SOCIO-ECONOMIC EFF TS OF URBAN LIVESTOCK FARMING IN DAR ES SALAAM CITY, TANZANIA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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ABSTRACT

This study was conducted in the Dar es Salaam city aimed at assessing the socio-economic effects of urban livestock farming in Tanzania. The specific objectives of the study were: (i) to determine the effect of urban livestock farming on household income and income distribution (ii) to determine the effect of urban livestock farming on employment and (iii) to determine the effect of urban livestock farming on food security and nutrition at household level. With and without research design was employed to determine the socio-economic effects of urban livestock farming. A structured questionnaire was used to collect data from 100 livestock keeping and 100 non livestock keeping households. The data were processed and analyzed using SPSS and Stata. The study finds income of livestock keepers to be significantly ($P<0.05$) higher than that of non livestock keepers. Concentration coefficient score indicates that the income from urban livestock farming affect negatively the income distribution. Livestock keepers were found to create significantly ($P<0.05$) more jobs than non livestock keepers. Diet was found to be significantly more diversified among livestock keepers than non livestock keepers. The livestock keepers were found to be significantly ($P<0.05$) able to feed themselves from their own resources than non livestock keepers. It is upon this conclusion that all null hypotheses that urban livestock farming has an inequality decreasing effect, urban livestock farming has no significant effect on food security and nutrition at the household level and urban livestock farming has no significant effect on employment creation have been rejected. To improve socio-economic situation of urban population through urban livestock farming the study recommends improvement in access to capital, review of urban livestock policies and by-laws, integrating livestock farming in urban land use

planning, reducing cost of livestock farming and enforcement of laws and regulations governing provision of public veterinary services.

DECLARATION

I, Isack Malipa do hereby declare to the Senate of Sokoine University of Agriculture, that this dissertation is my own original work done in the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

Isack Malipa 22-4-2013

(MSc Candidate) **Date**

The above declaration is confirmed by:

Prof. Ntengua Mdoe 22.04.2013

(Supervisor) **Date**

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DEDICATION

I dedicate this work to my late father Luwoneko Malipa and all teachers who have been teaching me since I started my primary school education.

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LIST OF ABBREVIATIONS AND ACRONYM

AU-IBAR	African Union Inter-African Bureau for Animal Resources
°C	Degree Celsius
CEPS	Centre for Education, Population and Social-economics
CREPA	Chinese Real Estate Professionals Association
CTA	Centre Technique de Cooperation Agricole et Rurole
DG INFSO	Directorate General Information Society and Media
FAO	Food and Agricultural Organization
Fig	Figure
GSDRC	Governance and Social Development Resource Centre
Ha	Hectare
HDDS	Household Dietary Diversity Score
Hrs	Hours
ICT	Information and Communication Technology
ILRI	International Livestock Research Institute
INSTEAD	International Networks for Studies in Technology, Environment and Alternative Development
MIT	Massachusetts Institute of Technology
MSc	Master of Science
PhD	Doctor of Philosophy Degree
RUAF	Resource Centers on Urban Agriculture and Food Security
SPSS	Statistical Package for Social Science

Tsh	Tanzanian Shillings
TV	Television
UA	Urban Agriculture
UK	United Kingdom
UNDP	United Nations Development Program
UPA	Urban and Peri-urban Agriculture
USA	United State of America
WEDC	Water, Engineering and development Center
χ^2	Chi square

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Urban Agriculture (UA) is a global phenomenon that involves the raising of livestock (cattle, chickens, goats, and pigs) and growing crops (vegetable, field crops, fruit trees, ornamental trees and food crop). In some urban areas it also involves the raising of bees and fish (Axumite, 1994). In Tanzania, UA mainly involves the rearing of animals (dairy cattle, chicken, goats and pigs) and the growing of vegetable and field crops (maize, cassava, legumes and plantains) in urban areas.

UA is practiced in varying degrees both in developed and developing countries. Study by the United Nations Development Programme (UNDP) (RUAF, 2007) indicates that 800 million urban residents worldwide are engaged in UA and this number is likely to increase in the near future. In Tanzania, UA has expanded enormously over the past two decades particularly as a coping strategy during economic crises (Mlozi, 1996; Stevenson *et al.,* 1994). Food security is reported as the main motivation for engaging in UA and for some is adopted as a survival strategy (Sawio, 1993). For wealthier households, UA is an economic imperative and most of them sell their produce for the primary reason of subsidizing their incomes (Mlozi, 1996). Due to the big role it plays, UA is now becoming a systematic focus of research and development in developing countries (Sharp and Smith, 2003).

This study is concerned with urban livestock farming in Tanzania and its socio-economic effects. As pointed out earlier, raising of livestock such as crossbred dairy cattle, layers and broiler chicken, local fowls, ducks, pigs, and goats as part of UA has been expanding in towns and cities in Tanzania (Mlozi *et al.*, 2005). The study was carried out in Dar es Salaam city. Dar es Salaam is one of the major urban centers in Tanzania where livestock farming has been expanding due to different reasons (Fuller, 2003).

1.2 Problem Statement and Justification

UA is seen as an important economic undertaking for many urban dwellers in developing countries and has expanded enormously in these countries over the past two decades (Mlozi, 1996; Stevenson *et al.*, 1994). Recognizing its importance, UA is now becoming a systematic focus of research and development in developing countries (Sharp and Smith, 2003; van Veenhuizen *et al.*, 2001; Omara, 1992). Nonetheless two different views concerning the development of UA still dominate the public debate. On one hand, there is the viewpoint that the positive effects of UA outweigh its negative effects (Landers, 2007; Kutiwa *et al.*, 2010; Pallana and McClintock, 2011). On the other hand, there is the view that the negative effects associated with expansion of UA outweigh its positive effects (Amerasinghe *et al.*, 2000). This study supports the first view but with a qualification that the perceived positive effects will be greater than the perceived negative effects if UA is properly planned and established by-laws and regulations are enforced. Although UA is seen as an important economic undertaking for many urban dwellers in Tanzania (Jacobi and Amend, 1997; Tesha, 1996) there is a paucity of information on whether the

positive effects of UA are greater than the negative effects or negative effects are greater than positive effects even if it is properly planned. This study was undertaken as an attempt to address this gap based on evidence from a case study of livestock farming in the Dar es Salaam city. Besides contributing to filling the existing research gap, the findings of the study would be used to convince urban planners to consider UA as one of the formal income generating activities in their review of urban plans. Also the findings would inform policy makers in the process of formulating appropriate policies and strategies to develop UA and urban livestock farming in particular.

1.3 Conceptual Framework

Fig. 1 is a conceptual framework of the study. Urban livestock farming as part of UA has positive and negative effects to the people living in urban areas. Positive effects include employment creation and food security and income generation through consumption and sale of livestock products while negative effects include environmental pollution, destruction of infrastructure, traffic hazards and misunderstanding between neighbours. This study only measured the positive effects of urban livestock farming in terms of income and income distribution, food security and nutrition and employment.

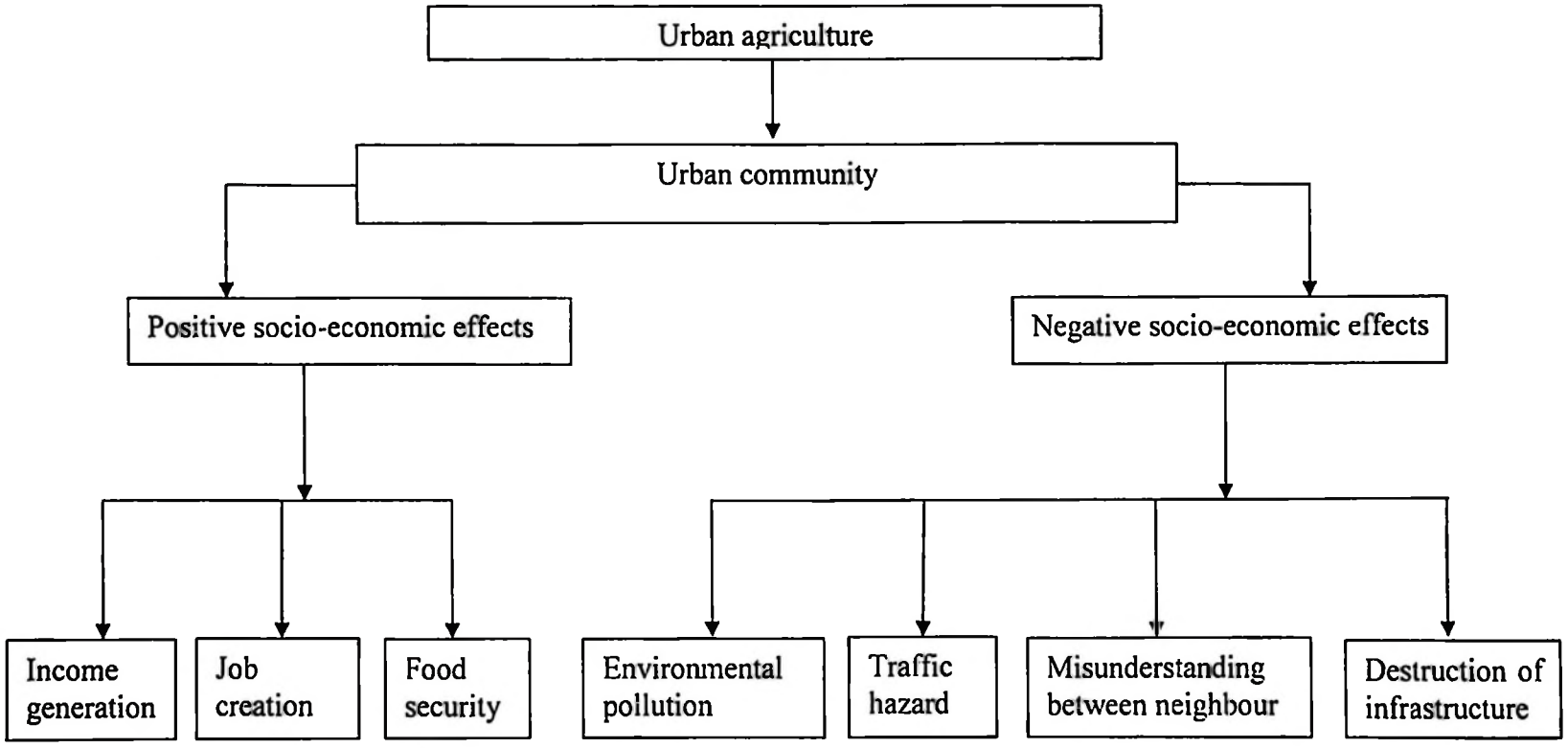

Figure 1: Conceptual framework for the study

1.4 Objectives of the Study

1.4.1 General objective

The general objective of the study was to analyze the socio-economic effects of urban livestock farming in Dar es Salaam city.

1.4.2 Specific objectives

i. To determine the effect of urban livestock farming on household income and income distribution.

ii. To determine the effect of urban livestock farming on employment.

iii. To determine the effect of urban livestock farming on household food security and nutrition at household level.

1.5 Hypotheses

i. H_0: Urban livestock farming has no significant effect on household income and income distribution.

H_1 Urban livestock farming has a significant effect on household income and income distribution.

ii. H_0: Urban livestock farming has no significant effect on food security and nutrition at household level.

H_1: Urban livestock farming has a significant effect on food security and nutrition at household level.

iii. H_0: Urban livestock farming has no significant effect on employment creation.

H_1: Urban livestock farming has a significant effect on employment creation.

1.6 Organization of the Dissertation

The dissertation is organized into five chapters including this first chapter which presents the background to the study, problem statement, conceptual framework, objectives of the study and hypotheses. The second chapter reviews literature relevant to the study. The chapter begins with a definition of urban farming. It then reviews previous studies on UA and urban livestock farming in particular. The chapter ends up with a review of approaches and methodologies of measuring effect. Chapter three describes the methodology of the study. It describes the study area, research design, sampling procedures, data collection and methods of data analysis. Chapter four presents and discusses findings of the study. The chapter begins with presentation and discussion of socio-economic characteristics of sampled households. It then presents and discusses the results of the analyses on the effect of urban livestock farming on household income, income distribution, employment, food security and nutrition at household level. The study ends up with Chapter five which presents the conclusions and recommendations emanating from the major findings of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Urban Agriculture

Urban agriculture refers to any agricultural related activities, which include production, processing and marketing of agricultural produces occurring in built-up "intra-urban" areas of cities and towns (Thornton, 2008). Mlozi *et al.* (2005) defined UA as the keeping of animals such as dairy cattle, poultry, pigs and goats, and growing of vegetables and field crops in areas designated as urban by the United Republic of Tanzania under the town and country planning ordinance. According to Thornton (2008) UA is not restricted to food crops since it includes animal husbandry, aquaculture, agro-forestry and horticulture. Sawio (1998) defined UA as socio-economic activity that involves growing of crops and livestock keeping in intra-urban open space and peri-urban areas. Smit *et al.* (1996) defined UA as an activity that produces, processes and markets food and other products, on land and water in urban and peri-urban areas, applying intensive production methods, and using natural resources and urban wastes, to yield a diversity of crops and livestock. This study adopted the definition by (Mlozi *et al.*, 2005) which is relevant to town and country planning ordinance of Tanzania where the study has been conducted.

2.2 Previous Studies on Urban Agriculture

UA as one of the common undertaking in many urban areas has become an interesting area for research. Many researches concerning UA have been done all over the world. In Tanzania number of studies concerning UA has been conducted. Some of these studies look on the potentiality of UA on addressing urban poverty. A

study on the Potential of UA for poverty reduction in Dar es Salaam by Hawassi *et al.* (2008) found that vegetable production increases income, food security and improve access and affordability of health and education service among vegetable producers. The study concludes that vegetable production has significant contribution on urban livelihood hence it has huge potential for poverty reduction.

Other research studies looked at the policy environment of UA e.g. Study by Foeken (2005) studied UA as a tool for poverty reduction and looked at legal and policy dilemma. It was found that the UA is a common economic activity having no legal status at least in built up areas. Registrations, policy and practice show that there are many contradictions at and within various levels of decision making. The study also found out that there was awareness to control and where possible to promote UA especially among the poor rather than restricting or overforbiding it but laws seem to be restrictive. Study suggests urban authority to allow UA to be used as tools for poverty reduction and create an environment for it not by words but through supportive laws.

De Zew *et al.* (2000) proposed that UA should be incorporated into the urban planning. There is doubt that urban planners do not want to see UA incorporated in urban planning since it compete with high paying sector like industry and trade. The study suggests the integration of UA to urban food security and support in term of research together with integrating it with environmental policy in order to promote ecological farming method.

Other studies looked upon legal and policy aspects of UA in Tanzania and found that urban farming is somewhat confusing for the urban farmers. The government pursues favorable policies and even tried to encourage people to do urban farming during a period of severe economic recession but by-laws at local level pose many restrictions. It is not clear to urban dwellers whether farming in urban areas is allowed or not (Mlozi, 2003). Mlozi *et al.* (2004) in their study "UA in Tanzania: Issue of sustainability" looked at the sustainability of UA and concluded that UA has significant effects on income generation, employment creation and food supply in urban areas. It suggests UA to be enabled by supportive legal and policy environment, where ''do'' and ''do not'' of UA should be clear to urban dwellers. In order to ensure its sustainability, UA should also not disturb the environmental balance which requires the awareness of urban farmers on environmental health and agronomic practices which are environmentally friendly.

There are also several studies on UA which focused on urban livestock farming in Tanzania and elsewhere in developing countries. A study by Mbarubukeye and Nyiransengimana (2005) "Peri- urban livestock production in Rwanda" conducted in Kigali to determine the extent of livestock production, marketing channels and constraints of production found that livestock production was carried out by individual farmers, families, and government officials who raise poultry, cattle, pigs, goats and rabbits. The main sources of feed for these animals were fodder, natural and artificial pastures, concentrates fortified with mineral supplements and vitamins. Farmers were selling produce directly to consumers or through middlemen. The

major constraint was limited land due to its competition with infrastructure development.

Pallana and McClintock (2011) studied urban livestock farming in Oakland and examined issues of ownership and management practices. The study found that urban livestock farming spreads rapidly across the country and city officials were attempting to amend outdated municipal codes to reflect this growing trend. In many cities, planners are updating zoning codes to reflect changing land uses and activities, including the production and sale of agricultural products and the keeping of urban livestock such as chickens, geese, ducks, goats, pigs, rabbits, and bees. The study also found that ordinance allowing urban livestock farming have neither led to an increased burden on city services, nor an increase in the volume of complaints. Nevertheless, some basic questions remain about the actual practices of urban dwellers keeping livestock as pets and/or sources of food.

A study conducted by Pushpa (2006) in Ethiopia found that the urban livestock production system contributed to overall development including income and employment generation, poverty alleviation, and improving human nutrition and health. Pushpa (2006) characterized the urban livestock farming to have poor waste disposal system and sanitation facilities and poor planning and management, lack of knowledge, lack of credit services and absence of development policy, poor research-extension services, shortage of trained manpower and training institutions. Farmers were constrained by lack of access to appropriate technologies, shortage of inputs, poor processing and handling of products and absence or lack of organized

producers' marketing cooperatives. In order to promote and develop the livestock sector in the country, the study proposed that the Federal Democratic Republic of Ethiopia has to recognize the need for organizing the marketing of the livestock products with the objectives of promoting the domestic and export market of animals, animal products and by-products through increasing the supply and improving quality.

A study by Pica-Ciamarra *et al.* (2011) identified market opportunities for livestock producers and provides policy makers with the information needed to design and implement policies that facilitate access to markets for livestock producers. Market and institutional imperfections along the supply chain prevent perfect vertical and spatial price transmission and prevent farmers and market actors from getting access to information, identifying business opportunities and allocating their resources efficiently. This acts as a barrier to market-led development and poverty reduction. This study viewed linking farmers to markets as a milestone towards promoting economic growth and poverty reduction.

A study by Guendel (2002) revealed that urban livestock keeping in East Africa benefits the poor and provides a way of diversifying livelihoods activities that are accessible to vulnerable groups. It also provides a source of locally produced food products for people living in the vicinity of the livestock keepers. However, there are various externalities like zoonoses, environmental contamination, and product safety which required to be addressed.

Msuya (2008) found that cost of keeping livestock in Kinondoni Municipality was higher for layers than other enterprise. The income obtained from broiler was the same as income obtained from dairy while income obtained from layers was lower. Education was found to be significant in influencing income. Cattle were contributing to environmental degradation than other livestock enterprises.

Urassa and Raphael (2006) found that average milk yield for the interviewed small scale dairy farmers in Morogoro Municipality ranged between 6-10 litres per cow per day. Average milk production per farmer per day was 22 litres whereas the average daily income earned by the respondents was 3950 Tsh. According to Urassa and Raphael (2006) the major constraints experienced by the respondents in this study were lack of land and high costs of supplementary feeds. Other constraints included, diseases, lack of adequate capital, and theft of animals, milk market and death of animals. The study observed that income from the dairy enterprise was used to meet costs of various items including; buying food, paying for health services, school fees, purchase of new assets, paying bills for water and electricity and building houses. The study concludes that small-scale dairy farming has a potential of improving the welfare of households.

Based on reviewed literature the socio-economic effects of urban livestock are yet covered. Little is known on how urban livestock keeping as one of common undertaking in urban areas impacted socio-economic status of urban population. This study conducted in response of this knowledge gap by analysing the socio-economic

effects of urban livestock farming with reference to urban livestock keepers in Kinondoni Municipality in the Dar es Salaam city.

2.3 Approaches for Measuring Impact

The primary aim of an impact evaluation is to measure whether a particular programme has achieved its desired outcomes. The two major approaches for assessing effect are with and without and before and after design. In with and without outcomes are measured by the programme in place and compared with outcomes without the programme (Purdon *et al.*, 2001).

Different methods that have been proposed for estimating the counterfactual compared a group of people involved with the programme which we term the 'intervention' or 'treatment' group with a group of people who are not involved 'control' group. The counterfactual is then estimated as the outcomes for this control group.

The intervention group will usually be everyone who is eligible to be involved in the program (eligible population), or a sub-sample of the eligible population, for instance people who are actually participating in the program while control group should be people who are, on average, identical to the people in the intervention group, with the single exception that they are not involved in the program. Much of the discussion about the relative merits of different evaluation methods centered on the extent to which the control group can be said to truly mirror the intervention group in all areas apart from the programme intervention (Christel *et al.*, 2011).

On the other hand, before and after measurements can be incorporated into most evaluation designs. What is referred as a 'before and after study' is just one particular instance of their use. In a standard before and after study, outcomes are measured on the population eligible for a programme both before and after the programme are implemented. Difference between before and after measurements is taken to be the effect of the policy. Before or baseline measurements act as the control measurements.

Typical outcomes are measured at just one point in time before programme implementation and at one point in time after implementation. But this basic design is considerably strengthened if the number of measurement occasions is increased both before and after. Before and after studies are primarily used in instances where a policy is to be implemented nationally without a pilot stage. Although before and after design is a relatively powerful approach, the strong data requirements mean that it is usually only possible to use administrative data or other standard datasets (such as large repeated government surveys). This limits the outcome variables that can be used (Purdon *et al.*, 2001).

Unit of Information and Communication Technology (ICT) for health in the European Union 2008 estimated the effect of eHealth using both before and after and with and without designs. In situations where data were available the effect of eHealth was estimated by comparing the situation before the introduction of eHealth and situation after eHealth. With and without approach was used in situations where baseline data were not available. With and without approach was also used to assess

the impact of eHealth support by taking total value of health services provided with the support of such systems less the total value of health services provided without this kind of support.

Value added from eHealth = Value of health services with eHealth – Value of health services without eHealth (Dobrev *et al.*, 2008).

A study by Kuscu (2011) also adopted the before and after research design in evaluating performance of management in a great menders basin in Turkey. In this study the performance of irrigation scheme management and water user association were measured before and after the turnover. Weighted average mark was used to assess the performance of irrigation scheme in term of physical economical and institutional indicators. The difference in weighted average mark before turnover and after turnover was taken as effect of irrigation management.

In the study area there were no baseline survey conducted to assess the socio-economic conditions of livestock keepers before they have started keeping livestock. The data from studied population were collected once. The above reasons necessitate adoption of with and without research design where livestock keepers were treated as group with intervention/treatment and non livestock keepers were treated as group without intervention/treatment.

Impact evaluation can be done qualitatively or quantitatively depending on the kind of data collected and kind or nature of the study conducted. In a quantitative study the data in the form of numbers are collected while in qualitative research the data

collected are in the form of text. The quantitative research that uses quantifiable data can use econometric and statistical models in measuring, aggregating, modeling and predicting behavior and relationship (Hentschel, 1999). Qualitative research brings important additional commitment to respect local knowledge and facilitate local ownership and control of data generation and analysis (Chamber, 2003). Seo and Mendelsohn (2006) used econometric model to measure impact of climate change on agriculture production where the spacial auto regression parameter was used. Kondratjeva (2010) also conducted a qualitative impact assessment of Mozambique cash transfer pilot program to see impact of cash transfer program to poor people.

Other studies adopted qualitative approach in assessing impact; such studies are like study by (Town, 2008). In this study the assessment of water and sanitation project was done to assess its institutional, social, environmental, economic and technical impact. Most of data used in this study were qualitative, quantitative data were used to reinforce qualitative data findings. Williams *et al.* (2001) also conducted qualitative impact assessment to assess the impact of school library resource centre on secondary school learning. The study found leaning was taking place in the context of the school library setting and the quality of learning was affected by number of conditional factor one of which being discussion and interaction with others.

Both quantitative and qualitative methods have weakness hence it is good if the combination of the two is used in assessing impact. By combining the two methods it is important to be aware of the comparative advantage of each method. While

quantitative methods provide data that can be aggregated, analyzed, describing and providing relationships, qualitative research helps to explain the relationship and its contextual differences in the quality of those relationships (Holland and Sabine, 2009).

This study adopted both qualitative and quantitative approach in assessing socio-economic impact of urban livestock farming as suggested by Town (2008) that better impact assessment should rely on both qualitative and quantitative method.

2.4 Effects of Livestock Farming on Income and Income Distribution

UA provides the highest self-employment earnings in small-scale enterprises as it was observed to be the third highest earning enterprise in urban Kenya (House *et al.*, 1993). Those engaging in UA sometimes earn more than the average income of the whole population. For example vegetable farming in Accra was estimated to yield a monthly income per farm, which was well above the per capita net income in Ghana (Cofie *et al.*, 2003). In areas like Lomé the mean monthly income of a market gardener was found to be equal to ten salaries of a senior public servant (Abutiate, 1995). Despite the recognition of the effects of UA on income generation, the pattern of income distribution has been an area of interest to many economists.

Income distribution in a given population can be measured by using inequality indices and there are various inequality indices that can be employed to assess the effect of certain activities on income distribution. According to Shorrocks (1980) the desirable indices should satisfy four basic properties: (i) anonymity – the index is unaffected by who earns the income but is based on the distribution of income

among all individuals. (ii) Income homogeneity or mean independence – the index remains the same if all individual incomes are changed by the same proportion. (iii) Population independence – the index remains the same if the number of recipients at each income level is changed by the same proportion and (iv) the Pigou-Dalton principle – a transfer from a richer to a poorer people that does not reverse their relative income ranks reduces the value of the index.

Income inequality indices can be decomposed for arithmetic and analytical reasons (Litchfield, 1999). Decomposing inequality by source of income is very helpful because it informs the effect of change in household labour force participation in each activity that can be made for income distribution (Fourinier, 1999). Gini coefficient and concentration coefficient are popular measures of inequality by themselves. Concentration coefficients are often used to measure related inequalities in other socially important variables (Van Doorslaer *et al.,* 1997). Both measures are used as building blocks for a number of related applications like decomposition of income inequality by sources, measurement of tax progressively and horizontal equity, measurement of income mobility and pro-poorness growth and measurement of income polarization (Van, 2009).

This study adopted gini coefficient, Lorenz curve and concentration coefficient in assessing inequality. Xiaoli (2011) suggested that inequality measure should be "invariance in scale or time" and "decomposable". Gini coefficient and concentration coefficient gather some or all of these desirable characteristics. Since Gini

coefficient may represent different income distribution, Xiaoli (2011) suggested that it should be combined with Lorenz curve.

2.5 Urban Agriculture, Food Security and Nutrition at Household Level

Food security exists when all people at all time has access to sufficient, safe, nutritious food to maintain a healthy and active life. It includes both physical and economic access to food that meets people dietary needs as well as their preference. This definition consists of three pillars: availability (sufficient quantities of food available on a consistent basis), access (having sufficient resources to obtain appropriate foods for nutritious diet) and utilization (appropriate use based on knowledge of basic nutrition and care) as well as adequate water and sanitation (Smit *et al.*, 1996).

Food production in the city is often a response of the urban poor to inadequate, unreliable and irregular access to food and lack of purchasing power. In urban settings, lack of income translates more directly into lack of food than in rural settings. Costs of supplying and distributing food from rural areas to the urban areas, or to import food in the cities, are rising continuously, and distribution within the cities is uneven. As a consequence, urban food insecurity will increase (Argenti, 2000). In response to this urban population is compelled to engage in agriculture.

UA contributes to food security both qualitatively and quantitatively. Quantitatively UA provides food to urban farmers in addition to what they can purchase from rural areas (Sawio, 1993). In Dar es Salaam, more than 90% of leafy vegetables come

from the open spaces and home gardens (Stevenson *et al.*, 1996), while 60% of the milk is produced in urban and peri-urban areas (Kurwijila, 1995). Qualitatively food security at household level is mainly determined by the access of various food groups. It provides urban population with fresh fruit and vegetables together with fresh milk, eggs and meat which are an important contribution to a healthy diet, particularly in households with children (Mlozi *et al.*, 2004). Under such conditions direct access to food may allow households to consume greater amounts of food and a more diversified diet richer in valuable micronutrients. The effect of UA on food security can be computed as the amount of food produced by a household as compared to total household food demand or the income a household raises for food consumption as compared to amount required to ensure the requirement of that household.

Food security can measured by estimating the amount of income the family saves for food consumption compared to what it needs as used by Garrett (2000). He used this approach since urban dwellers must buy most of their food hence urban food security depends mostly on whether the household has adequate effective purchasing power given the prevailing prices and incomes. Ruel (2006) uses Household Dietary Diversity Score (HDDS) tool to understand if and how diets are diversified within the given population. Dietary diversity is often used as a food security proxy in nutrition surveys, and has been generally found to be closely correlated to both caloric adequacy (the amount of kilocalories consumed) and anthropometric outcomes. Maxwell (1998) investigated the link between UA and food security in a multivariate framework, using child nutritional status as the dependent variable. In fact dietary diversity is the product of the food access, availability, and stability

dimensions, but does not reflect the dimension concerning the utilization of food, its preparation, and care and sanitation practices that are instead subsumed in anthropometric indicators. Despite this weakness this study adopted the approach by Ruel (2006) since it has a cross correlation with the relationship of the variables under study.

2.6 Urban Agriculture and Employment Creation

UA creates self-employment especially for the urban poor lacking access to other jobs and it acts as a complementary source of income to low and middle income households. Many urban dwellers have engaged in UA as their full time job as observed that about 1000 farmers in Accra were engaged in vegetable production as their full time job. UA provides employment not only to farmers but also to people who are involved to the chains in UA produces e.g. In Accra 20000 people were estimated to be involved in the processing, marketing and distribution of UA products (Cofie *et al.*, 2003). UA is a big employer in some areas of Tanzania. In Dar es Salaam, UA was found to be the second largest employer where it employed 20% of employed people towards the end of 1990's (Sawio, 1998).

2.7 Urban Agriculture, Health, Environmental and Welfare Issues

Gundel (2002) pointed out that most urban farmers are unaware of public health/concern associated with livestock keeping in confined area and close to human being. There is a paucity of information concerning health hazards caused by livestock. Many of urban livestock keepers are only aware of the flies and strong odor as a nuisance. Zoonotic diseases have been reported as one of health hazards

caused by livestock farming. Diseases like anthrax, brucellosis, cysticercoids and trichinosis which are transmitted from animals to human beings are mainly caused by inappropriate management practices for urban pig farming (Santadreu *et al.*, 2000). Human being can be infected by consuming leafy vegetables or water with pathogens due to the use of poultry manure which is not stored long enough (Drenchsel *et al.*, 2000).

Lack of control measure has been cited as one of the potential dangers hence most of livestock products produced in urban areas are channeled through informal channels or consumed directly by the household. These expose people who use these products to high risk of being infected by diseases (Gundel, 2002). It has been a common practice for livestock keepers to dump animal waste in rivers and dams (Ossiya *et al.*, 2000). This poor waste disposal of UA affects public health and the environment by contaminating water sources.

Scarcity of land in urban areas has affected animal welfare since animals are crowding into small space and inadequate housing. Also animals are exposed to dampness heat and injuries. For example old harness donkey transportation business in Nairobi which are uncovered by the city chaos. Most of the farmers do not afford to buy drugs and pay for veterinary services, this together with the consumption of contaminated drinking water lead to poor animal health and numerous deaths of livestock (Ishani *et al.*, 2002).

Because of difficulties in getting water for irrigation, urban farmers mostly use a typical urban resource like water from streams and drains and for this matter they expose urban farming to pollutions. In Tanzania though this water is not highly affected by heavy metals due to low industrialization, it is highly contaminated with fecal matters (Cofie, 2005). Problems that may associate with the use of human waste in agriculture are inching and swollen of feet, ground water pollution and salinisation (Cofie, 2005). In addition UA can support breeding sites for malaria vector through irrigated farming (Afrane *et al.*, 2002).

CHAPTER THREE

METHODOLOGY

3.1 The Study Area

The study was conducted in the Kinondoni Municipality in Dar es Salaam City (Fig. 2). Dar es Salaam is located between latitudes 6.36 degrees and 7.0 degrees to the south of Equator and longitudes 39.0 and 33.33 to the east of Greenwich. It is bounded by the Indian Ocean on the east and by the Coast Region on the west, south and north sides. The total surface area of Dar es Salaam City is 1800 square kilometers, comprising of 1393 square kilometers of land mass with eight offshore islands, which is about 0.19 percent of the entire Tanzania Mainland's area. Temeke Municipality has the largest land surface area followed by Kinondoni while Ilala has the smallest area.

Dar es Salaam City has a total land mass area of 1393 square Kilometers comprising of 210, 652 and 531 square Kilometers for Ilala, Temeke and Kinondoni municipalities respectively. About 110 850 ha of land in Dar es Salaam comprise of 52 000 ha in Kinondoni; 45 000 ha in Temeke and 13 850 ha in Ilala are potential for agriculture especially crop production. The figure may be low due to rapid expansion of urban related activities. Land under use for both cash and food crops is estimated at 58 278 ha or 52.03% (13 600 ha in Kinondoni, Temeke 33 000 ha, 11 678 ha in Ilala). Food crops are mainly cassava, sorghum, maize, rice, sweet potatoes, bananas, legumes etc. Cash crops include cashew nut, coconuts, oranges, pineapples, mangoes and vegetables

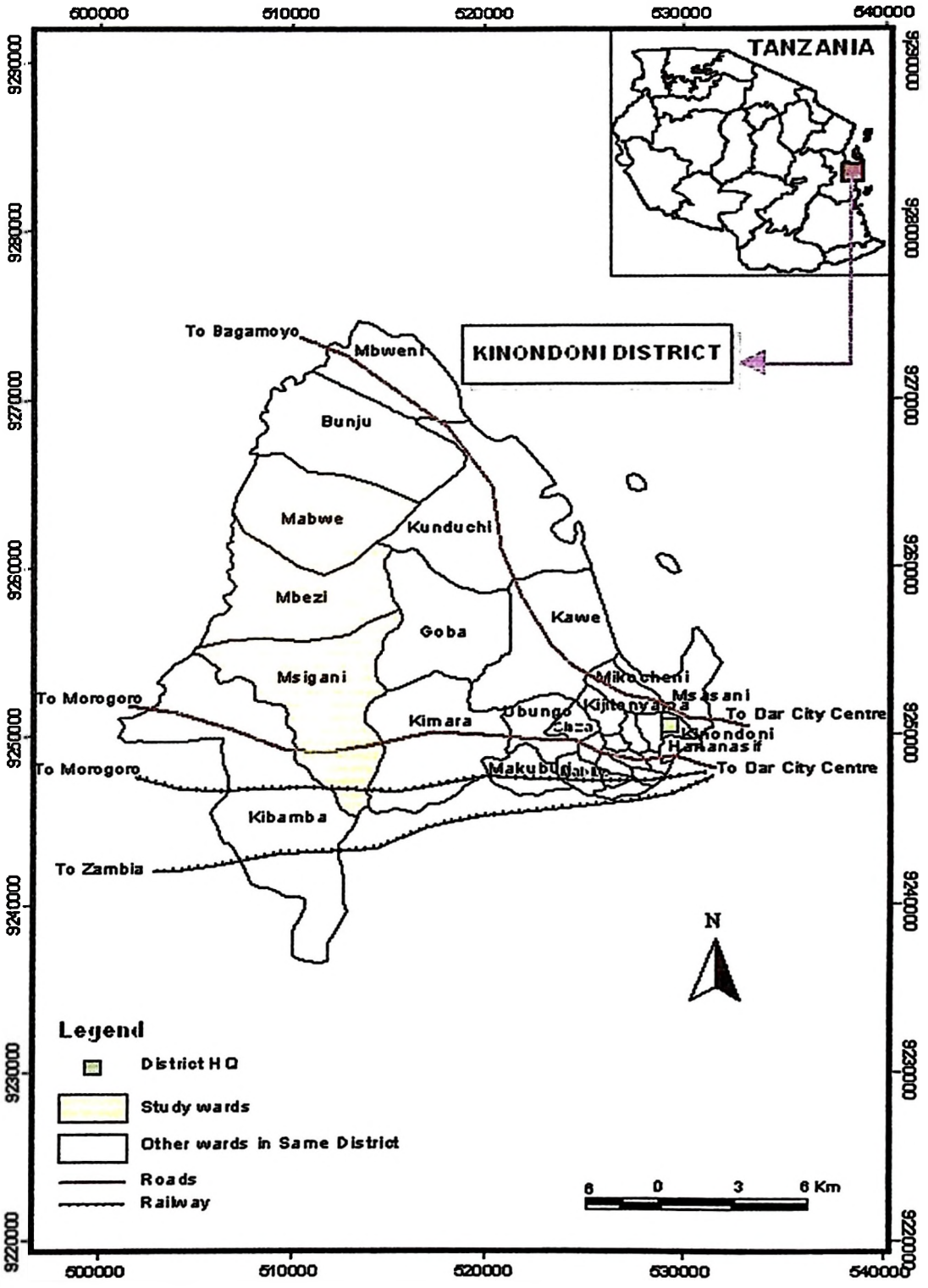

Figure 2: Map of Kinondoni Municipality

Dar es Salaam experiences a modified type of equatorial climate. It is generally hot and humid throughout the year with an average temperature of 29°C. The hottest season is from October to March during which temperatures can raise up to 35°C. It is relatively cool between May and August, with temperature of around 25°C.

There are two main rainy seasons; a short rain season from October to December and a long rain season between March and May. The average rainfall is 1000mm (lowest 800mm and highest 1300mm). Humidity is around 96% in the mornings and 67% in the afternoons. The climate is also influenced by the southwesterly monsoon winds from April to October and northwesterly monsoon winds between November and March.

The City is divided into three ecological zones, namely the upland zone comprising the hilly areas to the west and north of the City, the middle plateau, and the low lands including Msimbazi valley, Jangwani, Mtoni, Africana and Ununio areas. The main natural vegetation includes coastal shrubs, Miombo woodland, coastal swamps and mangrove trees.

Apart from UA, other major economic activities in Dar es Salaam include internal trade, manufacturing, tourism, transport and communication, forestry and fishing, mining and quarry, utility services, construction, finance and insurance and public administration and education.

Regarding farming, both peri-urban and urban farmers engage in small scale farming dominated by use of hand equipment. Few use tractors and traditional upgraded technology. Agriculture provides the City with 354657 tons food 134 060 tons in Kinondoni, 55 597 tons in Ilala and 164 100 tons in Temeke (Mlozi *et al.*, 2004).

Livestock in Dar es Salaam City contributes about 34% of the city livestock products requirement (Mlozi *et al.*, 2004). Thus all livestock products produced in Dar es salaam city including meat, milk and eggs are consumed in the city. The municipal councils and the private sector play a greater role in the supply of vaccinations and provision of livestock extension services.

3.2 Research Design

Effect can be determined by comparing the situation before and after an intervention or comparing situation with intervention and situation without intervention. This study employed "with and without" design to determine the socio-economic effects of urban livestock farming. This involved comparison of the socioeconomic status of a selected group of livestock keeping households with the socioeconomic status of a group of non livestock keeping households in 2011.

3.3 Sampling Procedure

A multistage sampling stage procedure was employed to select respondents for the study. The first stage involved selection of one municipality out of the three municipalities in the Dar es Salaam city. Kinondoni Municipality was purposely selected based on number of dairy cows. According to Kinondoni, Temeke and Ilala

municipal council's agricultural officers, Kinondoni has been ranked second in terms of dairy cattle population with 4236 cows in 2009. Temeke has been ranked first with 5982 cows while Ilala was ranked last with 3573 dairy cows. Kinondoni was selected to avoid overstating and understating of the findings of this study.

The second stage involved selection of sample wards from Kinondoni Municipality. Kinondoni municipality has 34 wards out of which only 8 wards (Kimala, Mbezi, Bunju, Kibamba, Msigani, Ubungo, Saranga and Mbwepande were practicing urban livestock farming. In other wards livestock farming has been prohibited since they are located at the center of the city. Three wards namely Msigani, Mbezi and Mabwepande were selected randomly out of the 8 wards which are keeping livestock. Msigani was selected to represent wards with high income earners, Mbezi was selected to represent wards with medium income earners and Mabwepande was representing wards with low income earners.

The third stage involved the selection of streets from the three sampled wards. From each ward a total of 3 streets were selected randomly. Since no list of farmers was found in local government offices, farmers and their neighbours were visited randomly with the aid of local government chairmen. In Mbezi ward there were 6 streets from which Mpijimagohe, Makabe and Mshikamano were selected. In Mabwepande ward, there were three streets and all were involved. These streets are Bunju B, Mabwepande and Mbopo. In Msigani ward, three out of 4 streets were selected which include Malambamawili, Temboni and Msigani.

3.4 Sample size

From each of the selected streets, 24 households were selected. Therefore a total of 72 households in each sampled ward comprising of 36 livestock keepers and 36 non livestock keepers were selected. The sample of 216 households was large enough for meaningful statistical analyses. As suggested by Sudman (1976) a minimum of 100 respondents for each group is considered to be enough when a comparative study is conducted.

3.5 Recruitment and Training of Enumerators

Enumerators were trained before embarking to the exercise of data collection. Enumerators were selected based on the level of education and all of them were degree holders.

3.6 Questionnaire Pre-testing

Before the exercise of data collection the questionnaires were pre-tested to check if they answer the stated objectives, their clarity to the respondents and to see the competence of enumerators in administering the questionnaires. A total of 15 questionnaires were administered during pre-testing exercise and the exercise was done in Morogoro municipality because it was the nearest town from Sokoine University of Agriculture. Some of the questions were found to be irrelevant or were not clear. Corrections were made to unclear questions and irrelevant questions were omitted.

3.7 Data Collection

Data used in the study were largely primary data collected from the sampled households using two questionnaires presented as Appendices 1 and 2. Appendix 1 is the questionnaire designed for livestock keeping households and Appendix 2 is the questionnaire for non livestock keeping households. Both questionnaires contain both closed ended and open ended questions on general household characteristics, sources of income, aspects of food security, household assets and employment. Apart from the above information the questionnaire for livestock keepers contains additional information on livestock keeping related activities. The questionnaires were administered by the researcher with the help of the three enumerators who were trained before the survey as described above. The questionnaires were written in English but the interviews with respondents were done in Swahili. The questionnaires were administered within a period of 28 days from 3rdJanuary to 30th January 2012. Appointments for interviews with a group of sampled households were made through the chairmen of respective streets one day before the date of the interview. In general, it took more time to interview a livestock keeper than a non livestock keeper because the questionnaire for livestock keepers has many questions compared to the questionnaire for non livestock keepers. On average it took one hour to administer the questionnaire for livestock keepers while it took an average of 45 minutes to administer the questionnaire for non livestock keepers. Despite making appointments with the respondents through their local government authorities some respondents were not available especially those visited during working days. This necessitated arrangements for follow up visits on weekends. At the end of the interview period on 30 January 2012, a total of 206 households were interviewed out

of 216 sampled households intended to be interviewed, giving a response rate of 95%.

3.8 Data Processing and Analysis

3.8.1 Data processing

Data were coded for easy analysis. The options for the close ended questions were assigned numbers while in open ended questions all possible answers were identified, and those responses with similar meaning were grouped together and then assigned numbers. These numbers were the ones entered in analytical software. Other responses like age, and income were entered as they were collected. The data were entered in Statistical Package for Social Science (SPSS) program and cleaned to check for outliers before being transferring to Stata for further analyses. SPSS was used to do most of the analysis including, descriptive analysis, comparisons of means and poisson regression analysis. Stata was used to find gini coefficient, concentration coefficient and plotting of Lorenz curve.

3.8.2 Data analysis

Different methods were used to analyze the data collected to achieve the study objectives as described below:

3.8.2.1 Effect of urban livestock farming on household income and income distribution

Percentage of income from urban livestock farming to total household income was calculated to compare its contribution with other sources of income using the following formula:

$$PCL = \frac{IFL}{\sum(IFL, IFE, IFP, IFT)} * 100$$

Where,

PCL=Percentage of income from livestock

IFL=Income from livestock

IFE=Income from employment

IFP=Income from petty business

IFT=Income from transfer payment

In determining the effect of urban livestock farming on income independent t test was used. Independent t test is normally used when comparing means of two groups and where it is impossible for one to belong in both groups. In this study mean income of livestock keepers and non livestock keepers were compared to see if there is statistical significance.

3.8.2.2 Assessing the effect of urban livestock farming on income distribution

In analysing income distribution, Gini coefficient was decomposed according to different sources of household income to determine the effect of income from urban

livestock farming to the total income inequality basing on two inequality measures: the coefficient of variation and the *Gini* coefficient.

The decomposition corresponding to the *coefficient of variation* is expressed as follows:-

$$\sum w_i c_i = 1$$

where $w_i = \mu_i / \mu$ and $c_i = \rho_i \left[\delta_i / \mu_i \right] / \left[\delta / \mu \right]$

Where; $w_i c_i$ = factor inequality weight of the i[th] source in overall inequality

μ_i and μ = the mean income from i[th] source and from all sources respectively.

c_i = the relative concentration coefficient of i[th] source in overall inequality

ρ_i = the correlation coefficient between the i[th] source and total income

δ_i = the covariance involving the i[th] income source.

The decomposition corresponding to *Gini coefficient* is expressed as follows:-

$\sum w_i g_i = 1$;

$$w_i = \mu_i / \mu \text{ and; } g_i = R_i \left(G_i / G \right). \quad R_i = \operatorname{cov}\left(y_i, r\right) / \operatorname{cov}\left(y_i, r_i\right)$$

Where; $w_i g_i$ = the factor inequality weight of i[th]source in overall inequality:

g_i = the relative concentration coefficient of the i[th] source in overall inequality

G_i = the Gini coefficient of the i[th] source of income

y_i = series of income from the i[th] source

R_i = Series corresponding ranks

G = total income *Gini* coefficient and

R = Correlation ratio

An income source is inequality–increasing or inequality-decreasing if C_i or g_i is greater than or less than unity.

3.8.2.3 Assessing the effect of urban livestock farming on employment

In determining the effect of urban livestock farming on employment, t test and χ^2 were used and comparisons were made between livestock keepers and non livestock keepers. Comparisons were done in terms of the number of people employed in urban livestock farming, number of household employed workers, nature of employment created by urban livestock farming whether permanent or temporally, whether laborers employed in urban livestock farming are from rural or urban areas, the ratio of people employed in UA in terms of sex and ethnicity.

3.8.2.4 Assessing the effect of urban livestock farming on household food security and nutrition at household level

Analytical model which was adopted by this study builds on the assumption that participating on urban livestock farming increases dietary diversity hence food security. The poisson regression model was used where number of food items eaten per week was regressed against participation on livestock farming, per capita expenditure, land ownership, education of household head and the age of the household head. Poisson regression model was used because it is a counted model.

The dependent variable used was count of food eaten per week, this kind of dependent variable necessitate the adoption of the counted model (Poisson regression).

$$\gamma = \alpha + \beta_1 ponfarm + \beta_2 pc\exp + \beta_3 landown + \beta_4 hhsize + \beta_5 educave + \beta_6 agehead + \varepsilon$$

Where

γ = Dietary diversity measure (simple count of food groups), this variable was measured by counting number of food items eaten by a household one week before an interview. According to Zezza and Tasciotti (2008) dietary diversity has a close correlation with both caloric adequacy and anthropometric outcome.

Ponfarm= Dummy variable indicating whether the household participates in livestock farming where 1 was standing for participating on livestock farming and 0 for not participating on livestock farming. The expected relationship was that participation on urban livestock farming increases dietary diversity. UA can increase the food security situation of the households which are engaged in this activity through the income it generates since urban dwellers mostly buy food from the market or through direct access to the food which is produced (Maxwell, 2003).

Pcexp = Per capita consumption expenditure. The expected relationship of this variable with dietary diversity was that increase in per capita consumption expenditure increases dietary diversity. As the household per capita consumption expenditure increases the household sets aside more income for food hence are able

to buy a wide variety of food. A household with low per capita expenditure has low income for food purchase hence limited to limited food varieties. The same relationship was observed by Langat *et al.* (2010).

Landown = Dummy variable identifying households that own land where 1 was standing for owning land and 0 for not owning land. The assumption put behind this variable was that ownership of land increases dietary diversity since household owning land can cultivate various crops and keep a variety of animals.

Hhsize = Sum of members of the household; it was assumed that as the household size increases also dietary diversity increases due to diverse taste and preferences of the different members of the household. Zezza and Tasciotti (2008) observed that the household size has a positive relationship with dietary diversity.

Educave = Average education of the head of the household. It was hypothesized that as dietary diversity increases with the education of the head of the household. The assumption was that people with higher education level are aware of nutritional advantages of diversifying their diets. This relationship was also found to be positive in the study by Zezza and Tasciotti (2008).

Agehead = Age of the household head in years. The age of head of household also was assumed to have a positive relationship with dietary diversity. Study by Zezza and Tasciotti (2008) observed that age of head of the household associate positively with dietary diversity.

ε = Error term

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of Sampled Households

4.1.1 Age of respondent

Table 1 shows the distribution of the respondents by age. The mean age for livestock keepers was 44 years which was above the mean age of 40.5 years for the whole sample and higher than the mean age of sampled non livestock keepers which was 37 years. Most of respondents fall under age between 26 years and 45 years which account for 56.5 % of the whole sample. The t statistic test shows that there was no statistically significant difference in mean age between livestock keepers and non livestock keepers ($t=0.076$, $P<0.05$). The difference was observed on age groups ($\chi^2=0.035$, $P<0.05$). Most of urban livestock keepers (71%) were elders aged above 36 years, the same was observed by Gundel (2002) that young people were less depending on urban livestock keeping as they can find alternative formal and informal employment. For people between 35 and 60 years, urban livestock keeping seems to supplement other informal or formal employment.

Table 1: Distribution of respondents by age

Age category (years)	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
≤25	6	6	15	15	21	10.5
26-35	23	23	34	34	57	28.5
36-45	31	31	25	25	56	28
46-55	22	22	15	15	37	18.5
≥55	18	18	11	11	29	14.5
Average	44		37			
Minimum	20		21			
Maximum	76		70			

4.1.2 Sex of respondents

The distribution of respondents by sex is as indicated in Table 2 which shows that most (73.5%) of the livestock keepers and non livestock keepers group were female. There were differences in distribution by sex as observed that females were many among non livestock keepers (79%) as compared to livestock keepers (68%). The observed difference was found to be statistically insignificant (χ^2=0.052, P<0.05).

Table 2: Sex of the respondents

Sex	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Male	32	32	21	21	53	26.5
Female	68	68	79	79	147	73.5
Total	100	100.0	100	100	200	100

4.1.3 Marital status of respondents

The findings in Table 3 show that most (85.5%) of the respondents were married. There were more married livestock keepers as compared to non livestock keepers but the observed difference was not statistically significant (χ^2=0.115, P<005). This finding indicates how society has stable families for production activities as it was suggested by Shimbe (2008)

Table 3: Marital status of respondents

Marital status	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Single	3	3	14	14	17	8.5
Married	91	91	80	80	171	85.5
Widow	5	5	5	5	10	5
Separated	1	1	1	1	2	1
Total	100	100	100	100	200	100

4.1.4 Ethnicity and region of origin of respondents

Table 4 shows that most of the respondents were migrants from different regions of Tanzania. There is a tendency for people to shift from rural or small towns to big cities. Dar es Salaam being one of these cities many people living in this City are migrants who pushed the natives away from the city center. There is no significant difference in the origin of respondents between livestock keepers and non livestock keepers (χ^2=0.189, P<0.05). Most of respondents in both categories were coming from northern zone, but the proportion of respondents from northern zone for livestock keepers was higher than that of non livestock keepers. This higher proportion of respondents from northern zone in the livestock keepers category is not surprising because intensive livestock keeping is widely practiced in the northern zone which is the origin of most of the respondents keeping livestock.

Table 4: Origin of respondents

Zone	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percentage
Eastern	10	10	18	18	28	14
Southern	5	5	13	13	18	9
Southern Highland	25	25	13	13	38	19
Lake	9	9	13	13	22	11
Western	4	4	6	6	10	5
Northern	43	43	27	27	70	35
Central East	4	4	10	10	15	7

4.1.5 Education

The findings in Table 5 show that livestock keepers were more educated than non livestock keepers whereby 54% of the heads of the livestock keeping households have attained secondary school education and above as compared to 31% of the

heads of non livestock keeping households. The difference between livestock keepers and non livestock keepers in terms of education was statistically significant (χ^2=0.029, P<0.05).

Table 5: Education level of heads of the household

Education level	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
None	1	1	9	9	10	5
Primary	45	45	60	60	105	52
Secondary	34	34	16	16	50	25
Certificate	5	5	4	4	9	5
Diploma	5	5	3	3	8	4
Higher education	10	10	8	8	18	9
Total	100	100	100	100	200	100

4.1.6 Occupation

Most (45%) of the respondents reported self employment in activities like carpentry, masonry and mechanics to be their primary occupation with non livestock keepers having a larger proportion of respondents reporting self employment as their primary occupation, Livestock keeping as a primary occupation among the sampled livestock keepers has been ranked second after self employment. The (χ^2=0.001, P<0.05) suggests that livestock keepers and non livestock keepers significantly depend on different types of primary occupation.

Table 6: Occupation of respondents

Primary employment	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Permanently employed	22	22	24	24	44	22
Self employed	39	39	51	51	90	45
Temporarily employed			3	3	3	1.5
Livestock keeping	27	27			27	13.5
Crop production	5	5	17	17	22	11
Unemployed	1	1	2	2	3	1.5
Retired	6	6	3	3	9	4.5
Total	100	100	100	100	200	100

Apart from primary occupation, the respondents reported various secondary occupations as indicate in Table 7. The table shows that most (92%) of the sampled livestock keeping household with more than one activity reported livestock keeping as their secondary employment while most (46%) of the sampled non livestock keeping households mentioned self employment as their main secondary employment. The difference in secondary employment between livestock keepers and non livestock keepers was found to be statistically significant (χ^2 =0.000, P<0.01).

Table 7: Secondary employment of respondents

Secondary employment	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Self employment	1	1	26	46	27	21
Livestock keeping	66	92	0	0	66	52
Crop production	4	6	15	27	19	15
Casual labor	1	1	15	27	16	13
Total	72	100	56	100	128	100

4.1.7 Household size

4.1.7.1 Distribution of respondents by number of people per household

Table 8 shows that livestock keeping households have more people in the household than non livestock keeping households. As indicated in the table, 79% of the livestock keeping households have more than five people as compared to 57% of the non livestock keeping households with more than five people. The (χ^2=0.006, P<0.05) indicate that there was a significant difference in the distribution of respondents by number of people per household between livestock keeping and non livestock keeping households. T test also shows that there was significance different in average households size between livestock keepers and non livestock keepers (t=0.000, P<0.05).

Table 8: Distribution of respondents by number of people per household

No of people	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Below 5	23	23	43	43	66	33
5-10	74	74	57	57	131	65.5
Above 10	3	3			3	1.5
Average	6		5			
Minimum	1		1			
Maximum	18		10			

4.1.7.2 Household size and composition by age

Findings in Table 9 indicate that there was no significance difference the number of household members in each age group between livestock keeper and non livestock keepers, as indicated by t=0.723 at P<0.05. The active working age group of 18 years to 60 years accounted for 48% of the household members for livestock keepers and 51% for non livestock keepers.

Table 9: Number of household members by age group

Age groups	Livestock keepers (n=100)		Nonlivestock keepers (n=100)		Total	
	Mean	Percent	Mean	Percent	Mean total	Percent
< 5	0.75	12.31	0.79	16.43	0.77	14.37
5-10	0.85	13.95	0.63	13.09	0.73	13.52
11-18	1.43	23.48	0.84	17.55	1.14	20.515
19-40	1.8	29.55	1.58	33.15	1.69	31.35
41-60	1.14	18.74	0.82	17.27	0.98	18.005
>60	0.12	1.97	0.12	2.51	0.12	2.24
Total	6.09	100	4.78	100	5.4	100

4.2 Livestock Keeping

4.2.1 Livestock types kept

Table 10 shows that the average number of cattle kept were 5 cattle per household. The average number of cattle was higher than the recommended number of 4 cattle per household in urban areas. This suggests that municipal council has failed to enforce this by laws since some of the livestock keepers kept up to 14 cattle. Chickens were kept in large number with average number of 653 birds for broiler, 263 birds for layers and 48 birds for local chicken. Broilers and layers were kept in large number because they were kept for commercial purpose. In general, chickens were kept in large numbers because they do not need large space and have low labour requirement.

Table 10: Number of animals per household by type in 2011

Type of animal	Number of farmers	Minimum	Maximum	Mean
Cattle	42	1	14	5
Ducks	32	3	40	18
Broiler	20	200	2500	653
Layers	9	16	600	263
Goat	45	2	60	10
Local chicken	49	4	450	48
Fowl	1	28	28	28
Goose	4	2	8	5
Pig	16	2	170	26
Guinea fowl	4	3	13	8

4.2.2 Reasons for keeping livestock

Most (81%) of the livestock keeping households mentioned income generation as the major reason for keeping livestock as indicated in Table 11. Other reasons were keeping livestock as a source of food, way to diversify income, as a hobby and as their tradition.

Table 11: Distribution of sampled livestock keepers by reasons for keeping livestock

Reason	Frequency	Percent
Income generation	81	81
Food	12	12
Income diversification	1	1
Hobby	3	3
Tradition	3	3
Total	100	100

4.2.3 Experience in livestock keeping

According to Table 12, most (45%) of the sampled livestock keepers have been on the livestock keeping business for less than 5 years. Only twenty five percent of the

respondents have been keeping livestock for more than ten years. This indicates that livestock keeping in Dar es Salaam started several years ago.

Table 12: Duration one has been keeping livestock

Duration	Frequency	Percent
Less than 5 years	45	45
5 to 10 years	30	30
More than 10 years	25	25
Total	100	100

4.2.4 Land ownership

Most (97%) of livestock keepers used their own land in raising their livestock as shown in Table 13. In many cases there is no separation between urban livestock farming areas and the livestock keeper's residence. Livestock farming was conducted in the backyards especially those living in their own houses. Keeping livestock in rented houses was practiced by those who have rented the whole house. Tenants who just rented part of the house were not keeping livestock either because of avoiding conflicts with other tenants or their landlords did not allow their houses to be used for livestock keeping.

Table 13: Land ownership

Land ownership	Frequency	Percent
Own land	97	97
Renting land	3	3
Total	100	100

4.3 Crop production

The major crops grown in the study area are cowpeas, maize, cassava, pineapples, pawpaws, bananas and vegetables. The cultivation of crops was done in very small

scale and mainly for home consumption. Those who cultivated for commercial purposes were farming outside the City and/or in other regions of the country. Both livestock keepers and non livestock keepers reported to engage themselves in crop production. As shown in Table 14, 61% and 51% of livestock keepers and non livestock keepers respectively were cultivating different crops. The observed difference in crop cultivation between livestock keeping livestock keeping household and non livestock keeping households was found to be statistically insignificant (χ^2=0.67, P<0.05).

Table 14: Crop cultivation

	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Who cultivate	61	61	51	51	112	56
Who do not cultivate	39	39	49	49	88	46

4.4 Trend, Reliability, Control and Access of Income from Livestock

4.4.1 Trend of income from livestock

When asked about the trend in income from livestock, most (95%) of the sampled livestock keeping households indicated that their income from livestock has been increasing (Table 15). The remaining 5% of the respondents who said their income has remained the same were those who have not yet started earning income from livestock because they started keeping livestock few years before the date of the survey.

Table 15: Trend of income from livestock

Trend of income	Frequency	Percent
Increased	95	95
Remained the same	5	5
Total	100	100

4.4.2 Reliability of income from livestock

When the sampled livestock keepers were asked about reliability of income from livestock, most (90%) of them reported that their income from livestock farming was reliable. Like the trend of income from livestock, reliability of income from livestock depended on the purpose of keeping livestock and duration one has been keeping livestock.

Table 16: Reliability of income from livestock

Income reliability	Frequency	Percent
Very reliable	68	68
Reliable	22	22
Less reliable	7	7
Not reliable at all	3	3
Total	100	100

4.4.3 Control of income from livestock

Findings in Table 17 show that women have higher (56%) control over income from livestock than other members of the household. Some respondents especially those coming from Kilimanjaro said that it is their tradition that income from livestock is controlled by women. For the households having more than one source of income women were mainly assigned to take care of animals while their husbands did other jobs. In most cases youths have low control over income because they are still under their parents' control. In a situation where livestock does not make a significant

contribution to total household income, control of household income was done by all members of the household.

Table 17: Control of income from livestock

Income control	Frequency	Percent
Husband	26	26
Wife	56	56
Youth	4	4
All member	14	14
Total	100	100

4.4.4 Access to income from livestock

Although it has been shown that women have great control over income from livestock its access was mostly fair to all members in the household. The findings in Table 18 show that livestock incomes of most (95%) of the sampled households were accessed by all members of the household. The access to income from urban livestock farming by another household member was through household consumptions which were financed by income from urban livestock. By having greater control over the income from livestock, women were able to have more access to this income than other members of the household.

Table 18: Access of income from livestock

Income access	Frequency	Percent
Women	5	5
All members	95	95
Total	100	100

4.5 Marketing of Livestock and Livestock Products

In many cases women market livestock and livestock products and this has enabled them to have greater access and control over income from livestock. Table 19 indicates that in most (54%) of the livestock keeping households marketing of livestock and livestock products was done by women. Very few households left the responsibility of marketing livestock and livestock products to youths. This was attributed to the fact that in most cases youths were not the owners of livestock and they were under parent's control. The greater involvement of women in marketing livestock and livestock products indicates that urban livestock farming can act as women empowerment activity.

Table 19: Marketing of livestock products

Marketing of livestock	Frequency	Percent
Husband	22	22
Wife	54	54
Youth	5	5
Both husband and wife	6	6
All household member	13	13
Total	100	100

4.6 Uses of Income from Livestock

The income obtained from livestock could be used in different ways but asset acquisition and children's education were the major uses of income from livestock in the study area. Table 20 and Fig. 3 show that income from livestock was mainly used to buy land whereby 35% of income from livestock which was equal to 3 140 000 Tsh was used for this purpose. The high price of land and its high demand attributed to this. Acquiring of all these assets does not entirely depend on income from

livestock but rather the livestock income is supplemented by income from other sources

Table 20: Uses of income from livestock (0000)

Use	Minimum	Maximum	Mean
Purchase of land	45	2000	314
Construction of house	20	7 00	135
Rehabilitating a house	7	1000	126
Purchase of livestock	1.5	1000	127
Buying TV	10	35	20.8
Buying mobile phone	2.5	30	11.6
Paying school fees	1	2000	134
Buying books and stationary	15	100	31

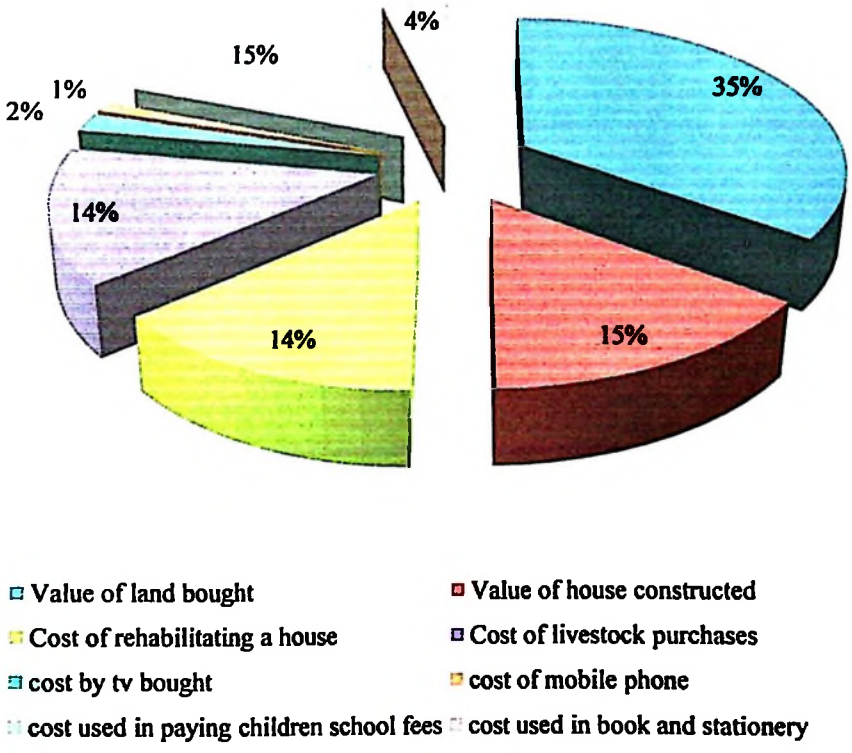

Figure 3: Uses of income from urban livestock farming on asset acquisition

With respect to children education, findings revealed that most of livestock keeping households started keeping livestock when their children were about to join secondary schools. Gundel (2002) in his study conducted in Nairobi, Kisumu, Kampala, Addis Ababa and Dar es Salaam suggests that there exists strong evidence from different case studies that education of children is an important objective for the livestock keepers. Some of the sampled livestock keeping households indicated that they have managed to educate their children up to university level using income from livestock. On average, about 1 340 000 Tsh from livestock keeping per household has been used to pay school expenses. Findings in Table 21 show that 71% of the households have been able to send their children to school either by paying full or part of school fees using income from livestock. The remaining 29% of the sampled livestock keepers said that the ability to educate their children has remained the same. These findings support the findings by Gundel (2002) who concluded that UA provides easily convertible assets for covering important expenditures such as school fees and health service charges.

Table 21: Change in ability to educate children

Ability to educate	Frequency	Percent
Increased	71	71
Remain the same	29	29
Total	100	100

4.7 Sources of Household Income in the Study Area

There were many sources of income in the study area. These sources were grouped into four major sources of income namely wage employment, petty business urban livestock farming and transfer payment. Income from wage employment refers to

income obtained by being employed either in the private sector or employed by the government. Petty business refers to income obtained from different businesses like kiosks, grocery, shops, hotels, restaurants, food venders, local brew, transportation business and the like. Income from urban livestock farming involved income obtained by a household through selling of animals or animal products like eggs, milk and meat. Crop cultivation was not included as one of the sources of income in this study because it was practiced at a very low scale and for home consumption. Transfer payment involved income received by a household as help or as a gift from relatives or neighbours.

4.8 Effects of Livestock Farming in the Study Area.

4.8.1 Effect livestock farming on household income

Urban livestock farming was found to contribute significantly to household income. The findings in Table 22 show that the average household income for urban livestock keepers was higher than average household income for non livestock keepers. The difference was found to be statistically significant ($t=0.011$, $P<0.05$). This suggests that urban livestock farming has a significant positive effect on household income.

Table 22: Household income for livestock and non livestock keepers

	Income for livestock keepers (Tsh)	Income for non livestock keepers (Tsh)
Minimum income	350 000	200 000
Maximum income	38 200 000	36 000 000
Average income	8 563 000	5 595 000

4.8.2 Contribution of livestock farming to household income

The contribution of different sources of income to total household income is as shown in Table 23 and (Fig. 4) below. Income from livestock ranked third in terms

of its contribution to total household income. It accounted for 19% of total household income in 2011 among livestock keeping households. This small contribution was attributed by the fact that livestock keeping has been regarded as rural activity hence receives little support from the government. Due to shortage of land in urban areas this activity is normally conducted on the backyard hence limit its expansion. This together with problems like diseases, shortage of capital, higher charges of veterinary services and higher feed cost leads to its low contribution on total household income. The same was observed by House *et al.* (1993) in Nairobi Kenya where UA provides the highest self-employment earnings in small-scale enterprises and the third highest earnings in urban Kenya.

Petty business has been ranked first in contributing to total household income among the sampled livestock keepers. Higher contribution of business as compared to employment and urban livestock farming is due to the support provided to small businesses by the government and the private sector. Households normally shift their resources to the high paying enterprises in this regard most of the urban households have been investing a lot in petty businesses than agriculture which was regarded as a rural activity. House *et al.* (1993) in their study "Urban self-employment in Kenya" found that UA was providing the highest self-employment earnings in small-scale enterprises and the third highest earnings in urban Kenya.

Transfer payment refers to gift and/or assistance from children and pension for retired people. Interestingly, transfer payment was found to have low contribution to total household income. Its low contribution was due to the fact that most of the

respondents were at active working age and therefore they were still engaging themselves in different income generating activities.

Table 23: Contribution of livestock to total household income in 2011

Source of income	Average amount earned per year (Tsh)	Contribution to total income (%)
Livestock	3 013 351	19
Employment	4 670 000	29
Business	7 503 725	46
Transfer payments	1 051 000	6

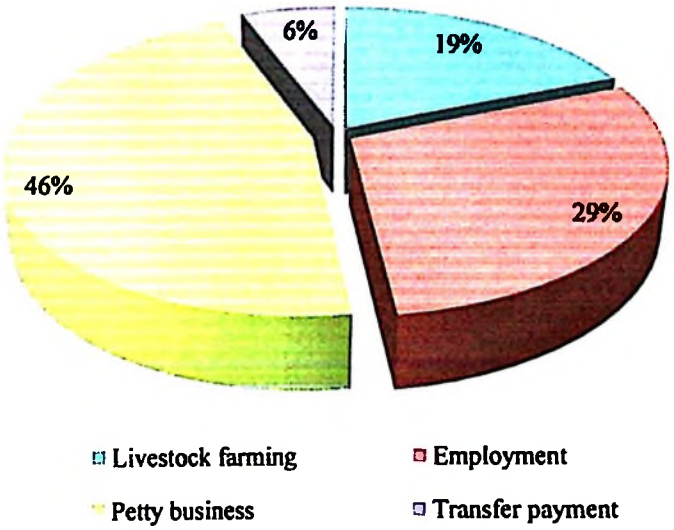

Figure 4: Contribution of different sources to total income

4.8.3 Urban livestock farming and income distribution

Table 24 and Fig. 5 show that incomes earned by the sampled household in 2011 were unevenly distributed. The problem of inequality was higher among livestock keepers than among non livestock keepers. This is evidenced by Gini coefficients for livestock keepers of 0.423 and that of non livestock keepers of 0.404. Furthermore the Lorenz curve in Fig.5 below show that 90% of the population own 62% of the total income while the remaining 10% of the population own about 38% of total

income. It is therefore necessary to institute policy measures in order to minimize the gap between those who have and those who do not have. This policy should focus on transferring income from rich people to poor people e.g by imposing tax the goods mainly consumed by rich people.

Table 24: Gini coefficient for livestock and non livestock keepers

Indices	Estimate for livestock keepers	Estimate for non livestock keepers
Gini	0.423	0.404

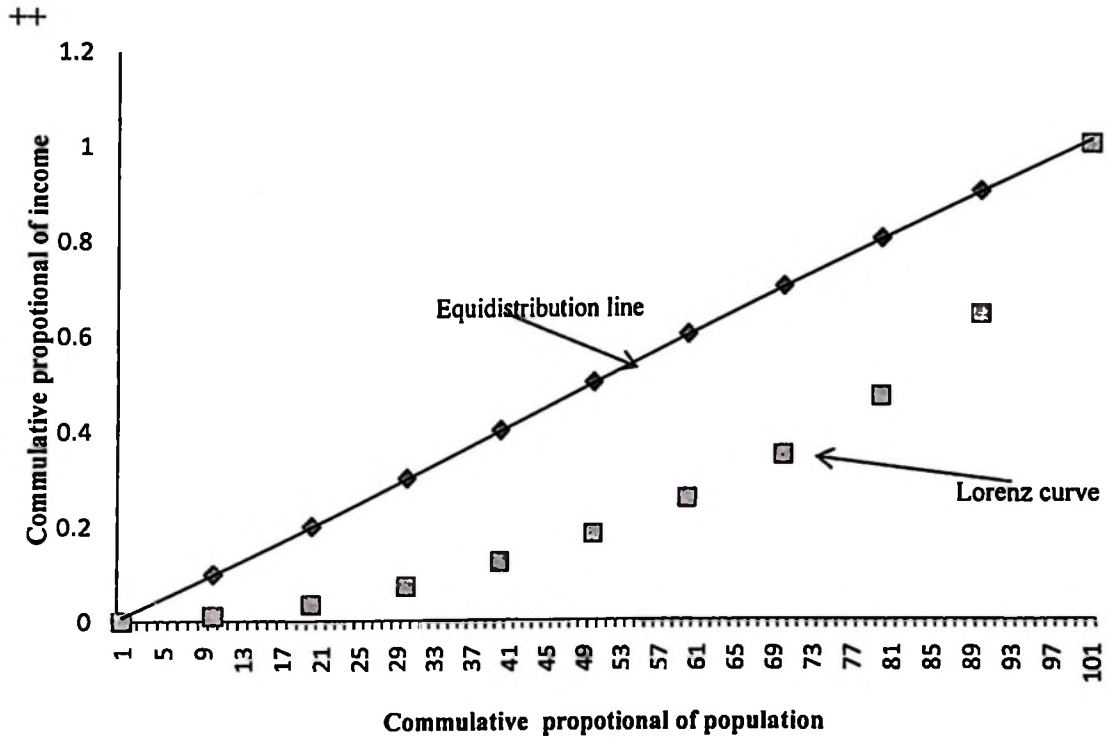

Figure 5: Lorenz curve

4.8.4 Concentration coefficients

To assess effects of different sources of income on income distribution the Gini coefficients were decomposed according to the source of income. The income from

livestock farming represents the income from UA since in the study area crop cultivation does not make a significant contribution on household income. Most of the urban households cultivate crops in very small scale and mainly for home consumption.

The findings on decomposition of Gini coefficient is as shown in Table 25 where the effect of each source of income of inequality is shown by the value of the relative concentration coefficient. According to Table 25 income from livestock and income from employment have inequality increasing effects while income from petty business and transfer payment have inequality decreasing effects. *Ceteris peribus* this means that additional increase of income from livestock or employment will increase the level of inequality. On the other hand transfer payment and petty business have inequality decreasing effects because increase in income from transfer payment and petty business will decrease the level of inequality. The following might be the possible reasons for these findings:

Firstly, engaging in livestock activities in most cases requires one to have land either by owning it or by hiring. Dar es Salaam being a big city with high population pressure the cost of land is very high. The raising in cost of acquiring land cause most of poor to remain landless; this has been favoring rich people to engage in livestock activities hence increasing levels of inequality. Also the support given to livestock keepers is very minimal which lead to most of the poor who engaged in livestock either to quit from livestock keeping or to operate at subsistence level.

Secondly, getting employment especially high paying job was a function of many things including having education. Most poor people have little access to education when compared to the rich. This enables rich people to have high access to the educations they also have higher access to high paying wage employment than poor people. Consequently wage employment increases the level of inequality. This result support findings by Klein (2011) that education expands both earning potential and employment opportunities to young people in America.

Thirdly, many families which were getting transfer payments were low income earners who depend on income from their friends and relatives. This source of income involves the transfer of payment from rich people to poor people hence decrease the level of inequality. Fourth; many poor people have been engaged on petty business because it has low entrance cost and also it receives a lot of support from government, financial institutions and other organizations. By involving more of the poor together with support the subsector gets from the government, petty business as a source of income has inequality decreasing effects. These findings are consistent with Adams (1994) who found that agricultural and nonfarm government employment had inequality increasing source of income in rural Pakistan.

Table 25: Relative concentration coefficient of different source of income

Source	Relative concentration coefficient (gi)	Rank
Livestock	1.122744	2
Employment	2.79394	1
Pet business	0.534099	3
Transfer payment	0.178652	4

4.8.5 Effect of livestock farming on employment

4.8.5.1 Number of workers

Most of the household employ only one worker. As shown in Table 26, 81.2% and 79% of household employing workers from livestock keepers and of non livestock keepers respectively have only one worker. This is because most of the households have few activities. Livestock keepers who have employed 2 to 3 were in most cases having large number of animals.

Table 26: Number of workers

Number of workers	Livestock keepers (48)		Non livestock keepers (19)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
1	39	81	15	79	54	80
2	7	15	4	21	28	18
3	3	4	0		3	2
Total	48	100	19	100	67	100

4.8.5.2 Workers employed in different activities

Table 27 shows that only nine percent of livestock keepers have employed someone for household chores as compared to 19% of non livestock keepers. The table indicate that only 33.5% of the sampled household employed workers for different household activities. In general, livestock keepers employed more workers than non livestock keepers. Forty eight percent of livestock keepers were found to employ workers as compared to 19% of non livestock keepers and this difference was statistically significant (χ^2=0.000, P<0.05). These findings indicate that there was a significant difference in employment creation between livestock keepers and non livestock keepers.

Table 27: Workers employed in different activities

Response	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Household chores						
Yes	9	9	19	19	28	14
No	91	91	81	81	172	86
Total		100		100	200	100
Employment						
Employ	48	48	19	19	67	33.5
Do not employ	52	52	81	81	133	66.5

4.8.5.3 Sex of workers

As indicated in Table 28, most (83%) of the people employed by livestock keepers were males. Female workers accounted for only a small proportion of the workers in livestock keeping households. The reason for livestock keepers to employ more males than non livestock keepers is that working on livestock involves difficult tasks like cutting of grass, fetching water for the animal, milking and marketing of animal products. Most of these activities can effectively be done by men than women. Women were employed mostly as housekeepers. The observed difference in sex of respondents was found to be statistically significant (χ^2=0.000, P<0.05).

Table 28: Distribution of workers in sampled households by sex

Sex	Livestock keepers (n=48)		Non livestock keepers (n=1'		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Male	40	83	9	47	49	65
Female	3	6	8	42	11	24
Both	5	11	2	11	7	9
Total	48	100	19	100	67	100

4.8.5.4 Residence of workers

Most (78%) of the respondents were staying with their workers. Table 29 shows that 85% of livestock keeping households stay with their workers as compared to 71% of non livestock keepers who stayed with their workers. This observed difference is not statistically significant (χ^2=0.7, P<0.05). Most households stay with their workers because most of their activities were full time activities.

Table 29: Whether a household stays with the worker

Response	Livestock keepers (48)		Non Livestock keepers (19)		Total (67)	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	41	85	12	71	53	78
No	7	15	7	29	14	22
Total	48	100	19	100	67	100

4.8.5.5 Workers payments

Only few workers received payment equal or above the amount set by the government. As shown in Table 30 most (81.3%) of workers were receiving wages which were below the minimum wage set by the government of 60 000 Tsh per month. When asked why they were paying such a small amount most of livestock keepers argued that they were offering other payments in kind such as shelter, clothes, health service and food. Others argued that the salary for workers depend on income obtained from livestock keeping activity. The rise in the cost of keeping livestock due to increase cost of medicine, veterinary services and feed resulted to low income from livestock and consequently livestock keepers offer low wages to their workers. On average monthly salary to their workers of 41 700 Tsh as indicated in Table 30.

Apart from the monthly salary, workers received payment in kind as can be seen from Table 31, (90%) of livestock keepers offer their workers payments in kind compared to 64% of non livestock keepers. The in kind payments referred here include shelter, food, health services and clothes. Staying with the workers has influence on whether the household offers these payments or not. Because most of livestock keepers stay with their workers it is not surprising that they were the ones who to large extent offered payments in kind. The observed difference was not significant (χ^2=0.92, P<0.05). Households that offered payments in kind were paying relatively lower wages than households which did not offer payments in kind.

Table 30: Worker's monthly wage payment in 2011

Amount	Frequency	Percent
Below 30 000	9	18.7
30000- <60 000	30	61.6
60000-100 000	9	18.7
Average	41 700	
Minimum	10 000	
Maximum	100 000	

Table 31: Payment in kind given to workers

Response	Livestock keepers (48)		Non livestock keepers (19)		Total	
	Frequency (48)	Percent	Frequency (19)	Percent	Frequency	Percent
Yes	43	90	12	64	55	77
No	5	10	7	36	12	23

4.8.5.6 Place of origin of workers

Most (82%) of the workers employed by non livestock keepers were coming from central zone while those employed by livestock keepers were mainly (26%) from northern zone as shown in Table 32. The difference in place of origin of workers was statistically significant (χ^2=0.03, P<0.05). The reason for livestock keepers to employ

more workers from northern zone might be the fact that most of them (43% as indicated in from Table 4) were coming from same a zone so they source these workers from their area of origin.

On other hand central zone is characterized by semi desert climatic condition which is not suitable for agriculture activities this lead to many of people from this zone opting to go in other areas to look for the jobs, domestic activities being the one. This might be a reason to why most of workers were coming from this zone comprising of 24% for livestock keepers and 82% for non livestock keepers.

Table 32: Place of origin of worker by sex and ownership

Zone	Livestock keepers (n=100)		Non Livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Eastern	17	17	2	2	19	9.5
Southern	6	6	2	2	8	4
Southern Highland	23	23	4	4	27	13.5
Lake	2	2	6	6	8	4
Western	2	2	1	1	3	1.5
Northern	26	26	3	3	29	14.5
Central	24	24	82	82	106	53

4.8.5.7 Time spent on livestock keeping activities

On average male workers spent more time (4.8 hours) in livestock keeping activities as compared to female workers (3.7 hours) as shown in Table 33. The time spent by male and female owners was approximately equal. The female workers were spending fewer hours in doing livestock activities than male workers because most of them were employed to care for small animals like chickens that do not need much of their time.

Table 33: Time or labour demand in livestock farming by sex and ownership

Responsible personnel	Minimum	Maximum	Average
Average hours used by male worker	1.00	12.00	4.8
Average hours used by female worker	3.00	6.00	3.7
Average hours used by male (owner)	.25	12.00	2.2
Average hours used by female (owner)	.20	10.00	2.2

4.8.6 Effect of livestock farming on food security and nutrition at household level

The three parameters of food security namely food availability, food accessibility and food utilization should be taken into account in assessing food security (Kutiwa *et al.*, 2010). This study compared the ability of a family to feed itself, consumption of the perceived luxury products, source of protein, trend of food security, number of meals consumed by a household, number of months the household can feed itself using own produced food and dietary diversity to assess the effect of livestock farming on household food security and nutrition.

4.8.6.1 The ability of households to feed themselves from own resources

Almost all sampled livestock keepers said that they did not depend entirely on livestock for food security in their households but rather used income from livestock and other sources to feed themselves. As shown in Table 34, most (96%) of the sampled livestock keepers were able to feed their households as compared to 74% of the non livestock keepers. The difference in ability of household to feed itself from own resources was tested by χ^2. The score was (χ^2=0.002, P<0.05) indicating that there was statistically significant difference in the ability of a household to feed itself between livestock keepers and non livestock keepers. This suggests that urban livestock farming has had positive effect on food security and nutrition at household level.

Table 34: Ability of households to feed themselves from own resources

Ability to feed from own resources	Livestock keepers (n=100)		Non Livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	96	96	74	74	170	85
No	4	4	26	26	30	15
Total	100	100	100	100	200	100

4.8.6.2 Luxury food items

Table 35 shows that most (39%) of the sampled livestock keepers and non livestock keepers indicate rice to be a luxury food item. They mentioned rice as luxury food item because the price of rice during the survey period in 2011was higher than price of other cereal food items. Also the prices of meat, fish and banana were high by this time. The difference in the kind of food item considered to be luxury between livestock keepers and non livestock keepers was not statistically significant ($P<0.05$).

Table 35: Luxury food items

Luxury food	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Banana	17	17	8	8	25	12.5
Breakfast	1	1	0	0	1	0.5
Chicken	4	4	6	6	10	5
Fish	6	6	13	13	19	9.5
Meat	26	26	24	24	50	25
Kande	1	1	1	1	2	1
Pork	1	1	0	0	1	0.5
Potato	1	1	2	2	3	1.5
Rice	37	37	41	41	78	39
Ugali	4	4	5	5	9	4.5
Vegetable	2	2	0	0	2	1
Total	100	100	100	100	200	100

4.8.6.3 Source of protein

Livestock keeping and non livestock keeping households differ in their sources of protein as shown in Table 36. Livestock keepers (81%) depend mainly on chicken and eggs as sources of protein while non livestock keepers (70%) depend mostly on beans and sardines as sources of protein. For the whole sample beans and sardines were considered to be the main sources of protein which were being used by 74.5% of the respondents. The observed difference was due to the fact that most of the livestock products consumed by livestock keepers were from their own herds while non livestock keepers have to buy the products from the market where prices are somehow high. This shows that keeping livestock enabled the livestock keeping households to get these sources of protein that they could not have if they were non livestock keepers.

Table 36: Source of protein

Source	Livestock keepers (%)		Non livestock keepers (%)			
	Frequency	Percent	Frequency	Percent	Total	Percent
Chicken, eggs and milk	81	81	27	27	108	54
Beef, mutton and fish	55	55	45	45	100	50
Beans and sardine	70	70	79	79	149	74.5

4.8.6.4 Trend in food security

Trend on food security indicates that, generally food security has increased. As shown in Table 37, 92% of livestock keepers said that their food security has increased since they started keeping livestock. These findings show that livestock keeping to a large extent affect food security positively in most of the households. Households that said their food security has decreased have argued that they are forced to take money that could be used to buy food for their household to feed livestock. This finding support the finding by Atukunda (2000) who found strong

relationship between participation in UA and food security especially for low and very low income household.

Table 37: Trend on food security for livestock keepers

Trend on food	Frequency	Percent
Increased	92	92
Remain the same	7	7
Decreased	1	1
Total	100	100

4.8.6.5 Trend in child nutrition

Children nutrition have been positively affected by livestock keeping as shown in Table 38 that 97% of the livestock keepers said that their child nutrition has improved since they started keeping livestock. Livestock keeping has improved child nutrition in two ways: Firstly by direct consumption of livestock products and secondly by using income from livestock to buy food for the children. Animal products like eggs, milk and meat are good sources of protein and very essential for child nutrition. By keeping animals, urban livestock keeping households have higher access to all these sources of proteins than non livestock keeping households. On the other hand the purposes of keeping animals sometimes reduce the effect of livestock on children nutrition. For example those keeping pigs for educating their children cannot feed directly from those animals hence the nutritional status of children remain unchanged. The findings were consistent with findings by Maxwell (1998) and Atukunda (2000) who found that there was effect of UA on child nutrition.

Table 38: Trend of child nutrition

Trend in nutrition	Frequency	Percent
Increased	97	96.0
Remain the same	3	3.0
Total	100	100.0

4.8.6.6 Average number of meals per day

Ability to get three meals per day was higher among livestock keepers (90%) than among non livestock keepers (86%) as shown in Table 39. Chi-square statistic indicate that the difference between livestock keepers and non livestock keepers in term of number of meals taken per day was not statistically significant (χ^2=0.508, P<0.05).

Table 39: Average number of meals per day

	Livestock keepers (n=100)		Non livestock keepers (n=100)		Total	
Number of meals	Frequency	Percent	Frequency	Percent	Total	Percent
2	8	8	14	14	22	11
3	90	90	86	86	176	88
4	2	2	0	0	2	1
Total	100	100	100	100	200	100

4.8.6.7 Months in a year household were able to feed themselves from own resources

Table 40 shows that livestock keepers were able to feed themselves from own resources for a longer period than non livestock keepers. Majority (96%) of livestock keepers have been able to feed themselves from own resources for more than 10 months per year as compared to non livestock keepers. However, the observed difference in number of months a household was able to feed itself from own resources was not statistically significant (t= 0.57, P<0.05). Livestock keeping households did not entirely meet their food requirements from livestock activities.

They also depended on other activities like crop production, business, employment, transfer payment and other sources of income to meet their daily food requirements. Shortage of land for livestock keeping might be a limiting factor for expansion of livestock keeping in urban areas as argued by Mlozi *et al.* (2004) that UA was mainly done at one's compound.

Table 40: Months in a year households were able to feed themselves

Number of months	Proportion of household able to feeding themselves Livestock keepers (n=100)	Non livestock keepers (n=100)
<7 months	0	3 (3%)
7-10 months	4 (4%)	21 (21)
>10 months	96 (96%)	76 (76)
Total	100 (100)	100 (100)
Average	11.76	11.27
Minimum	4	6
Maximum	12	12

4.8.6.8 Results of the poisson regression analysis

Table 41 summarizes the results of the regression analysis that was aimed at determining the effect of urban livestock farming on household food security and nutrition. Household dietary diversity was used as a proxy variable for household food security and nutrition. The omnibus value of 210.139 was significance at $P<0.05$ indicating that the regressors were statistically significant in explaining variation in household dietary diversity.

The P value shown in Table 40 indicate that household participation in livestock keeping, total household size, education of the head of the household and age of the household head are statistically significant in explaining the variation in household

dietary diversity. These results support findings by Zezza and Tasciotti (2008) and Ruel (2006) who found that there were positive relationships between dietary diversity and involvement in UA, education of the head of the household, household size and age of the head of the household.

Table 41: Results of the poisson regression analysis

			95% Wald Confidence Interval		Hypothesis Test		
Parameter	Coefficients	Std. Error	Lower	Upper	Wald Chi-Square	Df	P value
Constant	0.000	1.656	2.991	9.463	447.140	1	0.000
Intercept	1.418	0.000	0.704	2.111	15.380	1	0.000**
P_onfarm	-2.5E-08	0.796	-3.067	5.591	83.000	40	0.000**
Pcexp	0.709	0.021	-4.868	-1.518	27.440	5	0.000**
Landown	0.264	0.231	-3.724	2.14	20.560	11	0.038*
Hhsize	0.841	0.109	-0.879	0.971	0.010	1	0.922
Educ_ave	0.041	0.913	-0.567	0.344	0.034	102	0.765
Omnibus Test					210.14	59	0.000

*P<0.05, **P<0.01

4.8.6.9 Tests for presence of multicollinearity

Simple correlation coefficient was 0.94 indicating serious problem of multicollinearity. To get rid of the problem more data was required or dropping of other independent variables from the model. Neither of which was done since Wooldridge (2005) argue that dropping a variable that belong to the population model can lead to bias. Another reason is that multicollinearity does not violate any assumption of multiple linear regressions. One can conclude that there is problem of

multicollinearity when R square is "closer" to one, but this conclusion is normally put in quotation mark because there is no absolute number that we can cite to conclude that multicollinearity is a problem. For example, R square of 0.9 means dependent variable has a strong linear relationship with other independent variables.

4.9 Challenges faced by urban livestock keepers

Urban livestock keepers argue that livestock keeping has got a lot of benefits to them and to the society at large. Livestock keeping has been acting as a source of income, ways of diversifying income, a source of food, a source of employment and also as a source of manure for crop production. Despite its contribution to the life of urban people, urban livestock farming faces a number of problems as shown in Table 42. Shortage of capital and presence of diseases was the main problem to most of the urban livestock keepers as reported by 72% and 65% of the sampled livestock keepers respectively. Diseases that were common included New Castle, Typhoid, Salmonelosis and Coccidiosiss in chickens and Foot and Mouth disease, East CoastFever, Salmonelosis, Intestinal Salmonelosis and Anaplasmosis in cattle.

Table 42: Problems faced by urban livestock keepers

Problem	Frequency	Percent
Diseases	65	65
High treatment cost	18	18
High feed cost	27	27
Poor artificial insemination services	4	4
Theft	9	9
Shortage of capital	72	72
Conflict between neighbors	7	7
Shortage of feed	10	10
Shortage of water	7	7
Poor vertinary services	10	10
Low price produces	3	3
Poor quality of feed	3	3

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

The main objective of the study was to assess the socio-economic effect of urban livestock farming. The specific objectiveS of the study were: (i) to determine the effect of urban livestock farming on household income and income distribution. (ii) To determine the effect of urban livestock farming on employment and (iii) to determine the effect of urban livestock farming on household food security and nutrition at household level. In assessing the socio-economic effect of urban livestock farming, with and without design was adopted whereby socio-economic status of livestock keeping households was compared with the socio-economic status of non livestock keeping households in the same location. The study was conducted in Kinondoni municipality in Dar es Salaam city. Data were collected using questionnaires administered to 100 livestock keeping and 100 non livestock keeping households randomly selected from livestock and non livestock keeping households in Kinondoni municipality. The data were analysed using descriptive statistics, regression analysis and Gini coefficient. This chapter presents the conclusions and recommendations based on the major findings of the study.

5.1 Conclusions

5.1.1 Effect of urban livestock farming on household income and income distribution

It was hypothesized that urban livestock farming has no significant effect on total household income and income distribution. The findings of the study have shown income of livestock keeping households to be significantly higher than incomes of

non livestock keeping households. On income distribution the concentration coefficient score indicates that the income from urban livestock farming affect negatively the income distribution. These two findings indicate that urban livestock farming has effect on household income and income distribution hence the null hypothesis that urban livestock farming has no significant effect on total household income and income distribution is rejected.

5.1.2 Effect of urban livestock farming on employment

The study hypothesized that urban livestock farming has no significant effect on employment creation. Contrary to the stated hypothesis, livestock keeping households were found to create significantly more jobs than non livestock keeping households. Therefore the null hypothesis that urban livestock farming has no significant effect on employment creation that urban livestock farming has no significant effect on employment creation is rejected.

5.1.3 Effect of urban livestock farming on household food security and nutrition at household level

The findings of the study indicate that livestock keeping households were significantly able to feed themselves from their own resources than non livestock keeping households. Furthermore diets of livestock keeping households were found to be significantly more diversified than diets of non livestock keeping households. These evidences are contrary to the null hypothesis that urban livestock farming has no significant effect on food security and nutrition at household level. Therefore this null hypothesis is rejected.

5.2 Recommendations

5.2.1 Improving access to capital

Although urban livestock farming was found to contribute significantly to total household income, shortage of capital was a major problem for urban livestock keepers. This calls for banks and other financial institutions to look for possibilities of giving loans to urban livestock keepers. The loans should be well designed in terms of repayment period (should reflect life cycle of the animal and long enough) and interest rate to suit the long gestation period of livestock enterprises. Provision of capital will enable urban livestock keepers to expand their livestock business and increase its contribution to total household income. The capital can be in kind in the form of animals, farm inputs or in the form of cash. All these will enable the poor who are disadvantaged to participate in urban livestock farming. Participation of the poor in urban livestock farming would likely reduce income inequality.

5.2.2 Review of urban livestock policies and by-laws

Most urban livestock farmers have been operating without formal recognition of their main livelihood activities and they lack structural support, policies and regulations. This necessitates review of the existing policies and by-laws which seem to be confusing. In addition to the review of policy documents, recognition of urban livestock farming needs to be reflected not only on policy documents but also on day to day operations of Municipal authorities.

5.2.3 Integrating livestock farming in urban land use planning

Many scholars have argued that urban livestock farming should be integrated in urban land use plan but the authorities responsible for enforcing urban by-laws have

never prioritized urban livestock farming in their land use plan despite its contribution. In highly populated areas, urban livestock keepers have been pushed away from the city centers and if necessary measures will not be taken this will continue as the city expands. It is the duty of urban planners to see how well they can include urban livestock farming in their land use plans. By doing so urban livestock keepers will be able to expand livestock business and hence improve its contribution to food security and nutrition.

5.2.4 Reducing cost of livestock farming

Although urban livestock was found to contribute to employment in urban areas, returns from the livestock farming business were found to be low due to the rising cost of keeping livestock. Urban livestock keepers could increase their returns and employ more people if the government subsidizes livestock farming inputs for a given time period.

5.2.5 Enforcement of laws and regulations governing provision of public veterinary services

The higher cost of keeping livestock is also attributed to high veterinary costs. Veterinary services have turned into business rather than services. Extension workers who are government officials misuse their offices by offering their services as private business rather than civil servants. The municipal council authorities should make sure that public veterinary officers abide to the laws and regulations which govern provision of their services.

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APPENDIXES

Appendix 1: Questionnaire for livestock keeping households

SECTION A: FARMER'S CHARACTERISTICS

A1	Age(years)	
A2	Sex	1=Male 2= Female
A3	Marital status	1= Single 2 = Married 3 = Widowed 4 = Separated
A4	Origin	1 = Native 2 = Migrant
A5	If migrant, what is your place of origin and tribe?	
APPENDICES A6	Education level	1= None 2 = Primary 3 = Secondary 4 = Post-secondary certificate 5=Diploma 6=Higher education
A7	Primary Occupation	1=Permanently employed 2=Temporarily employed 3=Self employment 4=Casual labourer 5 = Farming (including livestock) 6=Unemployed
A8	Secondary Occupation	1=Permanently employed 2=Temporarily employed 3=Self employment 4=Casual labourer 5 = Farming (including livestock)

SECTION B: INFORMATION ABOUT LIVESTOCK KEEPING

B1: For how long have you been raising livestock?

1= Less than 5 years 2= 5 to 10 years 3 = More than 10 years

B2	Reason for keeping livestock	1 = To get income 2= to get food 3= to diversify income 4 = Hobby 5 = inherited 6 = Tradition 7 = Lack of job 8=others(specify)

B3: Which livestock enterprises are you undertaking?

Enterprise	Number of animals

B4: Are you using your own land or you're lending?.....

B5: What were the sources of income from all livestock enterprises last year season?

Enterprises	Type of produce	Amount produced (Specify units)	Amount sold (Specify units)	Selling price per unit (Specify units e.g. Shs/litre)	Income
Cattle	Milk				
	Live animals				
	Meat				
	Skins				
	Manure				
Goats	Live animals				
	Meat				
	Milk (if dairy goat)				
	Skins				
	Manure				
Sheep	Live animals				
	Meat				
	Skins				
	Manure				
Pigs	Live animals				
	Meat				
	Manure				
Poultry (Layers, broilers, local chicken)	Eggs				
	Live birds				
	Others (Specify)				

B6: Would you say your household income has increased, remained more or less the same or decreased after getting involved in livestock farming? (√ Appropriate):

1. Increased ---------- 2.Remained more or less the same (No change) ----------3.Decreased----------

B7: How reliable is income obtained from livestock farming enterprise (√)

Very reliable ( ) Somehow reliable ( ) Less reliable ( ) Not reliable at all ( )

B8: To whom are you selling your excess? .....

B9: Please provide the following information on control over income and access to income/benefits derived from livestock farming by sex

Enterprises	Control of income				Access to income/benefits			
	Husband	Wife	Youth	All members	Husband	Wife	Youth	All members
1.								
2.								
3.								

B10: Who is usually involved in marketing agricultural products? (√)

1. Husband----------2.Wife ----------3.Youths ---------- ------ 4.Both husband and wife ----------5. All household members ---------- ----------

SECTION C: INCOME FROM DIFFERENT SOURCES

C1: What are other sources of income apart from livestock farming?

	Source of income	Amount earned per month (Tsh)
1	Salaried employment	
2	Business (Gross income- costs)	
3	Crop cultivation	
4	Transfer payments	
5	Other sources	
	Total	

SECTION D: HOUSEHOLD FOOD SECURITY

D1. Rank the sources of food in your household in order of importance (Most important=1)

Source of food	Rank
Own farm	
Purchase	
Given by neighbors/friends/relatives	
Government	

D2. On average, how many months in a year is your household able to adequately feed itself? ---------- --------- (Number of months)

D3: Are you able to feed yourself from own produced food or own produced and purchases? ---------- ----------

D4. On average, how many meals per day can your household provide to its members?

---------- (Number of meals)

D5. What food items do you consider to be luxury or of high value? ---------- ---------- ----------

D6. How often do you consume these high value foods per week? (√)

1. Very often ---------- 2.Often ---------- 3.Rarely ---------- 4. Not at all ---------- -------

D7: Compared to the past, has the food security situation improved, remained the same or decrease since you started keeping livestock? (√)

1. Increased ---------- 2.Remained the same ---------- 3. Decreased ----------

D8: How much (income) do you save for home consumption/food?

.....

.....

D9 How many people are there in the family and their age group?

.....
.....
.

D10: What food stuffs have you eaten last week?

1.....2.....3.....4.....5.....6.....
.....7.....8.....9.....10.....

D11: What portion of your produce do you use for your consumption?

.....

SECTION E: HOUSEHOLD ASSETS

E1.Please indicate household assets (and their value) which were purchased using income obtained from the livestock enterprises

Type of assets	Number	Value
Physical e.g. land, livestock, new house construction or rehabilitation of old house etc		
Land		
New house constructed (Indicate stage of new house)		
Rehabilitation of old house		
Livestock purchase		
Equipment and tools acquired using income from project enterprise e.g. ox-carts, TV, radio, mobile phone, plough, hand hoe etc		

E2. Please indicate amount of income used for education

Item	Number of children	Cost
Fees		
Books and stationery		
Others (specify)		

SECTION F: LIVESTOCK FARMING AND EMPLOYMENT

F1: Have you employed any labourer? Yes ( ) No ( )

F2: If yes, what is originality of your worker? .....

F3: How much do you pay him/ her? .....

SECTION G: CONSTRAINTS FACING URBAN AGRICULTURE

G1: What are the problems facing you as an urban farmer?

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.....
.....
.....

G2 what are the causes of these problems?

.....
.....

G3: In order to solve the problems what do you think should be done?

.....
.....
.....
.....

THANK YOU VERY MUCH FOR YOUR TIME AND CO-OPERATION

Appendix 2: Questionnaire for non livestock keeping households

SECTION A: RESPONDENT'S CHARACTERISTICS

A1	Age(years)	
A2	Sex	1=Male 2= Female
A3	Marital status	1= Single 2 = Married 3 = Widowed 4 = Separated
A4	Origin	1 = Native 2 = Migrant
A5	If migrant, what is your place of origin and tribe?	
A6	Education level	1= None 2 = Primary 3 = Secondary 4 = Post-secondary certificate 5=Diploma 6=Higher education
A7	Primary Occupation	1=Permanently employed 2=Temporarily employed 3=Self employment 4=Casual labourer 5 = Farming (including livestock) 6=Unemployed
A8	Secondary Occupation	1=Permanently employed 2=Temporarily employed 3=Self employment 4=Casual labourer 5 = Farming (including livestock)

SECTION B: HOUSEHOLD FOOD SECURITY

B1: Rank the food sources in the household in order of importance (Most important =1)

Source of food	Rank
Own farm	
Purchase	
Given by neighbors/friends/relatives	
Government	

B2: On average, how many months in a year is your household able to adequately feed itself? ---------- (Number of months)

B3: Are you able to feed yourself from own purchases? ----------

B4: On average, how many meals per day can your household provide to its members?

---------- (Number of meals)

B5: What food items do you consider to be luxury or of high value? ----------

B6: How often do you consume these high value foods per week? (√)

1. Very often ---------- 2.Often ---------- 3.Rarely ---------- 4. Not at all ----------

B7: Compared to the past, has the food security situation improved, remained the same or decrease since you started keeping livestock? (√)

1. Increased ----------2.Remained the same ----------3. Decreased ----------

B8: How many people are there in the family and their age group?

.....
.....

B9: What food stuffs have you eaten last week?

1.....2.....3.....4.....5.....6.....
.....7.....8.....9.....10.....

B10: How much (income) do you save for home consumption/food?

.....
.....

SECTION C: HOUSEHOLD ASSETS

C1:Please indicate household assets (and their value) which were purchased using income obtained from the livestock enterprises

Type of assets	Number	Value
Physical e.g. land, livestock, new house construction or rehabilitation of old house etc		
Land		
New house constructed (Indicate stage of new house)		
Rehabilitation of old house		
Livestock purchase		
Equipment and tools acquired using income from project enterprise e.g. ox-carts, TV, radio, mobile phone, plough, hand hoe etc		

C2: Please indicate amount of income used for education

Item	Number of children	Cost
Fees		
Books and stationery		
Others (specify)		

C3: Are you using your own land or you're lending? .....

C4: What is a total area of that land? .....

SECTION D: INCOME FROM DIFFERENT SOURCES

D1: What are other sources of income apart from livestock farming?

	Source of income	Amount earned per month (Tsh)
1	Salaried employment	
2	Business (Gross income- costs)	
3	Crop cultivation	
4	Transfer payments	
5	Other sources	
	Total	

SECTION E: EMPLOYMENT

E1: Have you employed any labourer? Yes ( ) No ( )

E2: If yes, what is originality of your worker? .....

E3: How much do you pay him/ her? .....

THANK YOU VERY MUCH FOR YOUR TIME AND CO-OPERATION