EFFECTS OF THE CHANGING LAND USE PRACTICES ON THE WELLBEING OF PERI-URBAN INHABITANTS OF KAMULU AREA, NAIROBI COUNTY, KENYA

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DECLARATION

I declare that this document and the research that it describes are my original work and that they have not been presented in any other University for academic work.

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This research was conducted under our supervision and is submitted with our approval as University supervisors

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DEDICATION

This research work is dedicated to my husband, Victor Okito Nyongesa, without whose caring support it would not have been possible, to my sons Graham Victor and Kieran Victor whom I hope to inspire and to my parents, Samuel Ochieng and Caroline Ochieng who have always believed in me and passed on the love of reading and respect for education.

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ABSTRACT

Urban sprawl is a phenomena experienced around most big cities. Nairobi, the capital city of Kenya, has caused this effect to the surrounding towns as most people want to settle around the town area for various reasons. Kamulu town is one such area where population pressure from Nairobi city has caused movement of persons into settling. Currently, there has been increased population in Kamulu town, which in turn has led to changes in land use patterns from the large tracts of ranch to smaller portions which are of diversified uses. This study sought to assess the effects of the changing land use practices on the wellbeing of peri-urban inhabitants in Kamulu area, Nairobi County, Kenya. The specific objectives of the study were to determine the influences of reduced land sizes on the wellbeing of the peri-urban inhabitants of Kamulu area; to establish ways in which infrastructural development had impacted on the wellbeing of the residence of Kamulu area; and, to assess the influence of peri-urban land use economy on the wellbeing of the people of Kamulu area. The study used a descriptive research design where systematic random sampling technique was used to select a random sample of 378 respondents for the study. A household survey using a researcher administered questionnaire was conducted. The unit of analysis was the household and the contact persons for the feedback were the household heads. A pilot study was conducted on 20 random selected residents of Nairobi-Kangundo corridor to determine the validity and reliability of the data collection instrument. An alpha reliability coefficient of 0.799 was obtained and considered for the study. One Focus Group Discussion was conducted to triangulate the household data. Descriptive (frequency distributions, means and standard deviation) and inferential (multiple regression analysis) statistics were used to analyse the data at 95 % level of confidence. Land use diversification was found to significantly affect wellbeing of the residents of Kamulu area (β= 0.85, p=0.04). Land use diversification impacted wellbeing at 48.9%. Infrastructural development was found to significantly affect wellbeing (β=0.49, p=0.04). Infrastructural development impacted wellbeing at 24%. The three variables altogether impacted on the wellbeing at 45.3%. This implies that there are other variables that were impacting on the wellbeing of the residents in Kamulu area. Based on a scale of 0 to 10 the overall wellbeing of the residents was found to be 6.3 indicating the household heads have wellbeing slightly above the average of 5. The researcher therefore recommends that infrastructural development and land use diversification being vast should be exploited fully within Kamulu area for it to impact with a greater margin on the wellbeing of the residents. Also more variables resulting from the changing land use practices can explored to get a better feel on the residents wellbeing.

DEFINITION OF TERMS

Effects: The influence of something or someone on behaviours or ways of things. It refers to the ability to cause desirable and measurable actions and outcomes (Solis, 2010). In this study, it was used to determine the relationship between the independent and dependent variables.

Household: A household consists of one or more people who live in the same dwelling and also share meals or living accommodation, and may consist of a single family or some other grouping of people. A single dwelling will be considered to contain multiple households if either meals or living space are not shared. The household is the basic unit of analysis in many social, microeconomic and government models, and is important to the fields of economics and inheritance. In this study a household was considered to be a unit of dwelling with the breadwinner as the household head and respondent (Haviland & William, 2013).

Land Use Practices: Land use practices refer to a series of activities done to generate one or more products or services. The same land use can occur on several different parcels of land, and reciprocally, the same land may have several uses (FAO, 1998). In this study the researcher focused on the different activities done within Kamulu area and how they are changing due to the influence from Nairobi city.

Peri-urbanization: Peri-urbanization is a transitional process occurring beyond the built-up edge of large cities (Maneepong & Webster, 2008. Formerly rural areas acquire urban economic functions that are mixed in with more traditional rural functions, such

as agriculture. In this study, peri-urbanization refers to the transition of Kamulu area from traditional set up and livelihood into an urbanized set up.

Peri-urban settlement: Peri-urban refers to areas lying at the interface between designated urban boundaries and adjacent rural areas (Narain, Khan, Sada, Singh & Prakash , 2013). What makes the land "peri-urban" is the complex mix of land uses stimulated by urban and rural impacts. These areas are usually in the process of transition due to urban sprawl and encroachment as population expands. In this research study Kamulu area was considered to be peri-urban.

Urbanization: Urbanization is the process of increasing concentration of a country's national population into towns and cities (Kjell, Pauleit, Bell, Aalbers & Nielsen, 2013). The process includes the multiplication of points of concentration and increase in size of individual concentration. In this study, the focus was on Kamulu area, how the population concentration has changed as people move from the neighbouring Nairobi town.

LIST OF ABREVIATIONS AND ACRONYMS USED IN THE STUDY

ExWB	Experienced Wellbeing
GLS	Global Life Satisfaction
QOL	Quality of Life
ComQOL	Comprehensive Quality Of Life Scale
SACCO	Savings and Credit Cooperative Organization
SWLS	Satisfaction with Life Scale

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The study was an assessment of the effects of the changing land use practices on the wellbeing of peri-urban inhabitants of Kamulu area, Nairobi County, Kenya. The four independent variables that were covered in this study included: reduced land size, infrastructural development and; land use diversification. The dependent variable was wellbeing of households in Kamulu, Nairobi. This chapter introduces the study under the following sub-headings: background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, scope of the study, delimitation of the study, limitations of the study, assumptions of the study, theoretical framework, and conceptual frame work.

1.2 Background of the Study

Peri-urban areas have been commonly defined as transitional zones located in the outskirts of a designated city boundary, where rural and urban characteristics meet each other. Generally, peri-urban area moves away from the metropolitan core following the establishment of urban settlement (Winarso, Hudalah, & Firman, 2015). Peri-urban areas are characterized by great heterogeneity and rapid changes of land use. Furthermore, population composition changes as peri-urban areas offer attractive residential alternatives to city centres or more remote locations. The dynamic processes leave peri-urban areas in an in-between situation, neither city nor countryside and home to a range of functions, spanning from agricultural production to residential and recreational areas (Gravsholt, Søren, Kristensen, Præstholm, Reenberg & Primdahl, 2006).

.Land use patterns in peri-urban areas are experiencing changes due to outward expansion of cities to the peri-urban areas (Appiah, Bugri, Forkuo & Boateng, 2014). In addition, Appiah *et al*. (2014) observed that peri-urban areas are in constant pull and push due to their strategic location. The urban residents are noted to buy prime agricultural land from the peri-urban areas for residence or for commercial purpose since the peri-urban areas present an area with relatively affordable rent in comparison with the main cities. For this reason, most peri-urban areas are attracting middle-class and higher income earners with lifestyles similar to those within the city environment.

According to Allen and Hofman (2006), the peri-urban interface comprises a "heterogeneous mosaic" of productive and environmental ecosystem intertwined with the existing socio-economic conditions. This is likely to result in a set up that has mixed activities ranging from residential to commercial activities which encompass built environment with varied agricultural activities. Currently, land owners and land managers within the peri-urban areas are making decisions regarding the land use changes since the land use diversification is now dependent on the owner as opposed to communal land ownership where the decision on land use was pre-determined. Further to this, reports indicate that changes in land use may be largely influenced by the political environment or socio economic pull (Irwin & Geogeghan, 2001). In many instances, the latter causes the biggest influence (Irwin & Geogeghan, 2001). Land conversion from agricultural to other uses according to Webster (2002) is due to the notion of higher economic gain from alternative uses of land. This implies that agricultural land is reduced in the peri-urban areas. More land owners are therefore opt to sell land for other uses other than agriculture as the alternative uses seem more profitable. This is likely to be the case of Kamulu town.

Kamulu area is located approximately 35 kilometers from Nairobi Central Business District CBD. It is at the periphery of Nairobi County. It is located in Kasarani Constituency, Ruai Sub-County with coordinates 1.37^0S, 38.03^0E. The town has experienced a shift in land use (Researcher, 2019) due to various reasons, some of which have been highlighted in earlier section. The impact of the changing land use on agriculture is direct as the land changes to a mixture of activities as opposed to extensive agriculture. Degradation of agricultural land implies food insecurity may ensue as well as negative impact to the environment. There is need to assess the impact of all these changes to the wellbeing of the residents. The utilitarian movement described wellbeing subjectively as an important goal of individuals" behavior and public policy (Haq & Zia, 2008). This views wellbeing not only in the economic dimension but also considers an individual's interests, ideals, values and attitudes. The shift in the land use changes is anticipated to have an impact in these dimensions of the inhabitants in Kamulu area.

1.2 Statement of the Problem

Globally, urban sprawl is a phenomena experienced around most big cities. Nairobi city has caused this effect to surrounding towns as most people want to settle around the town area for various reasons. Kamulu area around Kamulu town is one such place where population pressure from Nairobi city has caused movement of persons into settling. Currently, there has been increased population in Kamulu area This ultimately implies the land use is changing from the large tracts of ranch to smaller portions which are of diversified uses. The situation is further compounded by the poor service delivery mechanisms earmarked for the fringes. This is likely to affect the wellbeing of the inhabitants in Kamulu area. Many of the studies have highlighted the economic and environmental impact of land use change in the peri-urban areas. This, however, does not encompass the totality of the inhabitants of the peri-urban fringe as it leaves out

five other dimensions of human wellbeing, namely, health, personal security, literacy/reasoning, respect, attachment (love and affection) and self-determination. To address this gap, this study was conducted to assess the effects of the ongoing changes in land use patterns resulting from the rural-urban fringes on the wellbeing of the communities living in Kamulu area, Nairobi County.

1.3 Purpose of the Study

The purpose of the study was to assess the effects of changing land use practices in the household wellbeing of the peri urban residents of Kamulu area in Nairobi County

1.4 Objectives of the Study

The overall purpose of this study was to assess both direct and indirect influence of the changing land use practices on the wellbeing of peri-urban inhabitants in Kamulu area, Nairobi County, Kenya.

When broken down, the researcher intended to:

(i) Assess the effect of reduced land sizes on the wellbeing of the peri-urban inhabitants of Kamulu area, Nairobi County.

(ii) Establish the effects of infrastructural development on the wellbeing of the residence of Kamulu area, Nairobi County.

(iii) Determine the effects of land use diversification on the wellbeing of the people of Kamulu area, Nairobi County.

(iv) Evaluate the combined effect of the independent variables (land size, infrastructural development and land use diversification) on the dependent variable (household wellbeing).

1.5 Research Questions

(i) In what ways does reduced land size impact on the wellbeing of the peri-urban inhabitants of Kamulu area in Nairobi County?

(ii) In what ways does infrastructural development impact on the wellbeing of the residents of Kamulu area, Nairobi County, Kenya?

(iii) How does land use diversification influence the wellbeing of the people of Kamulu area, Nairobi County?

(iv) What is the combined effect of the independent variables (land size, infrastructural development and land use diversification) on the dependent variable (household wellbeing)

1.6 Significance of the Study

This study is beneficial to different people at different levels. The findings and recommendations of this study may be used at the policy formulation level. They influence policy formulation and adjustments with regard to the management of land resources, as a means of achieving the most appropriate balance between agricultural activities and other development programs within peri-urban settings with keen consideration on the wellbeing of the people. Governmental departments in charge of land administration together with the departments of urban planning and development are likely to benefit from the real time empirical study findings on the current trends in the development of urban centers, land use patterns and changes within the peri-urban settings. Additionally, the recommendations of this study may assist in providing frameworks of improvement and/or adoption of more improved means of land use and development. This study has added on to the existing literature that will be used for

references by other scholars. The recommendations of this study may also form the basis for the future studies within Kamulu area.

1.7 Scope of the Study

The research was conducted in Kamulu area, Nairobi County. The variables investigated included the influences of reduced land sizes on the wellbeing of the peri-urban inhabitants of Kamulu area, ways in which infrastructural development had impacted on the wellbeing of the residence of Kamulu area and the influences of peri-urban land use economy on the wellbeing of the people of Kamulu area.

1.8 Delimitations of the Study

The study focused on the impacts of the ongoing changes in land use patterns, resulting from the rural-urban fringes, on the communities living in Kamulu, Nairobi County. The main areas of focus in this study included; influences of reduced land sizes on the agricultural productivity of the peri-urban inhabitants; ways in which infrastructural development had impacted on the wellbeing of the residence; influences of peri-urban land use diversification on wellbeing of the residence of Kamulu in Nairobi County.

1.9 Limitations of the Study

The study was limited in a number of ways as it only focused on the changing land use practices within Kamulu area. The small geographical coverage (Kamulu area) limited the generalization of the findings of the study to other peri-urban settings that may exhibit similar or different characteristics from the study area. Another limitation of the study was the unwillingness of some respondents to participate in the study due to issues/ aspects which they may deem confidential especially the land size and land

ownership status. The researcher assured the respondents of the utmost confidentiality of the information given and that the information was purely for academic use.

1.10 Assumptions of the Study

The researcher assumed that respondents would be available and willing to answer questions, and actively participate in the study, and that the answers would be correct and truthful.

1.11 Theoretical Framework

This section introduces and describes the theories that explain why the research problem existed in the first place. Two theories were selected for the research study: The spreading pancake model and the Ricardo's land rent and use theories.

1.11.1 The Spreading Pancake Model

The spreading pancake model is reminiscent of von Thonen's theoretical model of agricultural land use with the urban fringe spreading outwardly in a more or less concentric pattern (Gough & Yankson, 2000). The model also exhibit aspects of the land use ecological processes of invasion-succession where, the dominant core influences the expansion and transformation of its fringe areas. Peri-urban areas bordering the city experience fast population growth, high density and high intensity of urban activity. However, as land diminishes and the carrying capacity of these areas gets exhausted, population and urban activity spill over to the neighbouring outer parts of the peri-urban zone. The theory holds that the closer the city comes, the more pronounced is the transition from rural to urban characteristics. Eventually, these settlements become part of the built-up urban area, which then comprises a "complex

mixture of formal houses, shanties, rural huts and other dwellings". It is considered this is the likely model for the average Kenyan town.

1.11.2 Ricardo's Land Rent and Use Theory

This theory takes into account the quality of land. According to this theory all the units of land are not of the same grade, location and quality and therefore the superior land (better quality, best location) will attract an economic rent (Irwin & Geoghegan, 2001). It states that the higher the quality of land, the higher the likelihood of intensified use. Land quality is determined by: ability to produce in a way that justifies investment, low labor intensity in preparation and maintenance of land, distance (short) that is required to ensure product reaches market. Hardie and Parks (1997) further state that based on this theory the quality of land is an important determinant of land use and change in its use. Looking at the location, distance to major town (Nairobi) there is an implication that the use of land use within Kamulu has shift from agricultural land to a built environment to earn the land owners " higher economic rent".

1.12 Conceptual Framework

The researcher conceptualized that the subjective wellbeing of peri-urban dwellers within Kamulu town can be influenced by three independent variables which are; reduced land size, infrastructural development and peri-urban land use diversification.

1.12.1 Operationalization of Variables

In this section the researcher defined and measured the independent variables (land use economy, land size and infrastructural development) and explained how they were used in the study.

1.12.2 Land Size

Land is a delineable area of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface including those of the near-surface climate the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes, and swamps), the near-surface sedimentary layers and associated groundwater reserve, the plant and animal populations, the human settlement pattern and physical results of past and present human activity (terracing, water storage or drainage structures, roads, buildings,(FAO, 1995). Land size therefore is a defined portion of land measured in a specified unit of measurement like acre, square feet/meters, or hectare. In this study land size was operationalized using one indicator, its actual size in acres. The information of land size was collected by asking the household heads the actual size of their lands based on the measurements indicated on their title deeds or share certificates for those without title deeds. The values indicated in square feet were then converted to acres by the researcher.

1.12.3 Infrastructural development

Infrastructure is defined as the sum of material, institutional and personal facilities and data which are available to the economic agents and which contribute to realizing the equalization of the remuneration of comparable inputs in the case of a suitable allocation of resources that is complete integration and maximum level of economic activities (Straub, 2008). In this study infrastructural development was operationalized at a material level where the residents were asked in general if they have noticed any development of infrastructure and how infrastructural development had affected different aspects like agriculture, value of land and peaceful living. The researcher

explained the material infrastructure to be road network and access to social amenities like schools, hospitals and shopping centers.

1.12.4 Land Use Diversification

FAO (2005) defines land use as the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it. Economists view land as a factor of production and therefore land use diversification can be operationalized in this research to refer to activities carried out on land and how they are utilized to create wealth. In this study land use diversification was operationalized using the eight indicators namely subsistence cultivation, cash crop plantation, food crop plantation, livestock production, playground and building/construction activities. Data on the indicators were collected by presenting to the household heads a set of questions with the indicators and they were to acknowledge or dispute the statements. From the answers provided by the respondents the researcher then converted them into continuous data for analysis in order to get a collective opinion on land use diversification.

The dependent variable subjective wellbeing of the household had eight indicators, which include: material provision, health, social relations, spiritual fulfillment, emotions, affiliations, and life achievements. This relationship can be influenced by urban land administration policies which can intervene as indicated in Figure 1.

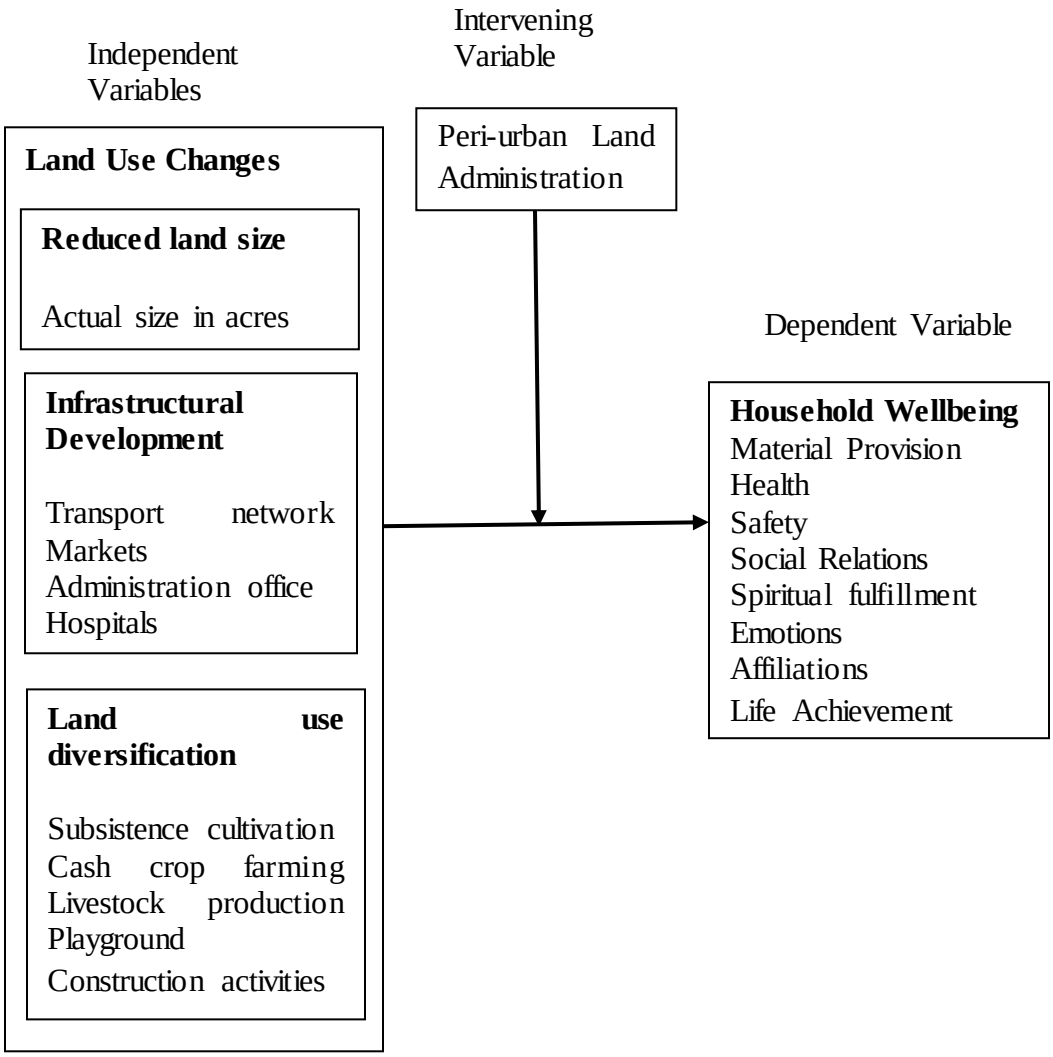

Figure 1.1: Conceptual framework showing the influence of land use change on the household wellbeing of residents in Kamulu area

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents literature review on areas that relate to the study. The main areas of literature reviewed focused on the specific variables presented in this study which include; wellbeing; influences of reduced land sizes on the wellbeing of the people; ways in which infrastructural development has impacted on the wellbeing of the residents and influences of peri-urban land diversification on the wellbeing of the people. This chapter also identified the existing research gaps that the present study intends to fill.

2.2 Household Wellbeing

Quality of life (QOL) has been stated to have no standard form of measurement or agreed definition. This has led to varied number of instruments developed to measure the QOL (International Wellbeing Group, 2013). Human wellbeing is multifaceted and can be described by the following four concepts: i) a human has well-being if they exist in accord with their nature, their essence; ii) a human has well-being if they understand (are conscious of) what are good things of life for them and have an opportunity and intention to achieve these good things; iii) a human has well-being if they have an opportunity to realize their potential as human beings; iv) a human has well-being if the society constituting the grounds of the state creates conditions and provides opportunities for them to exist in accord with their nature, realize their potential as human beings, and achieve the good things of life that human strives to achieve (Alatarseva & Barysheva, 2015). These four aspects upon investigation are useful in drawing the line between objective and subjective wellbeing. Alatarseva and Barysheva

(2015) further explain that the objective aspect of well-being is characterized by the third and fourth concepts and may be described with terms defining material well-being and the quality of life. These terms are formed and influenced by such factors as the level and stability of income, the conditions of residence, the opportunity of having education, the quality of the social and natural environment, safety and security, and the opportunity to realize social and civil rights and needs. The terms are also measured and evaluated by way of the corresponding values. Meanwhile, the subjective aspect of well-being is characterized by the first and second concepts and may be conceptualized only as an internal subjective experience of each particular individual.

There are two conceptual approaches to wellbeing (Western & Tomaszewski, 2016). The two approaches are the objective approach and the subjective approach to wellbeing. The objective approach defines wellbeing in terms of quality of life indicators such as material resources like income, food, housing and social attributes (education, health, political voice, social networks and connections). The subjective approach emphasises subjective wellbeing that is people's own evaluations of their lives, especially their life satisfaction (a cognitive evaluation), happiness (a positive emotional state) and unhappiness (a negative emotional state). Further Western and Tomaszewski, (2016). lists core human capabilities to include life, bodily health, bodily integrity, the ability to use the senses to think and to imagine, the ability to express emotions, to exercise practical reason and autonomy with respect to one's own life, to affiliate, to live with dignity, to live in and with nature, to play, and to control one's own political and economic environment, through education, work and political and social participation. In summary the subjective wellbeing evaluations are one component of overall wellbeing alongside objective measures and "the core question

for the objective approach is to agree on the list of goods that are necessary for a good life" The subjective approach on the other hand theorizes objective wellbeing affecting subjective wellbeing implying that objective goods and circumstances influence subjective life evaluations.

2.2.1 Subjective Wellbeing

Subjective wellbeing (SWB) can be defined as how people experience and evaluate specific activities and domains of their lives (National Research Council, 2013). The report further explains that SWB is multifaceted and for analysis it has to be disentangled for proper understanding of the components. SWB is categorized into two parts i.e. evaluative wellbeing and experienced wellbeing. The report further describes evaluative wellbeing as judgments towards how satisfying life is towards specific aspects like relationships, community, health and work while experienced wellbeing ExWB is concerned with a person's emotional state and their assessment of the states in question. It therefore implies that experienced wellbeing could either be positive or negative experience.

A study was carried out with undergraduate students from various departments to investigate whether the QOL is a significant predictor of subjective wellbeing (Malkoc, 2011). The study gave out four domains of quality of life; physical health, psychological health, social relationships and environment and set out to check if these indicators were significant predictors of subjective well-being and also examined the quality of life in terms of gender, socio-economic level, the number of sibling, living environment, mother education level and father education level. Results revealed that quality of life (overall) and psychological health, social relationships and environment

domains of quality of life predicted subjective well-being positively whereas physical health domain did not predict subjective well-being. This research recommends that further study be done to persons of different age group older than 29 years old who probably are household heads. This study had the respondents as household heads.

The dimensions of wellbeing are pointed out to factor in: personal security, health, reasoning, literacy, respect, attachment (love and affection) and self-determination. Limited literature has highlighted the impact of migration on wellbeing both at national and international scale (Lima, 2017). Part of recommendations in the research done was to explore the impact of migration on the wellbeing of immigrants an aspect which this research intends to contribute to. This study comes to context in that people are moving to the peri-urban areas and likely to encounter new changes or circumstances. The people are likely to develop feedback or response to the new environment which is constantly changing as more people are settling into the area. This study will therefore concentrate on land use change as a result of population spread due to urban sprawl to the peri-urban area and assess the wellbeing of the inhabitants.

In summary SWB retains the democratic aspect of letting people decide what is good for them, in the wake of preference satisfaction. At the same time, though, it does not stand on the assumption that people display and behave as according to a well-defined system of preferences. Mental-state accounts of well-being do not require that people know what they want and be informed decision-makers, because it shifts attention from their choices and circumstances to the consequences of their choices and circumstances for how they feel. The value of an outcome, moreover, is not regarded as fixed once and for all, but as varying according to how the outcome makes people feel over time.

We thus need not worry about whether people are mistaken or incoherent in what they think is good for themselves, because we are focusing on what they experience as good for themselves (Bacheti, Pelloni & Rossetti, 2008)

2.2.2 Measurement of Subjective Wellbeing

Measurement of SWB determines how people think and feel about their lives. SWB has three components; life satisfaction, positive affect and negative affect (Eid & Larsen, 2008). These three factors are studied separately since the presence of negative affect does not necessarily mean the absence of positive affect and vice versa (Eid & Larsen, 2008). There are various instruments in place for measurement of SWB. These entire instruments outline the dimensions of wellbeing (subjective, objective) and formulate questions to gauge the satisfaction of each of the dimensions. Since SWB is gauged by a set of questions directed towards respondents, there are three ways in which the set of questions can be administered (International Wellbeing Group, 2013).

First there is a Single-item scale where people are asked to rate their global satisfaction with life (GLS) in which one question is asked to know the feeling derived from life as a whole. Second is the multi-item scale which is in two forms; single construct scales and life domain scales. The single construct scales taps into the GLS by combining several items that create a variation to give a clearer input into the SWB. This scale is widely used by Deiner *et al.*, (2009) in the Satisfaction with Life Scale (SWLS). The Life Domain Scales approach adopts a domain-level representation of global life satisfaction. Here, individual items refer to specific life domains (life aspects) and the scores are averaged to produce a measure of SWB. A large number of SWB instruments have adopted this approach and the Personal Wellbeing Index was be used in this study.

Not all measures of SWB are evaluative or experiential in a strict sense. Between these two extremes, there is a range of measures that share features with both evaluative and experiential ones (Viterso, 2016). These 'hybrid' indicators of SWB tap into the flow of feelings to some degree, but they nonetheless require people to make a summary appraisal about it. An example question used to acquire hybrid measures of SWB may be '*How happy did you feel when you acquired this land?*' – which directs respondents' attention to the experiences they had the when they acquired the land, while also compelling them to an overarching evaluation thereof. Many of the measures that have been used in psychology and clinical research to appraise SWB fall into the category of hybrid measures. At present, evaluative (and hybrid) measures have received much more consideration in research and policy. The reason is that evaluations are much easier and cheaper to procure than experiences. Indeed, evaluative measures lend themselves to be collected in large-scale national and international surveys.

Surveying experiences is not as straightforward since it requires looking into how people feel as they keep at doing their daily activities (Dolan & Metcalfe, 2012). There are however various techniques in use, which, besides asking people to report on their current feelings, also involve an assessment of how they are spending their time, so as to take account of the basic context surrounding the experience. Evaluations may be comparatively more practical to elicit, but experiences are what life is truly about. People experience their lives always, but they only evaluate it sometimes. A number of reasons underlie the divergent findings emerging from evaluative as opposed to experiential measures. People cannot possibly envision the entire flow of their experiences when pondering about how they feel overall. For instance, they tend to neglect how long their past experiences lasted, with the consequence that the actual

time they have felt well or badly will not transpire in their evaluations Therefore, only the experiences people are thinking about will feed into reports of life-satisfaction and measures alike. Because the context of the evaluation affects what comes to mind, even seemingly irrelevant factors, such as the recent performance of the national rugby team, have been shown to exert a powerful influence on evaluative measures

2.2.3 The Personal Wellbeing Index (PWI) and its Application

The Personal Wellbeing Index (PWI) developed by the International Wellbeing Group (IWbG) is currently the only multi-dimensional scale measuring satisfaction with life (IWbG 2006). The PWI covers a basic set of eight quality of life domains: - standard of living; personal health; achieving in life; personal relationships; personal safety; community connectedness; future security; spirituality/religion. These eight domains represent the first-level deconstruction of satisfaction with "life as a whole". The International Wellbeing Group (IWbG 2006) indicates that there is no current theory to motivate the choice of life domains, but suggests that two further criteria be employed to narrow the focus of the search to domains most likely to result in a scale with the simplest conceptual construction.

The PWI scale contains eight items of satisfaction, each one corresponding to one of the quality of life domains mentioned above. Each item represents a domain of life satisfaction that explains some unique variance in the "life as a whole" question, while also sharing most of its variance with the other domains. This shared variance is called Homeostatically Protected Mood (Cummins 2009). Essentially, therefore, each item represents its own domain through a small amount of unique variance with sufficient power for the domains to respond differentially when subjective wellbeing homeostasis

is challenged. Thus, the PWI can be used as a scale comprising closely-related items that form a single factor measuring subjective wellbeing, or the individual domains can be examined to provide a diagnostic profile of wellbeing across the domains.

The items in the PWI are all intentionally semi-abstract. For example, people are not asked how satisfied they are with the relationship they have with their partner. While this is an interesting question in its own right, it is very specific, such that the satisfaction response will be driven by specific cognitions and emotions determined by the target. However, the PWI domains are designed to measure broad life aspects. It has been shown that countries can be compared on the PWI (Lau, Cummins, and McPherson 2005). This implies that people from different cultures interpret the translated scale in a similar way. The predecessor of the PWI, the Comprehensive Quality of Life Scale (ComQol), was developed by selecting relevant domains from the literature followed by empirical validation (Cummins 2007; Gullone & Cummins 2009). This is used as a benchmark to validate the PWI. The basic psychometric characteristics of the PWI in Australia have been described (Cummins, Eckersley, Pallant, Van Vugt, & Misajon, 2003). Cumulative psychometric characteristics of the scale and Australian norms are provided in the most recent report on the Australian Unity Wellbeing Index.

2.3 Peri urban Characteristics

While conducting a research on peri-urban settlement in Australia Kennedy, Butt and Amati (2016) allude to the fact that the peri-urban inhabitants "look like the country but think like the city". The settlement in the peri-urban area is stated to be due to migratory and technological developments that unsettle the established dichotomy of

the suburbs and rural areas. The settlement pattern is described as planetary and spreading outward from the city. Further the research states that migration into the peri-urban area creates an area with a hybrid of activities and features die to the mix of rural and urban features. The land use is then expected to change depending on various factors governing the "hybrid" inhabitants.

Peri-urban areas are known for complex configurations of dynamic population growth, shifting economic activities, and a complex juxtaposition of formal and informal land conversion. They are hybrid and multifunctional spaces, which pose great challenges for governance as they often collide with non-matching administrative boundaries, widespread institutional multiplicity, and fragmentation, as well as legal pluralism (Allen, 2014). A critical analysis of peri-urban dynamics is, therefore, in great need of 'contextual spatial knowledge' (Pfeffer, Martinez, O'Sullivan, & Scott, 2015). We argue that a processual, contextual mapping of these multi-layered peri-urban dynamics is key to detect, analyze, and – in the optimal case – 'better' govern processes of periurbanization for sustainable and inclusive development.

In India for instance, natural population increase, economic growth, and rural–urban migration result in rapid urbanization and a dynamic transformation of peri-urban areas (Dikshit, 2011). In this process, Indian cities face serious challenges in providing sufficient and affordable housing. Overall, the country's urban growth is characterized by a juxtaposition of planned and unplanned, formal and informal, legal and illegal developments. Across India, public–private partnerships are developing large-scale housing complexes at the urban fringe (Kennedy & Sood, 2016). However, this inherently entrepreneurial development path of urban expansion often reproduces

existing spatial inequalities of Indian cities in their periphery. While officially following pro-poor and integrative development strategies, the regional states' Urban Development Authorities (UDAs) – generally the main authorities in charge of urban development in India – in cooperation with private investors almost exclusively implement housing for the middle and upper classes (Plumley, 2016). Large-scale planned affordable housing for the economically weaker sections is absent. By contrast, planned development is predominantly reserved for a minority, while the majority of India's new urban and peri-urban dwellers depends on informally developed housing, scattered around 'planned' cities. These mostly sub-standard settlements (in terms of inadequate housing conditions and infrastructure provision compared to planning norms) at the fringe of Indian cities are often termed 'unauthorized'.

2.3.1 Land Size

Urban sprawl has been highlighted to be one of the main causes of land use change even in the developed world (Vanempten, 2009). It increasingly creates major impacts on the environment in terms of surface sealing, emissions by transport-based activities and ecosystem fragmentation. On the social structure, the effects include segregation, lifestyle changes and neglect of urban centres while on the economic structures, it creates changes including aspects of levels of production and land prices. In a study on the effect of peri-urban development on the livelihoods of indigenous households in lower Kiandani area, Machakos municipality, Mutua (2013) found out that Peri-urbanization often leads to declining household land holdings which, potentially, diminishes the economic significance of agriculture in urban peripheries. At the same time, new urban activities constitute an opportunity for new livelihoods (livelihood diversification) in urban-based employment.

Urbanization may also be synergistic to some forms of agriculture such as horticulture and dairying, due to increased urban demand for fresh farm produce. Because of peri-urbanization, the study revealed, the economic significance of agriculture as a livelihood strategy in the area had diminished, as evidenced by the locational differential trend of livelihood diversification away from the activity, with distance towards the core, leading to multiple farm and off-farm strategies. In spite of this diversification, the study revealed that household incomes in Lower Kiandani are not influenced by household space and locational factors. On further investigation, however, it was revealed that majority of the households, especially in the inner areas, have not taken advantage of the opportunities of urban-based land use/activities. While Mutua (2013) focused on the direct influences of peri-urban development on the general livelihoods of the indigenous households with emphasis on the economic household considerations, this study focused on how these trends affect the wellbeing of the current inhabitants of Kamulu area.

It has been observed that peri-urban "village" (indigenous and agricultural) households often diversify their livelihood strategies by having a second foothold in urban activities Baker (2006). While land and agriculture usually form their main livelihood support, non-farm and off-farm economic activities are also integral components of a household livelihood portfolio. Similarly, peri-urban "urban" households (in-migrants often in non-farm employment) endeavor to have a second foothold in agricultural land which then becomes an essential component of their livelihood diversification strategies. Thus, risk aversion, income diversification and multiple activities enable peri-urban households to accumulate financial capital for purposes of acquiring/buying more land, more assets or improving the value of existing assets. Narain (2010) has however noted

that in the long run, peri-urban households in a particular geographical locale tend to increasingly diversify away from agriculture as more and more non-farm activities sustained or created by urbanization processes, emerge. In this process, poor households will diversify to survive, middle-class households will diversify to consolidate and rich households will diversify to accumulate. The implication of this process on the peri-urban land use would be different to the different strata of human society. The current study would focus on the extent of the impact of this process on the most vulnerable group living within the peri-urban settings.

In a study focusing on the challenge of sustainable land uses in a rural-urban fringe: a case study of the Nairobi-Kiambu corridor, Ng'ayu, (2015) noted that the development of the urban fringes is an inevitable consequence of urbanization given that as cities continue to grow, urban activities spread outwards in waves towards the rural areas. The rural-urban fringes of cities thus, are the exit points for residents relocating from major urban built areas. The spatial development issues at the rural-urban fringes are many and varied. A synopsis of the findings reveals that, contrary to conclusions in studies carried out elsewhere in Africa that periphery development accommodates low income residents, the Nairobi-Kiambu corridor presents an area interspersed with low and high income households; land use is a function of livelihoods, that is, land has been put into different uses that translate into family incomes. The study recommends that there is need to focus on the existing conflict between peri urban land use and agricultural activities, with the aim of providing clear recommendations on a workable balance. It is in line with these recommendations that the current study will focus on the influences of reduced land sizes on the agricultural productivity and analyze the impact of the wellbeing of the inhabitants.

2.3.2 Land Tenure

Land use in the peri-urban area is progressively shifting from agricultural to other uses as a result of three important factors: large number of existing rural lots which if developed change the character and functioning of the entire region; introduction of a wide range of urban uses; and potential for future subdivision of larger properties (Maheshwari, Singh & Thoradeniya, 2016). All the three factors are highly dependent on land tenure system. FAO (2009) defines land tenure as a relationship established either legally or customary among people with respect to land where land is a symbol of other natural resources such as water and trees. This relationship defines how property rights are allocated within the society that is; access to rights to use land, control, transfer, responsibility and restraints. In Kenya the National Land Policy (NLP) was developed to guide the country towards Sustainable use of land. Development of the policy involved stakeholders from the public, private and the civil society. According to the NLP land in Kenya can either be public, private or communal land and the policy gives guidelines on land administration, land use planning, environmental degradation, restitution of historical injustices, access to land, conflicts, unplanned proliferation of informal urban settlement, institutional framework and information management.

According to Tsikata and Golah (2010), competition and conflict over land use and land access is at a historical peak globally due to population growth and urbanization. Further this has led to new waves of land privatization in which international actors, national elites and local entrepreneurs are alienating the historical uses of land from its territory. With these changes it is expected that social relations of new land ownership will lead to new uses and new values for the natural resources of land. This

could lead to gains or losses on the inhabitants depending on their reception to the change an aspect that is highlighted in their wellbeing.

2.3.3 Effects of Land Size on the Wellbeing

Urban expansion means consumption of more land to provide for urban housing, locate industry, built infrastructure and facilities. Since the supply of land is fixed, it means that having to avail more land to cater for increasing urban demands will inevitably involve reducing the amount of land under other equally important rural uses, usually agriculture, by a corresponding amount. The demand for urban land has been increasing over the years because of the pressure to accommodate increased human urban activity. Although population pressure as pointed out in the preceding sections is no doubt the main cause of urban spatial expansions, other socioeconomic dynamics among the middle and upper class urban citizens can also be seen to be at play. Kivell (2004) underscores the effect of increasing personal affluence which creates a further boost to the consumption of urban land.

Rising living standards result in lower residential densities, increased use of motor vehicles, increased recreation activity all of which require land near major urban areas. Again, the fact that land (and property) has traditionally been a "hedge against inflation" (Davison & Wibberley, 2007; Kivell, 2004) and especially in times of economic uncertainties, coupled with lifestyle preferences, has led to rapid growth in urban home ownership meaning consumption of more land. In addition, medium and long term increases in the value of properties has been a particular attraction when other forms of investment have not been very rewarding. Equally notable is the increasing availability of and accessibility to mortgage finance to urban middle and upper-class

citizens. Perhaps the arguments to follow herein will not be properly grounded if land is not defined and understood at this point. This invaluable "commodity" has been perceived and defined in diverse ways. To mention just but two of common perceptions, to the physical geographer, land is synonymous with the landscape while the economist will see it as a resource. Many other perceptions hold depending on different disciplines and perspectives.

2.4 Infrastructural Development

The ambiguity of the peri-urban area, which is split between urban and rural jurisdictional boundaries, presents significant governance challenges (Kakoi, 2013). The separate jurisdictions have different resources, capacities and political leanings, making coordinated management difficult. There are often contradictory and in some instances absent regulatory frameworks, breeding a situation of „organized irresponsibility". This study was designed to examine the efficacy of existing legislation and institutions in guiding development of Ongata Rongai, one of the peri-urban areas outside the gazetted boundary of Nairobi city, and to propose an institutional framework that could be used in the management of the town in order to achieve orderly, planned and well serviced development. It was revealed that the provisions of the Physical Planning Act are not enforced by officers from the Physical Planning Department, County Council of Olkejuado and City Council of Nairobi. While this study looks into issues of ownership of land and spaces within the peri-urban settings, with a focus on the boundaries and subdivisions, the present study would focus on the infrastructural development in these regions and how it would impact on the wellbeing of the local people within this region.

2.4.1 Influence of Infrastructure on Wellbeing

Access to markets, infrastructure and services at household or community level are context dependent. Nkonya et al. (2010) allude that household with better access to markets or infrastructure and markets will tend to receive higher prices for their outputs and pay lower prices for inputs. This translates to an economic edge or advantage for inhabitants with access to infrastructure as they will always have profitable production. However when it comes to labour intensive practices areas with access to infrastructure tend to have higher opportunity costs. They further emphasize by stating that better access to infrastructure and roads may ultimately lead to over exploitation. This was based on research done in the East African Highlands where better access to roads led to increased use of purchased inputs and negatively impacted on labour intensive farm management practices as well as collective management of pool resources.

2.5 Peri-urban Land Use Diversification

Urban Agriculture has been viewed as a sound coping strategy in the face of dwindling food security, economic upheavals, civil strife and unprecedented population growth within many urban centers in the world (Nugent, 2000). The state of unemployment, need for recreation and desire for engaging in farming activities in itself for self-esteem are some of the reasons fronted for rising in urban agriculture among the urban residents, though in different setting and by different socio-economical groups. For the poor urban residents, food security is the main driver to farming as it is taken as coping strategy not only for food security but also for economic empowerment through selling of surplus. Among the urban poor vulnerable households urban agriculture is a livelihood coping mechanism (UN Habitat, 2006).

One of the key demerits associated with urban agriculture is the huge pressure exerted on the physical infrastructural resources within the urban areas. This is despite the enormous challenges facing the Government in provision of funds for repair and maintenance of crucial infrastructural services. It is also notable that due to failure of the infrastructure, the housing environment is degraded, filth, and has effect on the level of self-esteem of the tenants. The study recommends further studies which could not be sufficiently covered by the research. From these findings, the current study will focus on the direct and indirect impacts these infrastructural trends on the wellbeing of the residents within the peri-urban settings.

Urban expansion means consumption of more land to provide for urban housing, locate industry, built infrastructure and facilities. Since the supply of land is fixed, it means that having to avail more land to cater for increasing urban demands will inevitably involve reducing the amount of land under other equally important rural uses, usually agriculture, by a corresponding amount. This basic fact crystallizes the rest of this work. The demand for urban land has been increasing over the years because of the pressure to accommodate increased human urban activity. Although population pressure as pointed out in the preceding sections is no doubt the main cause of urban spatial expansions, other socioeconomic dynamics among the middle and upper class urban citizens can also be seen to be at play. Kivell (2004) underscores the effect of increasing personal affluence which creates a further boost to the consumption of urban land.

Rising living standards result in lower residential densities, increased use of motor vehicles, increased recreation activity all of which require land near major urban

areas. Again, the fact that land (and property) has traditionally been a "hedge against inflation" (Davison & Wibberley, 2007; Kivell, 2004) and especially in times of economic uncertainties, coupled with lifestyle preferences, has led to rapid growth in urban home ownership meaning consumption of more land. In addition, medium and long term increases in the value of properties has been a particular attraction when other forms of investment have not been very rewarding. Equally notable is the increasing availability of and accessibility to mortgage finance to urban middle and upper-class citizens. Perhaps the arguments to follow herein will not be properly grounded if land is not defined and understood at this point. This invaluable "commodity" has been perceived and defined in diverse ways. To mention just but two of common perceptions, to the physical geographer, land is synonymous with the landscape while the economist will see it as a resource. Many other perceptions hold depending on different disciplines and perspectives.

However, a common observation is that peri-urban spaces are undergoing rapid land use change, with agricultural land being taken for residential or industrial purposes (Foley and Scott, 2014). Such land use changes go hand in hand with changes in the social fabric, as new residents and businesses move into the area. These new residents often value and inhabit the landscape differently, leading to a diversification of peri-urban landscapes (Argent, Tonts, Jones, & Holmes, 2010). In addition, agricultural uses are also changing, broadly following two contradictory paths. On the one hand, agricultural activities become increasingly industrialized and intensive (Taylor et al., 2017); on the other, a shift towards a post-productivist, multi-functional landscape is taking place (Zasada, 2011). Change in land use, social fabric and the nature of agricultural activities does not occur in a smooth, predictable linear fashion. Rather,

change typically occurs in ad hoc and inadvertent ways, steadily building up the potential for conflict in peri-urban areas (Taylor et al., 2017).

2.5.1 Influence of Peri-urban Land Use Diversification on Wellbeing

Poverty can be conceptualized in different ways. In an article published in the Journal of applied science (Siwar, Ahmed, Bashawir & Mia, 2016) poverty is defined as lack of monetary ability to procure basic needs which can either be food or non-food in nature. These needs are elements considered for the totality of human wellbeing. In the study conducted in Malaysia, the article indicates that a boom in the urban population within a short time frame resulted to various problems that include rise in the cost of living, environmental deterioration, unemployment, crime, social problems and poverty. Kamulu area being subject to the effect of the urban sprawl is likely to encounter similar problems. These challenges are likely to have varied influence on the wellbeing of its inhabitants. This study therefore will establish the impact of the change in land use, its influence on the wellbeing and generate recommendations to tackle the challenges.

In a study conducted in Ghana by Appiah *et al.* (2014), it was concluded that land use change in peri-urban areas is on a rise due to increased demand for residential, commercial and recreational facilities, all at the expense of agro-forest land uses. The report further highlights that these changes have caused negative implications on local climate and food security. Food security is a key aspect on the wellbeing of people. If residents in an area are dependent on agriculture and the land is used for alternative uses the people may be considered to „lack". This research will assess the impacts of the changes in land use to the entire wellbeing dimensions as opposed to the focus on

climate and food security. In a paper written by Ephraim et.al (2010), the relationship of poverty and environmental degradation comes up. The paper highlights that many land owners moved to the city to seek employment and these land owners sell their land at low prices. These lands were used for agriculture mostly but with the purchase the new owners tend to utilize the land for other alternative income generating uses, a process that has precipitated land degradation. This social exclusion and land degradation culminates eventually to absolute and relative poverty within the peri urban areas.

2.6 Summary of literature and Gaps

Many of the studies have highlighted the economic and environmental impact of land use change in the peri-urban areas. The literature review has also highlighted the different types of wellbeing and how wellbeing of household is determined using the personal wellbeing index. The characteristics of the periurban area were explored and how the location has influenced land use. From the literature studied by the researcher it is evident that previous research does not encompass the totality of the inhabitants of the peri-urban fringe as it leaves out five other dimensions of human wellbeing, namely, health, personal security, literacy/reasoning, respect, attachment (love and affection) and self-determination. The study therefore was conducted to assess the effects of the ongoing changes in land use patterns resulting from the rural-urban fringes on the wellbeing of the communities living in Kamulu area, Nairobi County.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents various techniques that were applied in conducting this research. It covers research design, location of the study, population of the study, sampling procedure and sample size, instrumentation, data collection, data analysis and ethical consideration.

3.2 Research Design

The study employed a descriptive research survey design. A descriptive research survey design is used to obtain information concerning the current status of the phenomena to describe "what exists" with respect to variables or conditions in a situation (Chandran, 2004). Kothari (2004) also defines a descriptive research study as one that is "concerned with describing the characteristics of a particular individual or of a group". In a descriptive survey research objectives are predetermined in which case it allows data collection to be relevant and sufficient to the study problem. By combining both the quantitative and qualitative data collection procedures, a descriptive research design allows the researcher to gather information in manner that reduces the cost of data collection. This research design therefore enabled the researcher to establish the impacts of the ongoing changes in land use patterns, resulting from the rural-urban fringes, on the communities living in Kamulu area.

3.3 Research Site

The study targeted the residence of Kamulu area in Nairobi county, which is a small town located roughly 40 Kilometers from Nairobi Central Business District. The exact location is shown on the map (Figure 3.1) and the subdivision of the plots (Figure 3.2).

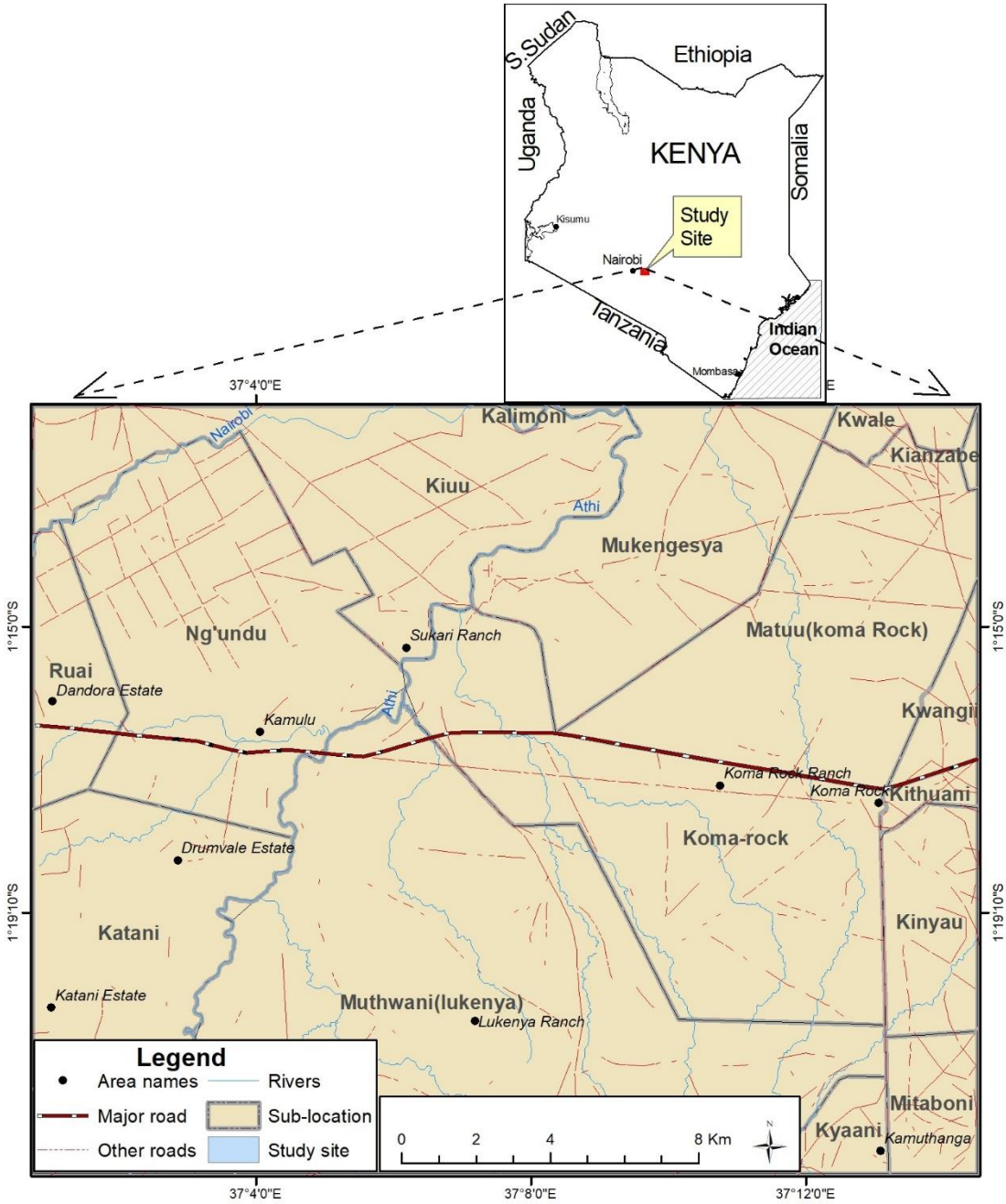

Figure 3.1 Map showing the location of Kamulu

3.4 Target Population

The target population for this study was the 26,448 residents, residing within the Kamulu area, which is the former Drumvalle ranch that was subdivided for urban settlement. According to the Kenyan Demographics statistical data (2015) and the Kiangazi foundation that conducted a population survey within the metropolitan areas, it is noted that Kamulu area has a total adult population of about 26,448 residents, who live in this peri-urban area and its environs, and this study adopted this population. Figure 3.2 shows a map of land subdivision within Kamulu area.

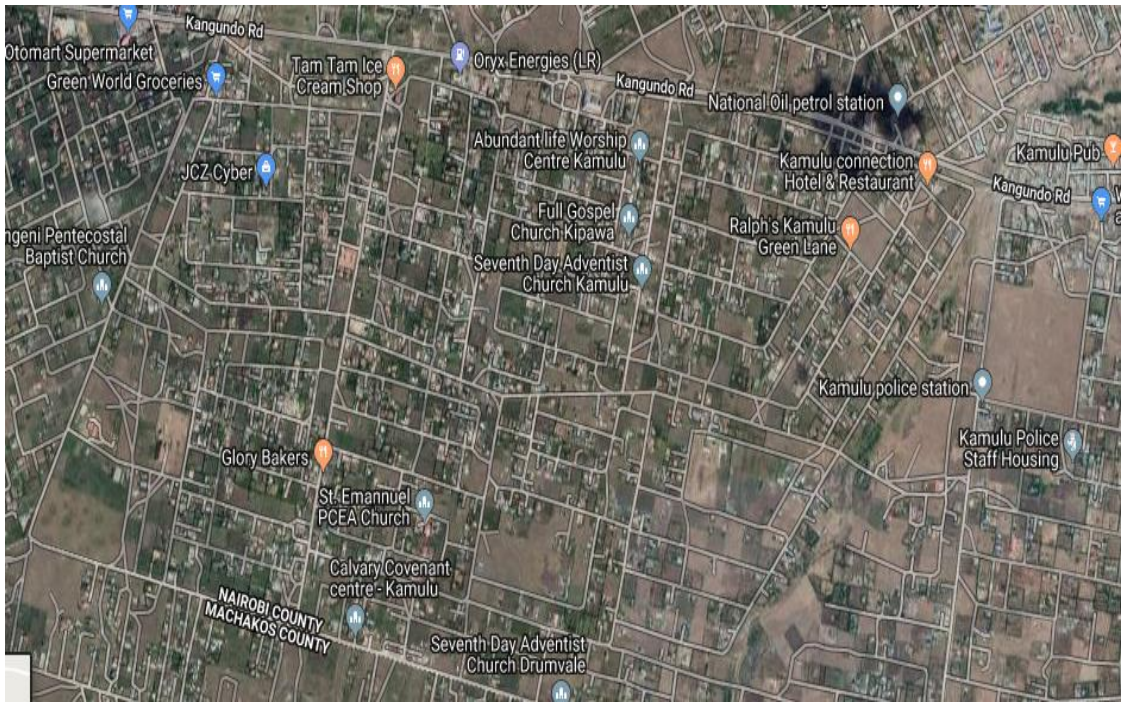

Figure 3.2: Map showing the subdivisions of Drumvale Close, Kamulu Area.

3.5 Study Sample

The study sample was made up of households in Kamulu that were selected for the household survey.

3.5.1 Study Sample Size

The population of Kamulu area in terms of residents was considered finite and thus the following suitable formula was used (Krejcie & Morgan, 1970):

$$s = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)}$$

s = Required sample size.

X^2 = The table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = The population size.

P = The population proportion (assumed to be 0.5 since this would provide maximum sample size)

d= The degree of accuracy expressed as a proportion (0.05)

Therefore the sample size for the study was calculated as follows:

s = [3.841 × 26448 × 0.5(1-0.5)] ÷ [0.05^2(26448-1) + 3.841×0.5(1-0.5)]

t s = 378.6

379

Thus, a sample size of 379 was used in the study.

3.5.2 Sampling Procedure

A stratified random sampling technique was used to select the study samples. The study area was subdivided into three strata based on the Kamulu subdivision map (Figure 3.2) map. The strata were aligned with the Nairobi to Kangundo road and run on the opposite direction of this road. The first stratum, which was named “A” started from Green world groceries and ended at the Tamtam ice cream shop, the second stratum named “B”started at the Tamtam ice cream shop and ended at the road leading to the Abundant

Worship centre, the third stratum named "C' started at the road to Abundant Worship center and ended at the Kamulu connection hotel and restaurant. The households were then selected at random from these three strata. The chiefs register and the *"Nyumba Kumi"* list of residents were used to make the sampling frame, from which the households were drawn at random.

3.6 Data Collection

This section gave the details on how the data from the household heads, key informants and the focus group discussion would be obtained by the researcher. It detailed on the instruments to be used and how the pilot study was conducted.

3.6.1 Data Collection Instruments

The instruments used for this study included a household questionnaire and Focus Group Discussion guide. The household questionnaire (Appendix C) was a structured type and had five parts that were related to the objectives of the study; the first part had questions on the personal information of the respondents, the second part had questions on land use practices, the third part had questions on impacts of infrastructure on land development, the fourth part contained questions related land use economy and wellbeing and finally the fifth part had the subjective wellbeing questionnaire. A subjective wellbeing scale which comprised a set of statements and a rating scale of zero to ten was incorporated in the questionnaire determine the level of wellbeing of the household residents. The researcher used the structured form of questionnaires as the main instrument of data collection. Mugenda and Mugenda (1999) observed that questionnaires give detailed answers to complex problems and therefore are most effective. The use of questionnaires is also a popular method for data collection in

deduction because of the relative ease and cost-effectiveness with which they are constructed and administered. Questionnaires give a relatively objective data and endear themselves well design. Same set of questionnaires was administered to all household heads. The questionnaires exhaustively made inquiries on the key issues outlined in the objective of the study. The researcher also engaged one key informant (Drumvale location chief) in an interview to verify the information provided in the questionnaires. A focus group discussion was held with a *Nyumba Kumi* head, the secretary and treasurer within Drumvale area at Crescent close

3.6.2 Pilot Testing and Reliability of the Instrument Process

The research instrument was administered to 20 residents of Nairobi-Kangundo corridor who were selected randomly, a week before the main study was done. This was to allow for fine–tuning of the research instruments before the actual study. The respondents from the pilot survey were however not part of the data analyzed.

3.6.3 Instrument Reliability

The reliability of the instrument was determined using the Cronbach's alpha method. The Cronbach's alpha value is normally high when the correlation between respective questionnaire items are high. The Cronbach value ranges between 0 and 1 and a value at or above 0.7 is desirable (Andrew *et al.*, 2011). The formula below was utilized in determination of the Cronbach's alpha reliability coefficient.

$$\alpha = \frac{N.\bar{c}}{\bar{v} + (n-1).\bar{c}}$$

Where: N is the number of items,

C bar is the average inter item covariance among the items V bar is the average variance.

The reliability coefficient for the Kamulu area was as determined and found to be 0.799 which is desirable in research. Various methods are in place to determine the reliability of research instrument. Reliability in research may be affected by random errors, the pre-test helped the researcher to identify the most likely source of errors and hence responded to them before the actual study. The researcher in designing and administering of instruments took care to avoid any errors. The researcher also used the delayed response technique, whereby the instruments were given to the respondent and a follow up question asked to verify the same question. The researcher then compared the consistency in the responses. In this case the 20 respondents gave consistent responses and therefore the instrument was considered as being reliable.

3.6.4 Validity of the Data Collection Instruments

Validity of an instrument may be established deductively by showing that the item corresponds to the definition of the traits intended to be measured (Andrew et al., 2011). To ascertain the validity of the instruments, each respondent completed the questionnaire and each question item discussed to determine suitability, clarity and relevance for the purpose of the study. The researcher also sought expertise of the supervisors to establish content validity and assess the relevance of the instruments to the study. The researcher administered the research instruments independently to three scholars to examine each question item against research objectives. Each of them was requested to give an independent opinion on suitability and adequacy of each question item. Their views comments and suggestions were used to improve the questionnaire while working on the final copy in which they were incorporated in the design of the final instrument.

3.6.5 Data Collection Procedure

The NACOSTI research permit was first obtained, then permission was sought on the ground from the Chief of the area and the *Nyumba Kumi* initiative. The selected respondent were then briefed on the purpose of survey and their permission was sought to conduct the interview. The questionnaires were then administered by the researcher. The researcher also used the delayed response technique, whereby the instruments were given to the respondent and a follow up question was asked to verify the same question

3.7 Data Analysis

The study collected quantitative data. The quantitative data were coded for analysis. Data were analyzed using both descriptive and inferential statistics within the Statistical Package for the Social Sciences (IBM SPSS version 26.0). Descriptive analysis included frequency distribution, charts, measures of central tendency and dispersion (means, modes, median, variance and standard deviation and cross tabulation of categorical variables). Inferential statistics was used to determine the effects of the independent on the dependent variable. Inferential statistics used included bivariate and multiple linear regression analysis to determine the effects of the independent on the dependent variables (Mugenda & Mugenda, 1999). The statistical significance of the effects was determined using p at alpha ($p<0.05$). The factors considered by the study included independent variables(X) and dependent variable (Y).

The regression formula; $Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\alpha$ was used in comparing variables. Where

Y is the dependent variable (the well-being of the peri-urban communities), β_0 is the regression coefficient,

β_1, β_2, β_3 and β_4 are the slopes of the regression equation, X_1 reduced land sizes ,

X_2 is infrastructural development,

$X_3$is peri-urban land use diversification

3.8 Ethical and Legal Considerations

While conducting this research, the researcher critically considered various legal and ethical issues that are of greatest concern and that are highly considered today. In regard to respect to persons, the researcher ensured that the individuals participating in the research were treated as autonomous agents. The researcher ensured that the subjects received a full disclosure of the nature of the study, the risks, benefits and alternatives, with an extended opportunity to ask questions. In regard to beneficence, the researcher ensured that all the participants were assured of maximum possible benefits and minimum possible harms. The researcher then gave forethought to the maximization of benefits and the reduction of risk that might occur from the research. In regard to the issues of justice, the researcher ensured that there was fairness in all the data collection process in terms of selection of participants. Legally the researcher sought permission from the National Commission of Science, Technology and Innovation to conduct the research within Kamulu area. The researcher paid the relevant fee for the same.

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Table 3.1: Summary of Data Analysis

Study Question	Variables Involved	Statistical Method Used
What are the effects of reduced land sizes on the wellbeing of the peri-urban inhabitants of Kamulu area in Nairobi County?	Independent: Reduced land size, Dependent Variable: Wellbeing. Results presented in tables and charts	Descriptive statistics, Simple linear regression analysis
What is the influence of infrastructural development on the wellbeing of the residents of Kamulu area, Nairobi County, Kenya?	Independent variable Infrastructural development, Dependent Variable: Wellbeing. Results presented in tables and charts.	Descriptive statistics, simple linear regression analysis
What are the influences of peri-urban land use diversification on the wellbeing of the people of Kamulu area, Nairobi County?	Independent: Peri-urban land value, Dependent Variable: Wellbeing. Results presented in tables and charts	Descriptive statistics, simple linear regression analysis
What is the combined effect of the independent variables (land size, infrastructural development and land use diversification) on the dependent variable (household wellbeing) of the people of Kamulu area.	Independent: Reduced land size, land use diversification and infrastructural development Dependent Variable: Wellbeing. Results presented in tables and charts.	Descriptive statistics, multiple linear regression analysis.

DATA ANALYSIS AND FINDINGS

4.1 Introduction

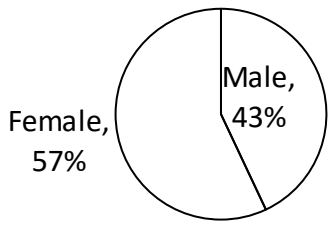
This chapter presents the study findings. The aim of the study was to assess the effects of changing land use practices on the wellbeing of the inhabitants in Kamulu area, Nairobi County. The chapter is composed of the following sections: characteristics of the household heads,

4.2 Characteristics of Household Heads

This section gives the analysis for the general information regarding the household heads. It gives the general impression of the household heads in line with their gender, marital status, source of income and the size of their households.

4.2.1 Sex of the Respondents

The sex for the household heads was determined by observation. The frequency distribution was then calculated and the data presented as shown in Figure 4.1.



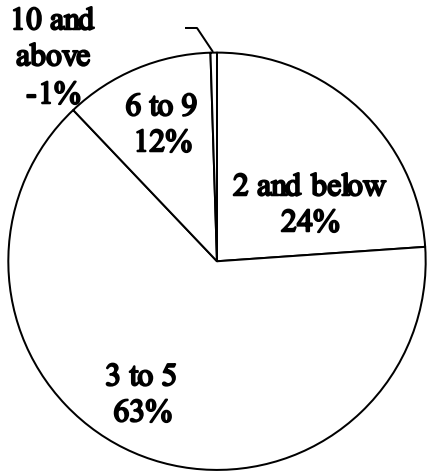
n= 379

Figure 4.1: Sex of household heads in Kamulu area

The household heads have an almost equal representation with regards to gender with the female household heads being slightly more (57%) and the male household heads at 43%. Since the survey targeted household heads within the area of study it implies that most of the household heads within Kamulu are female.

4.2.2 Size of Households

The household heads were asked to state the size of their households and the data filled in depending on the ranges provided in the questionnaire. The data was then frequently distributed and the results presented as shown in Figure 4.2



n= 379

Figure 4.2: Household sizes of the respondents within Kamulu area

Sixty three percent of the households are of the range between 3 and 5 and 12% of the households have between 6 and 9 members. The frequency distribution table for the marital status of the respondents highlighted that of the respondents 80% were married, 16% were single, 2% were divorced. This indicates that a majority of the residents are married. This contributes directly to the large household sizes of more than 2 members.

4.2.3 Age of the Household Heads

The household heads were asked to state their age and the value filled in depending in the pre-defined range set out in the questionnaire. The frequency distribution of the data was then analysed the results are shown in the Table 4.1.

Table 4.1: Age of Household Heads

Age of Household head	Frequency	Percent
21 and below	21	5.6
22 to 29	106	28.0
30 to 39	117	31.0
40 to 49	70	18.5
50 to 59	46	11.9
60 and above	19	5.0
Total	379	100.0

Mean 36.5, Minimum 20, Maximum 68, Std Deviation 1.179

Ninety four percent of the respondents are above the age of 21 implying most of the residents are mature. 66% of the household heads are above the age of 30. These goes hand in hand with the previous analysis for the marital status and household sizes which confirms that a big percentage of the household heads are married, have dependents and are mature.

4.2.4 Household Head Occupation

The household heads were asked to state the main occupation they were actively engaged in. The feedback was selected from pre-defined sources which included; self-employment, formal employment or informal employment and in the event that none fit their source of income, the household heads were to input their income source under option of other and state what source they got their income from. The information is summarized in Table 4.2.

Table 4.2: Main Occupation of Household Heads

Type of Occupation	Frequency	Percent
Self-employment	167	44.0
Formal employment	123	32.5
Informal employment	89	23.5
Total	379	100

The household heads that were engaged in self-employment were 44 %, while the ones in formal employment were 32.5 % and 23.5 % were engaged in informal employment. In this study, formal employment meant that the household heads had an engagement with their employer with defined working hours and benefits. Informal employment in this case meant the household heads were engaged in income generating activities with an employer and their agreement was not regulated or protected by the government. Self-employment meant the household head had an income generating activity and engaged themselves fully in it with a varied range in returns.

4.2.5 Household Number of Income Source

The household heads were asked to state the number of income sources they had. Their responses were then analysed to determine the number of income sources they had. The number of income sources per household was the determined by addition of the different sources the households were engaged in. A scale of 1 to 3 was generated to represent the number of income sources within the household. A percentage of each value based on the total number of residents determined. The information was then summarized and the descriptive statistics and frequency distribution are given in Table 4.3.

Table 4.3: Household Number of Income Sources

Number of Income Sources	Frequency	Percent
1	89	23.5
2	135	35.6
3	155	40.9
Total	379	100

Mean 2.7, Mode 3, Std Dev 1.38

The households that had three (3) income generating sources were 40.9 %, while those with two (2) income sources were 35.6 % and those with only one income source were 23.5 %. This is in line with the characteristics of peri urban population.

4.3 Subjective Wellbeing of the Households

The respondents' subjective wellbeing was assessed using the personal wellbeing index scale. The assessment was based on eight different domains which include; material provision (food, shelter, clothing, capital, provision of assets and work), good health (provision of health services, cost of health services), safety (peace of mind, absence of constant fear, absence of constant worry), social relations (connection with other community members, good relations with family, good relations with community), spiritual fulfillment (belief in God, attendance to worship areas), controlling the state of environment- ability to (control political situation, acquire services, acquire resources, acquire knowledge, acquire skills, acquire loans and acquire information), emotions and affiliations (social respect, being part of the community, fulfill social obligations, listened to by others and help others) and life achievement. Impact of changing land use practices was evaluated based on the eight domains detailed above (Simmons & Lehman, 2013).

The impact was assessed on a scale of 0 to 10.where zero meant completely dissatisfied, 5 meant neutral (neither satisfied nor dissatisfied) and 10 completely satisfied. From the values filled in an average for each domain was determined for every resident by adding up the values from each respondent. For each domain the average was obtained by dividing the total by the number of indicators in the domain. The total wellbeing of the residents was the obtained by adding up the average from each of the domains and eventually wellbeing index was for the respondents for each domain determined by dividing the total wellbeing by eight- the total number of domains. (Kassie, Kim & FellizarJr, 2017). The results of all the indicators is shown in Appendix C and the summary of the eight domains with the descriptive statistics are displayed in Table 4.4.

Table 4.4: Wellbeing of Household Heads in Kamulu Area

Domains	Mean	Std. Error	SD
Material Provision	5.5	0.14	1.93
Health	4.02	0.17	2.36
Safety	6.8	0.14	1.84
Social relations	7.48	0.12	1.64
Spiritual fulfillment	8.52	0.12	1.56
Control of environment	5.32	0.13	1.79
Emotions and affiliations	6.36	0.12	1.72
Life achievement	6.57	0.15	2.04
Wellbeing index	50.56	0.67	9.12
Grand Mean Wellbeing index	6.32	0.08	1.14

n=379

From the PWB index scale the grand mean wellbeing of the respondents is at 6.3, an implication that the residents are generally satisfied with the quality of life in general. According to Glatzer *et al* (2016) this is an indication of a well-functioning society that

embodies trust and mutual cooperation among them. Further, they state that a value above 6 underpins stability for peri-urban areas which are a highly multicultural society.

4.4 Effect of Reduced Land Size on Household Wellbeing

The first specific objective of the study was to assess the effect of reduced land sizes on the wellbeing of the peri-urban inhabitants of Kamulu area in Nairobi County. The household heads were asked to state the sizes of their land in acres. Most of the land was portioned in square feet and the data was collected as such and converted to acres. The data was then presented as shown in the Table 4.5.

Table 4.5: Average Land Size in Acres

Land size Categories (Acres)	Frequency	Percent
0-1	88	42.7
1.1-2	82	39.8
2.1-3	19	9.2
3.1-4	4	1.9
4.1 and Above	13	6.3
Total	206	100.0

Mean 1.89, Mode 1.00, Median 2.00, Minimum 1.00, Maximum 5.0, Std. dev 1.08

Most of the house owners and land owners buy land that has already been subdivided in plots that are measured in square foot. A majority of the residents have plots divided into 5000 square foot and they acquired several of these plots giving the mean land size at 1.89 acres. Some the lands are yet to be bought and therefore the companies selling out still own the larger tracts of the land. There are some land owners who have bought several plots and are holding up for the value to appreciate for other uses apart from residence.

A map obtained from the Drumvale area chief showed the following land subdivision affirming further the reduced land size. The map is as shown in Figure 4.3.

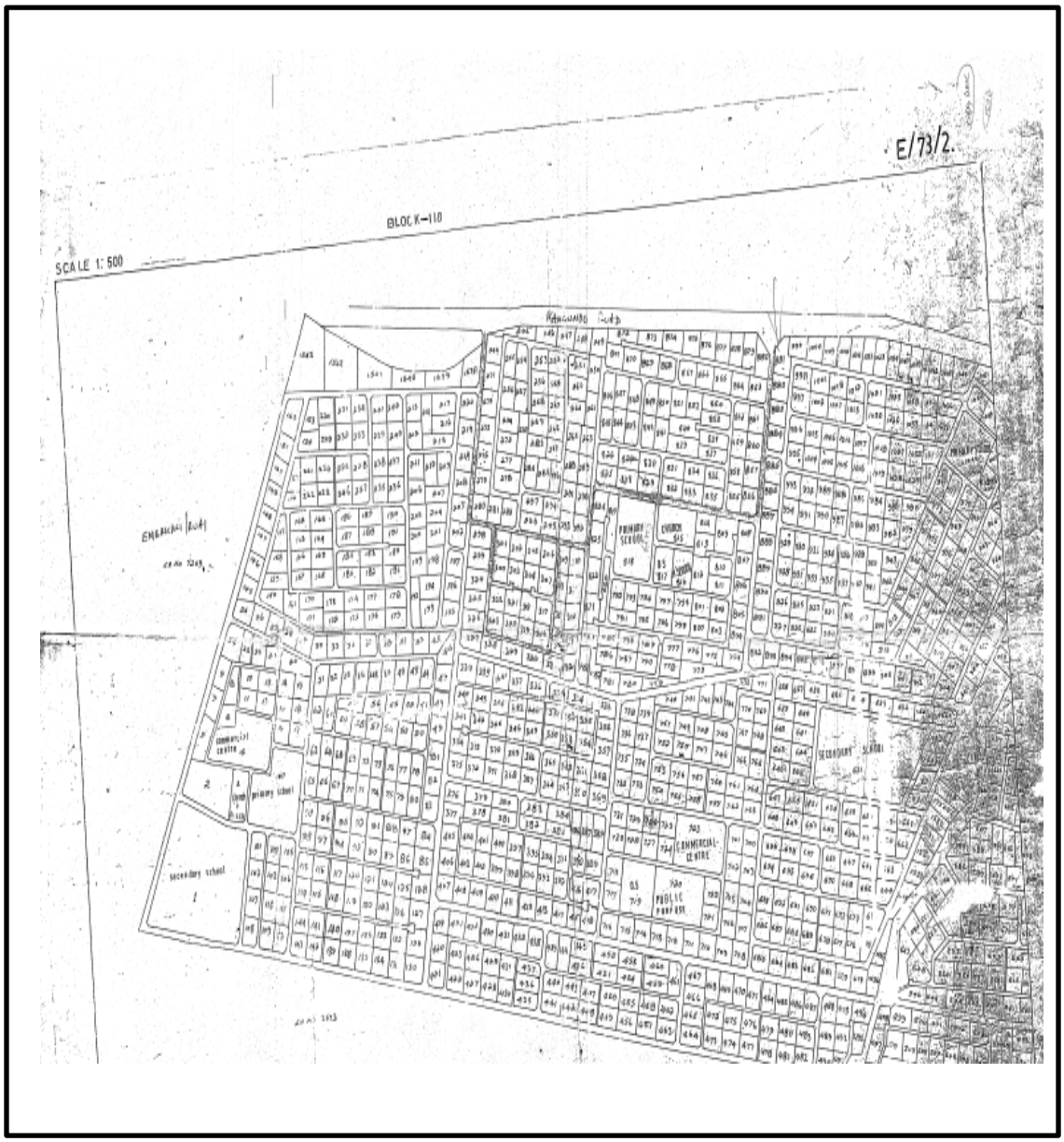


Figure 4.3: Map Showing Land Division within Drumvale Close, Kamulu

4.4.1 Effects of Reduced Land Size on Household Wellbeing

The first specific objective of the study was to assess the effect of reduced land sizes on the wellbeing of the peri-urban inhabitants of Kamulu area in Nairobi County. From

the data collected on the land sizes and the personal wellbeing index, the effects were assessed using simple linear regression and the summary of the regression model is shown in Table 4.6

Table 4.6: Regression Summary on Effects of Reduced Land Sizes on Household Wellbeing

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.0774 [a]	0.006	0.0053	0.027

Reduced land size solely explains wellbeing at 0.6% (R^2 =0.006). This implies that reduced land size as one variable does not explain the wellbeing for household heads. In a conference paper done by the Social Research Network (2012), an R squared value of 9% for social study was considered respectable enough. The F test for the regression model is shown in Table 4.7.

Table 4.7: *F* Test for the Regression Testing the Fit of the Model

Model	Sum of Squares	*df*	Mean Square	*F*	*p*
Regression	1.216	1	1.216	.252	.616[b]
Residual	1287.725	377	4.823		
Total	1288.941	378			

a. Dependent Variable: index of household wellbeing
b. Predictors: (Constant), reduced land size

The results for the ANOVA test indicates that the overall regression model was not significant statistically (F (1, 378) =.252 p =.616). The regression coefficient of the model showing the *beta, t* statistics and the collinearity statistics is shown in Table 4.8

Table 4.8: Regression Coefficients of Reduced Land Sizes on Household Wellbeing

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics
	B	**Std. Error**	**Beta**	**t**	***p.***	**VIF**
(Constant)	6.236	.067		61.786	.001	
land size	.010	.027	.001	0.01	.992	1.000

The results (Table 4.8) indicate that reduced land size had a non-significant effect (β=0.001, t=0.01, p=0.992) on the household wellbeing of the residents in Kamulu area. This means that the residents do not depend on land for their wellbeing. This could be as a result of the area being peri-urban is experiencing an increase in land value despite the reduced land sizes and therefore reduction in land size has no impact on the household wellbeing of the residents.

4.5 Infrastructural Development and Household Wellbeing in Kamulu Area

The second specific objective of the study was to establish the effects of infrastructural development on the wellbeing of the residents of Kamulu area, Nairobi County.

4.5.1 Infrastructural Development

The independent variable infrastructural development was operationalized as an index which combined a rating by the household head on how the existing infrastructure impacted their day to day activities on a 5-point scale. The developments that were rated included: the condition of the roads, schools, availability and condition of hospitals, access to markets, administration offices and quality service. The feedback was evaluated on a self-ranking scale where 0 meant no extent/effect and 4 meant very large extent. The ratings were then added to form an index. For each statement and the

feedback the total was obtained and the percentage out of 100 determined based on the cumulative score. The feedback was then presented as shown in Table 4.9.

Table 4.9: Infrastructural Development within Kamulu Area

	% Rating by the Household Heads					
Statement	**0**	**1**	**2**	**3**	**4**	**Total**
Good road network	14.2	17.4	27.6	29	11.8	100
Schools	6.2	5.1	4.8	38.9	45	100
Hospitals	47.7	22	16.8	10.3	3.5	100
Access to markets	67.3	17.2	8.7	4.9	1.9	100
Administrative office	8.2	5.4	16.3	39.8	30.2	100

0- No extent, 1-Low extent, 2- Average, 3- Above average, 4-Very large extent

40% of the respondents feel that the road network plays a very important role in their day to day life within Kamulu area. The respondents acknowledge that the road network within Kamulu area is good and aids in their daily activities. 84% of the respondents acknowledge that schools are largely available within the area and that it plays an important role in their day to day activities. This could be linked to the previous finding where most households had more than 3 people implying there could be school going children and therefore having schools within the area will be a great boost to their stay and settlement in the area. The researcher during the study noted quite a number of schools within the area. Only 14% of the respondents acknowledged access to good hospitals within the area. About 86 % of the respondents did not feel the impact of the existing health facilities in the area. The same was notable during the study as the researcher came across the proposed public dispensary next to the Chief's office that had stalled in the construction stage. 94% of the respondents felt that the area had no proper market and therefore could not feel its impact to their day to day lives. In the map for the Kamulu area obtained from the area Chief at Drumvale, an area had been

set aside for market and commercial center and the area was still unoccupied giving an implication that the same is yet to be commissioned for use. 70% of the respondents acknowledged the presence of the Chief's functional office in the area.

4.5.1 Effects of infrastructural Development on Household Wellbeing

The second specific objective of the study was to assess the effect of improved infrastructural development on the wellbeing of the peri-urban inhabitants of Kamulu area in Nairobi County. An average value for the infrastructural development indicators was obtained and the average wellbeing as well. The effects were assessed using simple linear regression. The results of the model summary are shown in Table 4.10.

Table 4.10: Relationship between Infrastructural Development and Household Wellbeing

R	R Squared	Adjusted R Squared	Std Error of Estimate
0.49	0.24	0.238	0.143

Infrastructural development solely explains wellbeing at 24% (R^2 =0.24). This implies that infrastructural development explains approximately 24% of the household wellbeing for the residents in Kamulu area. The regression coefficients of the model showing the beta, t statistics and the tolerance levels are shown in Table 4.11.

Table 4.11: Effects of infrastructural Development on Household Wellbeing

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics
Model	B	Std. Error	Beta	t	*p*.	VIF
(Constant)	6.487	0.192		24.462	0.001	
Infrastructure	0.095	0.143	0.490	0.665	0.041	1.000

Improved infrastructural development significantly affects the wellbeing of the residents positively (β= 0.490, t=0.665, *p*= 0.041). This implies that infrastructural development influences the wellbeing of the household heads in Kamulu. On the test for collinearity the variance inflation factor (VIF) obtained was 1.0 implying that there was no multicollinearity between infrastructural development and the other independent variables making the regression model acceptable. The area is notably having a lot of infrastructure and construction activities. This is from the new land owners who are increasingly putting up houses. It is also noted from the increase in population, commercial centers are coming up with social amenities. Most of the respondents also reported that the road network within the area is constantly being upgraded.

4.6 Land Use Diversification and Household Wellbeing

The third objective for this study was to determine the effects of land use diversification on the wellbeing of the households in Kamulu, Nairobi County.

4.6.1 Land Use Diversification

The independent variable land use diversification was operationalized as an index. This was defined as any use that was put to the land owned by the household. The household heads were asked about their exposure to various land use practices within their area of residence. A list of land use activities was presented to the household heads and they were to acknowledge if they practiced any of the activities within Kamulu area. The land use activities included: kitchen gardening, farm crops, grazing livestock, mining of stones, construction, growing horticultural crops, and business premises. The number of the activities undertaken by each household varied from 1 to 6. The numbers of practices per household were added and the total number of practices per household

was created as an index. The number of households involved in each practice was obtained and a percentage from the total number of households determined. The data was then presented as shown in Table 4.12.

Table 4.12: Land Use Diversification Index for Kamulu Households

Number of Practices	Frequency	% of Households
1	62	16.4
2	176	46.4
3	78	20.6
4	31	8.2
5	22	5.8
6	10	2.6
Total	379	100

n=379

The results shown on Table 4.12, majority (83.6 %) of the inhabitants of Kamulu peri urban area have diversified their land use, undertaking above two land use practices. These practices include kitchen gardening, small scale farming, livestock grazing, zero grazed dairy animals, horticultural crops, poultry keeping, pig keeping, rental buildings among others. Most of the land use practices have to be done on the small pieces of plots due to land subdivision and the value of land. The study highlighted the average land size to be 1.89. This size of land cannot be used for cash crop farming or commercial agriculture.

4.6.2 Effects of land Use Diversification on Household Wellbeing

The third specific objective was to evaluate the influences of land use diversification on the wellbeing of the people of Kamulu area. From the six practices involved in land use diversification, the total number of practices for each household was obtained. The

total number of household engaged in each practice was obtained and an average number of practice per household obtained by dividing the cumulative total with six (which was the index for the land use practices). The index for the land use practices and that of household wellbeing were then utilized for further analysis to establish the relationship between the two variables. The result from the model summary for simple linear regression analysis is as shown in Table 4.13.

Table 4.13: Effect of Land Use Diversification on Household Wellbeing in Kamulu Area

R	R Square	Adjusted R Square	Std. Error of the Estimate
.699[a]	0.489	0.479	0.129

Land use diversification solely explains wellbeing at 48.9% (R^2 =0.489). This implies that land use diversification affects the wellbeing of the household heads in Kamulu by approximately 47 %. The F-test for the fit of the regression model was undertaken and the results are shown in Table 4.14.

Table 4.14: *F* Test for the Regression Testing the Fit of the Model

	Sum of Squares	***df***	**Mean Square**	***F***	***p***
Regression	158.379	1	158.379	37.404	.001[b]
Residual	1130.562	377	4.234		
Total	1288.941	378			

a. Dependent Variable: index of household wellbeing
b. Predictors: (Constant), land use diversification

The results for the F-test indicates that the overall regression model was significant (F (1, 377) =37.404, p <. 001). The regression coefficient of the model showing the *beta, t* statistics and the collinearity statistics is shown in Table 4.15

Table 4.15: Regression Coefficients for Land Use Diversification and Wellbeing

	Unstandardized Coefficients		Standardized Coefficients	t		Collinearity Statistics
Model	B	Std. Error	Beta		*p*	VIF
(Constant)	6.349	0.089		71.052	0.001	
Land use diversification	0.212	0.129	0.85	1.648	0.001	1.000

Land use diversification significantly affects the wellbeing of the household positively (β= 0.85, t=1.648, *p*= 0.01). This implies that the household in Kamulu area greatly dependent on land use diversification for their wellbeing. On the test for collinearity the variance inflation factor (VIF) obtained was 1.0 implying that there was no multicollinearity between land use diversification and the other independent variables making the regression model acceptable.

4.7 Combined Effect of Independent Variable on the Dependent Variable

The fourth specific objective set to determine the combined effect of the independent variables (land size, infrastructural development and land use diversification) on the dependent variable (household wellbeing) of the people of Kamulu area. Multiple linear regression was applied to get the general impact of the independent variables on the dependent variable.

The regression formula; $Y=\beta_0+ \beta_1X_1+ \beta_2X_2+ \beta_3X_3+\alpha$ was used in comparing variables. Where;

Y is the dependent variable (the well-being of the household heads), β_0 is the regression coefficient,

β_1, β_2, β_3 and β_4 are the slopes of the regression equation,

X_1 is average land size,

X_2 is infrastructural development,

$X_3$is peri-urban land use diversification

Table 4.16 gives a summary for the regression analysis.

Table 4.16: Regression Summary Results on the Relationship between the Independent Variable and the Dependent Variable

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.673	0.453	0.448	0.318

From the model summary it is noted that independent variables explain household wellbeing at 45.3%. This implies that the three variables together affected household wellbeing by approximately 45%. The F-test for the significance of the regression model was performed and the results are shown in Table 4.17.

Table 4.17: Statistical Significance of the Regression Model using the *F* Test

	Sum of Squares	***df***	**Mean Square**	***F***	***p***
Regression	1038.565	1	1038.565	1107.524	.001[b]
Residual	250.375	377	.938		
Total	1288.941	378			

a. Dependent Variable: index of youth participation in agribusiness
b. Predictors: (Constant), level of training

The results for the F- test indicates that the overall regression model was significant (F (1, 377) =1107.23, p <. 001). The regression coefficient of the model showing the *beta, t* statistics and the collinearity statistics is shown in Table 4.18.

Table 4.18: Regression coefficients results on the relationship between the independent variables and the dependent variable

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity statistics
	B	Std. Error	Beta	t	*p*	VIF
(Constant)	6.322	0.318		19.885	0.001	
Land use diversification	.775	0.448	0.865	4.732	0.001	1.000
Infrastructural Development	0.602	0.838	0.419	3.105	0.002	1.000
Reduced land size	0.211	0.221	0.080	0.957	0.340	1.000

The results of the regression analysis (Table 4.16) shows that Land use diversification significantly affects wellbeing at (β= 0.865, t=4.732, .*p*= 0.001) while infrastructural development is significantly affects wellbeing at (β= 0.419, t=3.105, *p*= 0.002). On the test for collinearity the variance inflation factor (VIF) obtained was 1.0 implying that there was no multicollinearity between the independent variables making the regression model acceptable.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the discussion of the study findings, drawn conclusions and recommendations made there to. The conclusions and recommendations drawn are focused on addressing the objectives of this study which were to explore effects of changing land use practices on the wellbeing of the peri-urban residents in Kamulu area. The independent variables that were observed included the reduced land sizes, infrastructural development and land use economy. The dependent variable was wellbeing of the residents.

5.2 Discussions

In this section of the thesis, the findings of the study are discussed based on the objectives of the study.

5.2.1 Characteristics of the Households in Kamulu

The characteristics of the households in Kamulu are discussed under the following sub-sections: sex of the respondents, household number, household income sources and land size.

Sex of respondents

The general image of the area signifies that a majority of the residents within Kamulu area are mature and married with more than a half of the owning houses. The willingness of the female respondents to come out and provide information on a topic that highlights their wellbeing goes in line with previous research that highlighted a higher likelihood of women participating in surveys more than men. It is also an

indication that women are ready to have a stake in issues which affect them and want to be heard on the same level as men (Curtin et al 2000; Moore & Tarnai, 2002).

Household number

A large number of the households have more than three members signifying that the respondents have dependents. This contributes directly to the large household sizes of more than 2 members. It can therefore be assumed that most of the inhabitants moving to the peri-urban area of Kamulu are "family people" who are married and are probably having children or other dependents within their households. This is in line with a survey conducted by the Bower Foundation (2016) which gave the average household size in peri urban areas as 4.4 persons per household.

Household income sources

A periurban area has the following characteristics; a relatively low population density by urban standards, scattered settlements, high dependence on transport for commuting, fragmented communities and lack of spatial governance (Kjell et al., 2012). Considering that a majority of the household heads were engaged in formal employment (60%) and the self-employed households, it implies that they all rely on good transport to commute to work area and therefore will prioritize proper transport as part of their wellbeing requirements.

These goes hand in hand with the previous analysis for the marital status and household sizes which confirms that a big percentage of the household heads are married, have dependents and are mature. The needs of such households will be totally different compared to that of a youthful population and will imply that their wellbeing may be pegged on completely different domains (Fernando, 2011)

Land size

In a study done in Bang Yai district- a periurban area neighbouring central Bangkok the area had a population surge causing the population to increase from 7104 in 1993 to 32,350 by 2011. During the same period the number of households in the area increased from 1443 to 17,189 (Tsuchiya, Hara & Thaitakoo, 2015). They further state that the increase in the number of households led to a significant drop in land sizes from about 3.7 acres per household to 0.3 acres per household over the same period. A similar characteristic has been exhibited with the current average land size of 1.89 acres per household in Kamulu area.

5.2.2 Subjective Wellbeing of the Households in Kamulu

In line with material provision like food, shelter, clothing, asset provision and labour or employment, the respondents felt like the changing land use practices has averagely aided the provision of the above items. Most of the respondents interviewed practiced subsistence farming within their households, something which greatly contributes to food provision. The house ownership status also assured the respondents of shelter and asset ownership (Mandere, Ness & Anderberg, 2010).

In line with the health, most of the respondents felt the changing land use practice has not reached average in aiding their access to health services or provision of health services. There was no major hospital noted in the locality with the researcher and the respondents affirmed the same. In the Key informant interview with the local chief for Drumvale area, he showed the researcher a structure that had been erected by the County Government. The structure was the proposed Kamulu Health Centre but had stalled since the Member of County Assembly was ousted in 2017 elections. He

confirmed that no changes have been done to see the completion and commissioning of the facility.

When it comes to effect of land use changes on safety, the respondents felt that it has fairly contributed on ensuring their safety Most of the respondents who owned houses felt at peace and relieved of rent payment. They stated to have no fear from constant rent dues. For the respondents living in rental houses, they found it to be cheaper compared to other residents closer to Nairobi or even the neighboring Utawala estate. In a focus group discussion by the Nyumba Kumi head and his secretary, they gave a history of the area having cases of burglary in the past (five to ten years ago). They felt this was mostly due to vast bare lands, poor roads within the area, lack of power connectivity and very limited number of persons who had settled with their households. This left them vulnerable to burglary. With the development in infrastructure, more households have settled in the area, the land sizes have reduced and the residents have formed "Nyumba Kumi" initiatives which have positively impacted on cohesion among the residents and improved the security within the area. There is a police post within the area and the area chief felt their response to any security issues was swift.

The respondents felt that the changing land use practices overwhelmingly improved how they related with their families and the community. This was evident from their active enrolment in the "Nyumba Kumi" initiative. The respondents who owned houses felt that the privacy that comes with house ownership improved the bonding within the household and generally made them satisfied. Those who lived in rental houses equally felt at peace as they felt the area was not crowded. According to a research conducted among eight peri urban villages in Kumasi-Ghana, a similar conclusion is drawn where

the residents felt a strong sense of belonging within their settlement area and that the community was generally conducive for their social growth (Simon and McGregor, 2012). In the focus group discussions with the "Nyumba Kumi" heads they pointed out that members used pooled security where they contribute and the money is pooled to pay the security agents who patrol the area at night. This further creates cohesion among the members as they have to periodically assemble to get feedback from the security agents. The respondents felt that from the cohesion, they can easily help out each other and get respect from the other members of the community. Most of the respondents felt that from their current status, they have achieved a lot in their life and were content of their current status. It was evident during the survey that the area had various churches and a mosque. The respondents affirmed the same highlighting that the areas of worship were now closer and that it motivated their spiritual fulfillment.

The respondents felt that the current changes in land use averagely assisted in control of their environment. On breaking down the factors, the respondents felt like the land use changes have very minimal impact on controlling the political situation around them. Most of the respondents who had bought land and settled had no knowledge of the current member of county assembly. The local chief however is greatly known due to the constant interaction with the residents during the "Nyumba Kumi" periodic meetings. The respondents felt that they had little control over the political decisions in the area. With the increased population in the area, livelihood diversification is being experienced within the area. There were various private and public primary schools in the area that were equipped and the most of the respondents had enrolled their dependents. There were two secondary schools that were affirmed by the area chief to

be operational. There was one tertiary institution "Panorama College" in the locality as well. All these institutions provide a path to access knowledge.

5.2.3 Effect of Reduced land size on the wellbeing of the households

The first objective of the study was to assess the effect of land size on the wellbeing of the residents in Kamulu area. The land units have been subdivided into plots in feet. Most of the residents purchase one or more depending on their availability of funds. Some of the residents acquired the land directly from the SACCO's that distributed the land among its members and other residents bought land from the members of the SACCO. In a study done in peri-urban Nyahururu with the objective of assessing the impact of the peri-urban development dynamics to household income the analysis showed a decline in full time farming households from 90% in the 1960s to 49% in 2009; an indication of the declining economic significance of agriculture (Mandere, Ness & Anderberg, 2010). Further the report states that the decline in significance of agriculture was mainly due to rapidly shrinking household agricultural land as well as low and fluctuating agricultural output prices which reduced the profitability from agricultural production. This caused a shift in households have adopting diverse non-farm activities whose earnings proved to be of varying importance to the annual household income. This could be a similar case for Kamulu area.

5.2.4 Effect of Infrastructural Development on the Wellbeing of the Households

The second objective of the study was to assess the effect of infrastructural development of the wellbeing of the residents within Kamulu. The residents overwhelmingly noted that infrastructure had improved over time. Ultimately as much as the infrastructure is improving the residents do not feel it impacting as much on their wellbeing. In an article written by Akrofi and Whittal (2015) while studying

infrastructural development in peri-urban parts of Ghana, they alluded to the fact that the peri-urban areas have very little or no infrastructure as no one is directly accountable for such developments. It is also evident that a basic amenity like good quality hospitals could not be easily accessed within the area and the respondents had to travel to Ruai the settlement next to the study area. (Mandere, Ness & Anderberg, 2010) in their research concluded that infrastructural developments coupled with emerging business enterprises enhanced the opportunities for household engagement in high income productive activities in peri-urban set up. They further state that most of these developments were limited to the financially constrained informal sector and hence could not provide sufficient high income opportunities to lift majority of the population from poverty. Therefore, the possibility for peri-urban development to accomplish a reduction in poverty for the households will not only depend on the infrastructural developments but also on the socio-economic opportunities that arise from the developments – which will be dependent on the developers involved and the government policy.

5.2.5 Effect of Land Use Diversification on the Wellbeing of the Households in Kamulu

The third objective of the study was to assess the effect of land use diversification on the wellbeing of the residents. The residents were generally happy with the state of land use within the area and even felt that the current land use practice was good for their household. Most respondents felt that the current land use practices had changed their lifestyle, income and was good for their household. In a study conducted in Kumasi-Ghana, (Kabila *et.al*, 2013) with the objective of determining peri-urban household responses to livelihood transformation, the study shows that most households rarely depend on one strategy to survive. However, non-farming households were noted to

have more diversified livelihood strategies than farming households. The social network support base was also identified to play a very important role in the livelihood of respondents and since farming still remains a very important component of livelihood strategies in those communities, it was recommended that the country's urban policy and land policy needed to be fully implemented. Moreover, interventions to provide alternative means of livelihood to farmers who have lost their farm lands due to urbanization was to be considered. The dependence of the households in Kamulu area to land use diversification exhibits that the residents have embraced varied forms of land use to improve their livelihood and ultimately wellbeing.

5.2.6 The Combined Effect of the Independent Variable on the Dependent Variable

The fourth specific objective set to determine the combined effect of the independent variables (land size, infrastructural development and land use diversification) on the dependent variable (household wellbeing) of the people of Kamulu area. Multiple linear regression was utilized and the model summary indicated that the three variables together explained wellbeing at significantly impacted household wellbeing of the residents and therefore the residents depend on land use diversification as well as infrastructural development for their wellbeing.

5.3 Conclusion

The main conclusions drawn from this research are:

(i) The reduced land size did not affect household wellbeing of the residents in Kamulu area. This can be linked to the fact that land use is changing and has moved from being extensively agricultural to other uses and therefore the value of land may be increasing even with its reduced size.

(ii) Infrastructural developments statistically affected the household wellbeing of the residents of Kamulu area the area is also experiencing an improvement in its infrastructure.

(iii) Land use diversification affected the household wellbeing of the residents of Kamulu area. Most of the residents in Kamulu area have diversified land use and are impressed with the land use in the area.

(iv) Land use diversification, infrastructural development and reduced land size when combined affected the household wellbeing of the residents.

5.4 Recommendations

Wellbeing of people gives a measure of how satisfied they are with life. This is an important index for policy makers. Since this research aimed to assess the effects of changing land use practices on the wellbeing of the peri-urban residents of Kamulu the conclusions have shown that there is still more to be done to actualize a figure higher than 6.2 on the scale of PWB index. The following recommendations therefore should be considered:

(i) To begin with the policy makers should explore other angles of infrastructural development like health facilities to improve on the household wellbeing of the residents. The policy makers need to diversify the development such that it cuts across all categories of infrastructure.

(ii) The land tenure system in the area is not well defined and therefore the researcher would recommend that proper land tenure systems be implemented such that residents have knowledge on the same. That way with the improving value of land they may know the advantage of leasing or selling and maybe even explore better ways of utilizing land.

(iii) The community within Kamulu area to uphold the diversification of land use. Financial support can be sought to explore on other means of livelihood diversification. Further, skills upgrading on other means of land use would come in handy with equipping the residents with alternatives and ultimate optimization of available land.

(iv) When all three variables were combined the effect of wellbeing was more significant. Therefore the researcher recommends that further research be done to explore other variables resulting from changing land use practices that may have an impact on the wellbeing of the residents

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APPENDICES

Appendix A: Questionnaire

Questionnaire Preamble (Introduction):

My name is Vivian Ochieng'. I am conducting a research to ***Assessment of the Effect of Changing Land Use Practices on the Wellbeing of Peri-Urban Inhabitants in Kamulu Town, Nairobi/Machakos County, Kenya*** The purpose of this research is to collect information on the changing land use practices on the wellbeing of peri-urban inhabitants in Kamulu area. You have been identified and selected for this study and I therefore request you to participate in this study by providing the information sought through this questionnaire. The information obtained is strictly for research purpose and shall be treated with utmost confidentiality.

Instructions

Please answer all questions appropriately and tick (X) in *all that apply*

Part 1: Personal Data

1. State your gender

   Male ( ) Female ( )

2. Marital status

   Single ( ) Married ( ), divorced/separated ( ) widowed ( )

3. What is the size of your household? How many members

   2 and below ( ) 3-5 ( ) 6-9 ( ) 10 and above ( )

4. Indicate your age bracket

   21 and below ( ) 22-29 ( ) 30-39 ( ) 40-49 ( ) 50-59 ( ) 60 and above ( )

5. Highest level of education attained

   Primary level of education ( ), secondary level of education ( )

   Middle level college ( ) Bachelors level of education ( )

   Post graduate level of education ( )

6. What is your main source of income?
   Formal employment ( ), Informal employment/casual labor ( )

   Self-employment /business ( )

   Any other, specify……

7. Residence (homestead):
   Ownership of house: _____ (own house/ rental house)

   Type of house:

   Material used: _____ (wooden, mud, stone)

   Number of rooms: _____

Part 2: Land Use Practices

8. Do you own any piece of land at your current residence? Yes ( ) No ( )

9. Tick against the following land use activities taking place within your area of residence

Land use practice	Yes	No
Subsistence cultivation/kitchen gardening		
Cash crop plantation		
Food crop plantation		
Livestock production		
Playing ground/ sports activities		
Construction of roads and other infrastructure		

10. Tick on the spaces representing your opinion on the following statements

Statement	True	Not true
There is proper land use in my area of residence		
There is changing land use in my area of residence		
There is increased infrastructural development on land within my area of residence		
Land owners always sell their pieces of land		
There is congestion in every unit piece of land		
There is high need to change from the current land use practices within my area		

Part 3: Impacts of Infrastructural Development on Land Use

11. Have you noticed any changes in the land use patterns within your area of residence?

    Yes ( ) No ( ) not sure ( )

12. Have you noticed any increasing trends in the infrastructural development in your area?

    Yes ( ) No ( ) not sure ( )

13. Give your honest opinion regarding the following questions

Statement	Very large extent	Large extent	No extent	Low extent	Very low extent
Development of infrastructure impacts on agricultural productivity					
Development of infrastructure improves the value of land					
Development of infrastructure destabilizes peaceful living					
Development of infrastructure denies people their daily source of income					
Development of infrastructure changes land use patterns					

Part 4: Land Use Economy and Wellbeing

14. Express your honest view by ticking on the following statements

Statement	True	Not true	Not sure
Changes in land use has brought about a positive change in my income			
Changes in land use has brought about a negative change in my income			
Changes in land use of good for my household			
Changes in land use is highly welcome among the people within my community			
Changes in land use has brought about changes in lifestyle			

Part 5: Subjective Wellbeing of the Residents of Kamulu

Have the Changes in land use assisted you in any of the following? If it has rate the assistance on a scale of 0 not assisted /contributed to 10 highly assisted / contributed.

Statement	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	Not Assisted/ Contributed										Highly Assisted/ Contributed
1. Improved your standard of living (Material Provision)-food, shelter, clothing, capital. assets											
2.Assisted in your health (Good Health)-provision and cost											
3.Made you to feel more safer (Safety)-absence of constant fear/ worry, peace of mind											
4.Improved your Social Relations-connection with community and family											
5.Assisted in your Spiritual Fulfilment- belief in God, attendance to worship											
6.Assisted you in Controlling the State of your Environment											
Ability to Control Political situations											
Ability to Acquire Services											
Ability to Acquire Resources											
Ability to Acquire Knowledge,											
Ability to Acquire Skills,											
Ability to Acquire Loans											
Ability to Acquire Information											
7. Assisted in your Emotions and Affiliations- social respect, fulfillment of social obligations											
8. Life achievement (what you are achieving in life)											

Appendix B: Focus Group Discussion Guide

1. What is your opinion on the changing patterns of land use in the peri-urban settings?

2. What are the advantages and disadvantages in the contemporary changes in land use patterns in your locality?

3. How does infrastructural development impact on the livelihood of the local population of your area?

4. What effects does the current wave of changes in land use patterns have on the livelihoods and wellbeing of the people?

5. Apart from infrastructural development, how else could the land be used within your area of residence?

6. How best can the county government strike a balance between infrastructural development and the peaceful daily living among the people?

Thank you.

Appendix C: Household Wellbeing of Kamulu Residents

	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Std. Error	Statistic
Food	0	10	5.96	.186	2.516
shelter	0	10	6.58	.198	2.681
Clothing	0	10	4.60	.201	2.725
Provision of Assets	0	10	5.38	.206	2.787
Capital	0	10	5.16	.209	2.821
Work(paid labour, employment	0	10	5.29	.205	2.769
Average material provision	**.00**	**10.00**	**5.495**	**.14248**	**1.92744**
Provision of health services	0	10	4.26	.211	2.851
Cost of health services	0	10	3.78	.216	2.918
Average health	**.00**	**10.00**	**4.02**	**.17478**	**2.36440**
Peace of Mind	0	10	6.68	.163	2.211
Absence of constant fear	0	10	6.81	.169	2.280
Absence of constant worry	0	10	6.91	.183	2.478
Average safety	**.00**	**10.00**	**6.798**	**.13616**	**1.84200**
Connection with other community members	0	10	7.47	.138	1.863
Good relations with family	0	10	7.54	.154	2.078
Good relations with community	0	10	7.43	.149	2.009
Social relations average	**.00**	**10.00**	**7.48**	**.12174**	**1.64693**
Belief in God	0	10	8.27	.158	2.144
Attendance to worship areas	0	10	8.77	.141	1.906
Average spiritual fulfilment	**.00**	**10.00**	**8.5191**	**.11548**	**1.56223**
Ability to control political situation	0	10	4.80	.203	2.745
Ability to acquire services	0	10	5.19	.177	2.395
Ability to acquire resources	0	10	5.63	.192	2.594
Ability to acquire knowledge	0	10	5.74	.161	2.177
Ability to acquire skills	0	10	5.49	.160	2.163
Ability to acquire loans	0	10	4.40	.202	2.728
Ability to acquire information	0	10	5.99	.187	2.535
Average control of environment	**.00**	**10.00**	**5.3201**	**.13200**	**1.78565**
Social respect	0	10	6.57	.157	2.129
Being part of the community	0	10	6.39	.154	2.083
Fulfill social obligation	0	10	6.37	.155	2.095
Listened to by others	0	10	6.13	.160	2.161
Help others	0	10	6.34	.142	1.914
Average emotions and affiliations	**.00**	**10.00**	**6.3585**	**.12724**	**1.72124**
Life achievement	**0**	**10**	**6.57**	**.151**	**2.044**
Well being	**.00**	**77.75**	**50.5583**	**.67453**	**9.12483**
Wellbeing index	**.00**	**9.72**	**6.3198**	**.08432**	**1.14060**

Appendix D: Photos from the Research Site

A school in Kamulu

A school in Kamulu

Roads in Kamulu

Condition of the roads in Kamulu

Residential plots in Kamulu, showing the brick fences and planted trees

A residential plot showing the kitchen garden and tree fence

A health centre under construction in Kamulu

An overgrazed plot

Appendix E: Letter from Africa Nazarene University

AFRICA NAZARENE
UNIVERSITY

19th June, 2018

RE: TO WHOM IT MAY CONCERN

Vivian Adhiambo Ochieng 16S01DMEV003 is a bonafide student at Africa Nazarene University. He/She has finished his/her course work and has defended his/her thesis proposal ***entitled "Assessment of the effect of the changing land use practices on the wellbeing of peri-urban inhabitants of Kamulu area Machakos kenya.***

Any assistance accorded to him/her to facilitate data collection and finish his/her thesis is highly welcomed.

Prof. Rodney Reed
Deputy Vice Chancellor, Academic Affairs

P.O Box 53067 - 00200 Nairobi, Kenya • Tel: 020 252 7170/1 - 5 • Fax: 020 201 2233 • Cell: 0733 874 111 • Email: registrar@anu.ac.ke • www.anu.ac.ke

Appendix F: Letter from NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471, 2241349,3310571,2219420
Fax:+254-20-318245,318249
Email: dg@nacosti.go.ke
Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/18/34069/23824** Date: **24th July, 2018**

Vivian Adhiambo Ochieng'
Africa Nazarene University
P.O. Box 53067-00200
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Assessment of the effects of the changing land use practices on the wellbeing of Peri-Urban inhabitants in Kamulu Town, Nairobi/Machakos County, Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Machakos and Nairobi Counties** for the period ending **25th July, 2019.**

You are advised to report to **the County Commissioners and the County Directors of Education, Machakos and Nairobi Counties** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Machakos County.

Appendix G: Permit from NACOSTI

THIS IS TO CERTIFY THAT:
MS. VIVIAN ADHIAMBO OCHIENG
of AFRICA NAZARENE UNIVERSITY,
0-800 Nairobi,has been permitted to
conduct research in *Machakos, Nairobi Counties*

on the topic: *ASSESSMENT OF THE EFFECTS OF THE CHANGING LAND USE PRACTICES ON THE WELLBEING OF PERI-URBAN INHABITANTS IN KAMULU TOWN, NAIROBI/MACHAKOS COUNTY, KENYA*

for the period ending:
25th July,2019

Permit No : NACOSTI/P/18/34069/23824
Date Of Issue : 30th July,2018
Fee Recieved :Ksh 1000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation