspects which were not appropriately covered by Pamoja Trust data because it was gathered for other purposes. The questionnaire conducted focused more on qualitative data and particularly on aspects related to the level of satisfaction.

Due to the purpose and character of the research, structured questionnaire was the most appropriate method taking into account the research objective and research questions as well. For cross checking purposes, the questionnaire also included some questions already covered by the secondary data for a comparison with the secondary data.

Secondary data

The main source of secondary data for the research is Pamoja Trust data base based on the settlement enumeration form (Pamoja-Trust, 2010).

The household survey conducted by the organization in Manyatta 'A' covered 'all' the households in the area of study. The census inquiry conducted provides a better insight of the study population and is presumed that by doing so, highest level of accuracy is obtained.

The collected data are clustered in seven groups covering several socio economic aspects (see table 3-4).

Table 3-4: Structure of the Pamoja Trust data base

	CODE	MAIN CONTENT
1	Sub form	Household personal information Education
2	Bio Data	Household structure Housing characteristics Education Sanitation facilities Overall satisfaction with water
3	Gasbage disposal	Type of waste generated Garbage disposal Dumping state
4	Health and energy issues	Energy used for cooking Electricity Health care
5	Sanitation	Type of sanitation/bathing facility Higiene conditions
6	Socio Economic Data	People earning income Monthly income from all sources Expenditure with housing needs
7	Water	Water sources Time spent to fetch water Quality of water Overall satisfactionwith water

The data was collected based on the structured questionnaire through which, nominal, ratio and ordinal variable were the level of measurement applied. The latest two levels of measurement are organized in categories following a logical order.

From the Database, 15 variables were selected as indicators to assess deprivation in the area of study.

Other qualitative and quantitative secondary data were also used to support the research (See Table 3-5).

Table 3-5: Secondary data used

Data	Format	Source	Year
Situation analysis of informal settlements in Kisumu	Pdf	UN Habitat	2005
Socio Economic Enumeration data	Access	Pamoja Trust	2005 to 2010
Urban Matters Enumeration Form	Word Document	Pamoja Trust	2010
Digital Map of Kenya Administrative division	GIS	ITC database	2005
Digital Map of Manyatta 'A' Sublocation with household/structure enumeration	GIS	Pamoja Trust	2005 to 2010
Kenya Population and Housing Census	Hardcopy	KNBS	2009
Kisumu City Development Strategy	Pdf	MCI	2004 - 2009
KUP Pre Feasibility Study, Final Report	Word Document	KCC Housing Dev. Unit	2009
LASDAP Project Report	Word and Excel	KCC	2009 -2010
Kisumu District Poverty Reduction Strategy Paper	Hardcopy	Kisumu District Office	2001

3.5. Limitations of data collection

Data collection

The secondary data used in the research were not yet subject to verification, an ongoing process being carried out by the Pamoja Trust and its partners. That is a very crucial process particularly on the case of Manyatta 'A' where the data base presents inaccuracies, omissions and inconsistencies such as double counting the same household with different socio economic data. The field work phase was also used to find solutions to various limitations to the available data. These limitations include the lack of a spatial link to the socio-economic data and the need for boundaries at the lowest administrative level.

3.6. Data processing and analysis

The data processing and brief analysis of the collected data started in the field, with checking for completeness and performing quality control checks. This allowed to make adjustments on the way the questionnaire was been administrated.

Data processing

The Pamoja Trust data is compiled in access and divided in several topics according to the objectives of the survey. Then, the data was converted into SPSS and organized on the same layout.
The enumeration number is the reference point for geospatial and socio economic data as well since each housing structure has its own enumeration number. Two main housing characteristics can be distinguished:

1. One structure, one household
2. One structure, several households

The first type of structure has the profile and socio economic information related to the household living in that structure while the second one has the information of several households living in the same structure (mostly one store building). The structure of the spatial data permitted a better understanding of variations in degrees of deprivation and multiple deprivation at household level. (see fig. 5-11).

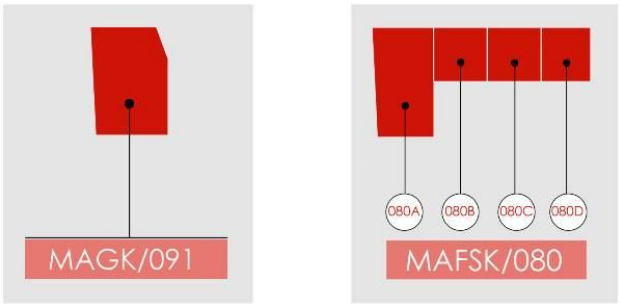


Figure 3-4: Illustration of the link between structure and enumeration number

The enumeration number is the base for the geospatial link of each and every structure in the settlement with the socio economic data. On the left side the structure correspond to one household while at the right side the enumeration number aggregates 4 different households living under the same structure.

Data analysis

Data analysis on both qualitative and quantitative methods from the primary household survey for cross checking with the secondary data was carried out partly on the fieldwork and later on pos field work. The analyses were carried out using several techniques. SPSS was used for data compilation and statistical analysis while GIS was the main tool for spatial analysis and illustration of the outcome.

For this study, the selected indicators to assess deprivation were clustered in six domains of deprivation namely housing facilities, housing adequacy, socio economic environment, social infrastructure, overall satisfaction with water and overall satisfaction with sanitation. Each dimension comprises an array of indicators to measure and quantify deprivation as can be seen below on the example of housing facilities dimension which comprises four indicators.
As far as qualitative indicators are concerned, each dimension assesses the level of satisfaction of Manyatta 'A' inhabitants in relation to a particular dimension.

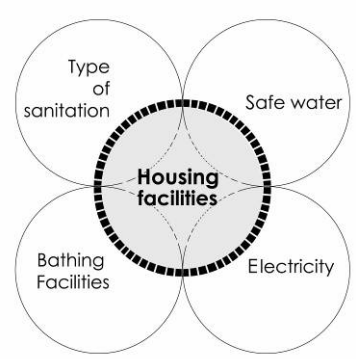


Figure 3-5: Illustration of housing facilities dimension with its indicators

The present concept of deprivation is based on broader multi-component measures of deprivation namely basic amenities and services which have a meaningful influence in the welfare of the individuals without them the quality of life is considered to be bellow the acceptable living standard. Thus, the argument supporting the choice of the variables is mainly based on consumption[4] and they should be essentials in this particular settlement.
The process of establishing the set of indicators started with the understanding of the needs, a process which involved key informants and focus group discussions followed by the inclusion in a dimension which aggregate indicators related to the main dimension. In the case of qualitative indicators, the dimensions assess the overall satisfaction with a set of items related to the dimension.

The dimensions of deprivation adopted in the present research are:

1. **Housing facilities and basic services**
   Relates to types or nature of facilities and basic services within housing units. The indicators assessed are, bathing facilities, safe water, type of sanitation and electricity.

2. **Housing adequacy**
   Indicators of housing adequacy employed in the research are overcrowding, material of construction and durable structure.

[4] See Deaton (1997) for a detailed discussion of choice of individual welfare measure.

3. Socio economic environment

Relates to basic socio economic indicators considered to be relevant to assess household socio economic status namely employment ratio, level of education, house ownership, income and energy used for cooking.

4. Social infrastructure

Assess the level of geographical access to primary health care and primary schools taking into account the social justice perspective. The indicator measure the distance to the nearest facility. Another indicator included in this dimension is distance to the nearest water source.

5. Overall satisfaction with water

The dimension assesses the level of satisfaction with provision and availability of water from different sources. The source, quality, reliability, distance and time needed for fetch water are the elements of analysis.

6. Overall satisfaction with sanitation

The dimension assesses the level of satisfaction with sanitation issues. Sanitation understood as provision of facilities and services for the safe disposal of human urine and faeces. It also includes hygienic conditions of the facilities.

When it comes to sanitation is important to mention that the majority of tenants share sanitation facilities with the neighbours and in some cases they access to the facility on a payment basis.

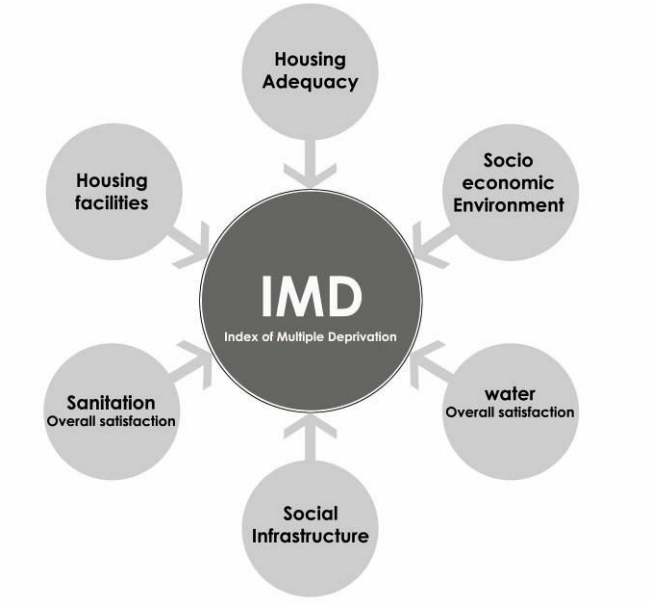


Figure 3-6: The IMD dimensions

Table 3-6: Dimensions of deprivation and their indicators

Dimensions	Indicators	Definition
Housing facilities	1.Type of sanitation facilities	Type of sanitation facility used in the house
	2.Bathing Facilities	Type of bathing facility in the house
	3.Safe Water	Type of primary water source
	4.Electricity	Whether the house is connected or not with electricity
Housing Adequacy	5.Overcrowding	Household with fewer than three people per habitable room is not overcrowded
	6.Material of Construction	Type and quality of material used to build the structure
	7.Durable Structure/Housing Structure	Character of the structure and capacity to protect its inhabitants from the extremes of climatic conditions such as rain and cold[5]
Socio Economic Environment	8.Unemployment	Employment ratio within the adult population of working age(18-65 years old)
	9.literacy	Level of literacy of the household members
	10.House ownership	Household owned by the current inhabitants
	11.Income	Monthly income from all sources
	12.Energy for cooking	Type of fuel/energy used for cooking
	13. Type of Employment	Type of employment of the household workers, formal, Informal or unemployed
Social Infrastructure	14.Access to primary health care	Distance to the nearest primary health care facility
	15.Access to primary school	Distance to the nearest primary school
	16.Access to water source	Distance to the nearest primary water source
Overall satisfaction with water	17.Satisfaction with water conditions	Level of Satisfaction with water issues, availability, quality, cost, reliability, time to fetch water and distance to the water source
Overall satisfaction with Sanitation	18.Satisfaction with Sanitation conditions	Level of Satisfaction with Sanitation issues, Type of sanitation facilities, hygiene and cost;

3.7. Urban indicators and their relevance

When assessing deprivation a basic condition to select the indicators are that they should be essential to the welfare. The current chapter describes the relevance of each indicator in the local context which came out from focus group discussions, key interviews and literature review particularly on urban indicators.

3.7.1. Quantitative indicators

Type of sanitation facilities

In slum areas, lack of sanitation is a major public health problem that causes disease, sickness and death. Inadequate sanitation, through its impact on health and environment, has considerable implications for economic development. In slum context, the risks of being contaminated with related diseases are greater in slum areas where it is more difficult to avoid contact with waste.

Primary water source / Access to safe water

Water is a fundamental element on human life which is taken for granted in the developed world. A supply of clean water is absolutely necessary for a healthy life. In slums, households are rarely connected to the network and can only rely on borehole and other sources of water which are most of the times unsafe for drinking. Improving access to safe water implies less burden on people, mostly women, to collect water from available sources.

[5] Source: UNHabitat (2004), Urban Indicators Guidelines

The indicator monitors access to improved water sources based on the assumption that improved sources are likely to provide safe water understood as drinking water collected from safer sources.

Distance to the nearest water source

In order to reduce the time and energy required for fetching water the households should have access points nearby. The higher the distance to the source, the higher is the time required to access water forcing people to leave their daily activities particularly the women and the children's.

Electricity

Our daily routine is based on various functions provided by electricity and it is part of the essential for an acceptable standard of living. The majority of urban dwellers does not have access to electricity which restrict them to the advantages of having electricity.

"The wires are passing by Magadi but in many houses they can not afford to pay for the connection". Chief of Magadi Unit

Energy for cooking

In Informal settlement the energy used for cooking is strongly associated with affordability, in the case of Manyatta 'A' for instance; the majority of people rely on firewood, makwangla and coal. It works perfectly as barometer to differentiate those who can and can not afford which is behind the essence of deprivation concept.

Overcrowding

Housing is a basic human right and overcrowding reflects how unsuitable a dwelling can be in terms of number of rooms and the mismatch between household size and the number of rooms. It is a critical level of the housing needs and the existence or not of sufficient living space within the house. Reduced space per person is often associated with certain categories of health risks.
The indicator measures the adequacy of the basic human need for shelter and a household above occupancy threshold of 3 persons per room is considered overcrowded.

Housing quality/Material of construction

Generally, a housing structure is considered durable when certain strong building materials are used for roof, walls and floor. The quality of materials has also to do with the quality of space and habitat conditions. The lower is the standard of the construction material, the higher the probability of been exposed to bad weather and floods. In developing countries, the principal issues in housing poverty are access and deprivation (Spicker, et al., 2007).

Durable structure/Housing structure

Slum dwellers usually occupy non durable dwelling units that expose them to high morbidity and then mortality risks. Even though some houses may be built with materials classified as durable, the dwellers may still not enjoy adequate protection against weather and climate due to the overall state of a dwelling. The indicator assesses the structure from the consistency of the material point of view.

Employment ratio

"Employment should generate income sufficient to achieve an adequate standard of living for all people, men and women"[6]. Unemployment rates are the best-known labour market measures and probably the most familiar indicators of all to express the health of the economy and the success of government economic policy. Unemployment is, however, a formal labour market concept

[6] Habitat Agenda, paragraph 118a

which is often not applicable in developing countries with their large informal sector. In Manyatta 'A' more than 70 percent of head of households are employed in informal sector (UNHabitat, 2005).

Type of employment

The majority of Manyatta 'A' dwellers are in informal sector particularly the youth which is the main labor force. Boda – Boda (local bicycle transport), small and informal business are among the main source of income in the settlement. The main characteristics of this type of activities in informal settlements are instability and yield only low incomes while a formal employment gives more stability.

Literacy

It is a proxy measure of social progress and economic achievement. Adult literacy is a significant indicator of the meaningfulness of public participation, therefore an important indicator of governance and has a powerful impact on future perspectives. It also allows a better employment opportunities and consequent better income.

House ownership

In Mannyatta 'A', the source of income of many dwellers is house renting and by doing so, they have a permanent and reliable source of income. That is a very common business in informal settlements not only in Manyatta 'A' but in all Kisumu Informal settlement. During the focus group discussion, asked how do they characterize the poor people in the settlement, one of the Unit Leaders mentioned that while the poor rent poor quality houses and don't have permanent source of income the reach own houses, cars and are employed.

Income

Ringen (1988) cited by Baud et al. (2009) argues that income only constitutes an important input to well-being, but it does not measure the level of well-being itself acknowledging the relevance of the indicator on measuring deprivation. Having a permanent income is half way to fulfil basic needs and afford amenities considered as essentials.

Access to primary health care

Ill health is a serious barrier to economic and social development and the access to this service is very important measure of deprivation. The availability of the service near by the area of residence theoretically implies a better access to the service but the service should be available/distributed proportional to need rather than rely on ability to pay.

Access to primary school

The principle applied for the previous indicators is also applied for access to primary school; the proximity of the service is a benefit for the community. Primary Education has been recognized as a human right in Article 26 of the Universal Declaration on Human Rights.

3.7.2. Qualitative indicators

Apart from the quantitative measures of deprivation, its important to understand how people feel about a particular service or facility. The level of satisfaction with a particular item can also work as a barometer to assess the quality of service or facility. More than the availability to the service, the access is a very important measure of social justice.

If the service is essential and people can not afford or access, the person is deprived of that particular item.

In the case of qualitative indicators they are the same as the dimensions 5 and 6 namely Overall satisfaction with water and sanitation (refer to chapter 3.6)

3.7.3. Sources of deprivation

The indicators used in the present study are related with seven sources of deprivation among several others mentioned by Pacione(2009) in the analysis of the nature of multiple deprivation.
The table bellow shows the indicators used to measure each of the covered sources of Deprivation.

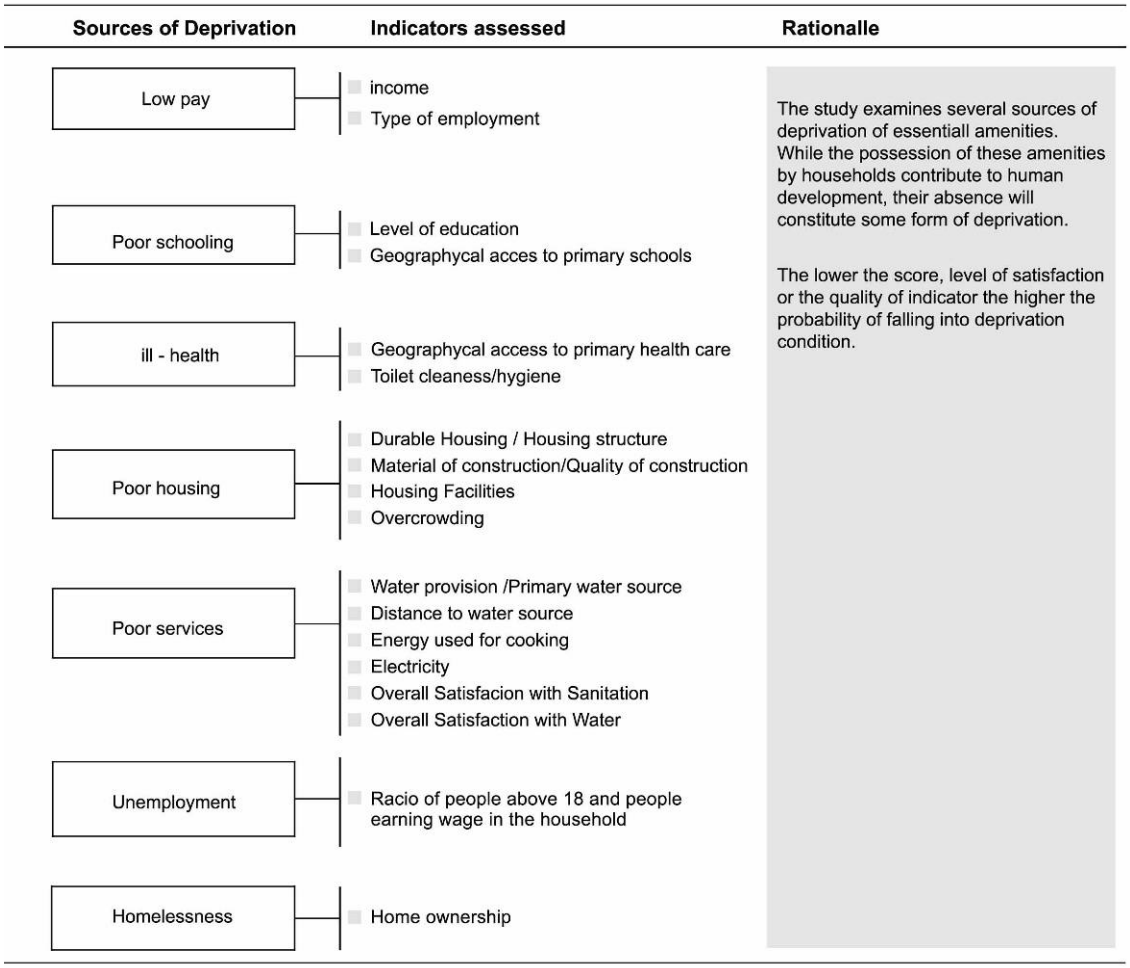


Figure 3-7: Sources of deprivation based on Pacione (2009), the nature of multiple deprivation

3.8. Principles of IMD construction adopted

In order to ensure a robust IMD as the outcome of the research, the construction of the index had to fulfil guidelines and principles of deprivation measurement based on previous studies as can be seen in the table bellow.

Table 3-7: Principles of IMD construction, Adapted from Saunders et. al(2007)

	Principles	The approach in the research
The index should fit the purpose for which it is to be used. It should therefore:	● Recognise, and reflect, different dimensions of deprivation based on a clear conceptual framework	● The research is based on 7 dimentions of deprivation namely housing facilities and basic services, housing adequacy, socio economic environment, social infrastructure and perceived wellbeing
	● Measure concentration of deprivation independentl of population size	● The research is use measures based on rates or percentages
	● Relate to a particular point in time, ideally as recent as possible	● The socio Economic Data is from 2010 household survey
	● Be updateable on a regular basis	● As far as possible, the research uses indicators which can be updated on a regular basis
	● Be transparent, and relatively easy to explain and understand	● Be transparent, and relatively easy to explain and understand
The index should be constructed at a spatial scale which:	● Is the lowest level for which consistent, reliable data are available	● The research is based on information of two different levels, units and subunits of the settlement
	● Allows presentation at the smallest level in a form which does not hide or obscure pockets of intense deprivation	● The research is based on household deprivation which allows analysis at household level
The indicators should:	● Be available on a consistent basis for the whole settlement	● The household survey cover all the households in the entire Manyatta 'A'
	● Be statistically robust	● In order to ensure robustness oof the Index, the choice of indicators were primarily based on the relevance in the quality of life
	● Be standardised in a straightforward way with the minimum of transformation	● The research uses quintile of five levels from least deprived to the most deprived based on percentages, intervals and rates
The dimensions should:	● Comprise Indicators which do not "double count" the same aspects of deprivation	● Based on the inter-correlation of variables within indicators through factor analysis the research exclude very correlated indicators which comprises the dimension
	● Be constructed by combining indicators using weighting which is explicit and on a justified basis	● The research explore different approaches, and justify, the chosen approach to weighting

3.9. Hot spot analysis

The Getis-Ord Hot Spot Analysis shows where high and low values are clustered. It compares the values of each feature with the neighbouring features within a specified distance. The values are clustered based on the deviation from the mean giving a very clear indication where actions should be prioritised.

The approach is useful particularly when the major objective is to tackle a concentration of specific deprivation taking into account the implementation of public policies.

The technique is used in this research as a tool to support the identification of clusters of deprivation to whom remedy policies should be addressed.

3.10. Principal Component Analysis

Statistical procedure of PCA was used to determine the weights for the index based on the indicators. The first Principal component of a set of variables is the linear Index of all the variables that capture the largest amount of information that is common to all of the variables (Filmer & Pritchett, 1998). From several variables, PCA starts by specifying each variable normalized by its mean and standard deviation. The first Principal component, expressed in terms of the original variables, is therefore an index of Multiple Deprivation for each household.

In the present research, Principal Components Analysis was used as an exploratory tool to uncover significant statistical relationships among a set of variables to assess deprivation. Factor analysis and multivariate statistical techniques have become one of the most widely used techniques in social

research and are now generally the preferred approach for dealing with the complex question of measuring urban socio-spatial differentiation (Knox, 2000).

Principal components analysis has been applied to analyze groups of correlated variables representing one or more common domains and the main applications of the method can be found in the analysis of: i)Multiple indicators; ii)Measurement and validation of complex constructs; iii)Index and scale construction and iv)Data reduction.

Since the study deals with multiple indicators aiming at producing a Multiple deprivation Index supported by a statistical data the technique was used to produce the IMD.
Despite the fact that the method has been used widely[7], critics of the PCA approach argue that the technique is arbitrary and the method of choosing the number of components and the variables to include is not well defined (Vyas & Kumaranayake, 2006).

Cut-off points
Studies have been using cut-off points to differentiate household status and the approaches used were either arbitrarily defined (based on the assumption that Deprivation is uniformly distributed), or data driven according to the structure of the data (Vyas & Kumaranayake, 2006).
One approach is to consider the lowest 40 percent into deprived or most deprived the highest 20% as not deprived or least deprived and the rest as the middle group according to the objective.
Another common approach is the use of quintiles by classifying the IMD score for each group into different categories according to the purpose (see chapter 5.6).

Weighting the indicators
How can one attach weights to the various aspects of deprivation is the challenging question of Measuring deprivation? As has been shown, simply summing indicators can itself lead to weighting which may be driven more by the availability of indicators rather than from any conceptual model of multiple deprivation.

There are five possible approaches to weighting [see Senior (2002) cited by the Scotish Government (2003)]:

- Driven by theoretical consideration;
- Empirical driven;
- Determined by policy relevance;
- Determined by Consensus;
- Entirely arbitrary.

The current research uses the empirical driven approach to weighting. A factor analysis using PCA method was used to extract a latent 'factor' called 'multiple deprivation' assuming, that is, that the analysis permitted a single factor solution.

There are two main arguments supporting the choice of the approaches to weighting: the auto detection of the weight of each variable based on the relevance and standard deviation and the impartiality of the techniques (not arbitrary and not politically influenced).

[7] Among several Index developed using PCA are UNICEF(Unicef multiple indicator cluster survey), USAID (DHS wealthy Index), AIDS indicator survey and malaria Indicator survey (MIS) and World Bank (Demographic and Health Survey) just to mention a few.

4. COMBINING QUALITATIVE AND QUANTITATIVE INDICATORS FOR DEPRIVATION MEASUREMENT

4.1. Qualitative and quantitative indicators

Indicators are a powerful and useful tool for monitoring and evaluation. There is a clear distinction between quantitative and qualitative indicators.
Quantitative indicators are measure of quantity while qualitative indicators can be defined as people's judgements and perceptions about a subject.
A more elaborated differentiation between quantitative and qualitative indicators is provided bellow.

> "Quantitative indicators can be defined as measure of quantity, such as the number of people who own sewing machines in a village. Qualitative indicators can be defined as people's judgements and perceptions about a subject, such as the confidence those people have in sewing machines as instruments of financial independence"(CIDA, 1997, p. 9).

4.2. Why combine qualitative and quantitative indicators?

The two types of indicators are really complementary, and both are important for effective monitoring and evaluation. The fact that they can cross-validate and enrich each other is an added value to the research process. Bastia (2000) argues that qualitative analysis is needed in order to gain an in-depth understanding of the changes that take place in any social setting.

Qualitative indicators are important because they focus on people's own experience. For this reason qualitative indicators are particularly useful in understanding local people's views and priorities related to development and implementation of projects or upgrading programs. Another argument supporting the inclusion of qualitative indicators on Monitoring processes is to make the process more participative where the deprived groups have something to say about their condition.

Deprivation measurement are often conducted using mainly quantitative data but studies have already proven that the inclusion of qualitative data can increase the accuracy of measurement despite the complexity of using both approaches [see Carvalho(1997), Klasen(2000), Kambur(2001)and Hayati, et al.(2006)]. Carvalho(1997)discuss three ways of combining the best of qualitative and quantitative approaches:

(i) Integrating the quantitative and qualitative methodologies; (ii) examining, explaining, confirming, refuting, and /or enriching information from one approach with that from the other; (iii) merging the findings from the two approaches into one set of policy recommendations.

The inclusion of qualitative indicator on measuring deprivation is gainful to understand how effective are the implementation of policies, how the services rich the people and the perception level of their condition.

There are several advantages on using the combination of both quantitative and qualitative indicators to assess the level of deprivation particularly in slum areas where the majority of people is deprived:

- While the quantitative indicators gives us the coverage of services, the qualitative indicators allows a better understanding of how accessible they are and the level of quality of service delivered;
- Reflects the real life experiences of the poor;
- Communicates a powerful and compelling picture of deprivation to the public;
- Measures actual standard of living;
- Captures dimensions of deprivation that income does not, for example accessibility to services;
- Reflects public perception of poverty and deprivation and not arbitrary decisions made by experts;
- Should reflect government investment in services and in-kind benefits i.e. If government invests in affordable housing, we should see a reduction in deprivation and poverty as well;
- The inclusion of perceived deprivation (qualitative) indicators may also measure well-being relevant factors that were not included in any of the previous variables or indicators.
- Complements (but does not replace) existing income measures.

Source: Adapted from Klasen (2000) and Matern (2009)

Despite the fact that the inclusion of qualitative indicators can be gainful to the overall deprivation analysis, the researcher should be aware of the temporal aspect of qualitative indicators. Aspects of security for instance can fluctuate in time.

4.3. Rationale behind the choice of qualitative indicators

The choice of qualitative indicators is based on the relevance on the quality of life in the settlement and the role of the local authorities in delivering basic services.

Another argument supporting the choice of the indicators is due to the fact that it is believed that by improving the two conditions, the settlement will pull out of the slum condition (See definition of slum according to the UNHabitat in chapter 2.1.3).

It is important to mention that unlike most informal settlement, most of the slum dwellers in Mannyata 'A' are land owners which mean that by improving water, housing and sanitation issues the settlement will no longer be an informal settlement due to the improvement of the life quality.

> "By providing infrastructure (roads, water, electricity and sewerage), the face of the slum will change completely and promote development"
>
> Key Informant 3 - MCK

5. RESULTS

The description of the settlements characteristics with a particular emphasis to housing and physical environment as well as the analysis of the results are presented in this chapter. Spatial and Statistical analysis were carried out to measure deprivation in the settlement.

5.1. Characteristics of the settlement

Mannyatta 'A' is by far the most densely populated peri-urban settlement in Kisumu with 20.001 population per km^2 . It is characterized as consolidated development and an irregular urban structure.

Table 5-1: Peri-urban settlements in Kisumu, source: Kenya population and census vol. 1A and Okonyo, 2008

Settlement	Population	Households	Area in Km^2	Density
Bandani	13.961		13.1	1.066
Obunga	8.576		8.5	1.009
Manyatta Arab and Kaloleni	13.515		2.1	6.436
Manyatta 'A'	48.004	12.525	2.4	20.001
Manyatta 'B'	21.027		3.3	6.372
Nyalenda 'A'	28.269	8.070	3.2	8.953
Nyalenda 'B'	32.430	8.561	4.7	6.886

The major characteristic of this particular settlements are:

- Substandard housing most of the times characterized by illegal and inadequate building structures. Despite the fact that within the settlement one can find high rise building surrounded by very poor housing structures a common feature is the generally low quality of construction;
- The majority of structures are let on a room-by-room basis and the most of the households occupy a single room or part of a room;
- Lack of physical planning and basic principles of spatial planning;
- The majority of the inhabitants have low or very low incomes;
- The majority of employed people are working in the informal sector;

5.2. Housing characteristics

The housing units in the settlement are in general of low quality standard which reflects the socio economic conditions of the inhabitants and their inability to pay for services and a better quality of structure. The major characteristics of the housing units are:

- Poor structural quality of housing;
- Lack of basic housing facilities such as toilet and kitchen;
- Sharing of toilets by a group of households;
- Lack of a proper ventilation in the extreme cases due to the lack of resources, some housing units does not have any means of ventilation;
- No sewage system;
- Lack of tap water;

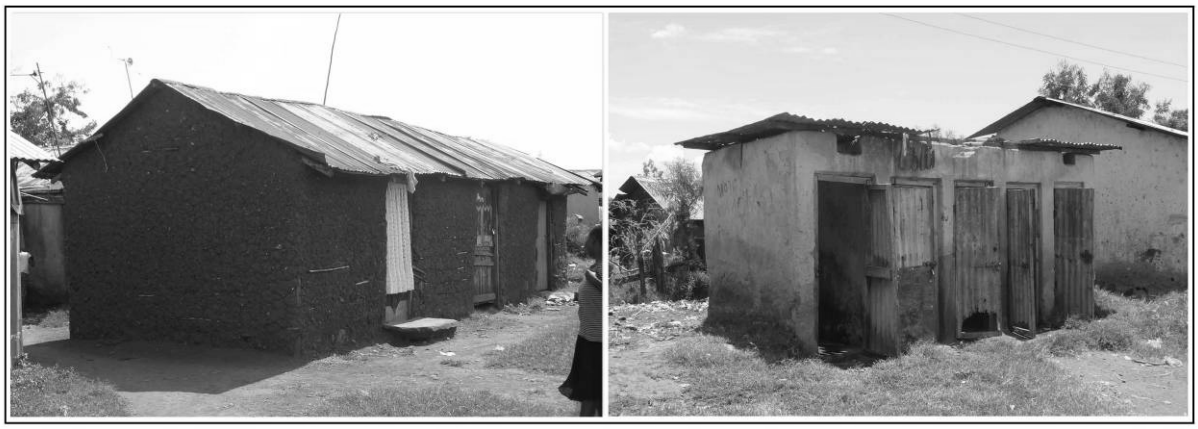


Figure 5-1: (left)Housing unit without ventilation and a common toilet shared by different tenants (right)

5.3. Key informant outcome

Regarding the resource allocation mechanisms the service delivery through LASDAP project were initially based on the area without taking into consideration specific needs of the slum dwellers which lead in many cases to the misallocation of recourses. According to the key Informants, the future allocation will be based on the incidence of poverty. It shows that they are aware of the need of the most appropriate strategy of resource allocation. As far as the scale of police making is concerned different ideas were raised but the bottom line was that the slum areas should be prioritized due to the fact that slum dwellers can not afford to pay for infrastructure provision.
Infrastructure in general with a particular emphasis to water, sanitation, housing and roads are the priorities in all slums of Kisumu city.

5.4. Focus group discussion and outcome

The focus groups were structured around three questions based on the original survey questionnaire.
The first was "What do you believe are the main necessities and their prioritization in Manyatta 'A' today?" This was an open question, which allowed for general brainstorming. At this stage they had no previous contact with the indicators prepared to assess deprivation. During the discussion, several issues were raised by the participants and one interesting point is that they are aware of lack of proper physical planning in the settlement. Asking an open question of people's opinions was effective as a conversation starter for the group. The outcome of the focus group discussion can be seen in the table bellow where they ranked according to their priorities to the necessities.

Issues	weight/ranking										Total Score
	1	2	3	4	5	6	7	8	9	10	
Drainage	●	●	●	●	●	●	●	●	●		9
Electricity	●	●	●	●	●	●					6
Garbage collection	●	●	●	●	●	●	●				7
Housing	●	●	●	●	●						5
Insecurity	●										1
Overcrowding	●	●									2
Roads and acessibility	●	●	●								3
Sanitation	●	●	●	●	●	●	●	●			8
Street light	●	●	●	●							4
Water	●	●	●	●	●	●	●	●	●	●	10

Table 5-2: Definition of priorities in the settlement

Interesting to note that road does not score higher like in other informal settlements (See weighting Table on the community needs, Anex B). This is explained by the fact that among the seven informal settlements in Kisumu, Manyatta 'A' benefited from an upgrading program back in 1983 which conferred a better quality of roads and access comparing with other informal

settlements. Despite the fact that the settlement does still have problems with secondary and tertiary roads it is 'better off' comparing with Nyallenda for instance.
Water, drainage and sanitation are the issues which scored high while security and overcrowding scored less. In Metameta for instance, one of the participants raised problems with the absence of drainage system which make the poor groups be more vulnerable to floods.

The second question of the focus groups consisted of a presentation of each of the 19 indicators initially proposed to assess deprivation. Focus group participants were asked which of the items presented to them stood out as important.
Generally speaking they agreed with the indicators and also recommended adjustments on the score and the exclusion of sewerage system because there is no public sewerage system in the settlement.

Regarding the choice of indicators, as mentioned above despite the fact that the majority of the proposed indicators being considered relevant to assess deprivation one indicator was included (house ownership) and two of them were excluded (sewerage system and safety). The included indicator was due to the relevance that the participants attributed to that particularly as a source of income generation such as subletting a room in their household. The fact that the owners are permanent residents on the settlement gives also a more stable character of the socio-economic environment of the settlement.

The third question asked to the participants was how they defined a deprived or poor person in their settlement. To this question they said that the poor are characterised by renting poor quality housing and not having a permanent source of income. On other hand the wealthy people are characterised by owning houses, cars and goods and having a permanent employment.

The last question was what is the best scale for decision making on budget/resource allocation.
According to them the current approach for resource allocation used by the Municipality through LASDAP project is not the best since they are allocating resources based on territorial units where the same amount of money is allocated to each sub location.
Manyatta 'B' for instance is more rural than Manyatta 'A' and when it comes to resource allocation it is based on equal share while in terms of population, area and physical infrastructure Manyatta 'A' is by far the unit which needs more support. According to the participants, equitable access of resources should be the principle and the best scale for resource allocation is the unit, the lowest level of administrative division despite the fact that below the unit they have sub units but they are not officially recognised by the local authorities.
Related to this point, is important to highlight that the new approach adopted for LASDAP project 2011 will be based on the level of poverty indicators and the participation of the community.

5.5. Primary household survey outcome

A primary household survey was conducted in Manyatta 'A' to understand the perception of the inhabitants about there level of satisfaction with the neighbourhood and cross checking with the available secondary data.
The outcome of the 90 households enquired reinforced the outcome of the focus group discussion with more than 70 percent of the households considering the neighbourhood as safe which support the argument of the non inclusion of the qualitative indicator safety in the neighbourhood. On the other hand, the overall satisfaction with the environment in the neighbourhood showed that the level of dissatisfaction is greater than the level of satisfaction

which shows that the majority of people living in Mannyatta 'A' are not satisfied with the life conditions in the settlement reinforcing the idea of the inclusion of qualitative indicators to understand particularly with which specific dimensions people are not satisfied with.

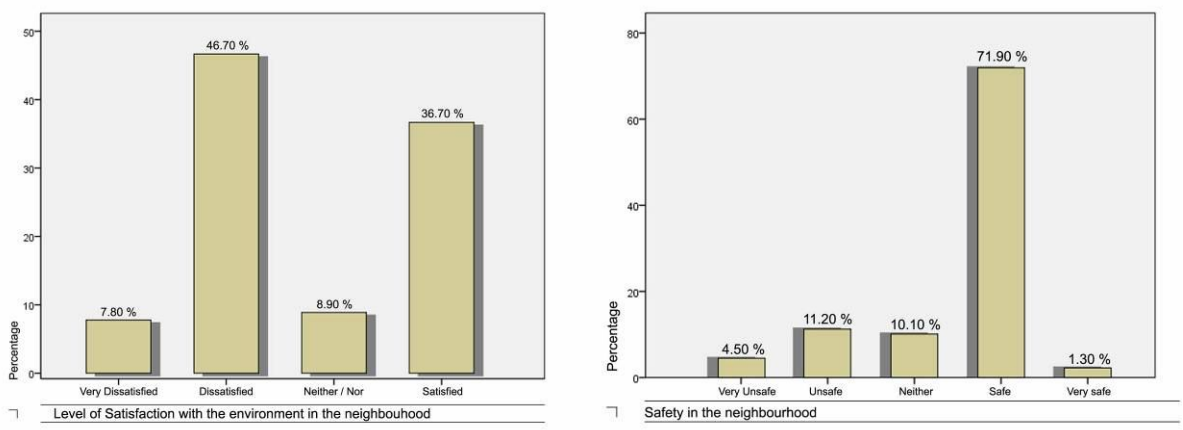


Figure 5-2: Satisfaction and Safety in Manyatta 'A'. Outcome from the primary Household survey

There is no so much variation in the settlement in terms of safety issues within Manyatta 'A' where the majority of inhabitants consider the settlement as a safety place to live.

A deep understanding of the safety in the neighbourhood brought to the surface an interesting factors. The outcome of the primary household survey showed that the women are more sensitive to the security issues in the neighbourhood. 14.6% of the women considered the neighbourhood as unsafe and 6.3% as very unsafe which makes that more than 20 % consider the neighbourhood unsafe and 66.7% consider the neighbourhood as safe. On the other hand 78.0 percent of the men classified Mannyatta 'A' as a safe place.

		Gender		
		Male	Female	Total
Very Unsafe	Count	1	3	4
	Gender %	2.4%	6.3%	4.5%
Unsafe	Count	3	7	10
	Gender %	7.3%	14.6%	11.2%
Neither	Count	4	5	9
	Gender %	9.8%	10.4%	10.1%
Safe	Count	32	32	64
	Gender %	78.0%	66.7%	71.9%
Very safe	Count	1	1	2
	Gender %	2.4%	2.1%	2.2%
Total	Count	41	48	89
	Gender %	100%	100%	100%
	% of Total	46.10%	53.90%	100%

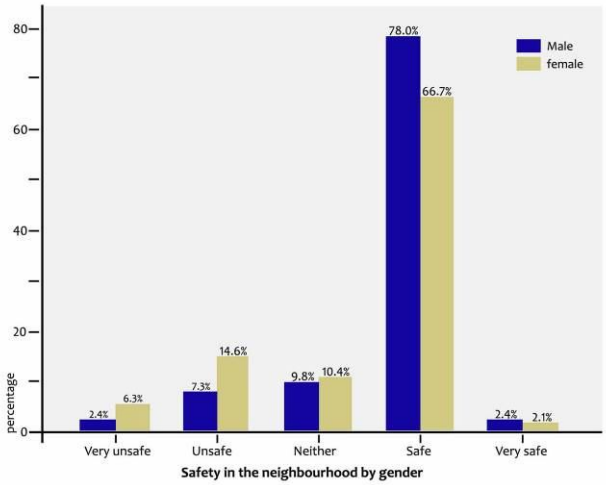


Figure 5-3: Gender dimension on safety issues

Studies carried out by Foster et. al (2004) also showed similar conclusion that women were more concerned than men about the safety of walking, particularly at night. Warr (1984), Gordon and Riger (1989) cited by Loukaitou-Sideris (2006) argue that crime and fear of crime seem to be more prominent among women than men.

Intra-household deprivation

Understand the individual deprivation experienced by the household members can portrait a better picture of deprivation within and outside the household.

The systematic inferior position of women particularly in developing countries has undermined the potential of women to contribute to the overall development and wellbeing.

The study revealed that 69.75% of women and girls are responsible for fetching water while only 10.63% of men and boys contribute to put water within the house. On the other hand, the children's in school-age also spend a lot of time to carry water rather than focus on school activities. Within the household the figure bellow shows the distribution of responsibility to fetch water within the household where the women and children's are the ones who suffer most with lack of water.

Women and girls spend more time fetching water compared to men and boys. As the primary source of drinking water most of the times is not within the plot they have to walk distances to the primary source of water where the women and children's are the ones who carry the water consuming time of their daily activities.

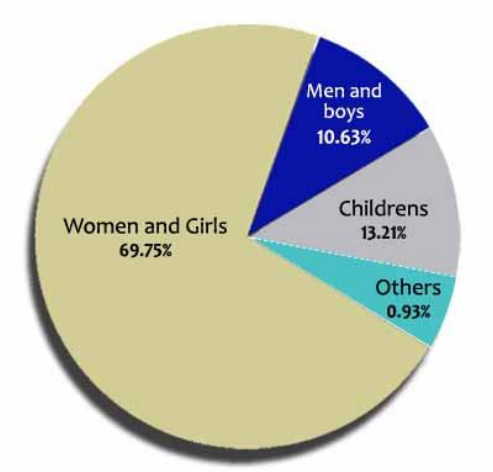


Figure 5-4: Who collect water in the house

These proportions support the idea that women and children's are the face of deprivation.

Spicker and Gordonet. al (2007, p. 77) argue that 'throughout there lives women are more vulnerable to both, poverty and deprivation, whilst there are more women than men living in conditions of poverty and deprivation at any one time'. According to them, this is primary related to gender division of labour, by which men are held to require an adequate or family wage and women are not, to some men the place of the women is in the house doing domestic activities. This phenomena is also known as feminization of poverty[8]

5.6. Deprivation indicators and scores

Deprivation scores are based on the type of variable and their level of measurement namely binary, nominal and ordinal variables divided in two different groups:

- Based on the subdivision of the indicator measurement in 5 quintiles from the least deprived to the most deprived. In the **quintile classification adopted,** the equal interval approach was the base to the quintile classification.
- Based on the binary scores where the household is deprived when does not have a certain commodity and not deprived when the household have the commodity.

[8] For more information of feminization of poverty read Spicker, et al.(2007, p. 78)

Cut-off points

The current research uses the quintile approach by differentiating one another by equal interval. The household status is divided into five different quintiles. The lowest quintile is classified as 'worst 20%' the second quintile 'Next worst 20%' and in the other extreme '20 percent least deprived' and 'next best 20 %. The ones in the middle are classified as the 'middle, group .The categories are organized in the following manner:

1 - Worst 20%, 2 - Next worst 20%, 3 - Middle, 4 - Next best 20% and 5 - 20% least deprived.

Table 5-3: Deprivation indicators and their scores

		categories (1 = most deprived;				5 = least deprived)
	Indicators	1	2	3	4	5
1	**Type of Sanitation facilities**	no toilet		pit latrine		flush toilet
2	**Bathing facility**	Public shower bath	Shower shared with the neighbour	Basin in the house	Combined toilet	Private bathroom
3	**Safe Water**	Borehole	Water vendors	Water kiosk	Shared yard connection	Piped waterin the house
4	**Electricity**	no electricity				with electricity
5	**Energy for cooking**	firewood	dung, makwangla	parafin, coal	botled gas	electricity
6	**Overcrowding**	more than 3 persons per room				3 or less perssons per room
7	**Type of employment**	Unemployed		Informal		Formal
8	**Housing material**	Mud and whattle	Timber		Tins and Metal	Brick blocks
9	**Durable Structure**	Temporary		Semi permanent structure		Permanent structure
10	**Employment Ratio**	0-19%	20-39%	40-59%	60-79%	+ 80%
11	**literacy**	Primary	Secondary		College	University
12	**House ownership**	no				yes
13	**Income**	none	less than 5000 Ksh	5001 - 10000 Ksh	1001 - 15000 Ksh	+15000 Ksh
14	**Distance to water source**	+200m	151 - 200m	101 - 150m	51 - 100 m	0 - 50 m
15	**Access Primary Health care***	+2000m	1500-2000m	1001-1500m	501-1000m	0-500m
16	**Access Primary School***	+1500m	1001-1500m	501-1000m	301-500m	0-300m
17	**Overall satisfaction with sanitation**	Very Unssatisfied	Unsatisfied	Neither	Satisfied	Very satisfied
18	**Level of Satisfaction with water**	Very unsatisfied	Unsatisfied	Neither	Satisfied	Very satisfied
		cut-off points	Household falling in this category are the most deprived households			

***** The distances of access to the facilities are based on the walking distances defined by the planning standards for Local authorities, See annex C.

The categories and cut-off points are based on the pre-defined structure of the socio economic data-base and literature review.

The geographical accessibility indicators for primary schools and health care centres are based on the centroid of the structures/buildings while the distance from the water source is from the secondary household survey.

5.7. Analysis of deprivation

The specific deprivation analysis focus mainly on the amenities where the local authorities can directly or indirectly intervene or influence actions towards the improvement of quality of life in the settlement.

The identification of levels of deprivation per quintile, from the lowest to the highest quintile are shown giving a picture of specific deprivation per each quintile.

Specific deprivation and hot spot analysis

The specific deprivation analysis was carried out at the level of sub-units where among the six sub units of Mannyatta 'A', three of them were excluded do to lack of sufficient data for analysis namely Magadi, Flamingo and Gonda. Clusters of deprivation were identified based on the Hot Spot Analysis where spatially concentrated households experiencing high levels of deprivation are clustered together. Since the influence of features outside the given distance is reduced with distance, in this case no threshold distance was applied which means that the distance band or threshold distance adopted is zero. This ensures that every feature has at least one neighbour.

Table 5-4: Specific deprivation per category in percentage

	Level of Deprivation in percentage				
	category 1 (worst off)	category 2	category 3	category 4	category 5 (best off)
Housing facilities					
Type of sanitation facilities	0.80	n.a	63.00	n.a	36.20
Bathing facility	6.30	50.30	8.30	24.10	10.90
Safe Water	34.30	20.60	27.20	8.90	9.00
Electricity	44.80	n.a	n.a	n.a	55.20
Housing Adequacy					
Overcrowding	39.10	n.a	n.a	n.a	60.90
Material of Construction	25.10	17.50	n.a	51.80	5.60
Durable Structure	9.70	n.a	41.60	n.a	51.30
Socio Economic Environment					
Employment ratio	23.10	15.80	22.70	8.90	29.50
Literacy	2.60	22.30	64.20	7.80	3.10
House ownership	78. 20	n.a	n.a	n.a	21.80
Monthly Income	4.90	24.80	36.20	20.10	14.00
Energy for cooking	2.60	5.80	83.60	6.90	0.80
Type of Employment	2.80	n.a	89.60	n.a	6.80
Social Infrastructure					
Access to Primary Health care	0.10	2.40	30.30	35.00	32.10
Access to primary schools	0.00	18.80	30.20	28.30	22.80
Access to water source	0.80	4.10	5.10	9.20	80.70
Overall satisfaction with Water	5.30	30.20	18.30	35.10	11.00
Overall satisfaction with Sanitation	18.10	51.50	11.50	15.70	3.20

Employment ratio

The Household employment ratio measures the proportion of people above 18 years old earning income [9]. The spatial distribution of the indicator shows spatial concentration of lowest employment ratio in Metameta particularly in two sub-units Callbox and Flamingo Group but the hot spot analysis brings a better picture of clusters with lowest employment ratio which goes beyond the boundaries of the sub-units concentrating between the upper side of Call Box and St.

[9] The International Labour Organization consider working age from 16-64 but the available information on the data base considered fro18years old.

Luke and the lower side of Kandegwa and Flamingo group. 23.10 percent of the household fall within the most deprived groups while 29.5 percent fall within the least deprived quintile.
Within the three upper units of the Settlement, Metameta is the Unit with highest number of households with the lowest employment ratio (36.9%) while Kondele is where the majority of household scores the highest ratio (37.1%)[see fig. 5.6 (a)].

Income

The Income distribution in the upper Manyatta confirms the socio economic heterogeneity of Mannyatta 'A' characterized by a mix of different income groups with an average income higher than the other slum areas (Omondi, 2009). Metameta and Konambuta are the units with highest concentration of lowest income households and fig.5-5 shows a clear pattern of households earning the lowest income while in Kondele are concentrated households with higher incomes compared with Metameta and konambuta. Clusters of households with highest and lowest incomes can be easily identified in each of the three units. 52% of Metameta inhabitants have there income bellow 5000 Ksh equivalent to 50 Euros. In Konambuta and Kondele 42.7 and 11.8 % of inhabitants earn less than 50 Euros.

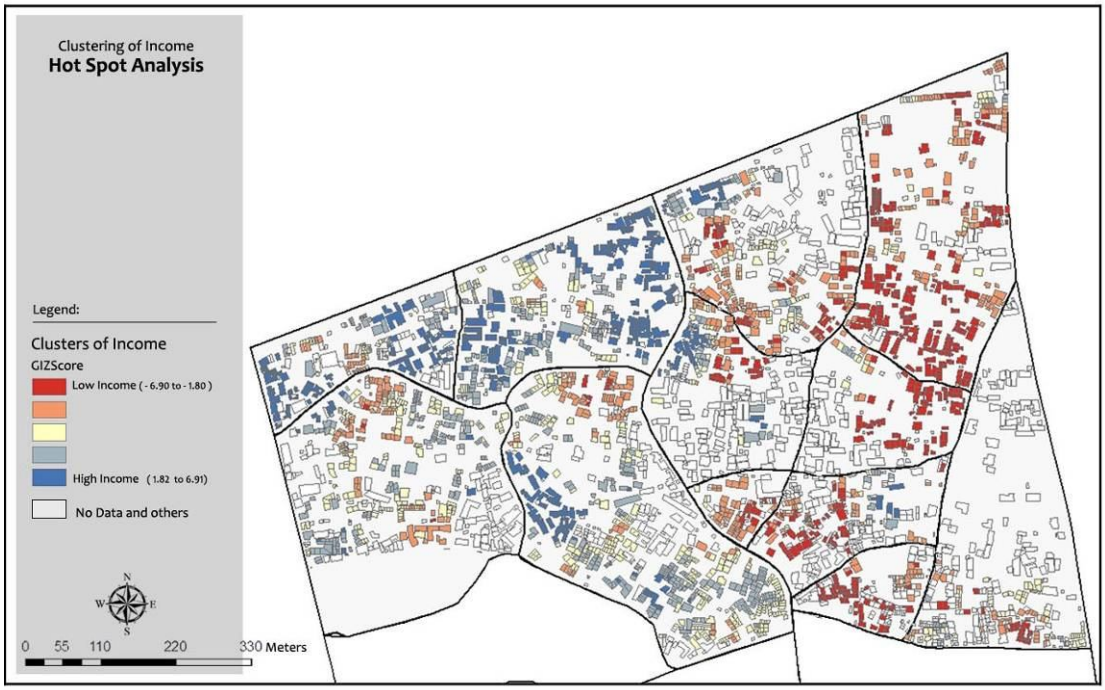


Figure 5-5: Spatial clusters of monthly income

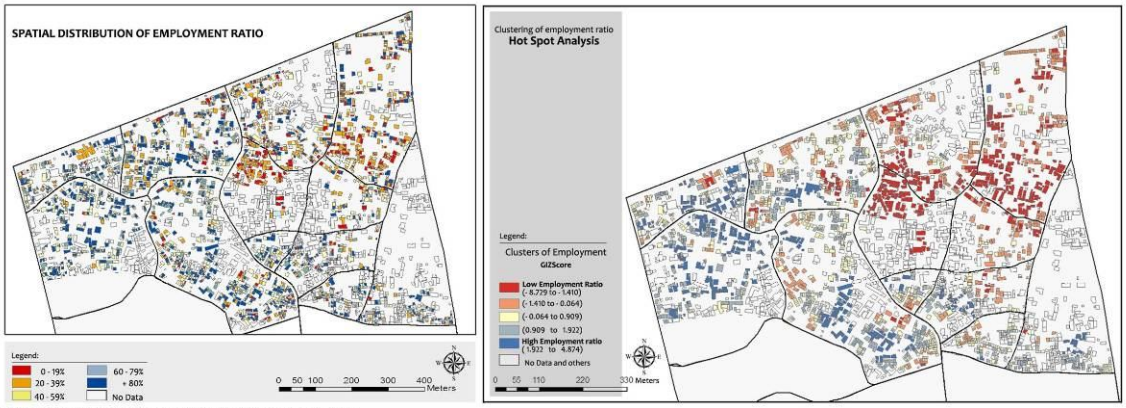
Primary water source

The main primary drinking water source in the settlement is borehole which when not very well handled became contaminated during collection and storage of water. Highest concentration of households relying on unsafe sources of water is sparsely distributed within Units with clusters of concentration on the western side of Konambuta and Kondele centre.
In Upper Manyatta, Kondele has the highest percentage of Household with access to water through pipe in the House (13.5%) followed by Konambuta (5.4%). In other hand, 58.4 percent of Konambura Households has borehole as the many source of drinking water followed by Kondele with 36.3 percent. [fig. 5-6 (b)]

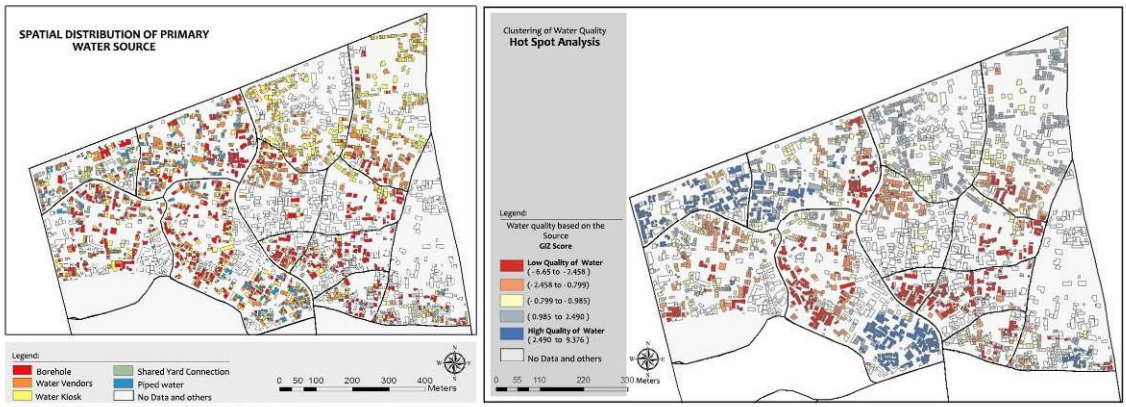
Housing structure

Metameta is the unit with highest concentration of temporary structures made mostly with mud and wattle and fig. 5-6(c) shows a clear pattern of low quality housing in Metameta and Konambuta while in Kondele the predominant type of housing is permanent characterized by a durable structure. Temporary structures are built with poor local material of construction and are bellow the acceptable standard of living due to its construction quality, material and lack of very basic facilities and housing components such as ventilation.

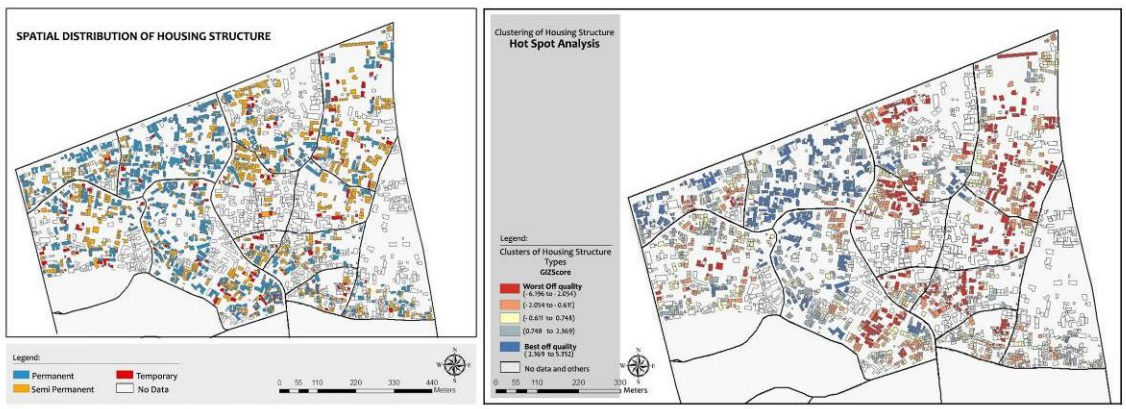
In upper Manyatta, 57% of the housing structures in Kondele are permanent while Konambuta is the unit with the highest percentage of temporary structures (12.9%) and semi permanent structures (45.8%).



a) spatial distribution and cluster of employment ratio



b) spatial distribution and cluster of primary water source



c) spatial distribution and cluster of housing structure types

Figure 5-6: Spatial analysis of specific deprivation in Upper Manyatta for employment ratio, primary water source and housing structure type

Sanitation facilities

In Manyatta 'A', 1.1 percent of households have no toilet at all, 61.2 % uses pit latrine and 37.7 uses pour flush connected to sewer or septic tank. [fig. 5-7 (a)]

Pit Latrine is the predominant sanitation facility type used in the settlement. In Upper Manyatta the percentage of people using pit latrine are 56.3 for Kondele, 75.6 for Metameta and 57.9 for Konambura while 43.6 percent of Kondele households uses pour flush toilet followed by Konambuta and Metameta with 40.1 and 23.3% respectively.

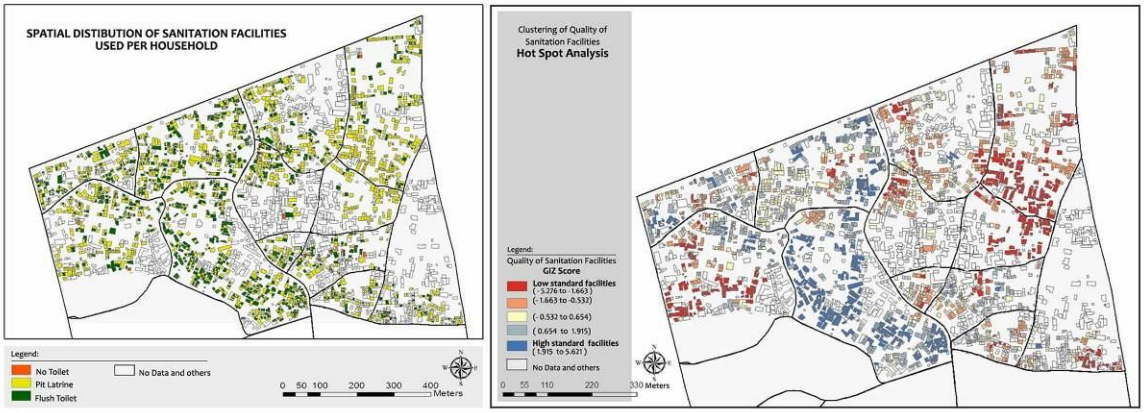
Overall satisfaction with sanitation

In the Settlement, 50,6% of the households are dissatisfied, 17.4 are very dissatisfied, 9.7 percent are not sure and 18.5 are satisfied and 3.8% are very satisfied with Sanitation issues in Manyatta 'A'. Those numbers confirms the scores attributed by the focus group participants and shows that more attention should be paid to water and sanitation in the settlement and how the improvement of the two can have a significant impact on the human health and quality of life of the inhabitants.

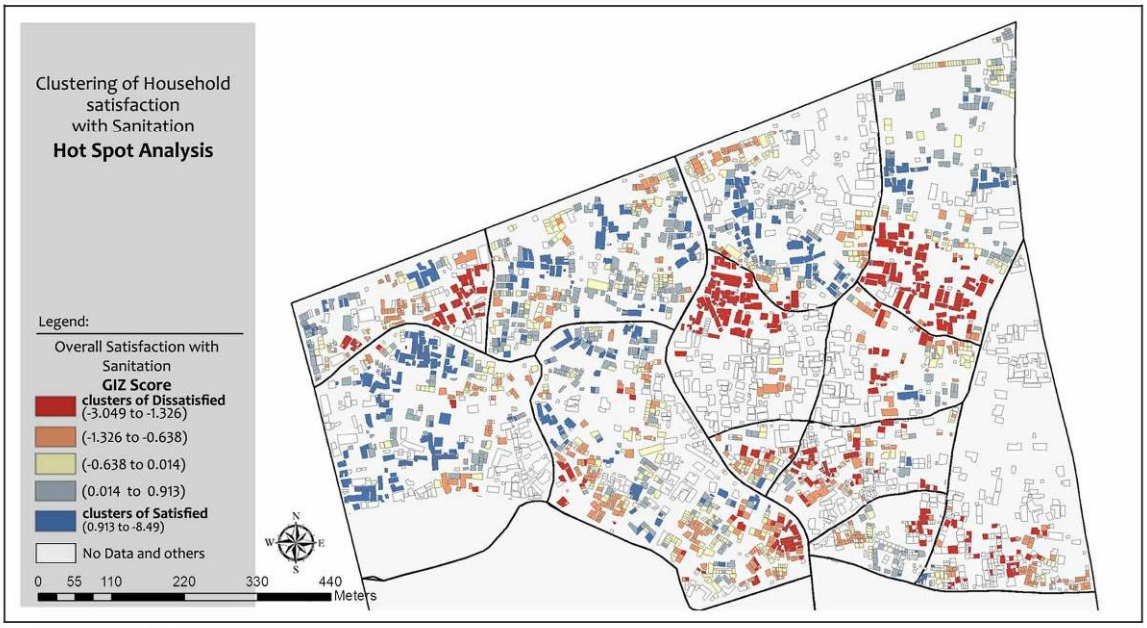
The figure 5-7 (b) shows clear clusters of dissatisfied households with the highest concentrations in Metameta followed by Konambuta.

Overall satisfaction with water

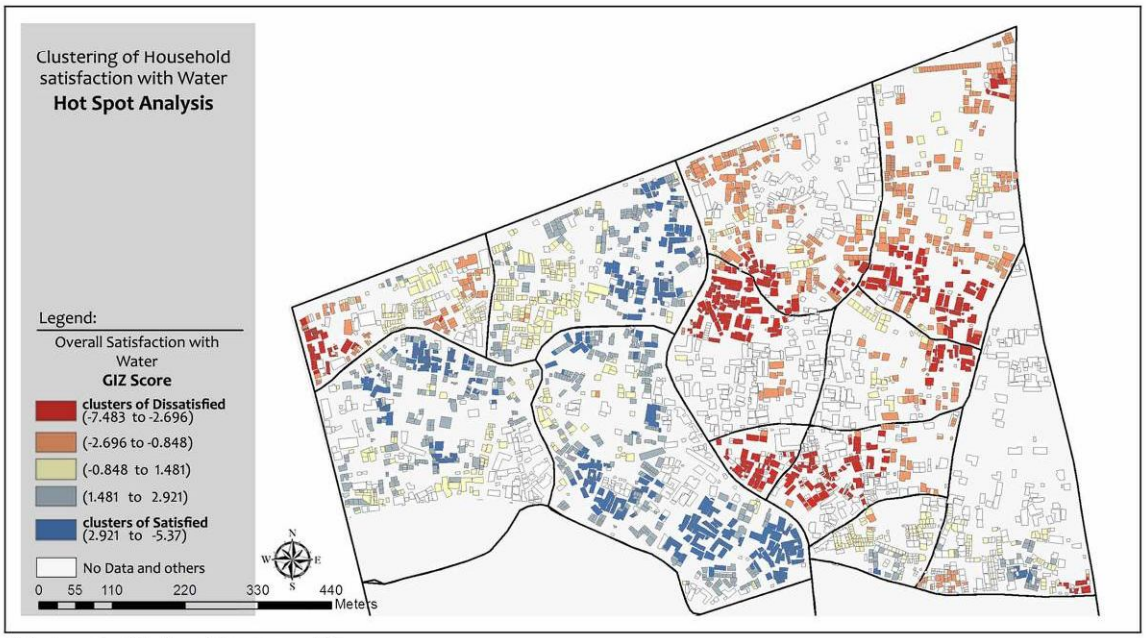
Clusters of level of satisfaction were identified in upper Magadi units and the least satisfied groups are concentrated in Metameta and Konambuta. The two lowest levels of satisfaction (dissatisfied and very dissatisfied) combined shows that more than 60 percent of households are dissatisfied in Metameta (62.2%) and Konambuta (60.3%) while in Kondele 21.3 percent are dissatisfied with water issues.[fig. 5-7 (c)]



a) Spatial distribution and clusters of sanitation facilities used



b) Clusters of satisfaction with sanitation conditions



c) Clusters of satisfaction with water conditions

Figure 5-7: Spatial analysis of specific deprivation in upper Manyatta for sanitation facilities and overall satisfaction with water and sanitation

Water and sanitation

The figure 5-8 bellow shows the contribution of each of 5 quintiles for the overall satisfaction analysis for water and sanitation where in both cases the percentage of people dissatisfied with the condition scores high in almost all units excluding Kondele. It also shows that the inhabitants are most satisfied with water than sanitation despite the fact that the percentage of satisfied is low.

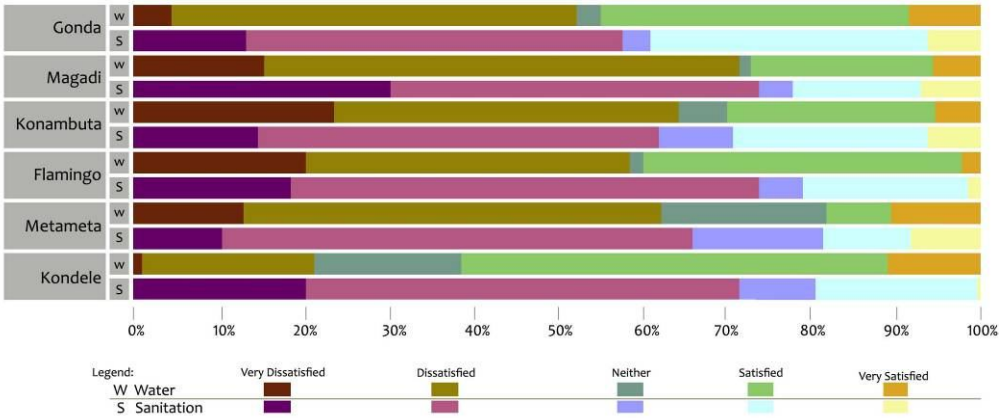


Figure 5-8: Contribution of degree of satisfaction with water and sanitation

5.7.1. Geographical access to social services

The accessibility analysis carried out to assess the level of accessibility in Manyatta 'A' took into consideration the specific characteristics of the settlement described in chapter 5.1.

Within the settlement, there are no natural barriers such as water bodies or significant differences in elevation. All the area is entirely accessible by walking while the use of automobile is somehow limited to some areas where due to very narrow roads, footpaths and the physical layout of the buildings the use of other means of transport becomes difficult.

Other relevant characteristics of the accessibility which should be taken into account when using accessibility measures are:

- The majority of slum dwellers does not have immediate access to the roads;
- People walk in between the buildings to access to the main roads or other facilities in the neighbourhood;

Access to primary schools and primary health care centers

The planning standards adopted by the local authorities sets a maximum walking distance of 600m to access a primary school and 1 km walking distance to primary health care centers. The accessibility analysis per spatial unit is based on percentage of households within the threshold mentioned above.

By using the local indicators the research intends to set a comparison ground with the local standards (See annex C).

The spatial distribution of public facilities

The analysis of the spatial distribution of public facilities was made taking into account the spatial distribution of social services and the area of coverage of the services. Geographical access to primary schools and primary health care centers in the area of study are the elements analysed.

Primary schools

In terms of access to primary schools, Konambuta and Magadi are well served with 100% of the structures falling within 400 meters of walking distance which according to the local standards are well served. The two units are followed by Metameta and Flamingo while Kondele and Gonda are the less well served (fig. 5-9 and table 5.5).

Primary health care

The accessibility to primary health services shows that Kondele and Metameta are the better off Units followed by Flamingo and Konambuta while Magadi and Gonda are the worst of. It is important to refer that within Manyatta 'A' there is only one health care facility located in Kondele Unit which makes that all the upper Manyatta units benefit from the shorter distance to the facility. The other facilities which benefits the residents of Mannyata 'A' are outside of the settlement (see fig. 5-10 and table 5.6)

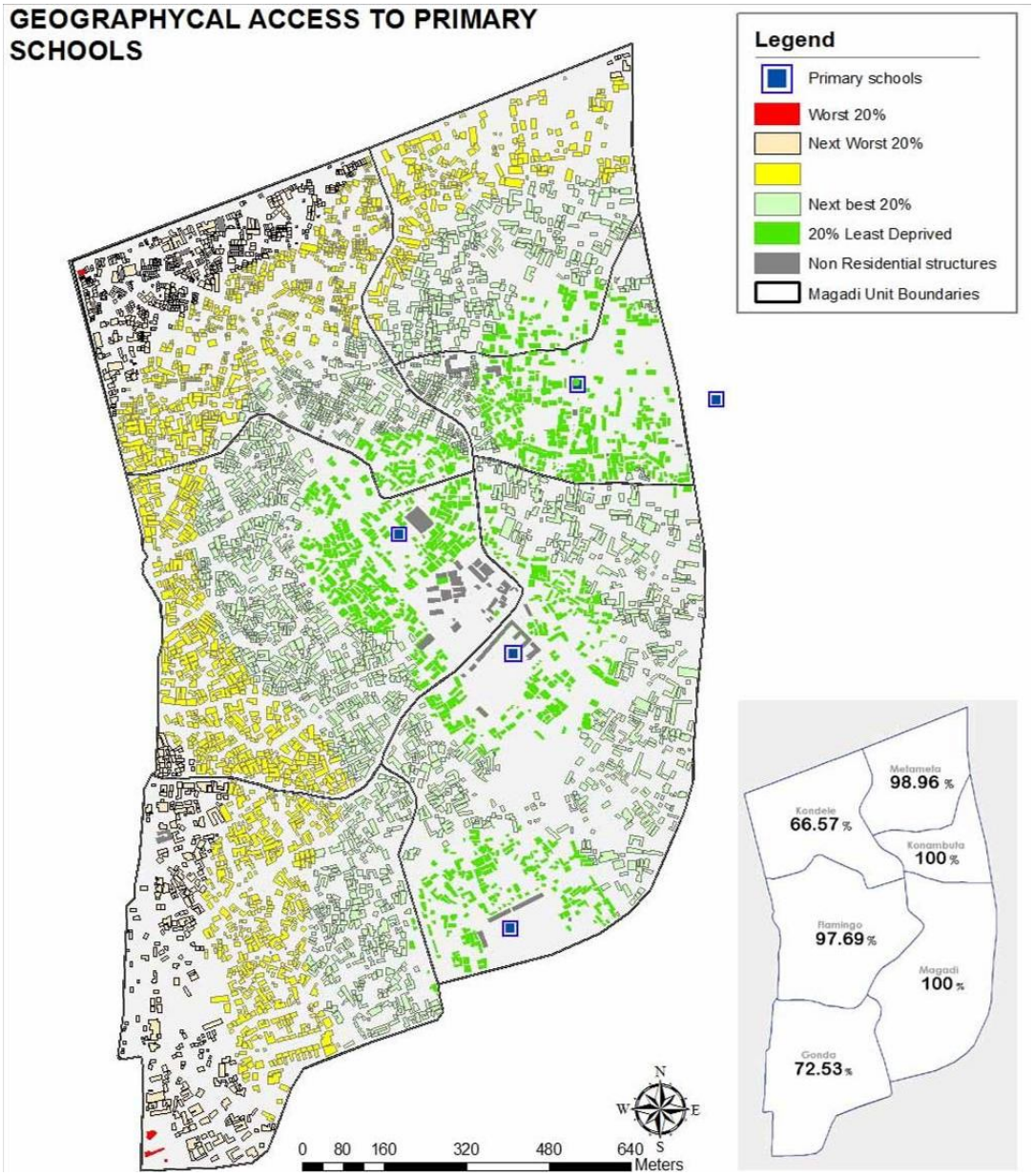


Figure 5-9: Access to primary education

7 public facilities were considered for the analysis, 4 within the boundaries of Mannyatta 'A' sub-location and the other three outside the sub-location.

Table 5-5: Primary school access per unit

Accessibility degree to primary schools	Manyatta 'A' sub-location	Percentage of access per Unit					
		Kondele	Metameta	Konambuta	Flamingo	Magadi	Gonda
0 - 200 m	12,48	9,48	9,48	77,84	24,90	40,68	0,77
201 - 400 m	35,11	19,66	48,45	22,16	43,51	59,32	31,25
401 - 600 m	30,35	37,43	41,03	00,00	29,28	0,00	40,51
601 - 800 m	21,61	33,29	01,04	00,00	2,31	0,00	27,14
+800 m	0,45	0,14	0,00	00,00	0,00	0,00	0,33
% of access	77,95	66,57	98,96	100,00	97,69	100,00	72,53

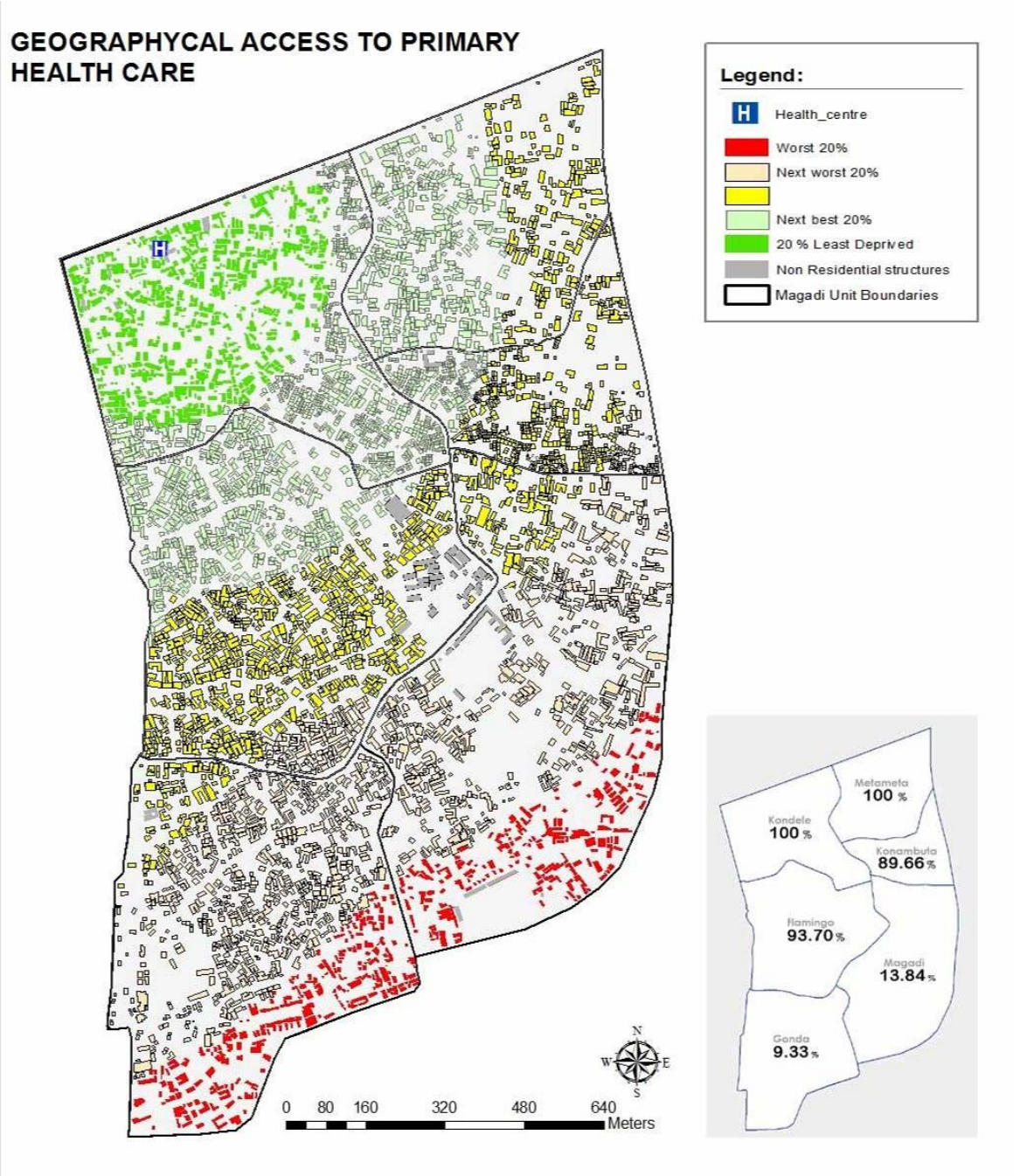


Figure 5-10: Access to primary health care

The spatial analysis on the geographical access to primary health care centers also took into account health facilities outside Manyatta 'A' boundaries. In this particular case three public facilities were considered within the sub-location and the other two outside the sub-location.

Table 5-6: Health care access per unit

Accessibility degree to primary health care	Manyatta 'A' sub-location	Percentage of access per Unit					
		Kondele	Metameta	Konambuta	Flamingo	Magadi	Gonda
0 - 350 m	20,48	62,56	00,00	0,00	00,00	00,00	00,00
351 - 700 m	28,94	37,40	66,30	26,73	36,10	00,00	00,00
701 - 1000 m	26,19	0,04	33,70	62,93	57,67	13,84	9,33
1001 - 1350 m	18,54	00,00	00,00	10,34	6,23	61,74	65,77
+1350 m	5,85	00,00	00,00	00,00	00,00	24,42	24,90
% of access	75,61	100,00	100,00	89,66	93,77	13,84	9,33

5.7.2. Correlation between dimensions of deprivation

The correlation matrix shows a very strong correlation between the socio economic environment and the Index of Multiple Deprivation. This fact can be attributed to the scoring factors from the PCA analysis where three of the indicators scored high comparing with other indicators.

Social infrastructure correlates moderately with housing adequacy (0.345) and socio economic environment (0.307) while housing adequacy correlates also moderately with socio economic environment (0.372).

The dimension of deprivation which correlates most with IMD is socio economic environment with a very strong correlation (0.948). This outcome confirms the argument of Thake and Staubach cited by Pacione (1995) which says that the root cause of deprivation is economic and stems from two fundamental sources: the low wages and unemployment. People experiencing several forms of deprivation are likely to have very little income and few other resources (Townsend, 1987).

Table 5-7: Correlation of deprivation dimensions and IMD

	Housing Facilities	Housing Adequacy	Soc. Economic Environment	Social Infrastructure	Overall Sat. Water	Overall Sat. Sanitation	IMD
Housing Facilities	1						
Housing Adfequacy	0.024	1					
Soc. Economic Environment	0.004	0.372 **	1				
Social Infrastructure	0.164 **	0.345 **	0.307**	1			
Overall Sat. Water	- 0.023	0.196 **	0.174 **	0.240**	1		
Overall Sat. Sanitation	0.058**	- 0.064**	- 0.027	- 0.157 **	- 0.033	1	
IMD	-0.018	0.254 **	0.948**	- 0.189**	0.098**	0.081**	1

** Correlation is significant at the 0.01 percent level (2 - tailed)

5.8. The construction of the IMD

The construction of the IMD was based on the 6 stages in the table bellow.

Table 5-8: Stages of IMD construction

Stage	Title	Main Task	Output
1	Selection of Indicators for constructing the Index	Based on the literature review on measuring poverty, deprivation, well being and social inequalities, a identification of the most common indicators used worldwide and in Developing coutries to assess the quality of life was carried out.	19 indicators were initially identified wich in its turn were clustered in 5 Dimensions of deprvation, namely Housing facilities, Housing Adequacy, Socio economic and Environment, Social Infrastructure and Overall satisfaction with sanitation and level of Satisfaction with water.
2	Validation of the selected Indicators by researchers and other experts	The selected indicators were presented to group of local experts /key informants and community leaders for validating and collecting there opinions, examine its content and validate the indicators.	Due to data availability and feasibility, relevance of the indicator and practicability 18 indicators were selected among the 19 initially proposed. The indicator kitchen within the housing unit and safety in the house were excluded.
3	Selecting the measures of deprivation	Based on Literature review and discussion with researchers and local experts the measures of deprivation per indicator were redefined and adapted to the local framework and the method of estimating/calculating the deprivation indicator were selected	Identification of different levels of Deprivation using objective and subjective methods to measure deprvation
4	Selecting a method to measure, estimate or display the deprivation indicator for geographical area	Selection of the Method for Measuring Deprivation taking into account the availability of data, local priorities and standards of living.	The Method adopted combine qualitative and quantitative indicators to assess the level of deprivation.Three units were object of study and in its turn each Ubunit was divided into 4 Sub Units resulting in 12 sub units for Upper Manyatta'
5	Identification of the most appropriate territorial unit to display the results	Discussion with Experts and Decision Makers the most appropriate scale to display the results taking into account its availability and the level of data desagregation.	Identification of the best scale to display deprivation to support decision making
6	Display the Spatial Distribution of Multiple Deprivation	Display the rank of Deprivation per Territorial Unit through a map at two different levels: 1. Spatial Distribution of Deprivation ranking between the 3 Upper Manyatta units and Sub units; 2. Identification of clusters of Multiple Deprivation	Ranking of Deprivation based on area and its desagregation to the level of household

Theoretically measures of household deprivation can be reflected by income, amenities, consumption, expenditure and access to utilities and infrastructure. The construction of the current IMD is based on the household socio economic data from Pamoja trust conducted in August 2010 for Mannyata 'A' Sublocation more specifically the upper Manyatta where both socio economic and spatial data was made available on time for the research which covers about 3349 households with data on all variables.

As the first step, a communality analysis was carried out for a better understanding of the indicator and how they represent the variables. The outcome of that showed that all the selected indicators scored above 0.4 which indicates that the extracted components represent the variable well. Rogerson (2006) argues that if communality is less than 0.3 the variable can be removed from the analysis.

Subsequently, a descriptive analysis of all the variables was carried out looking at the means and standard deviation (See Table 5-9).The inclusion of the indicators took into account also the need to include variables that best capture inequalities between households.

Application of the PCA

PCA is particularly suitable when asset variables are correlated but also when the distribution of variables varies across households. It is the assets that are more unequally distributed between households that are given more weight in the PCA [McKenzie (2003) cited by (Filmer & Pritchett, 1998)].

PCA was carried out with the 18 variables and the outcome of the analyses shows that employment ratio, literacy and monthly income scores higher which indicate that the variables have more weight than any other variable.

The table reports the scoring factors from the principal component analysis and other descriptive statistics.

Table 5-9: Scoring factors and means

	Three Upper Units			Means				
	Factor Score	Mean	SD	Poorest	Second	Middle	Fourth	Richest
Housing facilities								
Type of sanitation facilities	- 0.006	2.350	0.495	2.414	2.290	2.394	2.320	2.227
Bathing facility	- 0.012	2.830	1.185	3.178	2.831	2.798	2.854	2.853
Safe Water	- 0.024	2.380	1.281	2.541	2.470	2.431	2.357	2.487
Electricity	- 0.033	1.550	0.497	1.585	1.523	1.605	1.542	1.455
Housing Adequacy								
Overcrowding	- 0.134	1.609	0.492	1.757	1.672	1.684	1.523	1.406
Material of Construction	0.246	2.379	0.921	1.980	2.094	2.512	2.624	2.772
Durable Structure	0.257	2.390	0.658	2.235	2.209	2.424	2.613	2.682
Socio Economic Environment								
Employment ratio	0.736	3.060	1.532	1.114	1.713	3.412	4.335	4.642
Literacy	0.761	2.860	0.714	1.707	2.439	2.881	3.350	4.536
House ownership	- 0.036	1.220	0.413	1.312	1.233	1.182	1.244	1.219
Monthly Income	0.833	3.130	1.091	1.522	2.265	3.247	4.317	4.845
Energy for cooking	0.239	2.960	0.544	2.624	2.829	2.989	3.105	3.268
Type of Employment	- 0.181	2.020	0.359	2.292	2.070	1.970	1.978	1.959
Social Infrastructure								
Access to Primary Health care	0.208	3.970	0.855	3.528	3.698	4.217	4.204	3.926
Access to primary schools	- 0.095	3.550	1.039	3.522	3.688	3.338	3.333	3.682
Access to water source	0.152	4.69	0.828	4.484	4.404	4.755	4.753	4.796
Overall satisfaction with Water	0.098	3.050	1.161	2.789	2.819	3.254	3.148	3.040
Overall satisfaction with Sanitation	0.081	2.400	1.078	2.286	2.336	2.295	2.522	2.617

Notes: The percentage of the covariance explained by the first principal component analysis is 18%. The eingenvalue is 3.257

According to Vyas and Kumaranayake (2006), generally a variable with a positive factor score is associated with higher IMD and conversely a variable with a negative factor score is associated with lower IMD. The higher the household deprivation score, the higher the IMD for that particular household.

The first principal component is taken as the underlying index of multiple deprivation and each household's position on it is calculated using the PCA weights. It is important to mention that the PCA procedure produces an Index that is 'normalised' so that it has a mean value of ***zero*** and a standard deviation of ***one*** (Rutstein, 2008).

Since the first principal component analysis is the measure of the economic status, the IMD is based on the first factor score of the analysis and each and every household is assigned a different weight based on the weights of the variables. The factor score is adopted as the multiple deprivation index per household.

The table also shows the mean of the indicators used to assess deprivation in the settlement. It is interesting to note that among the 18 variables, the lowest quintile scores bellow the mean in 11 variables while the highest quintile scores higher than the mean in 9 variables.

IMD distribution across the area of Study

The Histogram (fig. 5-11) shows the IMD distribution in the area of study where more than 50 percent of the observations occurs between the second, middle and fourth quintile between -1 and 1 IMD score. It Means that half of the households in the area of study does not fall within the 20% worst 0f and 20% least deprived. It is important to remind that the area of study is part of the Kisumu slum belt which means that it is a deprived area but the purpose of the study is not to identify the deprived group but the spatial concentration of the most deprived groups.

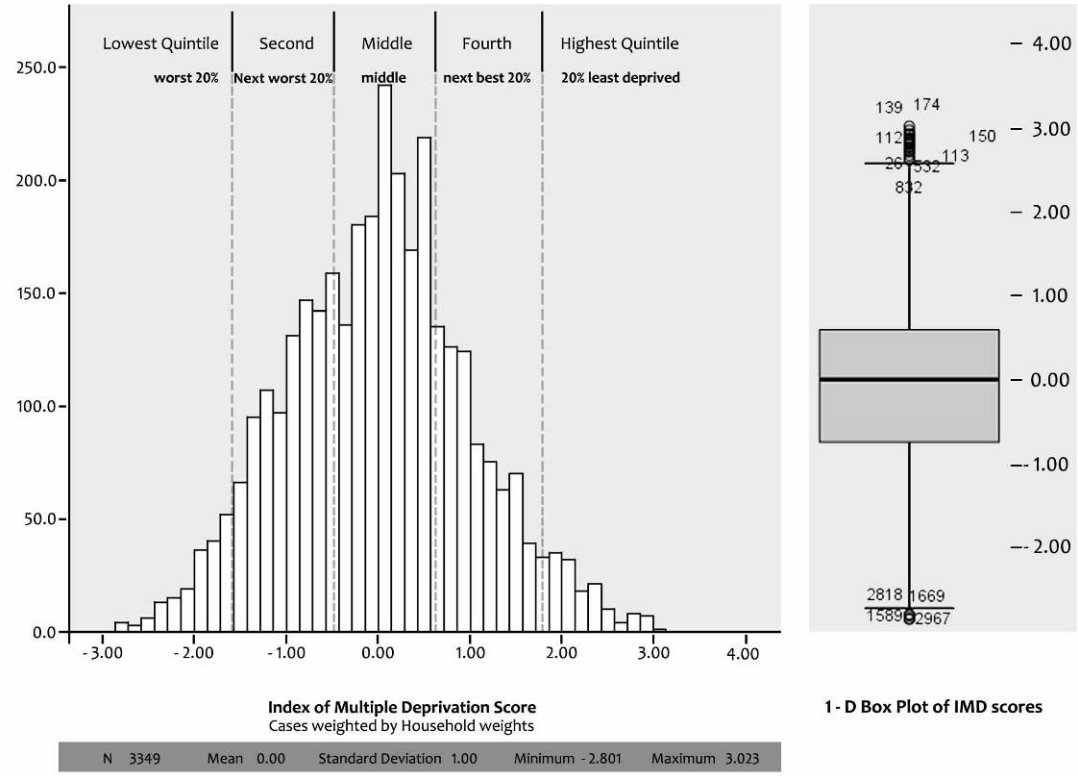


Figure 5-11: IMD distribution across upper Manyatta

5.8.1. Geographical distribution of multiple deprivation

The spatial distribution of households in the area of study shows a concentration of multiple deprivation in certain areas of the settlement and the condition does not have any administrative boundary.

It would be more realistic and interesting to see the entire area covered with the information about the household condition but the lack of the remaining structure code does not allowed a better picture of the area.

Even so, the spatial distribution of IMD gives a general picture of the disparities in deprivation among the three units of study.

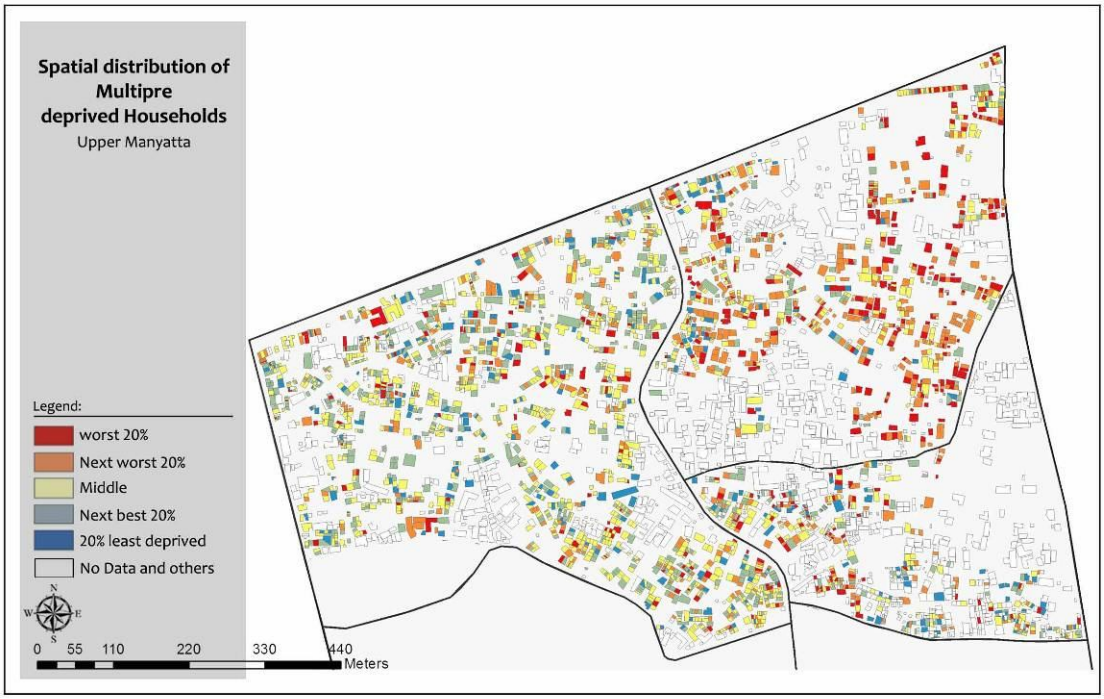


Figure 5-12: IMD distribution in upper Manyatta

The figure 5-12 shows spatial variability of IMD distribution across the area of study. The predominance of best off households can be seen in Kondele where the middle people are also spread all over the unit. In Metameta, there is a clear predominance of worst off households.

Specific household status can be easily identified at two different levels:

1. Structures experiencing multiple deprivation

The structure is occupied by a single family experiencing one condition of multiple deprivation or even sharing the same backyard with households experiencing a different condition. In the latest scenario in such cases the residents share the same sanitation facilities and water connexion available in the yard if there is some.

In some cases, the disparity is such high that the 'have' and 'have not's' share the same fence but with completely different conditions.

2.Households sharing the same structure but experiencing different level of multiple deprivation

In some cases, since deprivation is analysed at the household level and due to the structure of the building/structure the same building can experience different levels of deprivation. This fact occur because many structures are let on a room-by-room basis and the same structure has different tenants with different socio economic status (fig. 5-13 and 5-14).

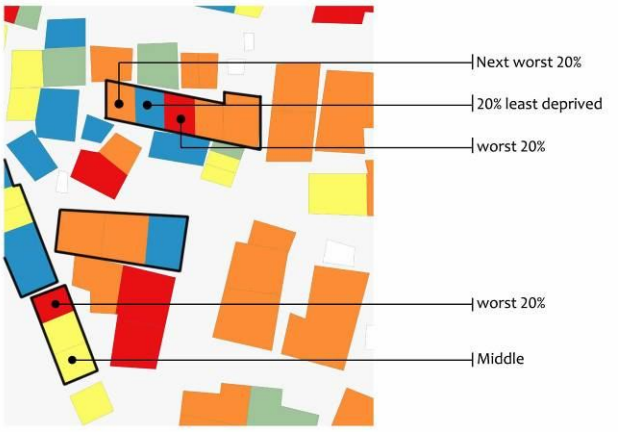


Figure 5-13: Multiple deprivation experienced by different households sharing the same structure in Metameta

Figure 5-14: Better off and worst off households sharing the same structure

Clusters of multiple deprivation

The identification of spatial concentration of households experiencing multiple deprivation makes more sense when they are clustered together.

Groups of households experiencing high levels of multiple deprivation can be easily identified on the urban space for better targeting through projects and policies directed to them.

In the area of study, the most deprived groups are concentrated in three sub-units. Flamingo Group, St. Look and Kandegwa (see fig. 5-15) while the least deprived are spatially concentrated in Kondele and Konambuta.

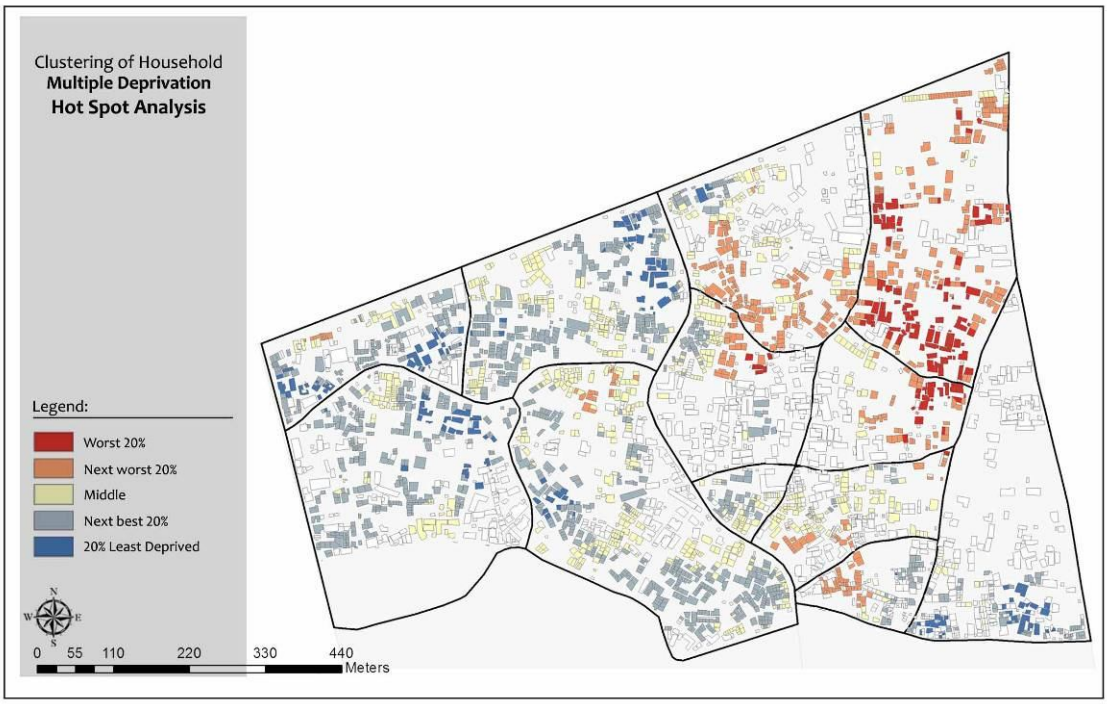


Figure 5-15: Clusters of multiple deprived household

The hot spot analysis of multiple deprivation allows the delimitation of spatial concentration of multiple deprivation beyond the boundaries of the settlement and remedy actions can be concentrated on that spatial boundaries. The spatial analysis was performed to identify where the most multi deprived households are concentrated. By doing so, the households falling into the most deprived groups can be identified, quantified and actions can be taken to lift up the living conditions of the inhabitants.

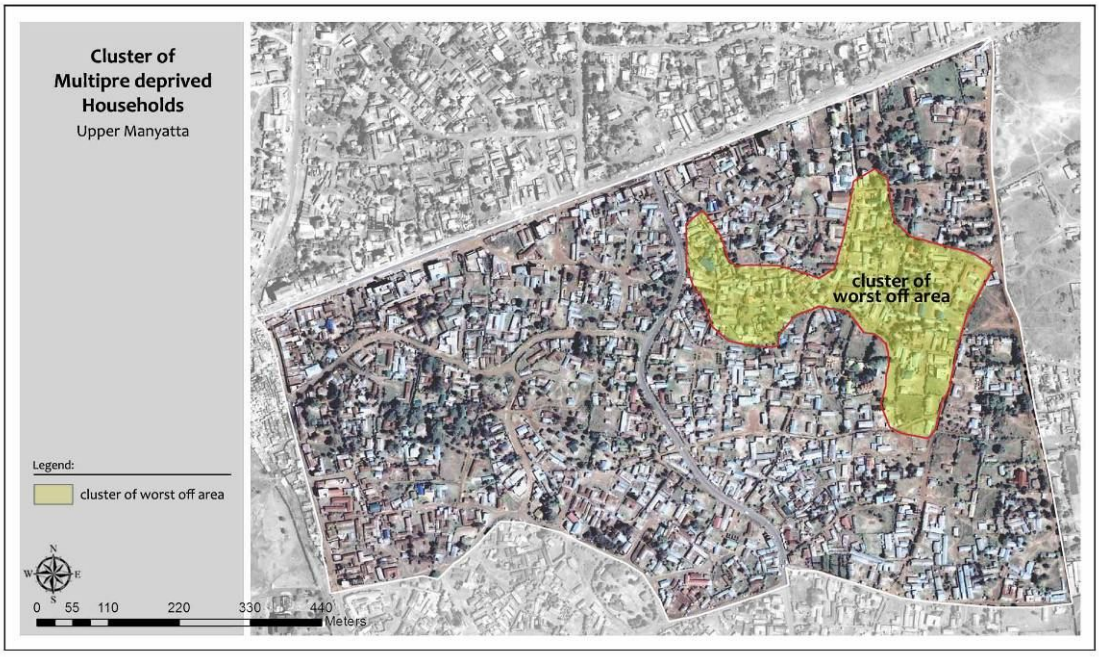


Figure 5-16: Cluster of worst-off households in the study area

Multiple deprivation at Unit and sub-unit level

The sub-unit is the smallest territorial unit in Mannyatta 'A' sub-location. At Unit level, the scores of Multiple Deprivation are 0.241, 0.191 and – 0.445 for Kondele, Konambuta and metameta respectively. These scores shows clearly that Metameta is the one scoring poorly, the most deprived.

Each unit has 4 sub-units under its jurisdiction. In the case of the study area, 12 sub-units compose the three units of the 'Upper Manyatta' and the spatial distribution of deprivation can be seen in the figure bellow. Kondele unit and Konambuta 'A' and 'D' sub-units are the least deprived sub units while Flamingo and St. Luke in Metameta are the most deprived subunits.

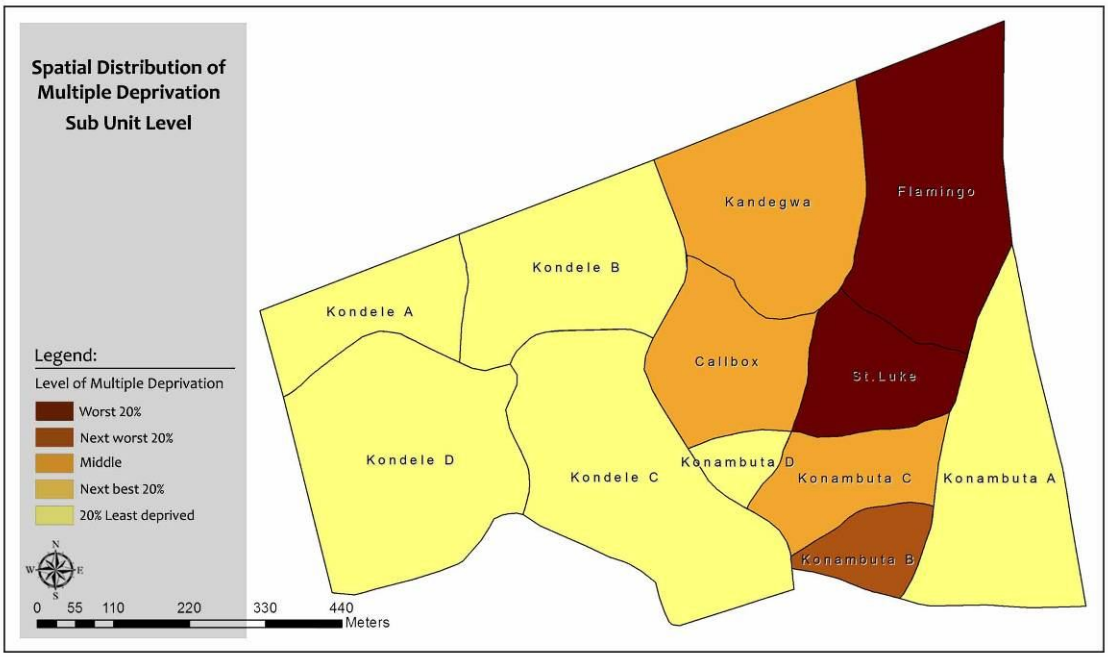


Figure 5-17: Spatial distribution of multiple deprivation at sub-unit level

The rank of multiple deprivation

Ranking deprivation at the sub-unit level allows a better comprehension of geography of deprivation in the settlement where the most deprived sub-units can be easily identified and area based approaches can be used to tackle the most deprived sub-units.

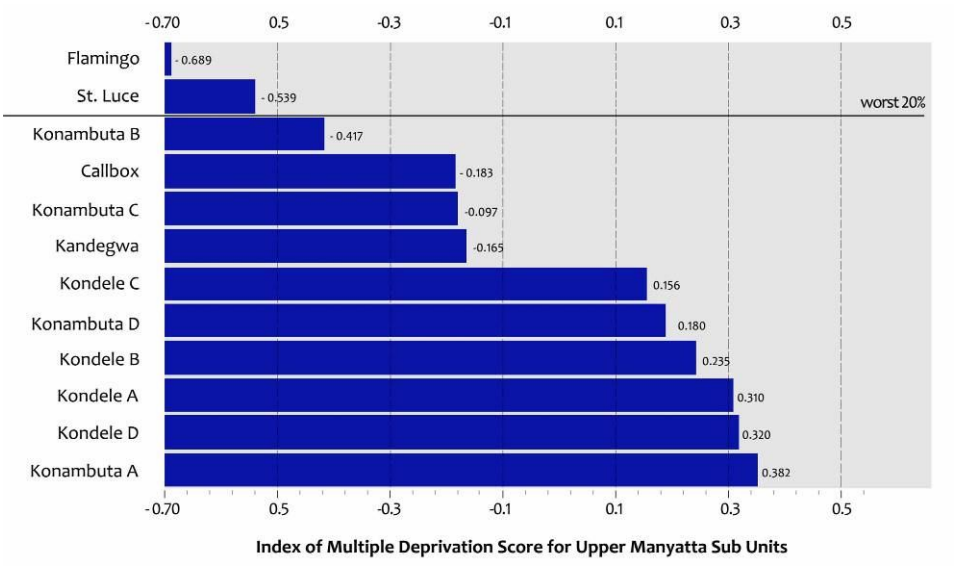


Figure 5-18: IMD Ranking

Since one of the challenges of local authorities is the scarcity of resources, by ranking the sub-units according to the level of deprivation the resources can be allocated gradually according to its availability and level of deprivation.
On that base, resources would be allocated primarily to Flamingo and St.Luke followed by Konambuta 'B' and Callbox and so on (fig. 5-18).

5.8.2. The effect of qualitative indicators on the overall IMD

An analysis to understand the effect of the inclusion of qualitative indicators in the overall IMD showed variation on the multiple deprivation scores across the study area.
Primarily was produced an IMD1 including qualitative Indicators and later on, the qualitative indicators were excluded to produce a second IMD2. In the first scenario, the worst 20% and the next worst percent (lowest and second quintile) scored higher than the second scenario while in the second scenario, the middle, next best 20% and 20% least deprived scored high compared with the IMD1.

The inclusion of qualitative indicators in the composite Index of Multiple Deprivation has the following effects:

- It shift slightly the histogram of frequency to the left decreasing the well of group numbers (Middle, Next best 20% and 20% least deprived) and increasing the amount of deprived groups.
- Shift the minimum IMD from -2.801(with qualitative indicators included) to - 3.051 (quantitative indicators only) and the maximum from 3.023 (with qualitative Indicators included) to 3.059 (quantitative indicators only) narrowing the range of IMD.

It shows that the inclusion of qualitative indicators, shift some households to the side of the deprived while the second approach overestimate the level of deprivation in the settlement.

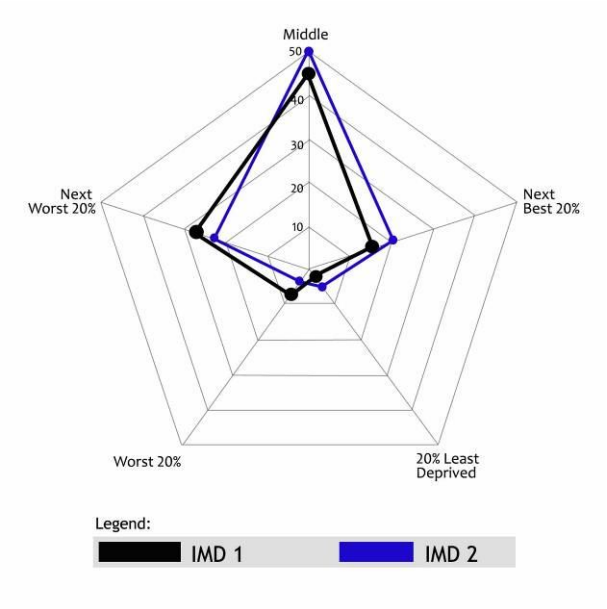


Figure 5-19: Differences in IMD coverage where the IMD1 shows that more people experience multiple deprivation than in the IMD2

The difference on the effect of the qualitative indicator can be seen on the table 5-10.

Table 5-10: Differences in IMD with and without qualitative indicators

	Minimum	Maximum	Worst 20%	Next worst 20%	Middle	Next Best 20%	20% Least Deprived
IMD 1	**- 2.801**	**3.023**	**4.82**	**26.46**	**47.00**	**18.50**	**3.78**
IMD 2	-3.051	3.059	3.47	23.45	49.72	19.55	3.81

5.9. Understanding the scope of the Index

The Index of Multiple Deprivation is a composite index which combines all the variables into one composite index which allows to differentiate the level of deprivation at three levels: unit, sub-unit and household level.

The meaning and interpretation of the IMD

- The IMD gives each household a score for each of the 18 indicators; The overall index of multiple deprivation combines the 18 indicators into one composite index of multiple deprivation.
- The greater the IMD score the lower the level of deprivation and conversely the lower the IMD score the higher the level of deprivation.
- The IMD scores can assume negative or positive values. An Index of Multiple Deprivation with a positive factor score is associated with higher IMD, and conversely a variable with a negative factor score is associated with lower IMD.

- The IMD is a relative measure of deprivation and therefore it cannot be used to determine 'how much' more deprived one area or household is than another e.g. it is not possible to say that Sub Unit X, ranked 1 is twice as deprived as sub-Unit Y, ranked 0.5. However it is possible to say that X is more deprived than Y.

The geographical scale of the index

Taking into account that the main objective of the research is to support the decision makers on resource allocation, the study provides intensity of deprivation at two different scales. The first is at sub-unit level where the 12 sub-units of upper Manyatta are ranked according to the level of deprivation. In the second stage, the research address deprivation at household level where the heterogeneity of deprivation can be seen from household to household and deprived groups can be easily identified beyond the administrative unit.

Scale to support police making in Kisumu

Tunstall et. al (2003) suggest that area-based policies may be particularly useful where they tackle the decline in spatially located phenomena such as housing, facilities and services, where it is the area itself which is the intended unit of change. That is the case of Mannyatta 'A' where housing, sanitation and infrastructure are the major constraint among the residents with variations between the units.

In this particular case, the unit would be the most appropriate to be the base for resource allocation and there are several reasons to support the argument:

- The existence of recognised authority in charge of the unit area;
- The prevailed socio economic homogeneity at this scale - unit level. The variation of deprivation incidence within each unit is less comparing with the level of sub-location and also the level of sub unit (See fig.5-20).
- At this scale, due to the limitation of resources, pilot projects can have real impact and be replicated to other areas while in larger scale the funds can not coverer the needs and at smallest scale the impact is not significant. For instance, in the case of Konambuta 'D' sub-unit with only 139 households, the impact would be insignificant.
- It brings additional benefits to programme deliverers, such as the input of residents through community participation or partnership between different agencies working in slum improvement. It has proven that in the case of Manyatta 'A', the higher the area the lower the community participation because it increases the level of socioeconomic disparities and as the Magadi Chief stated, the 'so called' wealthy people in the community does not participate in the Community solution problems.

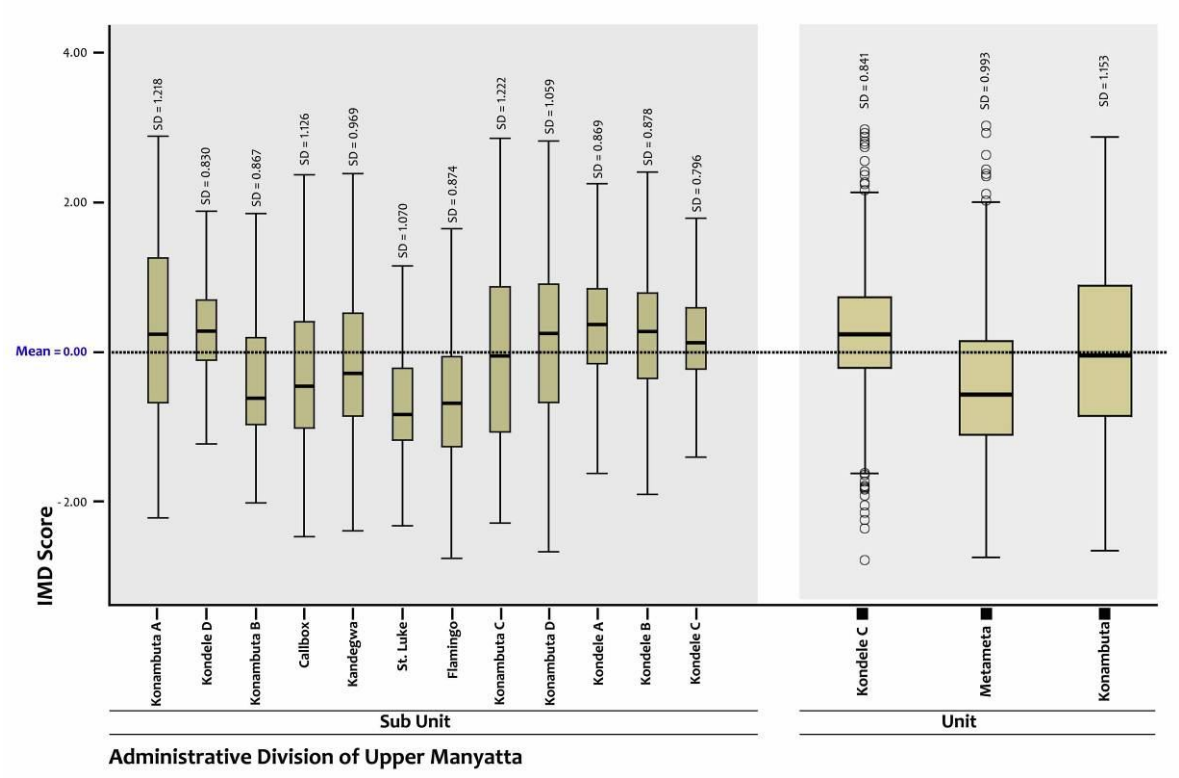


Figure 5-20: IMD Score at sub-unit and unit level

The variability of the IMD across the area of study shows much dispersion and deviation from the mean IMD at the sub-unit level. The deviation from the mean in three sub-units, Konambuta B, St. Luke and Flamingo is lower than the mean of Metameta, the lowest mean at Unit level.

There are several reasons to consider the units in Mannyata 'A' as the most appropriate scale to tackle deprivation in the settlement by allocating resources based on the particular need of the Unit.

6. FINDINGS AND CONCLUSIONS

The aim of this chapter is to state the main contribution of the research and to revisit the findings discussed and aspects related to the proposed objectives of the study as well as recommendations to the main stakeholders involved in upgrading programs in Manyatta 'A' and further researches. The findings are discussed following the structure of the proposed objectives, sub-objectives and research questions.

6.1. Findings

The main objective of the research is to ***identify household multiple deprivation which can be used to support decision makers in targeting the most deprived***.

In the current research two levels of deprivation were identified in the area of study. The first one is related to specific deprivation where the spatial distribution of deprivation were mapped with particular emphasis to those where the local authorities can intervene directly through upgrading programs such as bathing facilities, income, employment ratio, housing structure, primary water source, sanitation facilities and Overall satisfaction with water and sanitation. The last two indicators are subjective indicators which can also work as a barometer to feel the feedback of the slum dwellers in relation to the most challenging indicators in the settlement, water and sanitation/drainage (chapter 5.7).
The second stage of the analyses was the identification of households experiencing multiple forms of deprivation through a composite index of multiple deprivation. The ranking of people experiencing multiple deprivation at household, clusters of households and sub-unit level were also presented in the chapter 5.8.1

To answer the main objective of the research, several sub-objectives were defined. Each of the sub-objectives comprises one or more research questions.
The first sub-objective is to ***identify the key dimensions of deprivation in Manyatta 'A'***.
The key dimensions of deprivation is socio economic environment which comprises a set of indicators such as employment ratio, literacy, house ownership, monthly income, energy for cooking, and type of employment. (See chapter 5.8, table 5-9).

Three research questions helped to answer the sub-objectives: *Which are the most relevant indicators to assess deprivation in Manyatta 'A' and Which dimension of deprivation requires more attention to support pro-poor actions?*.
To answer this question, aspects suggested both in the literature and by existing urban indicators from the secondary data were the main base for discussion in different forums, from focus group discussions to the key informant's interviews followed by triangulation between literature review and qualitative and quantitative methods to select the most relevant indicators to assess deprivation. The outcome of that was the selection of 18 indicators (see chapter 5.6, table 5.3).
The dimensions requiring more attention to support pro- poor actions are socio economic environment, housing adequacy and social infrastructure following the order of priorities.

The second proposed sub-objective is to ***measure and quantify multiple deprivation in Upper Manyatta.***

A set of questions related to deprivation measurement techniques were elaborated to achieve the proposed sub-objective: *How different dimensions of deprivation can be integrated to assess physical, spatial and social aspects of the welfare? How different dimensions of deprivation correlate with one another and How PCA can be used to identify the most relevant indicators to assess deprivation?*

The use of PCA and the composite Index of multiple Deprivation allows to combine different aspects of welfare into one multiple deprivation measure where households can be classified according to the level of multiple deprivation. The correlation analysis (table 5-7) shows how the dimensions correlate with each other and with the overall IMD with the socio economic dimension being the one correlating highly with the IMD.

To answer the third question is important to understand the principle behind the PCA analysis. As stated by Filmer and Pritchett(1998), PCA is a technique for extracting from a set of variables those few orthogonal linear combination that capture the largest amount of information that is common to all of the variables. By doing so, it also overcomes the problem of double counting and the attribution of arbitrary weight to the indicator. In deprivation analysis, the higher the standard deviation of the indicator, the better the indicator assess deprivation level in the particular area. The table 5-8 in the chapter 5.7.1 shows the variation of standard deviation of the indicators.

PCA was the method used to assign weight to the variables used as indicators and the outcome of the factor score determine the level of deprivation. The higher the score, the less is the deprivation degree.

The third proposed objective is to ***evaluate the effect of qualitative indicators on the measurement of deprivation***. How the insights from qualitative indicators can feed into the improvement of the overall multi-deprivation analysis.

The inclusion of qualitative indicators, shift some households to the side of the deprived while the second approach overestimate the level of deprivation in the settlement showing a more positive picture of the scenario. The other advantages of the inclusion of qualitative indicators are discussed in chapter 5.8.2.

The fourth sub-objective is to extract and ***map the spatial clusters of Household deprivation***.

Two questions were raised related to this particular sub-objective. The first one is *Are there spatial clusters of deprived and multiple deprived households?* The second one was *how homogenous is the spatial distribution of public facilities in Manyatta 'A'?*

The answer to the first question is yes, there are spatial clusters of deprived and Multiple deprived household. The specific analysis of deprivation carried out in chapters 5.7 and 5.8.1 shows clusters of specific deprivation and Multiple deprivation.

To answer the second question is important to mention that primary schools and primary health care centres were the facilities evaluated and the degree of accessibility is based on the social justice perspective. The geographical access to these facilities differs from sub-unit to sub-unit which indicates that the facilities are not distributed within the area of study in a equal manner. Some units are well served and others are not well served (see chapter 5.7.1).

The bottom line here is that the spatial distribution of public facilities should be in such a way that all the facilities are accessible within the walking distance threshold recommended locally (see annex C).

The fifth proposed sub-objective is to ***identify the most appropriate scale for police making in the local context***.

Two related questions were raised namely *what is the most appropriate scale for police making and which criteria's are used for prioritization of resource allocation?*.

To answer this complex question many different factors has been considered and a triangulation from the outcome of the qualitative and quantitative research methods guided the research to the Unit as the most appropriate scale for police making related to deprivation. Three major reasons that supported the idea are the socioeconomic homogeneity at this level based on the spatial variation of the Index, the impact of interventions at this scale and the fact that by tackling at unit level, spatially located phenomena's such as housing, infrastructure and services can be better targeted impacting more on the lives of the slum dwellers

The second question is related to the criteria's currently used to prioritize the allocation of resources.

So far the allocation of resources is based on the area, using the 'equal share' approach of resources while the needs and the physical characteristics of the units are different. Using this approach, the impact of programs or infrastructure provision is meaningful to the life of the beneficiaries. The LASDAP scheme of infrastructure provision is a very clear example of the phenomena where the local authorities claim to build a certain facility but the supposed beneficiaries does not feel the impact.

The introduction of the community participation forums to define priorities within the community will be an added value to the improvement of quality of life but it is important that the local authorities should be well equipped with enough information about the spatial distribution of facilities and infrastructure to allow a better analysis and identification of those who needs most.

6.2. Recommendations

For a better insight of household deprivation analysis the study area should be larger and the spatial structure should be made available to understand the spatial variability of deprivation. Since Spatial analysis to identify clusters of deprivation are based on the attributes of the structures, a complete information for each housing structure would be beneficial for an accurate identification of clusters suffering specific or Multiple Deprivation.

Recognizing the financial difficulties of the Municipality, targeting the more vulnerable groups can be done more efficiently based on the needs of the slum dwellers with real impact on the citizens life improvement.

It is well known that the majority of slum dwellers experience poverty, deprivation and inequality in habitat conditions or access to social and physical infrastructure. The challenge of alleviate poverty can be reached with coordinated actions aiming at improving lives of those who needs most. The identification of the location of those suffering from a specific deprivation or multiple deprivations can be particularly important to target according to their needs.

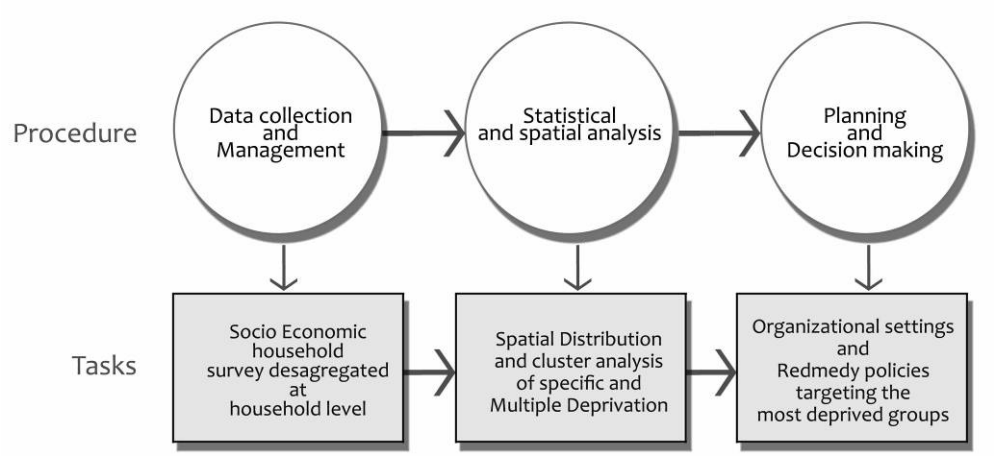
6.2.1. Future Research

- It would be more appropriate to compare the Index of Multiple Deprivation with the Overall satisfaction in the neighbourhood as a comparable indicator. It would allow understanding the spatial variability of objective and subjective deprivation measurement. The variable should be available for every household to be measured quantitatively allowing a better comparison with the overall IMD.

- The overcrowding indicator was the most difficult indicator to deal with due to the lack of direct measure of the variable. Further household survey should include overcrowding as a variable due to the relevance of the indicator to facilitate the analysis.
- The data base preparation should take into account the sensitiveness of the information and the spatial data at household level must be very clearly attached to the particular structure to avoid misinterpretation of the results. The process of data entry should be organized in a very coherent manner to make sure that each household has its own socio economic information which can be attached to its structure.

6.2.2. Local Stakeholders

- The outcome of the research showed that deprivation has spatial concentration in some areas of the sub-location and in coordination with community leaders remedy polices can be designed to target the ones who need most. Technical implementation team should be aware of the variability of deprivation level.
- Actions to improve the living conditions should prioritize the most vulnerable groups and targeting deprivation based on the spatial concentration can also improve the physical condition of the neighbourhood.
- The indicators should be available in a consistent basis for the whole settlement to allow a spatial temporal analysis to understand the trends of socio economic variations within the settlement.
- The coding system and the measurement of the indicators should be consistent for the purpose of monitoring and evaluation.
- Institutional support to ensure high quality of the final outcome is needed at all stages of the process, from the data collection to the decision making. The process of mapping deprivation should be guided by the following procedures:



Adapted from Yang (2010)

Figure 6-1: Implementation of the System at the Local level

6.3. Conclusions

The improvement of condition of life in Manyatta 'A' can be achieved through the improvement of quality of services and infrastructure. Water, sanitation, Garbage collection, electricity and drainage are top 5 priorities in Manyatta 'A'. It is clear that the scarcity of resources, particularly financial resources to deliver better services has been one of the major constraints to the Local authorities but a more efficient

approach based on the availability of information about the location of the urban deprived can lead to a better service delivery.
The research shows that aspects such as bathing facilities, safe water (primary water source), employment ratio and monthly income are the variables with more disparities and actions should concentrate on lifting up the most deprived groups.

By identifying, quantifying and locating the most deprived groups, the methods used on the current research can contribute to the quality improvement of service delivery provided by the Local authorities and other partners in development actions. By making available such information, the outcome of the research can play an important role in making informed decisions.

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8. ANNEX

Annex A – Primary household survey questionnaire

Questionnaire for Household Survey, September - October 21010

This interview is part of fieldwork survey to support an academic reasearch on Measuring Deprivation in Manyatta Settlement, Kisumu City. The Research is part of fulfillment of the requirement for the Degree of Master of Science in Geo Information Science and Earth Observation, Spetialisation in Urban Planning and Management at the University of Twente, Netherland.
The answers given to the questionnaire will be kept confidential and used only for reasearch objectives.

Note: A respondent should either be a head of house, wife or any household member who knows a household status

Duration: Years living on the settlement: ☐

Date: / / 2010 House / Enumeration number ☐

Respondent Gender | Male ☐ Female ☐

Posisition in a family | Head of family ☐ Other, specify _____

	Indicators	Questions	1	2	3	4	5
1	Type of Sanitation facilities	What type of toilet do you use?	no toilet		pit latrine		flush toilet
2	Bathing Facility	What type ofBathing facility do you use?	public shower/bath	shower shared with neighbours	basin in the house	combined toilet	private bathroom
3	Safe Water	What is your primary source of water?	unprotected well	protected well	street vendors	piped water in the plot	piped water inside the house
4	Kitchen	Do you have kitchen within the housing unit ?	no				Yes
5	Electricity	Is your household connected with electricity?	no electricity		parafin, coal		with electricity
6	Energy for cooking	What is your main source of energy for cooking?	firewood	dung, makwangla		botled gas	electricity
7	Overcrowding	Household with fewer than three people per habitable room	more than 3 persons per room				3 or less perssons per room
8	Housing Location	Is the Household located in hazardous location?	very poor location		good location		very good location
9	Ventilation	What material have been used to make the window?	none/no window		wooden shooters		glass window
10	Durable Structure	housing characteristics/structure	shack	traditional stick house/temporary	semi permanent structure	improved house permanente structure	decent house/ permanent structure
11	Unemployment	How many adults in the household and how many are employed?	0-19%	20-39%	40-59%	60-79%	all
12	literacy	What is the household literacy?	< 6		6 -12		12+
13	House ownership	Do you own the house?	no				yes
14	Income	What is the household income?	none	less than 5000 Ksh	5001 - 10000 Ksh	1001 - 15000 Ksh	+15000 Ksh
15	Acces to water	What is the distance to the nearest water source?	0-50m	51-100m	102-150m	151-200m	+ 200m
16	Safety within the house		very unsafe	unsafe	neither	safe	very safe
17	Perceived well-being	Do you feel safe in the neighbouhood?	very unsafe	unsafe	neither	safe	very safe
18		Are you satisfied with the environment in your area?	very unsatisfied	unsatisfied	neither	satisfied	very satisfied
19		Which Socio-economic group do you belong to	very poor	poor	normal/moderate	confortable	wealthy

What do you think that could improve the neighbouurhood

_____

_____

_____

Anex B – Weighting table on the community needs

Issues	Obunga Central		Kasarani		Sega Sega		Kamakowa		Total weight
	Priority nr.	weight	Priority nr.	weight	Priority nr.	weight	Priority nr.	weight	Per issue
Roads	1	10	1	10	1	10	1	10	40
Drainage	2	8	2	8	4	4	1	10	30
Electricity	6	-----	3	6	3	6	3	6	36
Piped water	2	8	2	8	2	8	2	8	32
Toilets	2	8	2	8	2	8	2	8	32
Security	6	----	3	6	2	8	3	6	20
Garbage collection and disposal	---	---	2	8	---	---	2	8	16
Sewerage	2		2	8	2	---	2	8	16
Dispensary	4	4	4	4	6	---	4	4	12
Housing poor shelter	3	6	7	---	11	---	3	6	12
Primary/secondary school	4	4	5	2	5	2	5	2	10

Source: Ministry of Lands, 2006

Annex C – Local Planning Standards

PROPOSED PLANNING STANDARDS TO BE ADOPTED BY LOCAL AUTHORITIES AS PART OF "SPECIAL SCHEDULE AREAS" OR BY-LAW

Facility	Population catchment	Max. walking distance (m)	Land Requirement (ha)	Notes
Nursery school	2,500	2 - 300	0.15 - 0.25	Some integrated with primary school
Special purposes area	5,000	4 - 600	0.25 - 0.50	Religious, social hall etc.
Primary school	3,500 - 5,000	3 - 600	2.0 - 3.0	Combined use for open space due to land constraint. Public access to facilities for meetings, functions, etc.
Local shopping centre	5,000	4 - 800	0.2 - 0.50	Integrated with local market
Playing field	5,000	4 - 600	1.0	Combined use with primary/ secondary school and general open space.
Secondary school	8 - 10,000	1 - 2km for day school	2.0 - 4.0	Combined with open space. Assembly hall and classrooms used for social functions.
Post office	20,000	N/A	0.2 - 0.40	Combine with savings bank, building society outlet, etc.
Community Centre	20,000	500 - 1000	0.4	Centrally located in urban areas.
Community Market	20,000	2Km	0.4 - 2.0	Centrally located in urban centre.
Light Industrial area (workshop)	20,000 25,000	N/A	1.0 - 2.0	Combined with local or community market, depending on location of site.
Health Centre with maternity	5 - 20,000	0.5 - 1Km	0.25	Should relate to other activities in the community centre.
Hospital	25,000	0.5 - 1Km	4 - 6	Inclusive of staff housing.
Police	50,000 - 80,000	N/A	0.5 - 2.5	Specific requirement will depend on the need.
Branch Library	80,000	0.5 - 1Km	-	Part of Community centre
Major shopping centre	100,000	0.5 - 1Km	2 - 3	50 shops
Fire Station	100,000	N/A	0.5	Centrally located in urban areas.
Sport centre	100,000	N/A	5	Should be within easy reach.
Bus station	100,000	1 - 2Km	0.8	Located near market.
Administration	100,000	N/A	0.5	Requirement will be determined by the government.
Commercial District	100,000	1 - 2Km	4 - 6	Integrated with other commercial Activities.

Annex D – Communality Analysis

	Communalities	
	Initial	Extraction
Type of sanitation facilities	1.000	.525
Bathing facility	1.000	.613
Safe Water	1.000	.341
Electricity	1.000	.626
Overcrowding	1.000	.569
Material of Construction	1.000	.483
Durable Structure	1.000	.586
Employment ratio	1.000	.615
Literacy	1.000	.619
House ownership	1.000	.543
Mothly Income	1.000	.732
Energy for cooking	1.000	.421
Type of Employment	1.000	.639
Access to Primary Health care	1.000	.753
Access to primary schools	1.000	.762
Access to water source	1.000	.659
Overall satisfaction with water	1.000	.545
Overall satisfaction with Sanitation	1.000	.626

The communalities in the table are all of them above 0.3 which indicates that the extracted components represent the variable well.

Annex E – Principal Component analysis outcome

	Components			
	1	2	3	4
Type of sanitation facilities	**-.006**	-.042	.228	.313
Bathing facility	**-.012**	-.006	-.023	-.062
Safe Water	**-.024**	.139	-.001	-.034
Electricity	**-.033**	-.030	.780	.113
Overcrowding	**-.134**	.536	.082	.072
Material of Construction	**.246**	.332	.519	.115
Durable Structure	**.257**	.068	.687	-.134
Employment ratio	**.736**	.065	.114	.092
Literacy	**.761**	.015	.061	.076
House ownership	**-.036**	.261	.087	-.564
Mothly Income	**.833**	.144	.123	.027
Energy for cooking	**.239**	.144	.249	.155
Type of Employment	**-.181**	-.090	-.124	-.070
Access to Primary Health care	**.208**	.803	.139	.152
Access to primary schools	**-.095**	-.826	.008	.029
Access to water source	**.152**	.109	.144	.596
Overall satisfaction with water	**.098**	.239	.045	.677
Overall satisfaction with Sanitation	**.081**	-.094	-.148	-.195

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization

The percentage explained by the first principal component analysis is 18%. The eingenvalue is 3.257

The first Principal Component is the Factor score