FACTORS INFLUENCING ACCESS TO AGRICULTURAL INFORMATION BY COMMERCIAL URBAN FARMERS IN KAMPALA CITY, UGANDA

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A Thesis submitted to the Graduate School in partial Fulfilment of the Requirement for the award Master of Science Degree in Agriculture Information and Communication Management of Egerton University

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DECLARATION AND RECOMMENDATION

Declaration

I declare that this work is original and has not been submitted to any other University/institution for any academic award. Where information is borrowed from other works done before, the sources have been fully acknowledged.

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DEDICATION

To the memory of my late father Mr Joseph Batte and sister Theopista Nagujja Adipala

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ABSTRACT

Commercial urban farming in Kampala is greatly challenged by inability to access agricultural information and agricultural department's lack of knowledge on farmer's information needs. In addition absence of designated areas for agriculture means that locations are ever changing, therefore a need for a comprehensive database. The purpose of the study was to contribute to the promotion of agricultural information dissemination to commercial urban farmers (CUFs). A total of 199 CUFs interviewed. In Kawempe division 76 farmers were interviewed, Lubaga 46, Central 16, Makindye 23 and Nakawa 38. Descriptive statics was used to identify and document farmer information needs and effective information pathways. Logit model using ordinary least squares was estimated to determine social economic factors that influenced access and use of agricultural information and Mann-Whitney test was used to asses levels of preferences of information sources for making production and marketing decisions for sub groups that were created. Majority of the farmers (28.1%) obtained their information from other farmers. Farmer's perceived demonstration plots and farmer workshops as being more effective sources of disseminating information. Most useful sources for making marketing decisions were marketing and production specialists (25.3%) and (24.2%) respectively. Most useful sources of information for production decisions were interpersonal and marketing specialists, (37.9%) and (25.9%) respectively. Access to information on high yielding varieties and pesticide application was influenced by education, farming experience, type agriculture and gender. Small income farmers preferred production specialists, print and interpersonal sources as their most useful sources of agricultural information for making production decisions ($P<0.05$). It can be concluded that access to agricultural information was influenced by farmer experience, education, gender and type agriculture practiced. The study recommends that more demonstration plots should be established on the peripheries of the city. There is need to consider aspects like farmer education, farming experience and gender when packaging information for dissemination. The information should cater for educated and non-educated farmers and should be gender specific.

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LIST OF ACRONYMS/ABBREVIATIONS

CAD -City Agricultural Department

CGIAR-Consultative Group on International Agricultural Research

CUFs-commercial urban farmers

FAO-Food and agriculture organisation

FC-Faecal Coliforms

FGDS-Focus group discussions

GIS- Geographical information system

GPS -Global Positioning System

IDRC-International Development Research Centre

KCC-Kampala City Council

Kg-kilogram

KES-Kenya shillings

MAPS- Marketing and Agro Processing strategy

NAADs National agricultural advisory services

NARS-National Agricultural Research Services

PEAP- Poverty Eradication Action Plan

PMA-Plan for Modernisation of Agriculture

RGB-Red Green blue

SPSS-Statistical Package for Social Sciences

UA-Urban Agriculture

UNDP-United Nations Development Program

UNFP-Uganda food and Marketing Policy

USD-United States dollars

CHAPTER ONE
1.0 INTRODUCTION

1.1 Background to the study

The past half-century has seen a massive movement of population in most developing countries from rural areas to urban areas (UN HABITAT, 2004). Until the latter half of the 20th century, the developing world was predominantly rural. In the mid 1900s, less than 20% of people in developing countries lived in cities and towns, (IDRC, 2005). By the turn of the millennium, that percentage had more than doubled (Figure 1.1).

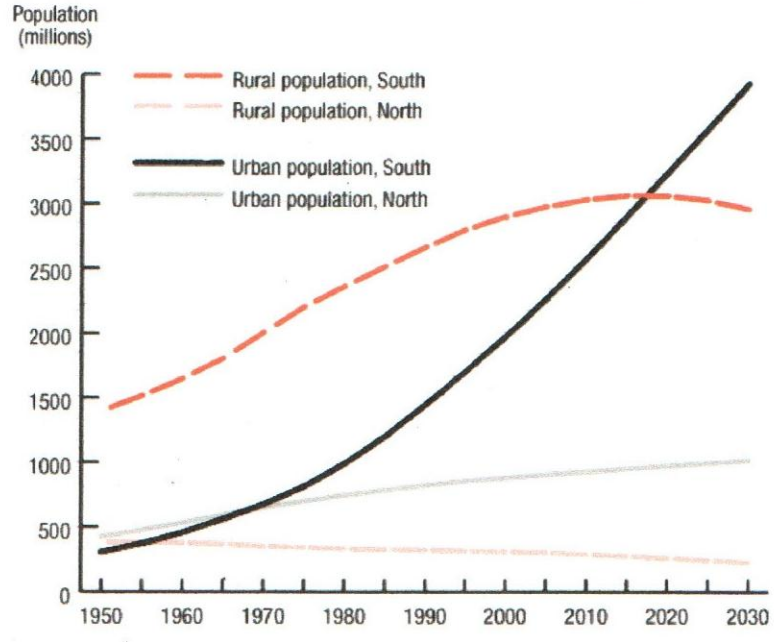


Figure 1.1 Rural and urban populations in developed (north) and developing (south) worlds 1950 to 2030 (projected): *Source: UN (2004).*

One predictable outcome of this massive population shift is poverty; the global level of urban poverty, currently estimated at 30%, is predicted to grow to 50% by 2020, with nearly this entire growth taking place in the world's less developed countries (UN-HABITAT, 2004). In Uganda, urban poverty constitutes 18% compared to 45% for the rural. It rose from 9.6% in 2000 to 12.2% in 2002/3 (Ministry Of Finance, Planning & Economic Development, Government of Uganda, 2004). Many of the migrants reach the cities with no resources,

bringing with them only what they can carry thus, resulting in increased number of urban poor. Most of the urban poor resort to urban agriculture to answer their problems of food insecurity and unemployment. In the early 1990s, agriculture provided the highest self-employment earnings among small-scale enterprises in Nairobi and the third highest earnings in all of urban Kenya (Karanja *et. al.*, 2006). In Tanzania it plays an important role in the employment sector, income generation and food supply. According to the 1998 Census, urban agriculture was ranked in Dar es Salaam's second largest employer, after small scale business enterprises. Urban agriculture occupied 11 per cent of the population aged 10 or more, but 20 per cent of those employed, turning out about 100,000 tons of food crops annually (Kyessi, 2002).

In Kampala, 36 per cent of the households surveyed within a 5km radius of downtown engaged in some form of agriculture (Maxwell, 2001). However, the effect of the sprawling cities and increase in population has transformed the agricultural land into other land uses especially residential and commercial use (Fig. 1.2). In addition Kampala agricultural land use has dropped from 35% to 13.5% between 1994 and 2004, and the resident population grew by 83.3%, from 774,241 to 1,419,272 between 1991 and 2006, (KCC, 2006). This has reduced land under urban agriculture. Productivity has also reduced as a result of low soil fertility, poor farming practices, competition for land from other land use practices, inadequate policies supporting proper urban agriculture practice in the city and inconsistent knowledge transfer and information flow among stakeholders, IDRC, (2005).

Maxwell (2001) further adds that the existing poor linkages between the farmers and the city council officials mandated to oversee the practices of urban agriculture has rendered vital information inaccessible and urban agriculture practices unsound in the city. Compounding the challenges is the lack of spatial information on location and activities of urban farmers, inadequate use of ICTs like Geographic Information System (GIS) in the city council agriculture department to collect, collate and analyse information for making informed decisions, (Atukunda et al., 2003). Urban farming, further carried out haphazardly within in the city, practiced in areas that are considered to be unsafe to the health of the people. In addition, urban farmers especially producers of vegetables use sewage irrigation which is also very hazardous, IDRC (2005). This could be done away with by GIS providing information to decision makers about the locations within the city where safe and orderly urban agricultural practices would be practiced through the use of land use maps.

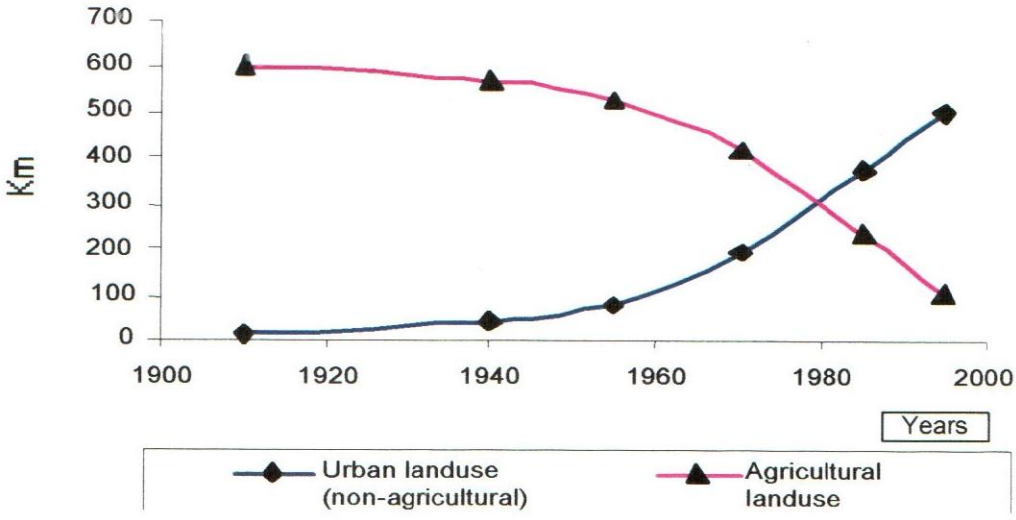


Fig. 1.2 Relationship between urban sprawl and agricultural land use

Source: (UNDP, 2004)

1.2 Statement of the problem

Urban agriculture is an important activity for low income urban communities in many cities of the world. In Kampala, just like in many other cities it has given solutions to problems of food security to many urban poor. However, the yields are still low among farmers that practice urban agriculture.

Most studies have mainly focused on factors like land tenure systems, institutional and policy infectiveness, effects of the sprawling city, socio- economic factors, safety and quality issues and production-based innovations like quality enhancement.

Access to agricultural information is one of the most important factors that influence production. Issues like effective pathways of disseminating information, appropriate knowledge about information needs of commercial urban farmers and a comprehensive geo spatial data base of urban farmers in the city have not been fully addressed. In addition limited work has also been done to determine the factors that determine farmer preferences of agricultural information pathways for making production and marketing decisions. The study therefore, mapped the location of farms, determined the socio-economic factors that influence farmers access to agricultural information, assessed and ranked the information pathways that

farmers preferred for making marketing and production decisions and identified and documented the information needs of commercial urban farmers to address the problem.

1.3 Objectives of the study

1.3.1 General objective

The broad objective was to contribute to the promotion of agricultural information dissemination in urban agriculture.

1.3.2 Specific Objectives of the study

The study was guided by the following objectives.

1. To map the spatial location of farms and determine the socio-economic factors that influences the access and use of information by commercial urban farmers in Kampala.
2. To identify and document the information needs of commercial urban farmers within Kampala.
3. To identify and rank the effective information dissemination channels that can be used to enhance the productivity of urban agriculture in Kampala
4. To assess and rank the information sources urban farmers consider useful to make production and marketing decisions

1.4 Research Questions

1. What socio-economic characteristics influence the access to information by commercial urban farmers in Kampala?
2. Where in Kampala are commercial urban farmers located?
3. What are the information needs of households that practice urban agriculture in Kampala City?
4. What effective information dissemination channels can be used to enhance the productivity of urban agriculture?
5. What information sources are considered useful by commercial urban farmers for making production and marketing decisions?

1.5 Significance of the Study

The contribution of urban agriculture to agricultural production, employment creation and food security over the recent past has been acknowledged and there is need to make available to urban farmers just like rural farmers appropriate information to enhance their yield from urban agriculture activities. In order to ensure appropriate farm technologies are passed to urban farmers, there is need to identify their information needs and their pathway preferences. It is against this background that the study took a closer look at urban farmers' information needs, effective pathways used in information dissemination, the socio-economic factors influencing access to agricultural information and information pathways useful for making production and marketing decision among commercial urban farmers.

1.6 Operational definitions of terms

Urban agriculture: Urban agriculture, generally refers to small areas (e.g. vacant plots and gardens) within the city for growing crops and raising small livestock or milk cows for own-consumption or sale in neighbourhood markets

Commercial urban agriculture: Commercial urban agriculture as used in the study is defined as a system of farming aimed primarily on commerce or income generation.

Commercial urban farmers: Commercial urban agriculture as used in the study is defined as a person/group of persons who engage in farming primarily for commerce or income generation.

Information Pathways: Route through which information about new innovations follows from the institution to the target users

Peri urban agriculture: Peri-urban" agriculture, as used here, refers to farm units close to town which operate intensive semi- or fully commercial farms to grow vegetables and other horticulture, raise chickens and other livestock, and produce milk and eggs.

Urban agriculture farming system: Urban agriculture is divided into five broadly defined farming systems aquaculture, horticulture, animal husbandry, agro-forestry and other urban farming activity.

CHAPTER TWO
LITERATURE REVIEW

2.0 Urban Agriculture (UA)

According to (IDRC , 2005), authors differ in defining urban agriculture; the following key features characterize the activity. (1) Urban agriculture involves crops and livestock production, but it may also include agro-forestry and fuel wood production. (2) Urban agriculture is practiced both within the urban boundary and its periphery. (Atukunda, *et al.*, 2003) defines urban agriculture as the practice of crop cultivation and livestock rearing within the boundaries or the immediate periphery of a city.

The choice of what to produce and how to produce it is determined by the culture, traditions, market, water supply, climate, soil condition, plot size and distance from home.

Family and individual resources, land availability and location are critical determinants of the type of urban agriculture practiced. Urban agriculture is an industry that produces, processes and markets food and fuel, largely in response to daily demand of consumers within a town, city or metropolis, on land and water dispersed throughout the urban and peri-urban area, applying intensive production methods, using and recycling natural resources and urban wastes, to yield a diversity of crops and livestock.

Urban agriculture is divided into five broadly defined farming systems aquaculture, horticulture, animal husbandry, agro-forestry and other urban farming activity (UNDP, 2004).

2.1 Commercial, Characteristics and Actors in Urban Agriculture

Commercial urban agriculture as used in the study is defined as a system of farming aimed primarily on commerce or income generation. The objective of a commercial system is to produce a maximum yield for regular sale on the market at an adequate rate of return such that the profit is reinvested in the system of farming to produce further yield and expand outputs, employment opportunities, and other necessities. Urban agriculture activities in greater Kampala are primarily informal; few that would be formal commercial agricultural enterprises operating without official recognition however do exist, (IDRC, 2005).

(Kyessi, 2002) asserts that the most striking feature of urban agriculture, which distinguishes it from rural agriculture, is that it is integrated into the urban economic and ecological system. Such linkages include the use of urban residents as labourers, use of typical urban resources (like organic waste as compost and urban wastewater for irrigation), direct links with urban consumers, direct impacts on urban ecology (positive and negative), being part of the urban food system, competing for land with other urban functions, being influenced by urban policies and plans. In Kampala majority of urban farmers produce for subsistence, followed by those who produce for both subsistence and commercial purposes while a small majority produces entirely for commercial purposes, (Maxwell, 2001). In addition most of the commercial farmers rear live stock especially poultry, mainly due to the small nature of urban farms in Kampala, (KCC, 2006).

Urban agriculture, generally refers to small areas (e.g. vacant plots and gardens) within the city for growing crops and raising small livestock or milk cows for own-consumption or sale in neighbourhood markets. "Peri-urban" agriculture, as used here, refers to farm units close to town which operate intensive semi- or fully commercial farms to grow vegetables and other horticulture, raise chickens and other livestock, and produce milk and eggs. The activity occurs within and surrounding the boundaries of cities throughout the world and includes products from crop and livestock agriculture, fisheries and forestry in the urban and peri-urban area, (Okiy, 2003). It also includes non-wood forest products, as well as ecological services provided by agriculture, fisheries and forestry. In addition, the territory covered within official city boundaries varies enormously across countries and can be more or less built-up; likewise the "peri-urban" area around cities ranges from densely to sparsely populated, (Karanja, *et al.*, 2006). The distinction between "urban" and "peri-urban" depends on the density, types, and patterns of land uses, which determine the constraints and opportunities for agriculture. What these diverse activities have in common - and in some cases what sets them apart from rural agriculture - is proximity to large settlements of people, thereby creating opportunities as well as risks, (IDRC, 2005).

The opportunities include;· less need for packaging, storage and transportation of food, potential agricultural jobs and incomes, non-market access to food for poor consumers, · availability of fresh, perishable food, proximity to services, including waste treatment facilities, waste recycling and re-use possibilities. The risks include, · environmental and health risks from inappropriate agricultural and aqua-cultural practices, increased competition

for land, water, energy, and labour, reduced environmental capacity for pollution absorption, (Karanja, *et al,* 2006, Kyessi, 2002).

According to (Sawio, 2002) actors in urban agriculture include; urban poor, contrary to general belief they are often not recent immigrants from rural areas (since the urban farmer needs time to get access to urban land, water and other productive resources).

In many cities, one will often also find lower and mid-level government officials, school teachers involved in agriculture, as well as richer people who are seeking a good investment for their capital, (IDRC, 2005). Women constitute an important part of urban farmers, since agriculture and related processing and selling activities, can often be more easily combined with their other tasks in the household. Most urban farmers in Kenya are women (56 per cent), with the proportion of women being higher in the larger towns (62 per cent in Nairobi). Only in Kitui were there fewer women than men among urban farmers (47 per cent), (Karanja, et al., 2006). Among household heads engaged in urban farming, women form an even higher proportion (64 per cent), whereas men were the majority among hired urban farm workers (82 per cent). The situation is not different in Uganda where 60% of the farmers are women and nearly 80% of the labour is provided by women, and both production and consumption decisions are largely made by women, (Maxwell, 2001).

2.2 Why Urban Agriculture

(Kingori, 2004), observes that rapid urbanization that is coupled with a rapid increase in urban poverty and food insecurity. By 2020 the developing countries of Africa, Asia, and Latin America will be home to some 75% of all urban dwellers, and to eight of the anticipated nine mega-cities with populations in excess of 20 million, (UN HABITAT, 2004). It is expected that by 2020, 85% of the poor in Latin America, and about 40-45% of the poor in Africa and Asia will be concentrated in towns and cities. Most cities in developing countries have great difficulties to cope with this development and are unable to create sufficient formal employment opportunities for the poor, (Smit, *et al.*, 2000).

(Smit, *et al.*, 2000) further contends that urban agriculture provides a complementary strategy to reduce urban poverty and food insecurity and enhance urban environmental management. It plays an important role in enhancing urban food security since the costs of supplying and distributing food to urban areas based on rural production and imports continue to increase,

and do not satisfy the demand, especially of the poorer sectors of the population. Next to food security, urban agriculture contributes to local economic development, poverty alleviation and social inclusion of the urban poor and women in particular, as well as to the greening of the city and the productive reuse of urban wastes. The contribution of urban agriculture to food security and healthy nutrition is probably its most important asset. Food production in the city is in many cases a response of the urban poor to inadequate, unreliable and irregular access to food, and the lack of purchasing power (Kyessi, 2002).

2.3 Economic Impacts of urban agriculture

Growing your own food saves household expenditures on food; poor people in poor countries generally spend a substantial part of their income (50 – 70%) on food, (IDRC, 2005). Growing the relatively expensive vegetables therefore saves money as well as on bartering of produce. In Mexico City production of swine brings in 10-40% of household earnings, urban cowshed-based milk can supply up to 100% of household income and in sub and peri-urban areas maize production provides 10-30%, vegetable and legume production even up to 80% of the household income (Alerge, *et al.*, 2000). In Harare, savings accruing to small-scale urban farmers are equivalent to more than half a month's salary (Nugent, 2001) In Dar es Salaam, urban agriculture forms at least 60% of the informal sector and urban agriculture is the second largest urban employer (20 percent of those employed), in Nairobi in the early 1990s, agriculture provided the highest self-employment earnings among small-scale enterprises and the third highest earnings in all of urban Kenya (Karanja, et al., 2006).

(Prain, 2006) further asserts that besides the economic benefits for the urban agricultural producers, urban agriculture stimulates the development of related micro-enterprises: the production of necessary agricultural inputs and the processing, packaging and marketing of outputs. Available information on urban agriculture in Kenya indicates that urban agriculture makes an invaluable contribution to national development. It is estimated that 25.2 million kg of crops worth about 61 million KES (about 4 million USD in 1998), were produced in urban areas in one season (IDRC, 2005). In Kampala just like other cities, urban agriculture has a significant contribution to the economy, through creation of employment, development of other micro enterprises, and source of food for the economically marginalised. It is estimated that over 40% of the Kampala dwellers are employed in urban agriculture, 55 per cent of 150

producers obtained 40 per cent or more, and 32 per cent obtained 60 per cent or more of their household food from their own urban gardens (Maxwell, 2001).

2.4 Social Impacts

Urban agriculture functions as an important strategy for poverty alleviation and social integration. Several examples exist of municipalities or NGOs that have initiated urban agriculture projects that involve disadvantaged groups such as orphans, disabled people, women, recent immigrants without jobs, or elderly people, with the aim to integrate them more strongly into the urban network and to provide them with a decent livelihood (Meyer, 2003).

2.5Contributions to Urban Ecology

Urban agriculture is part of the urban ecological system and can play an important role in the urban environmental management system, (Sawio, 2002). Among the contributions of urban agriculture to the environment (Sawio, 2002) observed, that a growing city will produce more and more wastewater and organic wastes. For most cities the disposal of wastes has become a serious problem. Urban agriculture can help to solve such problems by turning urban wastes into a productive resource. In many cities, local or municipal initiatives exist to collect household waste and organic refuse from vegetable markets and agro-industries in order to produce compost or animal feed, but one can also find urban farmers who use fresh organic waste. Quality compost is an important input that can fetch a good price, as is the case in Tanzania. Compost allows an urban farmer to use less chemical fertilizers and by doing so preventing problems related to the contamination of groundwater. In addition, compost-making initiatives create employment and provide income for the urban poor (Just, 2002).

Farmers may use wastewater for irrigating their farms when they lack access to other sources of water or because of its high price. The use of fresh (untreated) wastewater has the additional advantage for poor urban farmers that it contains a lot of nutrients (although often not in the proportions required by their soils and crops). However, without proper guidance, the use of wastewater may lead to health and environmental problems. Farmers need to be trained in self- protection during handling of the wastewater, proper crop selection and adequate irrigation methods, among other things, (Prain, 2006). In addition, in Bwaise, a

suburb in Kampala, the use of waste water resulted into high concentration of heavy metals in yams making them unsuitable for human consumption (Maxwell, 2001).

2.6 Challenges of Urban Agriculture (UA) among Practitioners

While UA offers enormous potential, it is a mistake to believe that producing food in cities is free of problems. Although a number of major constraints exist, three are particularly important: access to land, access to water and the absence of comparative economic values generated by UA in the face of other activities such as land development. In cities, land is at a premium. The high value of urban land often makes UA at any scale particularly vulnerable, especially in terms of how the poor can access space to grow food. (Mushi, 2004) observed that, most farmers in Malawi indicated that for them, access to land is the most pressing constraint on UA.

Security of tenure determines the extent of investment and self-help put into a property. Without secure tenure, farmers face eviction, uncertainty and are less willing to invest in long-term solutions related to their properties.

(IDRC, 2005) noted that another constraint is absence of Comparative Economic Values; failure to adequately measure and account for the relative contributions that UA make to alleviate poverty and contribute to a city's economy. Setting aside social and cultural 'returns' such as those outlined by Shillington in her chapter returns that as yet have not been well measured by economists – UA does not produce the same economic value on land that would otherwise be realized as a result of housing or commercial development. The lack of high economic output and, importantly, the lack of any assets that can be used for collateral restrict access to credit and financing mechanisms that urban farmers need so as to purchase inputs and build their enterprises. Other factors such as the predominance of the poor in UA, the illegal use of lands for UA, balancing health issues with social equity and the large number of women involved also contribute to the contentiousness of UA.

Nutrition and Environmental Health Burdens; much has been exposed by recent work on environment and health matters and UA in recent years. Its importance is clearly illustrated by the relevance some international organizations are placing on it. For instance, two of Consultative Group on International Agricultural Research (CGIAR) system wide initiatives

(International Water Management Institute and Urban Harvest) focus on supporting research on environmental and health matters related to the reuse of waste (IDRC, 2005).

Several studies have been conducted to explore the link between UA, environment and health. (Rakodi, 2000) noted that using water from the Rímac River in Lima for irrigation represents a major source of risk for farmers. Ninety seven percent of samples taken from the river were above acceptable limits for the presence of faecal coliforms (FC). Such micro-biological risks can be extrapolated to other rivers that are not only repositories for waste, but also sources of water for agricultural use. Heavy metals, especially cadmium and arsenic, also constitute a health problem in the Rímac River, where their presence as a result of mining was found in vegetables grown in the watershed. (Arce, *et al.*, 2006) shares his research from a large body that has been developed in Ghana on the topic of wastewater use. The level of pathogenic and pesticide contamination of produce at the farm level due to inappropriate irrigation methods is high. River for irrigation of vegetables and consumption of vegetables and yams from swamps around Kampala was discouraged based on the high levels of contamination with pathogens and heavy metals (Maxwell, 2001).

2.7 Use of GIS and mapping in Agriculture

Many studies in agriculture acknowledge the importance of mapping of agricultural and natural resources. It has been used especially in developed world in regions of intense agricultural production, to map adverse health effects from pesticide exposures, (Fenske, *et al.*, 2002; Lu, *et al.*, 2000; Ward, *et al.*, 2006). Furthermore geodatabases have been used in agriculture to monitor Poultry, in order to facilitate disease surveillance and assist in managing the response to outbreaks and other emergencies.

In addition, as a planning and decision support tool, GIS has the potential to provide much useful information to facilitate the siting of new farms, processing plants, and manure pelleting plants where they will have minimal impact on the surrounding environment. It could also assist planners in choosing locations for poultry litter application that will maximize the benefits of providing additional nutrients to cropland while minimizing the potential for nutrient runoff into the surrounding watershed. For regional resource management, such a database would enhance planning and budgeting efforts, provide important data to secure financial sup-port for needed infrastructure improvements, and

facilitate projections for future demand for inputs such as energy. In the event of a natural disaster or other emergency, a database of this type would assist in planning and relief efforts. (Michelle *et al.*, 2003)

2.8 Agricultural Information needs of farmers

Economists have long recognized the importance of complete and reliable information for making welfare maximizing decisions. (Hayami and Petersen, 1972) noted that missing information causes farmers to make production decisions that lead to lower profitability and a decrease in net social welfare. They further noted that much greater investment in collection and provision of data to primary farmers deliver social returns far greater than the extra costs related to the data provision. (Stiglitz,1985) contends that economic decisions usually are made under conditions of uncertainty but the uncertainty could be reduced by provision of information.

The amount of human capital possessed by various farmers drastically affects the amount and kind of information needed; those with more human capital got by with less-refined and less-targeted information whereas those with lower levels of human capital required more highly processed information and relied more extensively on commercial intermediaries and informal sources of information (Aina, 1995). The need of private sector farmers for information on markets, policies, production technologies and financial variables seems obvious. But information needs of farmers are tremendously complex and vary across types of farmers and regions, (Hayami and Petersen, 1972). (Xu , 2001) found large differences in information needs of farmers, depending on personal characteristics, local information, infrastructure conditions, market environment, and information services situation.

For instance (Zhao, 2000) noted that farmers in rural areas of Zhejiang province were most in need of information on agricultural policies and regulations and agricultural science and technology. In contrast, (Jiang., *et al.* 2006) in a survey of fifteen counties in Hebei province found that many types of information were in demand, though information on agricultural technology, agricultural economics was the most popular, cropping varieties, machines, production processes, product transportation, and rural policies, none of the farmers required information on agricultural policies and regulations

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More than 80% of the farmers in (Jiang, et al., 2006) survey had nine or more years of formal education, leading to increased needs for information. This partly agrees with (Zhao, 2004) findings that information needs of farmers in Hebei province depended on their educational level, income, level of economic development in their area, information service capacity, and cost of accessing the information.

But, (Okwu, 2009), revealed that farmers in Nigeria majorly needed information on pesticide and fertilizer application and improved farm inputs. In addition, (Sabo, 2006), farmers in Mubi region again in Nigeria needed majorly information on weather patterns and soil management insecticide and fertilizer availability. (Yahaya, 2000), intimates that women farmers generally needed information on how to increase farm income and prices of products from other states and market prices. In contrast (Rees, et al., 2000) noted that most farmers in Kenya considered information on technical details of farming (chemical application, how to manage late blight in potatoes, appropriate varieties, appropriate varieties for a given location, where to get certified seeds and others). Which slightly agree with (ministry of agriculture animal industries and fisheries, 2000) findings that many communities in Uganda blamed low productivity on lack of information on pests and disease control, prices, processing and pertinent government policies.

(Hu, *et al.*, 2006) studied the needs for agricultural information of farmers in Jiangxi province and found that the main challenges the farmers faced were the lack of awareness of available agricultural information networks. (Chen and Zhou, 2006) noted that not many qualified persons were available to provide reliable and scientifically based information on markets and technologies. However, (Ma, *et a.*, 2007) study of dairy farms in China's suburban areas and found that the rising demand for fluid milk and dairy products in Chinese cities led to increased total factor productivity in the dairy sector driven mostly by technological changes, including development of improved information systems

2.9 Agricultural information dissemination pathways and preferences

(Zhao, 1998) found that television and radio were the main channels by which farmers obtained necessary information to run their farming businesses and that information obtained through talking with friends and relatives tended to be mostly experience or hearsay information. He reported that the most educated farmers read newspapers to get information

on agricultural technologies and they tended to discuss agricultural policies in meetings with village leaders. This partly agrees with (Geng, 2001) who noted that, farmers who were educated mainly get information from television, radios and newspapers, in addition they also obtained information through internet, country market price notices, agricultural service stations, village departments that promote agricultural technology, and agricultural technicians' reports. It further agrees with (He and Zou, 2006) who noted that farmers in Inner Mongolia and Yunnan provinces mainly get information from television and radio. However, they noted that in addition other traditional approaches such as talking with neighbours and government officials were commonly used in rural areas. (Marvin, 1990) contends that sources of information for grain and corn farmers in the United States were radio broadcasts which partly agree with Zou's findings but differ significantly since commercial newsletters and marketing consultants were also commonly used in the United States. Zou's findings agree with (Okwu, 2009), who revealed that farmers in Nigeria got their information from their husbands and fellow women farmers. Though, mass media and extension personnel were also mentioned.

(Rees et al., 2000) however noted that in Kenya the major local sources of agricultural knowledge for farmers were extension services, neighbours, family, markets and community based organisation. Other sources of information included non governmental organisations, churches, community meetings, family and friends and agricultural companies. Information and visual centres that produced pocket books, leaflets, posters also served as alternative sources of agricultural information for farmers in Uganda, (Mubiru and Ojacor, 2001). In contrast (Oleru, 2004) found out that farmers in Arua district get information from private sources and major delivery methods were lectures, demonstration plots and field visits

On information source preferences, (Schnitkey, *et al.*, 1992) found out that commercial farmers in the state of Ohio preferred printed materials over other sources of information including Cooperative Extension Service, broadcast media and specialist sources for making marketing financial decisions. (Garcia, *et al.*, 1983) found that the likelihood that farmers in Illinois would prepare and use the information from financial statements was related to the expected costs and benefits from using such information. Farmers with larger farms, larger debts and more education were more likely to prepare and use this type of information in their decisions while older farmers were less likely to do so.

2.10 Conceptual framework

The diagram below shows the interaction of various factors that are considered to have various degrees and direction of impact on commercial urban farmer access to information and preference of information sources.

Institution and policy factors; policy and institution such as land tenure, legal and safety issues, have external impact on the production of farmers. Secured land tenure systems encourage farmers to make farm investment for sustainable and long term production. Farmer centred agricultural policies and institutional arrangements that facilitate access to credit will help the producer to get the needed inputs and capital for production. Membership to farmer's cooperatives can create opportunities for knowledge exchange among farmers and provides access to information. These policy and institutional factors are considered to have an indirect influence on farm production through affecting technical efficiency of the farmer. However these are not under the control of the farmer.

Environmental factors, factors such as climate change, weather conditions, pest and disease infestation and drought and famine, affect the resource use of farmers. Suitable weather for agriculture, absence of pests and diseases will affect how the farmers use resources.

Farmer related variables, like level of farmer education and years in farming influences the producer's management capacity. An educated and experienced farmer is likely to make sound production and marketing decisions and they are likely to access more information.

Farm related variables, like farm location is important since it may influence the farmer's needs and access to information. A farmer in different soil quality for example will seek for information on how to improve his/her land. Farm size will affect farmer resource use levels, there by affecting amount of resources committed to information sourcing.

Feed back effect, farm and farmer related factors which were affected by the external factors will have a simultaneous effect on the farmer's access to information, preferences, information needs and availability of information. As it is also indicated in the diagram, the outcomes of these interactions will contain different policy variables such as higher yield, sustainability of farming, food security and higher farm incomes. The levels of these policy variables will have an important feedback effect on the institutional and policy environment for further improvement and policy making process.

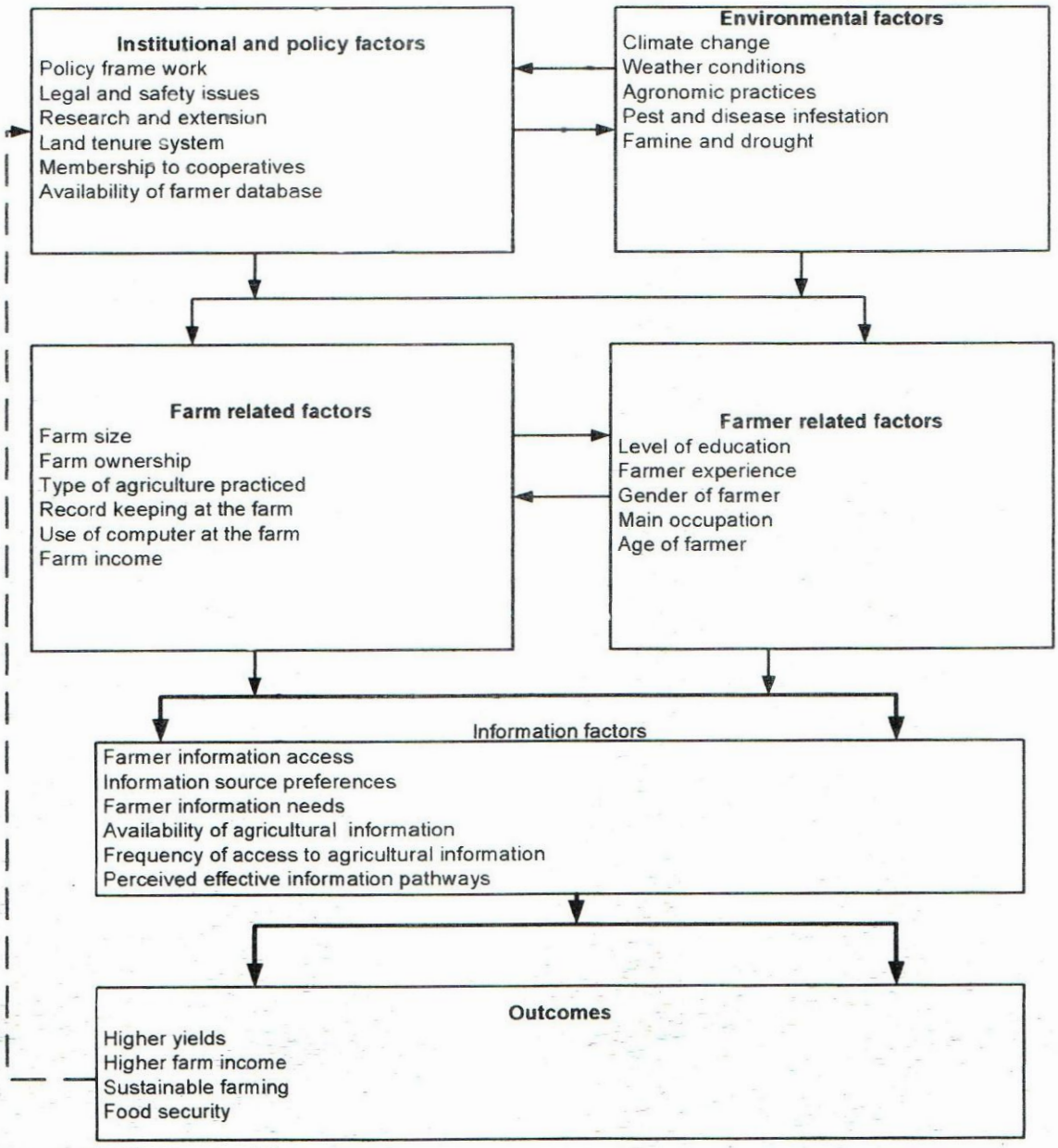


Figure 2.1 Conceptual framework

CHAPTER THREE

METHODOLOGY

3.0 Location and Administrative set up of Kampala

Kampala City is located in Central Uganda (Figure 3.1), on the northern shores of Lake Victoria, bordered by Wakiso District to the North, East, West and South- West, while Lake Victoria is in the South East. Kampala is situated 32°15'East; 0° 19' North. The city is about 45km north of the Equator. It covers an area of 195km^2.

Kampala is both the administrative and commercial capital of Uganda situated on about 24 low hills that are surrounded by wide valleys with wetlands, characterized by an imprint of scattered unplanned settlements. This urban form is attributed to the dualism, which arose between the local Kibuga and Kampala Township or Municipality. The former was largely unplanned and unsanitary while the latter was fully planned and highly controlled. The first modern urban planning scheme for Kampala was in 1912, covering Nakasero and Old Kampala hills, an area of 567 Ha and a population of about 2850 people. This was followed by other planning schemes in 1919, 1930, 1951, 1968, 1972 and the latest in 1994 (KCC, 2006).

The City is divided into five (5) Divisions, namely Central, Kawempe, Makindye, Nakawa and Lubaga. There are 100 parishes and 802 zones and their distribution is indicated in the (Table 3.1).

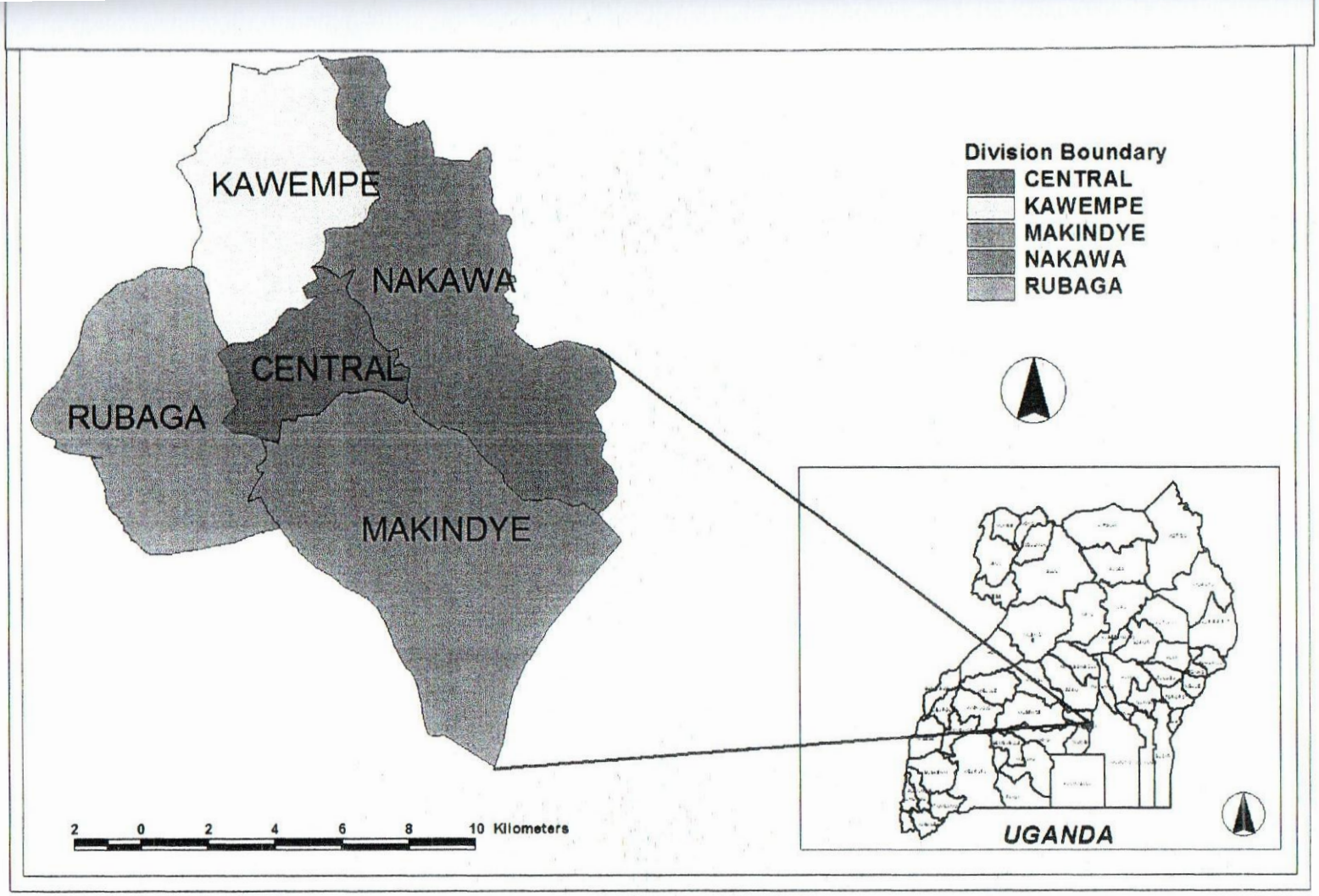


Figure 3.1 Location of study area

3.1 Geology, Climate and Vegetation

The geology is comprised of the pre-Cambrian rock systems of undifferentiated genesis and granite rocks. Soils are basically ferralitic soils with no minerals and mainly Buganda and Kabira catena, and Kaku series. The city is located on about 24 flat topped hills with average altitude of 3,910ft (1120m) above sea level, steeper upper sages, merging into undulating slopes ending into broad valleys dissected by perennial streams/channels (KCC, 2006).

Rainfall comes into 2 distinct rain seasons in a year, with 1,750- 2,000mm having peaks in March May and September- November. These are marked with dry seasons in June-July and December to January. The mean annual temperature is 21.9°C and annual range of 2.4°C. Relative Humidity ranges between 53 and 89%.

Natural vegetation is characterized by forests and swamp vegetation in the valleys. However most of this has been destroyed due to rapid urbanization and hence replaced by infrastructure, residential, commercial and industrial development. Currently, natural vegetation is limited to a few papyrus swamps.

3.2 Research design and sampling procedure

A purposive stratified random sampling was used. The City was divided into five (5) strata following the administration units of the City. A simple purposive random sampling was used to select the households that practice commercial urban agriculture within the five divisions. Households were chosen from each division purposively, based on at least selling some of their products to earn a living and divisions having adequate numbers of commercial farmers available to provide a good sized sample for the study based on calculated sample size. The sample size was derived as below

3.2.1 Sample Size (n)

The study draws its sample from farmers engaged in commercial urban agriculture. They comprises about 15% (p=0.15) of the total number of urban farmers in the city (Maxwell, 2001). Hence, for 95% (Z=1.96, 2 tailed test) level of confidence, within ±5% (e=0.05) margin of error and taking into account the proportion of commercial farmers in the city, the sample size n, was derived from the following formulae provided by (Israel, 2003).

$$n = \frac{Z^2.p.q}{e^2}$$

Equation 1

Where Z = value of the standard variate at a given confidence level, n = desired sample size when the population is large, p = proportion in population estimated to have characteristics being measured; e= level of precision and q= 1-p

By substitution: $n = 1.96^2 * 0.15 * 0.85 / 0.05^2$ *n=196.* Nevertheless 199 farmers were studied.

The proportions of commercial farmers that were studied in every division were deduced from table 3.2 below. The 199 farmers were equated to number of commercial farmers in each division to obtain representative proportions for each division, i.e. Kawempe 76, Lubaga 46; central 16 Makindye 23 and Nakawa 38 farmers were studied. For mapping of farms, GPS way points were captured for every commercial farmer during the interview.

Table 3.1 Commercial urban farmers working with CAD

Division	Total area (Km^2)	Crop farmers	Cattle farmers	Poultry farmers	Mushroom farmers	Fish farmers	Total
Central	15.8	40	42	300	10	0	**492**
Nakawa	31.7	642	104	850	55	7	**1208**
Makindye	47.9	400	73	990	43	5	**711**
Lubaga	50.8	412	70	940	33	7	**1462**
Kawempe	38.9	316	89	800	46	6	**2407**
Total	185.1	1810	378	3880	187	25	**6280**

Source: Adopted from District Urban Agricultural Report 2005

(Table 3.2 above doesn't show all the commercial urban farmers in Kampala city but only farmers that work with the CAD. The farmers studied were not those working with city council but the data in the table was used **only** to derive the proportions of farmers to be studied from each division since the sample size had already been deduced from the population).

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3.3 Measurement Variables for the study

Mapping of the spatial location of farms was done by taking latitudes and longitudes points for the households. Characterizing of households data on variables like, type of agriculture practiced by farmers, land ownership, household sizes, land size of the farmers, social economic characteristics of the farmers, reasons for practicing urban agriculture, household size among others was gathered.

Perception regarding effective agricultural information dissemination channels; was measured by collecting information on perceived importance, ease of accessibility and usability, clarity , accuracy, frequency of use of a given source, and retention of information from a particular source.

Agricultural information sources perceived to be useful in making production and marketing decision were measured by using farmer preferences of the various information sources for making such decisions.

Information needs of urban farmers; were determined using, type of information needed reasons for carrying out agriculture, and ranking of their degree of need of certain information and access of information received currently.

3.4 Validity

The questionnaire was tested in order to check its content, construct and face validity. Content validity was to ensure that the content that the instrument contains is an adequate sample of the domain of content it is supposed to represent. Face validity delt with format of the instrument and includes aspects like clarity of printing, font size and type, adequacy of workspace, and appropriateness of language among others. Construct validity determined the nature of psychological construct or characteristics being measured by the instrument. Experts, supervisors and peers from Egerton helped in the review to ensure the instrument accurately measured the variables it intended to measure in the study.

3.5 Reliability

The instrument was pre-tested with a sample of 20 households similar to the study area. This was done in the neighboring town council, Kira that has similar characteristics to the study area. The number 20 was chosen for pre-test because according to (Israel, 2003) it is the

smallest number that can yield meaningful results on data analysis in a survey study. The results of the pilot-test indicated a reliability coefficient of 0.7 for the whole instrument using the cronbach's alpha coefficient. More items were added into the questionnaire to improve its reliability.

3.6 Mapping and characterizing CUFs within Kampala

Image data was analysed to get the current status urban agriculture practices within the city. Farm locations were identified by the use of the current quick bird satellite image of Kampala, 50cm resolution, with natural colour composition, acquired on 20th of February 2010. This was digitized using on screen digitizing, and the polygons created formed a base map for location points and database to be generated. The borders of the identified locations were then drawn into the respective land use maps (scale 1:2500) of Kampala City. The high resolution of the images red, green and blue (RGB) and the large scale of the topographic maps made it possible to obtain high accuracy regarding the position of the boundary lines. For ground truthing, several accompanying field visits were made.

3.6.1 Field Work (using topographic maps and GPS)

All households contained in the sample and urban agriculture activities identified during the satellite image analysis were confirmed on the ground through ground truthing. All households considered in the sample were marked on the map. Global positioning system (GPS) points were taken to map the location of households that practice urban agriculture by taking their geographical location points and recording them in a booking sheet (Annex 3). The geographical coordinates of the location of the urban farmers were taken, given a unique identifier and entered in the booking sheet and some were saved in the GPS. Later, the coordinates were downloaded into a computer, those recorded manually on the data sheets were put into the computer using excel spread sheet, saved as DBase IV files and exported to ArcView 3.2 software to make shape files that were used as a basis for developing locational maps and establishing tables for making a database.

3.6.2 Information needs and Sources useful for making production and marketing decisions

The data in the main survey was obtained through a combination of farm and household surveys using a questionnaire. Individual interviews, focus group discussions, preference ranking and participant observations were used.

To achieve objective two, a questionnaire (appendix 2) sought to collect information on sixteen aspects of urban agriculture First the Farmers were asked to indicate whether they receive information on the aspects above, and ultimately ranking the degree of need of such information on a scale of 1-5 where 1 meant less need and 5 meant the highest need for a particular information.

To achieve objective three, a questionnaire (appendix 2) sought to collect information on eighteen information sources that were considered to be very common to farmers in Kampala. Ultimately, Farmers were asked to rank the source on a scale of 1-5 the accuracy, usefulness, importance, clarity and ease of obtaining information from those sources i.e. (1= not accurate, 5= very accurate). In addition commercial farmers were asked to indicate whether they understand, the information obtained, frequency of use of the channels and information sources when used, they retain a lot of information.

To achieve objective four, a questionnaire (appendix 2) sought to collect information on twenty information sources which were considered to be useful in farm decision making. Farmers were asked to indicate on a scale of 1-3 the source of information that they considered to be most useful, second most useful and least most useful when making marketing and production decisions.

Where applicable the questionnaire was supplemented by focus group discussions with farmers and key informants. This was done because they had considerable experience and information concerning agriculture in the city, thus were able to provide relevant information regarding information needs of farmers, collection, processing and dissemination to urban farmers within the city

3.7 Focus group discussions (FGDs)

Five focus group discussions were carried out 2 in Lubaga division and one in Kawempe, Nakawa and Makindye were convened. Focus group discussions were used to triangulate, verify and discuss further aspects related to access to information by farmers in Kampala city.

Key informants were identified and consisted of male and female farmers who explicitly demonstrated profound knowledge of information needs, types information accessed, and constraints of certain information sources. The informants were commercial urban farmers and officers from city agricultural department (CAD).

Participants in FGDs where asked to identify information sources used by farmers in Kampala, information needs and rank the degree of need of types of information that were given to them in addition to what they had suggested. Data collected from the questionnaires was complimented by personal contact/observation with respondent and discussions with officials from CAD, in that more information from the survey was realised.

3.8 Data Analysis

Data from focus group discussions was analysed descriptively while data from individual interviews were analysed using SPSS version 14. Spatial analysis was used and maps were generated for some farmers characteristic.

GPS way points of location of households were entered in MS excel and converted into a D-base (IV) file format and transferred to ArcView 3.2a for mapping of the location of the households. The map for location of commercial urban farmers by type of agric was generated. Other maps showing relationships spatially between farmer and some farm characteristics like (farm income, age, education, farm experience, gender) were also generated using ArcView 3.2a. The maps and locations established will be used for subsequent monitoring and improved dissemination of agricultural information to the farmers.

Individual interview data was subjected to cross tabulations, percentages frequencies and figures were used for analysis to establish relationships between data. Mean for socio-economic characteristics like age, level of education, farming experience annual farm income and farm size were derived by summing up and divided with their total.

Mean ranks for the four variables were first derived from ranks given by individual farmers for the four variables that were given to farmers to investigate effectiveness i.e. clarity, accuracy, importance and ease of getting information. This was done irrespective of the type of agriculture practiced. Example the mean for all the ranks for the 199 farmers studied given

to a radio under variable importance was deduced (Mubangizi, *et al.*, 2004). This was repeated for all the 12 pathways across the four variables that were studied.

In addition, mean ranks given by farmers practising specific type of agriculture were also deduced for every information pathway across the four variables studied. The means were obtained by dividing all the ranks given by farmers under a given agriculture category e.g. poultry for every variable under study example clarity, summed up and divided by the number of farmers under that category. This was done for all variables and categories of agriculture practiced.

Chi-square test of independence was used to find out whether two or more attributes are independent or not. Attributes are independent if the distribution of one criterion in no way depends on the distribution of the other criterion. If they are not independent there is an association between the criterions. The null hypothesis that there is no association between the attributes under study is used i.e. that the two attributes are independent is taken (Gupta, 2009). A significant chi-square test result ($p<0.05$) indicates that two variable are not independent. A result that is not significant ($p>0.05$) indicates that there is no significant dependence of one variable on another. It should be noted that chi-square does not measure the degree or form of relationship; it only measures whether two variables are significantly related without any reference to any assumption concerning the form of relationship (Cronk, 2008).

Access to information on the two most ranked information aspects needed is a dichotomous dependent variable (access or not access, which is influenced by some explanatory variables (Maddala, 1992). It is possible to compare ordinary least squares for binary choice models, but results into heteroskedasticity error terms, that is the variance term is not constant for all observation, the parameter estimates obtained are inefficient, thus classical hypothesis tests like t-ratios are inappropriate (Abdi, 2003). The alternative is to use probability models, but linear probability models results into predicted values falling out side the (0, 1) interval thereby violating the basic tenets of probability. The possible solution recommended to overcome most of these problems is the use of probit and logit models. All parameter estimates in these models are asymptomatically consistent, normal and efficient since the models use likelihood estimation procedures. In this case the analogy of the regression t-test can be applied

Empirical evidence suggests that neither logit nor probit have superiority over the other. The choice becomes a matter of preference (Gujarati, 1988). In this study, access of information analysis used the logit model because of its computational and mathematical conveniences. It was used because the dependent variable takes the value 1(access to information) and 0 (not accessing information) is regressed on a number of socio-economic characteristics of households.

The Logit model estimates were obtained to assess the relationship between access to information and the factors that influence the farmers' decision. For this study, the model is specified as follows. (Pindyck and Rubinfield, 1996)

$$\frac{P_i}{1-P} = \Sigma (a_i X I + \beta_i Y_i + \varepsilon) \text{ Equation } \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

$\frac{P_i}{1-P}$ is the probability of access (P_i) and (1-P), non-access to information.

α_i XI and $\beta_i Y_i$ are coefficients to be estimated by maximum likelihood method.

Y is 1 if a person accessed information and 0 if otherwise. This implies that Y is binary or dummy, forcing use of either logit or probit model.

X represents vector of independent variables (socio economic factors) that are hypothesized to influence access to information such as, farming experience, gender, education level, type of agriculture practiced, among others, and ε is the unexplained variation. The Wald statistics was used to test the significance (p-value) of individual logistic regression coefficients, β_i, for each independent variable, X_I, (that is to test the null hypothesis in the logistic regression that a particular logit (effect) coefficient was zero). The null hypothesis was set at H_o=0, that is the probability of having access to information was independent of X_i. The Wald ratio is the squared ratio of un-standardized logistic coefficient (β) to its standard error and has a chi square distribution. The approach has been used in several information preference and access studies like to determine factors that influence farmers likelihood to participate in field days (Amudavi, 2008), and show factors that influence farmer preference of information sources (Schnitkey, et al., 1992).

3.8.1 Test statistics for most useful sources for production and marketing decisions

Farmer's ranks for most useful information source were obtained for each source and each farmer's rank for most useful for a given source were placed within a single preference

category. If, for example, ranks for most useful for radio and TV were put together to comprise the number for farmers who ranked broadcast sources as most useful. The sample was then divided into two sub-groups based on, in turn, income size, age, and education level and farming experience. It was divided at approximately the sample mean for age and farm income, farming experience, and into primary school or less and secondary and above education levels. Variations in information preferences were tested based on response differences between the sub-groups using a Mann-Whitney nonparametric test. This test was chosen because it is more powerful than a simple t-test of mean differences and because it doesn't require distributional assumptions about the sample population, (Marvin, 1990).

CHAPTER FOUR

RESULTS

4.1 Social characteristics of commercial urban farmers (CUFs)

Female respondents in the survey comprised 53.3%. The study further revealed that adult family members were involved in making farm decisions and accessing of information. Few female farmers (f=6) kept goats, and a few (f=6) male farmers were involved in piggery appendix 3.

Age distribution for commercial farmers ranged between 18-92yrs with a mean of 39±12.45. Majority of the farmers were aged between 29-38 years, (Table 4.1a).

Over two thirds of the commercial farmers have been involved in urban agriculture for 1-10 years with a mean of 9±7.09. Such farmers were mainly in poultry (appendix 4). A chi-square test of independence indicated a significant correlation $\chi_2=7.413$, $p< 0.05$ between farming experience and the needs of information. Note farming experience was taken as the number of years respondents have practiced agriculture irrespective of their natural age.

The distribution of education levels among the farmers was 45%, 22% and 11% for secondary education, tertiary education level and no formal education respectively. The mean number of years spent in school was 10±4.68. A chi-square test of independence indicated a significant correlation $\chi_2=7.833$, $p<0.05$ between the level of education and the need for agricultural information

Table 4.1a: Socio characteristics of commercial urban farmers in Kampala

Socio-Characteristics	%
Gender	
Males	46.7
Females	53.3
Age (years)	
18-28	18.1
29-38	35.2
39-48	25.6
49-58	11.6
59 and above	9.5
Farming experience	
1-10 years	67.3
11-20 years	18.6
21+	14.1
Education levels	
No formal education	11.1
Primary	21.1
Secondary	45.2
Tertiary	22.6
Marital status	
Single	22.2
Married	67.8
Widowed	7.0
Divorced	3.0

Source: Data from the survey, 2010 (n=199)

4.1.1 Farm characteristics of (CUFs)

Among the commercial farmers interviewed the mean farm size was 0.29±0.26 acres. Majority of the urban farms ranged from 0.0124-0.25 acres (68.3%) Table 4.1b. Over fifty percent (52.3%) of the farms in the range of farm size 0.0494-0.124 were used to rear poultry. While farms between 0.88 acres 4 acres (46.2%) were used for crop agriculture, (appendix 4)

The information the study showed that over two thirds of the farms were owned by sole owners (66.3%), table 4.1c. While (55.1%) of the farms that were under multiple ownership cultivated crops. However, multiple owner ship was least common among farmers that reared cattle appendix 4.

Results indicated that majority (66.8%) of commercial farmers in Kampala, do not keep farm records. table 4.1b. This was similarly recorded for poultry and goat rearers (appendix 4).

Access to extension services by commercial farmers was low (16.1%), similarly urban farmers (99%), did not use computers in the management of their farms (table 4.1b).

Table 4.1b Farm characteristics CUFs

Farm size	%
0.0124-quarter acre	68.3
>1/4acre-Half acre	18.1
>1/2-¾ acres	1.5
>¾-1 Acre	7.0
More than an acre	5.0
Nature of farm ownership	
Sole	66.3
Multiple	33.7
Keep records	%
Yes	32.7
Access Extension	
Yes	16.1
Use computer	
Yes	1

Source: Data from the survey, 2010

4.1.2 Economic Characteristic

Survey results indicated that over 40% of the respondents engaged in farming as their primary economic activity and 36.7% obtained between 0.7m-1m from farming Ugandan shillings respectively per annum (Table 4.1c).

4.2 Spatial distribution of commercial urban farmers

Spatial analysis results indicated that majority of crop farmers were found in the divisions of Kawempe and Nakawa while poultry farmers were common in Rubaga (Fig 4.3).

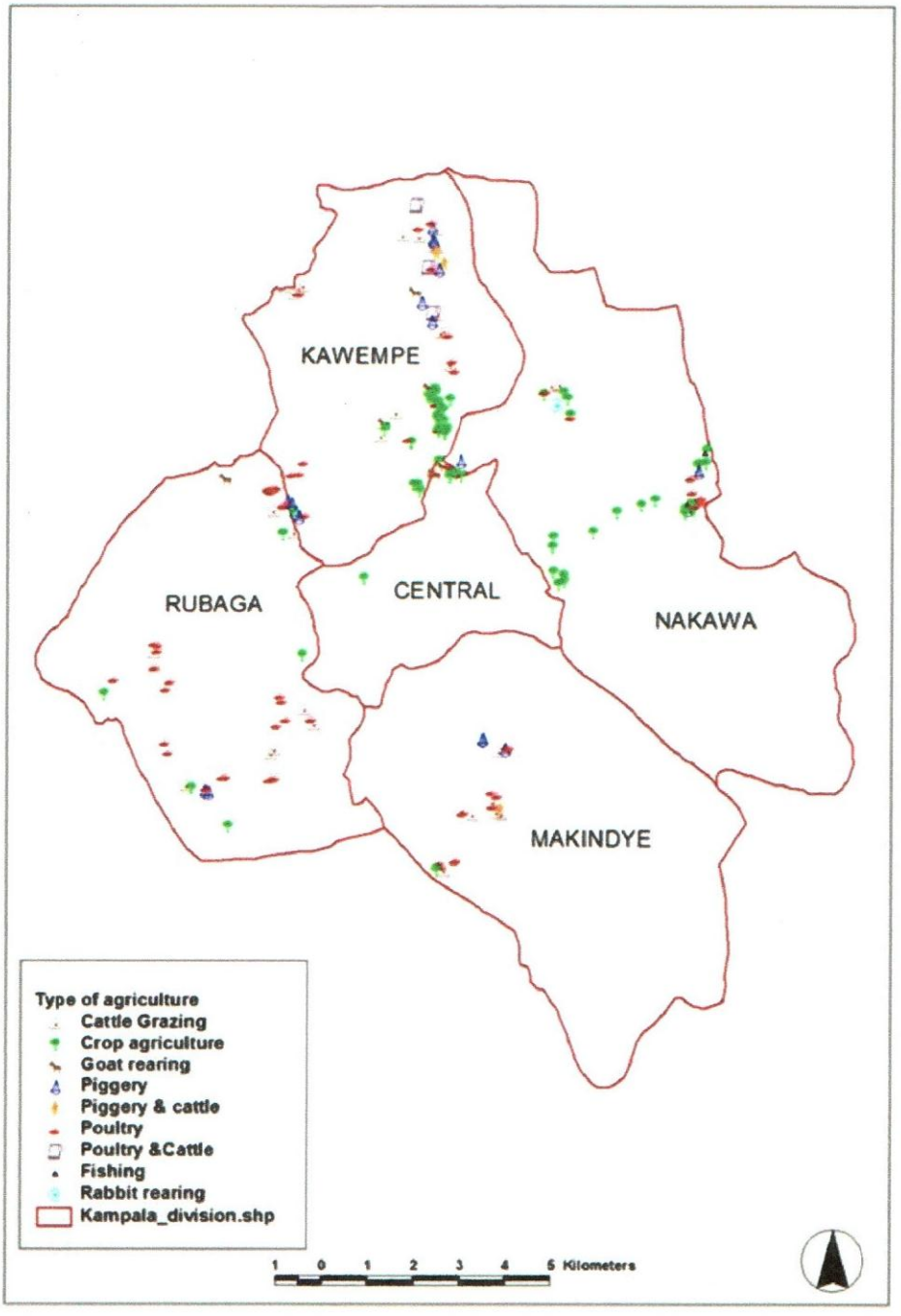


Figure 4.3 Spatial distribution of CUFs by type of agriculture practiced (***Source: Mapped from the field, 2010***

The spatial distributions of socio-economic attributes of farmers in Kampala were further analysed. Results showed that majority of Nakawa farmers were generally young. Their annual farm incomes were lower than that of other farmers. However, older farmers in Lubaga, Makindye and Kawempe divisions earned higher incomes than those in lower age brackets (Fig 4.4).

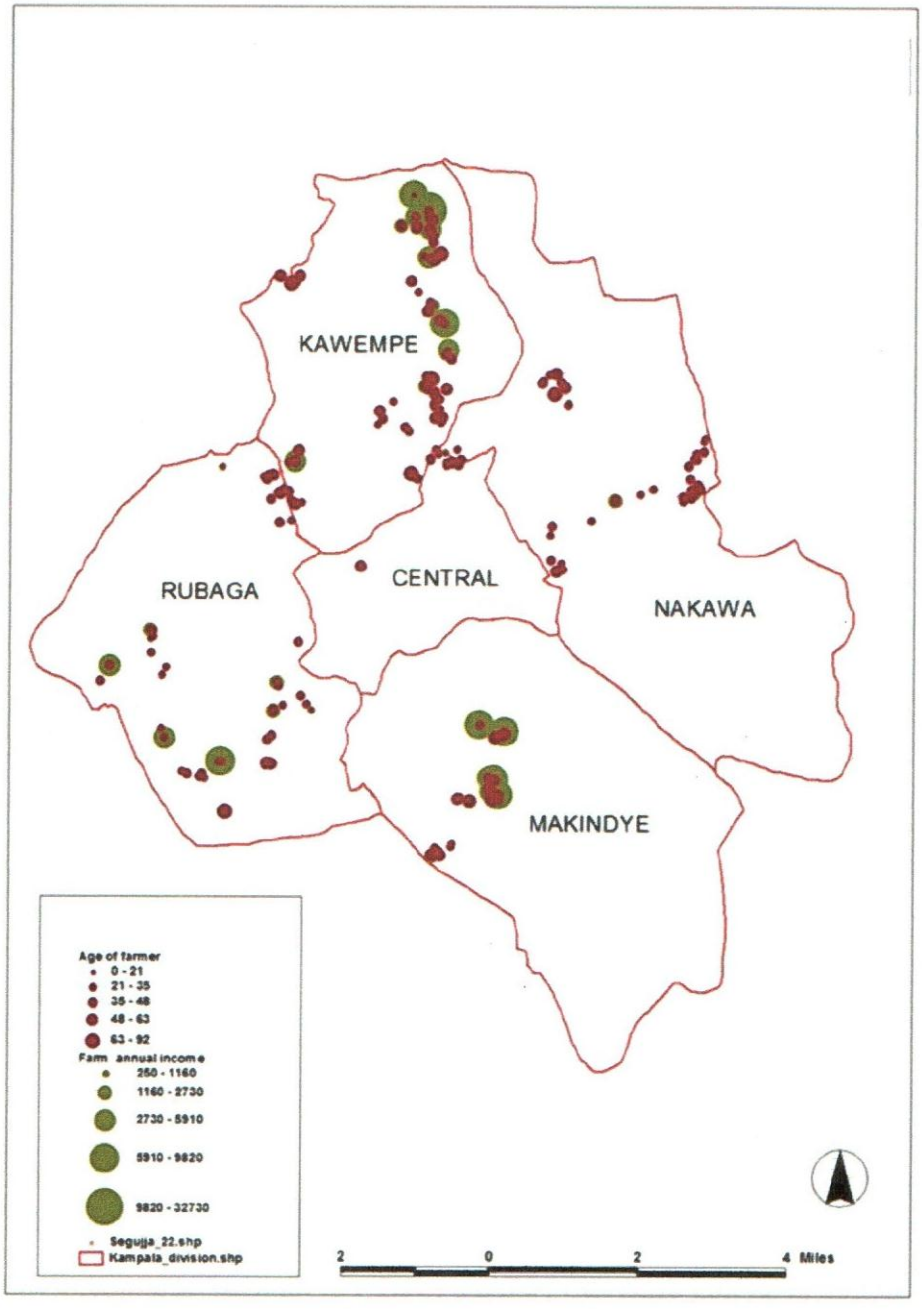


Figure 4.4 Spatial distributions of CUFs age and annual income (***Source: Data mapped from the field, 2010***)

Spatial analysis further showed that farmers with farming experience 7-13 and 13-20 years are well distributed through out the city. Farmers with more experience especially in the south- eastern part of Kawempe and most farmers in Nakawa earn less income compared to farmers with almost the same experience in the Northern part of Kawempe and Makindye divisions (Fig 4.5).

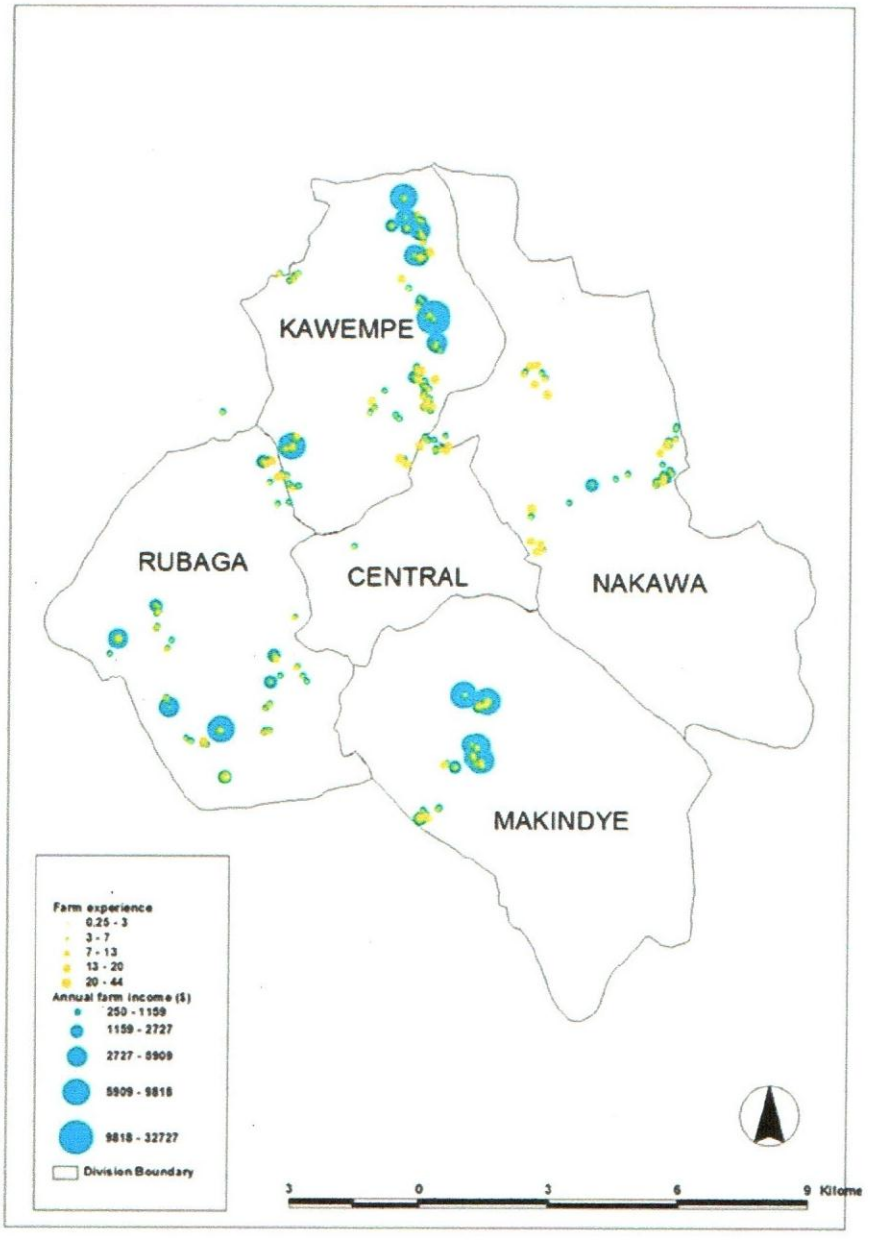


Figure 4.5 Spatial distributions of CUFs farming experience and farm income (*Source: Data from the field, 2010*)

There were more male respondents in Rubaga than in Kawempe. Few female farmers earned more income than their male counterparts (Fig 4.6).

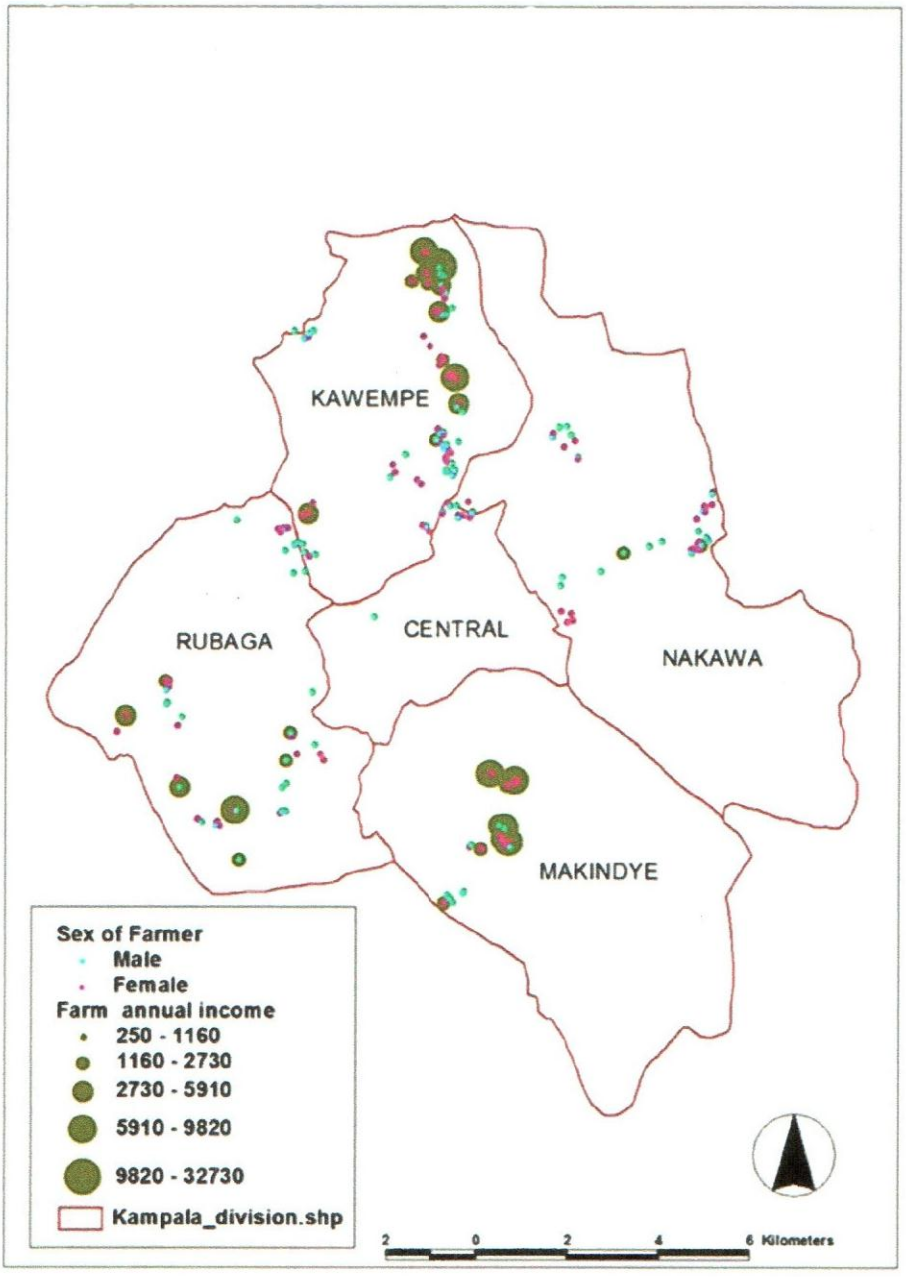


Figure 4.6 Spatial distributions of CUFs gender and annual farm income (***Source; Data from the field, 2010***)

Most of the urban farmers with no formal education earned less income throughout the city and were mainly found in Nakawa (Fig 4.7). In addition majority of farmers with tertiary education are found in Kawempe.

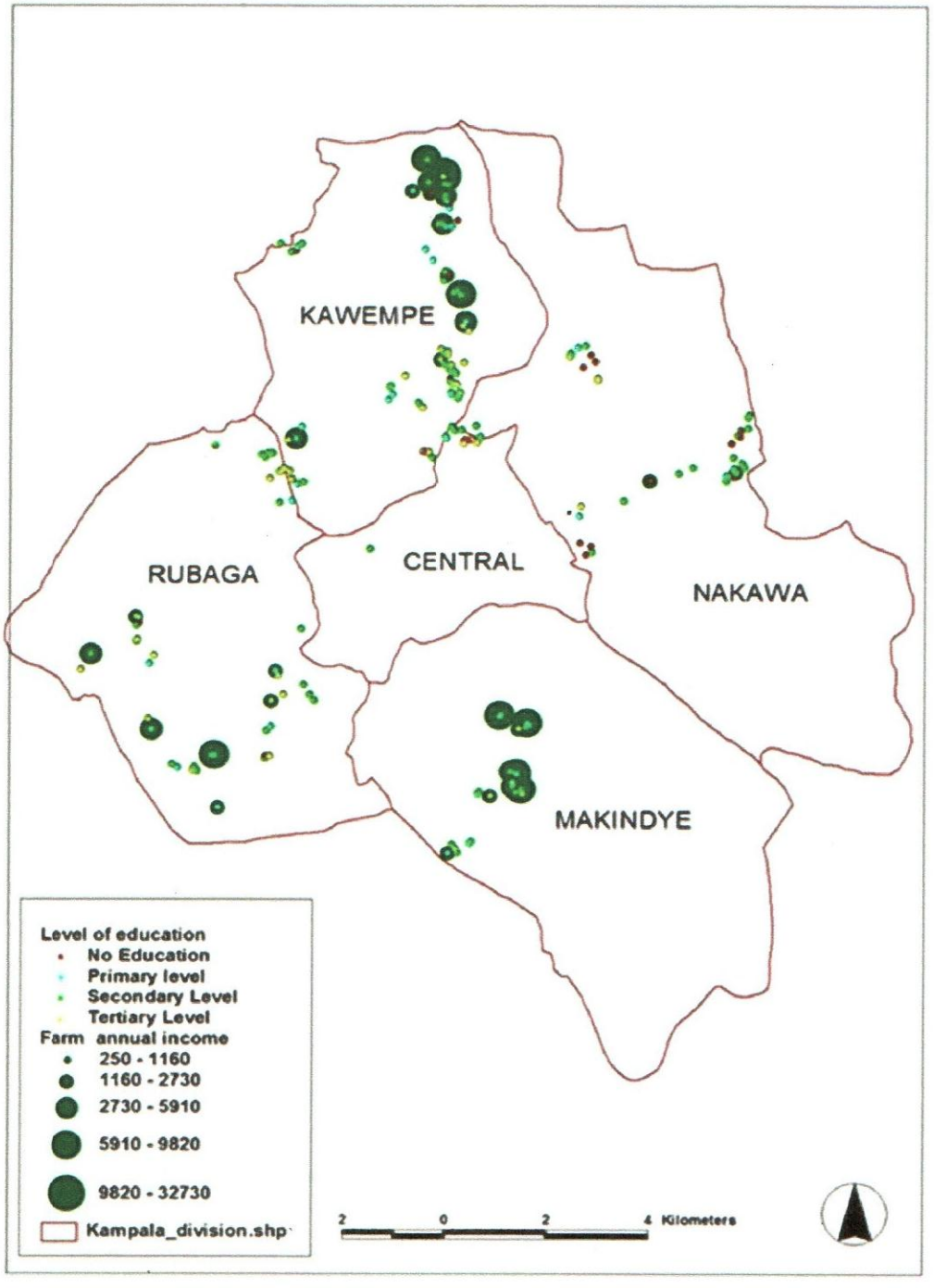


Figure 4.7 Education and annual farm income distribution of CUFs (***Source: Data from the field, 2010***)

Generally urban farms in Kampala city were very small (mean 0.36). Spatial analysis showed that bigger farms do not necessarily result into earning large income apart from a few farms in Lubaga, Nakawa and Kawempe. In addition, farmers with smaller farms in Makindye and Kawempe divisions earned significantly larger sums of income from their farms than some of farmers with large farms (Fig 4.8).

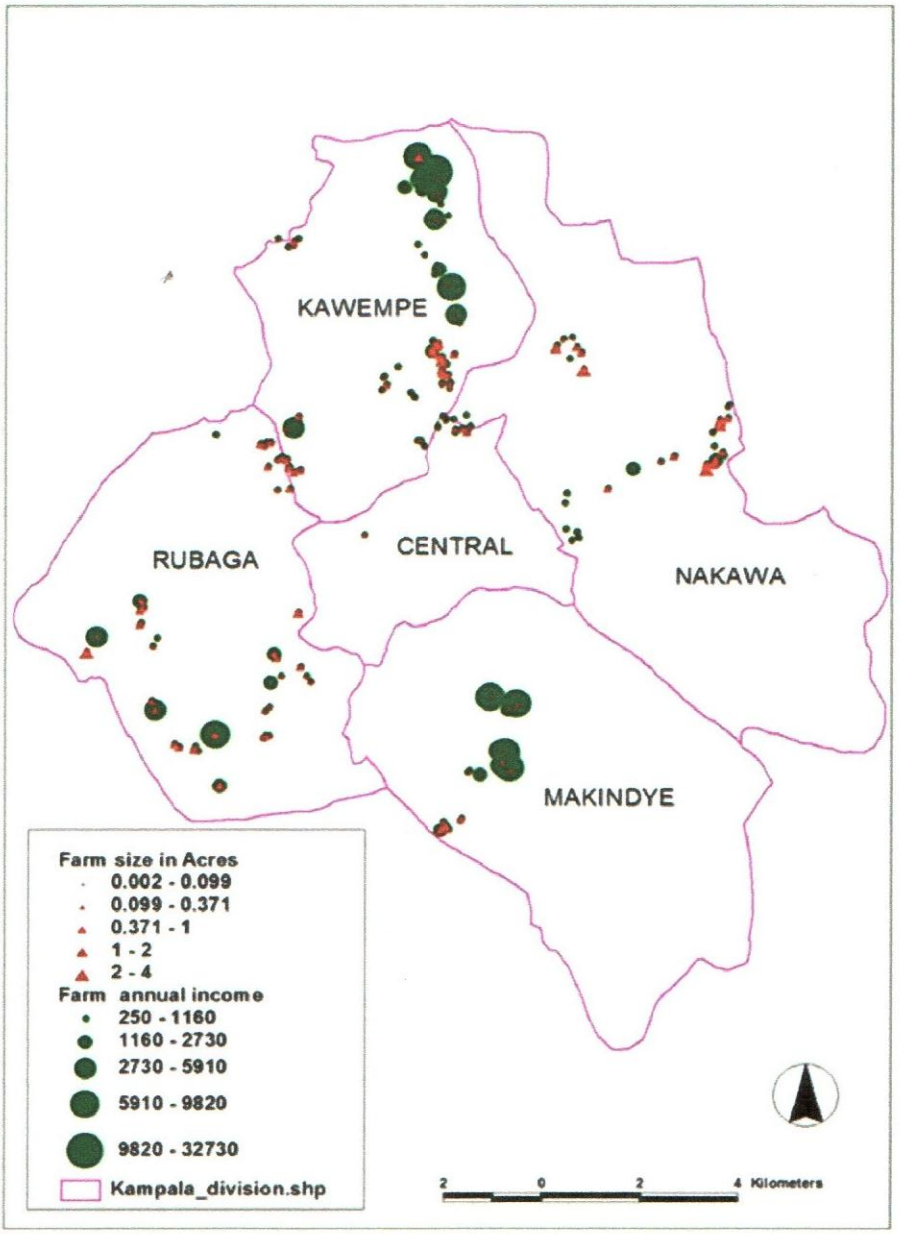


Figure 4.8 Farm size and annual farm income distribution of CUFs (***Source: Data from the field, 2010***)

4.3. Information sources for CUFs in Kampala

The survey revealed that CUFs obtain agricultural information from a variety of sources. However, majority of commercial farmers obtain their agricultural information from other farmers and farmer workshops and few get information from websites (Figure 4.9).

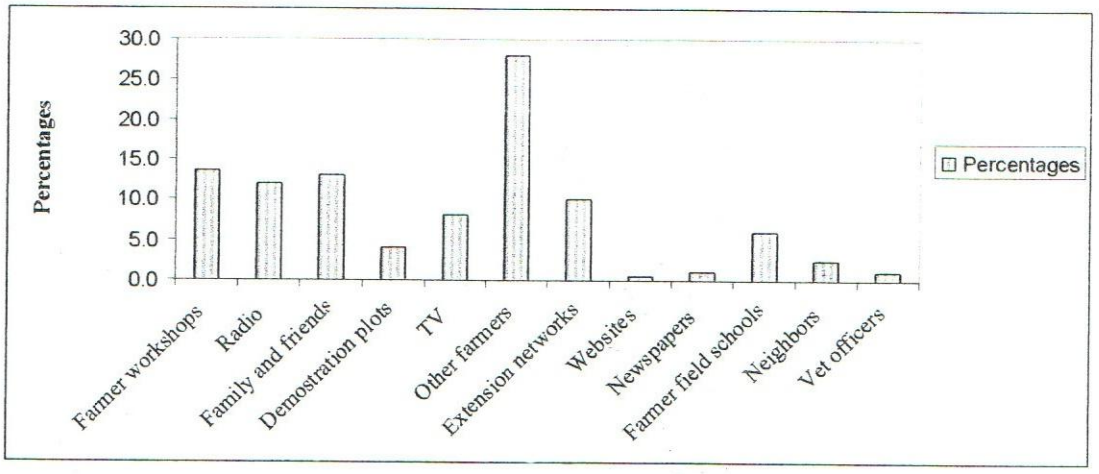


Figure 4.9 Information sources for CUFs in Kampala (*Source: Data collected from the survey*)

4.3.1 Frequency of use of information pathways by commercial urban farmers

Results indicated that most farmers in the City receive information across all information dissemination sources on a bi-weekly basis. It is important to note that very few farmers in Kampala access information through websites (Figure 4.10).

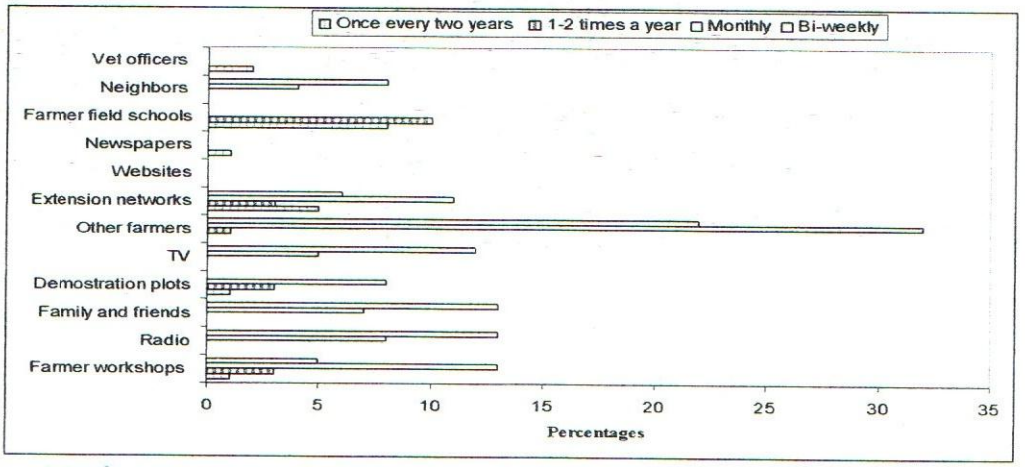


Figure 4.10 frequency of use of information sources by CUFs (*Source: Data from survey, 2010*)

4.3.2 Perceived retention capabilities of information sources

The survey revealed that a good number of the farmers perceived that they retain a lot of information when they get it from farmer workshops than farmer field schools. However, as expected most farmers said they retain lots of information from newspapers though very few farmers use newspapers as their source of agricultural information (Figure 4.11).

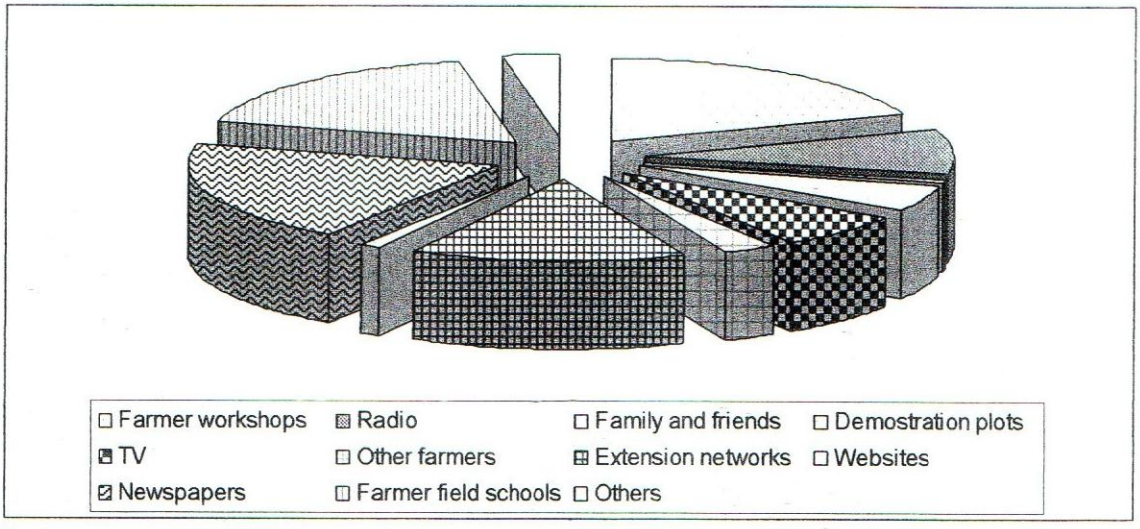


Figure 4.11 Perceived retention capabilities of information sources (***Source: Data collected from the survey)***

The main reason advanced for choice of the pathway was reference point (52.3%) table 4.3.

Table 4.3: Explanations for choice of information source

Reasons	%
Extensive training	4.5
Share different experiences	7.0
Audio visual combined	8.0
Reference point	52.3
Information is easily understood	2.0
Better demonstration from extension officers	3.5
Easy interpretation	4.0
Local language	5.5
Repetitive and convenient	3.0
Practical	10.1
Total	100

Source: Data from survey 2010

4.3.3 Pathways that take less time to exchange information

The element of time is very critical in information dissemination. This has two aspects that is timing (what time should the communication be passed on to end users and time in terms of duration taken to exchange information from the source and vice versa). It is due to this background that commercial farmers were asked to indicate the dissemination pathway that take less time to pass on information. Results of the survey showed that majority of the CUFs perceived radios to take less time to communicate information to them (48.2%), (figure 4.12). Majority of the farmers (26.1%) gave wider coverage as the reason for choice of pathway table 4.4.

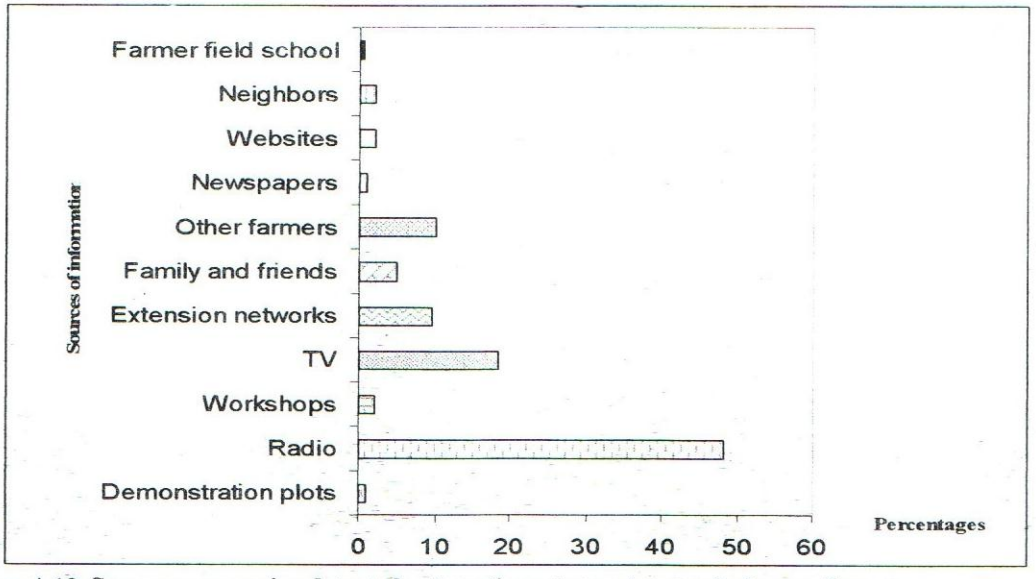


Figure 4.12 Sources perceived to take less time to exchange information ***(Source: From the survey 2010)***

Table4.4: Explanation for choice of source

Reasons for choice	%
Call in and listen to the program at the same time	8.0
Call ask and get answer at the same time	14.1
Reaches many people at the same time	26.1
Convenient	15.1
Don't take long to see the farmer	0.5
Information in local language	1.5
Immediate feedback	8.0
Easily approached	4.5
Easily called upon when needed	17.6
Always available for consultation	2.0
No movements involved	2.5

Total	100

Source: Data from the survey2010

4.3.4 Perceptions of CUFs on the information sources

Most farmers perceived that information obtained from most of the sources was important (mean scores of 3 out of 5 for most sources used). However, information obtained from farmer workshops, extension networks and demonstration plots was ranked to be of high importance with mean values of 4.2, 4 and 4.1 respectively (Table 4.5). Similarly information from non formal pathways like other farmers and neighbours was perceived to be more important than newspapers and websites.

Accuracy of information was also rated, respondents perceived information from demonstration plots to be more accurate than that obtained from any other sources mean 4.1 (Table 4.5).

Similarly farmers perceived that it was easy to receive information from family and friends and radios than any other sources mean value of 4.1 and 4 out of 5 respectively.

In addition the survey revealed that most of the information obtained from the sources was perceived to be clear (mean score of 3 out of 5 for most sources). However, demonstration plots mean score 4.7 extension and farmer workshops both mean score of 4 were the highly ranked sources. Information from newspapers was perceived to be clearer than that obtained from vet officers and radios. For almost all the information sources it is followed as expected that the higher the perceived clarity of the information the higher the perceived usefulness.

4.3.5 Effectiveness of information dissemination pathways

Farmer perceptions as indicated in (Table 4.5), showed that demonstration plots and farmer workshops were effective than extension networks in disseminating agricultural information.

Table 4.5: Mean rank scores for effectiveness of information pathways

Information sources	Mean scores (Max 5)				
	Importance	Accuracy	Ease	Clarity	Aggregate
TV	3.7	3.4	3.3	3.3	3.4
Radio	3.8	3.3	4	3.0	3.5
Farmer workshops	4.2	3.9	3.4	4	3.9
Other farmers	3.9	3.0	3.9	3.5	3.6
Farmer field schools	3.9	3.9	3.1	3.7	3.7
Demonstration plots	4.1	4.1	3.1	4.7	4.0
Veterinary officers	1.8	1.9	1.2	2.3	1.8
Neighbours	3.4	2.2	3.8	3.0	3.1
Websites	1.9	2.3	1.9	2.5	2.2
Extension networks	4.0	3.9	3.4	4.0	3.8
Newspapers	2.3	2.5	2.2	3.1	2.5
Family and friends	3.0	2.3	4.1	3.2	3.2

Source: Data from the survey 2010

4.3.6 Aggregate mean scores of information pathways by type of agriculture

The survey showed that demo plots were ranked highest across all the five types of agriculture practiced (Table 4.6). On the other hand, websites were ranked lowest across the five categories of farmers.

Table 4.6: Rank scores of effectiveness of information pathways and type of agriculture

Information pathways	Poultry	Piggery	Cattle	Goat rearing	Crop
TV	3.3	3.7	2.7	3.6	3.8
Radio	3.6	3.7	3.4	3.7	3.8
Farmer workshops	4.0	3.4	4.0	4.3	4.1
Farmer. Field schools	3.7	3.8	3.7	3.9	3.8
Vet officers	0.7	2.4	2.8	3.1	0.7
Extension Networks	3.7	3.8	3.8	3.9	4.1
Demo-Plots	4.0	4.1	4.0	4.2	4.1
Other farmers	3.5	3.6	3.6	3.6	3.7
Neighbours	2.9	3.3	3.0	3.1	3.0
Family and friends	3.1	3.4	3.0	3.1	3.2
Websites	2.0	2.1	2.0	2.1	2.1
Newspapers	2.6	2.7	2.4	2.9	2.5

Source: Data from the survey 2010

Main reason given was easy access to sources (28.6%) table 4.7 below.

Table 4.7: Explanations for best ranked pathway

Reasons	%
Easily accessed	28.6
Convenient	16.1
Future reference	6.0
Farmers have experience	3.5
Cheap and obtained on a daily basis	2.0
Information is understood easily	1.5
Physical contact with farmers	4.5
Have expertise to explain technical issues	10.6
Demonstrations can be made for farmers	10.1
Feedback is available	5.0
Communicates in local language	2.5
New innovations can be passed to lower farmers	2.0
Easy to learn from other farmers	3.5
Wwide coverage	4.0
Total	100

Source: Data from the survey 2010

4.4 Information needs of commercial urban farmers in Kampala

It was found out that most CUFs needed information on new innovations (24.1%). In addition few farmers needed information on better storage facilities and quality and quantity of products produced (figure 4.13).

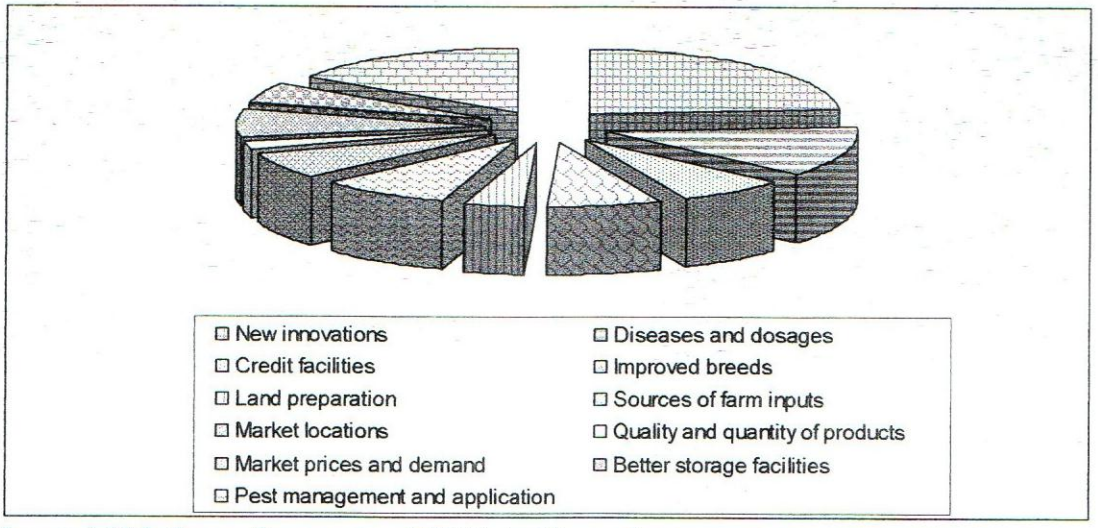


Figure 4.13 Information needs of CUFs in Kampala ***Source: Data from the survey 2010***

4.4.1 Availability of information to farmers

Results showed that agricultural information is not readily available to CUFs in Kampala, (96%) Table 4.8. In addition farmers do not easily get information fro CAD Table 4.9.

Table 4.8: Information readily available

Easy to receive info from CAD	Percent
Yes	3.0
No	96.0
Total	99.0
Missing System	1.0
Total	100.0

Table 4.9: Easy to receive information from CAD

Responses	Percent
Yes	29.1
No	69.3
Total	98.5
Missing System	1.5
Total	100.0

Source: Data from the survey 2010

However, the few who obtain information from CAD, noted that they obtain it through workshops mainly (87%). Similarly those who don't get information from CAD majority got it through private means (54.8%), Table 4.10. The private sources mentioned included other farmers and newspapers. Public sources included research institutes like Kawanda Agricultural Research Institute, Namulonge Agricultural Research Institute, Makerere University, friends, radio, television and private extension services. Other public sources mentioned included national agricultural advisory services (NAADs) secretariat and Ministry of Agriculture. NAADs programme is the main extension service provider set up by the Government of Uganda to extend extension services to farmers but, it has mainly concentrated on rural agriculture as urban farmers are not taken to be of value to the general agricultural production in Uganda.

Table 4.10: Broad categories of sources where farmers get agricultural information

Responses	Percent
Private sources	54.8
Public sources	45.2
Total	100

Source: Data from the survey 2010

4.4.2Assessment of information accessed by farmers

Majority of respondents across the five divisions of the city do not receive agricultural information on most of the agricultural aspects. On the other hand, larger proportions of farmers who received information on some of the aspects were in Lubaga (Table 4.11).

Table 4.11: Assessment of information accessed by CUFs in Kampala

Type of information	Access	Kawempe	Lubaga	Central	Makindye	Nakawa
Market information			**Percentages (%)**			
Market demand	Yes	47.7	56.5	25	39.1	60.5
Market location	Yes	35.5	69.6	31.4	47.8	28.9
Competition	Yes	27.6	26.1	31.3	13	5.3
Quality and quantity of products	Yes	17.1	21.7	25	17.4	7.9
Agro-inputs						
Sources of farm inputs	Yes	36.8	71.7	50	17.4	5.3
Credit facilities	Yes	19.7	34.8	12.5	13	23.7
High yielding varieties	Yes	34.8	21	9.3	5.3	20
Information on innovations	Yes	7.9	21.9	0	8.7	18.7
Control of pests and diseases						
Disease management	Yes	11.8	26.1	12.5	4.3	21.1
Seed treatment	Yes	10.5	28.3	12.5	8.7	21.1
Pesticide application	Yes	46.1	67.8	31.2	17.4	44.6
Other farm practices						
Polluted areas	Yes	7.9	21.7	50	0	18.4
Weed control	Yes	32.9	50	18.2	21.7	21.1
Land preparation	Yes	10.5	32.5	25	0	26.7
Harvesting and storage	Yes	38.2	34.8	43.3	17.9	36.8

4.4.3 Farmer's rating of the degree of need of different types of information

Farmer's ranked dosage and pesticide application as their main information need. Similarly information about high yielding varieties of both animals and crops was highly rated. Harvesting and storage was the least ranked information need of CUFs Table 4.12.

Table 4.12: Farmer mean rating of their information needs

Type of information	Mean	Rank
Dosage and pesticide application	4.18(0.75)	1
High yielding varieties	4.16(0.72)	2
Location of markets	3.97(1.09)	3
Sources of Credit facilities	3.861.04)	4
Sources of farm input	3.79(1.09)	5
New innovations	3.73(1.02)	6
Price information	3.65(1.11)	7
Quality and Quantity produced	3.489(1.07)	8
Pests and disease Management	3.44(1.24)	9
Land preparation	2.62(1.17)	10
Polluted areas in the city	2.57(1.36)	11
Methods of weed control	2.49(1.34)	12
Seed treatment	2.41(1.24)	13
Harvesting and storage	2.37(1.02)	14

Source: Data from the survey 2010 (Figures in brackets are standard deviations)n=199

4.4.4. Farmers farming experience and their information needs

The survey revealed that majority of the farmers across all the range of experience needed information on new innovations. In addition farmers with farming experience of 1-5 years dominated. Generally the need for information was high among farmers with few years of farming experience Table 4.13.

Table 4.13: Farmer's farming experience and their information needs

	Information Needs of Urban Farmers (%)											
Farming Experience (Years)	NI	M L	DD	QQ	CF	MPD	IB	IS	LP	PM	SFI	PA
1-5	31.5	5.3	9.2	2.7	3.9	9.2	1.3	1.3	14.5	10.5	7.9	2.7
6-10	26.5	8.8	16.2	0	8.8	2.9	2.9	2.9	5.8	11.8	13.4	0
11-15	21.7	8.7	17.4	0	4.3	4.3	0	0	13	21.9	8.7	0
16-20	21.7	8.7	17.4	0	4.3	4.3	0	0	13	21.9	8.7	0
21-25	8.7	8.7	8.7	4.3	17.4	4.4	0	8.7	17.4	17.4	4.3	0
26-30	15.4	15.4	30.8	0	0	0	0	0	7.7	23	7.7	0
31-35	0	0	0	0	0	0	0	0	0	0	0	0
36-40	0	0	0	0	0	0	0	0	0	0	0	0
41-45	100	0	0	0	0	0	0	0	0	0	0	0

Source: Data from the survey 2010

(NI= New innovations, ML=Market locations, DD= Diseases and dosage, QQ= Quality and quantity of products, CF=Credit facilities, MPD= Market prices and demand, IB=Improved breeds, LP= Land preparations, PM= Pest management, IS=improved storage, SFI=Sources of farm inputs, PA= Polluted areas).

4.4.5 Farmers education levels and their information needs

Famers with secondary education level dominated in every category of information needed. More still, in categories like disease management the response for farmers with secondary education was level with that of tertiary education. The responses for farmers of all education categories on quality and quantity of products demanded and improved breeds their response was the same. On the other hand, farmers with no formal education trailed in every category of information needed and in some categories like information on polluted areas in the city and market locations there was not even a single response. In addition Farmers with tertiary education seemed not to demand for information on improved storage, improved breeds and market prices just like their counter parts with secondary education on polluted areas Figure 4.14.

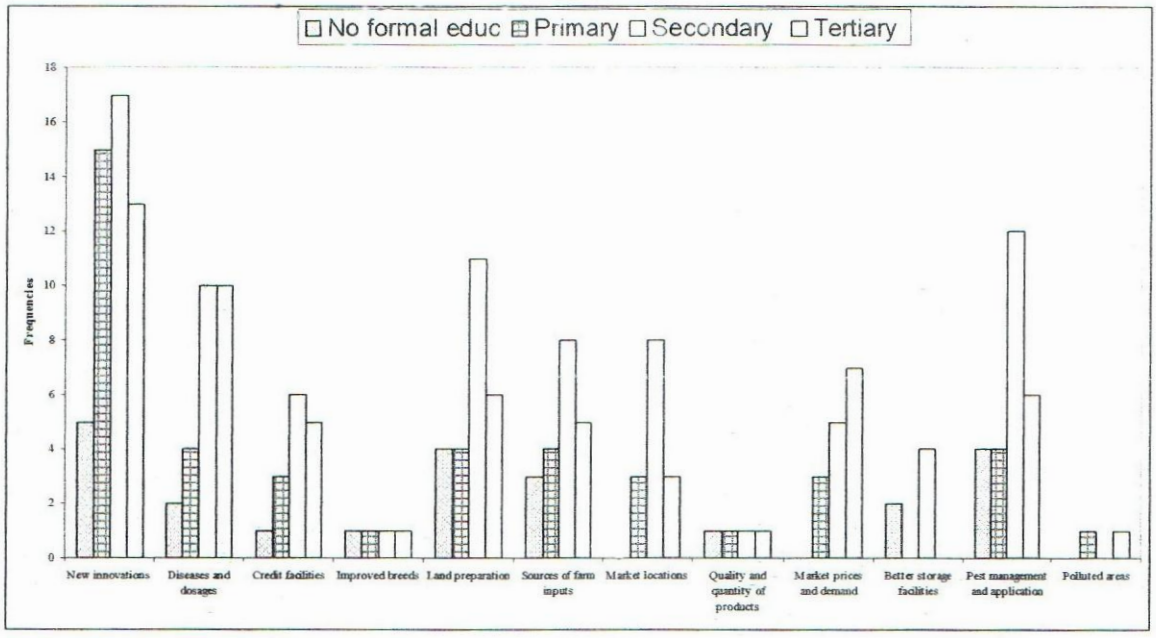


Figure 4.14 Farmer's education levels and their information needs

Source: Data collected from the field 2010

4.4.6 Type of agriculture and farmer information needs

Poultry farmers dominated information categories of market locations, disease management and dosage, sources of credit facilities and market prices and demand. More to that Innovations and pest management categories were dominated by farmers that practiced crop agriculture. Information on polluted area in Kampala seemed not to be demanded by poultry, cattle and goat farmers Figure 4.15.

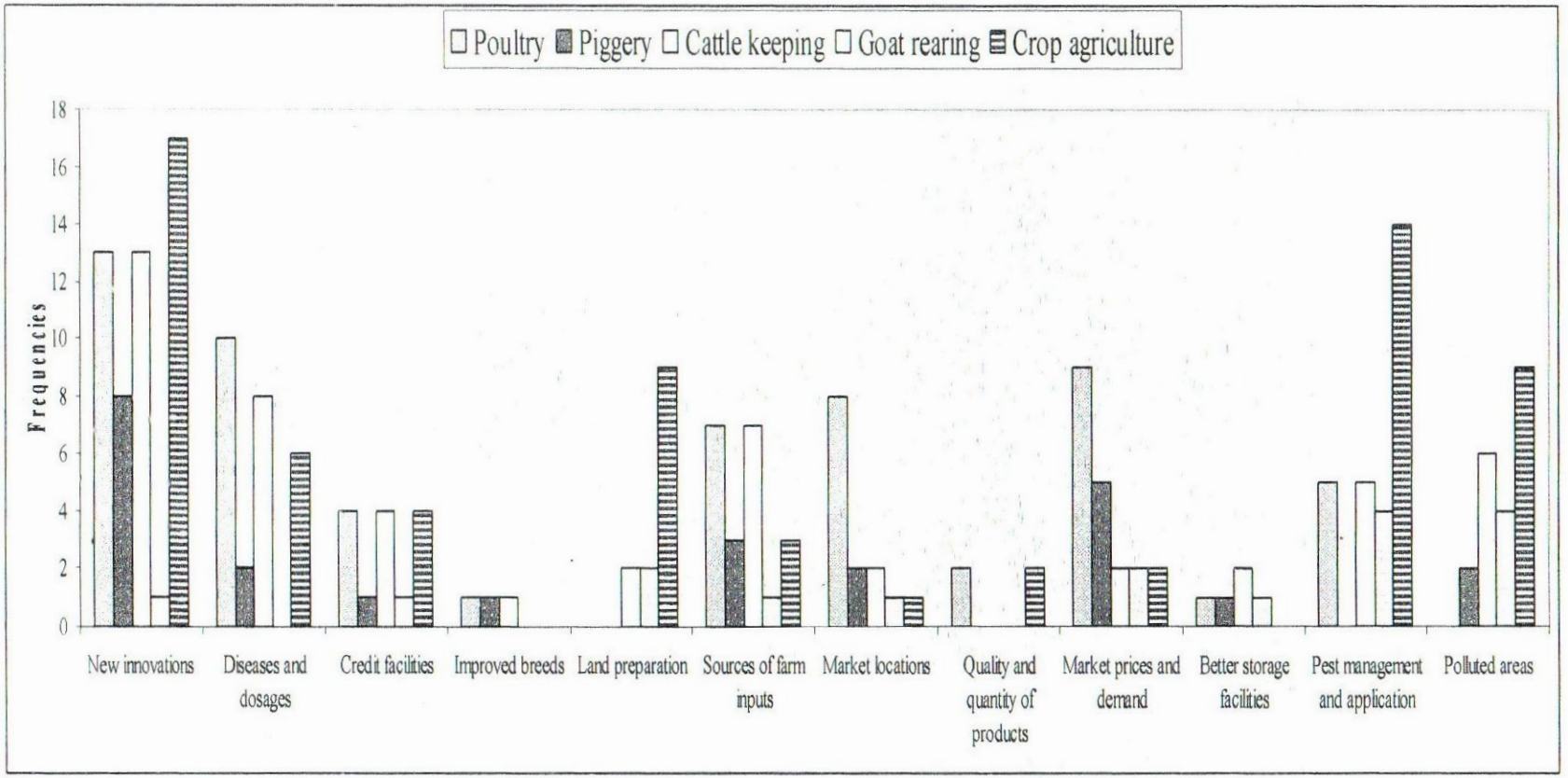


Figure 4.15 Information needs of CUFs and type of Agriculture

Source: Data collected from the field 2010

4.4.7 Factors that influenced access to the two types of information highly needed

Access to information on high yielding varieties was mainly influenced by three socio economic factors namely education, farming experience and type of agriculture practiced. All these factors were positive apart from farming experience and statistically significant at $P<0.05$ level. Similarly access to information on pesticide application is mainly influenced by education, gender and farmer experience. All the factors were positive apart from farmer experience and statistically significant at $P<0.05$ level as shown in table 4.14.

Table 4.14: Socio economic factors that influenced access to the two types of information that were highly needed

	Access to info on dosage and pesticide applications				Access to information on high yielding varieties			
Variables	B	S.E.	Wald	Sig.	B	S.E.	Wald	Sig.
Constant	2.310	1.857	1.547	0.214	1.554	1.082	2.063	0.151
Gender	2.153	0.865	6.192**	0.013	-0.548	0.405	1.828	0.176
Education	0.043	0.083	16.270**	0.004	2.142	0.049	8.310**	0.000
Farming experience	-0.109	0.052	4.384**	0.036	0.066	-0.034	23.781**	0.000
Farm income	0.000	0.000	0.400	0.527	0.000	0.000	0.009	0.924
Access to extension	0.450	0.954	0.222	0.637	0.335	0.555	0.364	0.546
Farm size	-1.092	0.740	2.175	0.140	-0.342	0.429	0.635	0.425
Ownership	-1.238	0.797	2.411	0.120	-0.423	0.440	0.925	0.336
Type of agriculture	-0.126	0.203	0.386	0.534	0.626	0.141	19.877**	0.000
Main occupation	-0.219	0.311	0.496	0.481	-0.083	0.226	0.135	0.713
Constant	2.310	1.857	1.547	0.214	1.554	1.082	2.063	0.151

S.E= standard error, B= coefficient estimates, wald= t- ratio. (**P<0.05)

Dependent variables: Access to information on high yielding varieties and pesticide applications (No, Yes). The logit model was run on access of these two information categories because they were the highest ranked type of information needed by respondents studied.

Independent variables gender (0=male, 1=female), Education (years), farm income (dollars), farming experience (years), access to extension (0=acess,1=No access), farm size (acres), farm ownership (0=sole, 1=multiple), type of agriculture (0=crop, 1=live stock), main occupation (0=farming,1=otherwise)

4.5.0 Useful information sources for making marketing decisions

Information sources in table 4.15 were divided into six categories based on type of information provided or medium in which information is given. The categories are the marketing extension service; production specialists, and inter personal, and broadcast, printed, and electronic sources. Marketing and production provide a specific type of information. Printed and broadcast sources provide a broader range of information.

The information source most frequently cited as "most important for marketing decisions" was the cooperative extension services and other farmers with just over 11% of the respondents in this category (Table 4.15). The two sources ranked 1 among the 18 information sources as the most useful. Radio broadcasts and marketing consultants respectively received the second and third number of first place ratings (10.7% and 10%) respectively.

Several other observations were made regarding the distribution of the responses to the most useful information question. Salesmen were the fourth ranked source with nearly 8.3 percent of commercial farmers selecting this source. Local newspapers, government publications agricultural networks, general farm magazines ranked low among the 19 sources of information (4.1%, 3.1%, 2.7% and 2.1%), respectively. Electronic sources (video and websites) received the lowest rankings (0.2% and 0.6%). Similarly friends and neighbours ranked first for second most useful source for marketing information (Table 4.15). Extension personnel, sales men and veterinarian received rank 2 and farmer organisations obtained rank 3. In least important category, videos obtained rank 1, internet rank 2 and general farm magazine rank 3.

Table 4.15: Information sources for making marketing decisions

Category		Most useful		2nd most useful		Least useful	
	Sources of information						
Broadcast		%	Rank	%	Rank	%	Rank
	TV	4.3	9	6.0	5	6.0	7
	Radio	10.7	2	5.2	9	2.3	12
	Total	**15**				**8.3**	
Printed	local newspaper	4.1	10	4.6	11	7.4	5
	Government Publication	3.1	11	5.5	7	7.4	5
	Agricultural Networks	2.7	12	2.2	16	10.5	2
	General farm Magazine	2.0	13	4.5	12	9.0	3
	Total	**11.9**					
Production specialists	Salesmen	8.3	4	7.8	2	1.6	15
	Other farmers	11.0	1	5.3	8	1.9	13
	Veterinarian	4.9	8	7.8	2	4.0	9
	Total	**24.2**					
Marketing specialists	Cooperative extension services	11.0	1	5.6	6	1.7	14
	Marketing consultants	10.0	3	6.5	4	1.5	16
	Trade fairs	4.3	9	3.7	14	8.2	4
	Total	**25.3**					
Inter personal	Family members	5.6	7	5.0	10	6.1	6
	Friends and neighbours	2.7	12	8.6	1	4.8	8
	Extension personnel	6.7	6	7.8	2	2.6	11
	Farmer organization	7.8	5	6.6	3	3.0	10
	Total	**22.8**					
Electronic	Video	0.2	15	3.3	15	11.5	1
	Website	0.6	14	4.0	13	10.5	2
	Total	**0.8**					

Source: Data from the survey 2010

4.5.1Useful information sources for making production decisions

Results revealed that interpersonal category is the most useful source of information for making production decisions (37.9%). Though, none of the information sources in this category got the highest rank as the most useful source. Farmer workshops and farmer organisations were the highest ranked source rank 3 and 4 respectively. Marketing specialist's category obtained the second highest percentage (25.9%), with cooperative extension services ranked second in all the 18 sources that were mentioned by farmers. Production specialists third, (22.6%), but other farmers a source in this category was ranked 1(Table 4.16).

In addition two categories print and electronic have the lowest rank as regards sources of information for making production decisions is concerned, Friends and neighbours received a first place ranking for second most useful source for production information. Similarly in category least most important source for making marketing information decisions, newspapers obtained ranked 1, general farm magazines ranked 2nd, websites and videos ranked third and fourth respectively Table 4.16.

Table 4.16: Information sources for making production decisions

Category	Sources of information	Most useful		Second most useful		Least useful	
Broadcast		%	Rank	%	Rank	%	Rank
	TV	1.4	15	6.5	4	6.9	7
	Radio	6.4	7	6.2	5	3.4	10
	Total	**7.8**		**12.7**		**10.4**	
Printed							
	Local newspaper	1.8	14	2.7	16	10.5	1
	Government Publication	1.3	16	4.3	13	9.3	5
	General farm Magazine	0.6	17	3.8	14	10.2	2
	Total	**3.6**		**10.8**		**30.0**	
Production specialists							
	Salesmen	5.8	8	8.3	2	1.8	17
	Other farmers	12.9	1	4.3	12	0.4	19
	Veterinarian	3.9	11	5.4	7	6.1	8
	Total	**22.6**		**18.1**		**8.3**	
Marketing specialists							
	Cooperative extension services	10.6	2	4.9	10	1.6	18
	Marketing consultants	4.7	10	5.4	7	5.6	9
	Agricultural Networks	8.8	5	4.9	10	3.0	13
	Trade fairs	1.9	13	5.3	8	7.7	6
		25.9		**20.6**		**17.9**	
Inter personal							
	Family members	7.8	6	5.3	9	3.4	11
	Friends and neighbours	5.2	9	8.4	1	2.1	15
	Farmer workshops	9.7	3	4.3	12	2.8	14
	Extension personnel	5.8	8	6.8	3	3.3	12
	Farmer organizations	9.4	4	5.5	6	2.0	16
	Total	**37.9**		**30.3**		**13.6**	
Electronic							
	video	2.1	12	3.2	15	9.7	4
	Website	0.0	18	4.4	11	10.1	3
	Total	**2.1**		**7.6**		**19.8**	

Source: Data from the survey 2010

4.5.2 Differences in Information Source Preference

Since information value, and indeed the demand for and ability to interpret information varies among individuals, systematic differences were expected in the use of information sources by farmers of differing age, education level, farming experience and by farm income. These were statistically tested by examining differences in information preferences across sample subgroups.

Production decisions, means were different (P<0.05) among small and large Income groups for production specialists, interpersonal and print categories. Similarly, response distributions differed among farmers by education for interpersonal and electronic sources Table 4.17.

Table4.17: Mean differences for production decisions

Farm and farmer characteristics	Source Categories	Mann-Whitney U	Z-value	Sig (2-tailed)
Income	Broadcast	3.000	-0.655	0.513
<=1363$	Production specialists	0.000**	-2.460	0.014
> 1363$	Marketing specialists	1.000	-1.768	0.077
	Interpersonal	0.000**	-2.449	0.014
	Electronic	6.000	-1.000	0.317
	Print	0.000**	-2.309	0.021
Education	Broadcast	2.000	-1.091	0.275
<=Primary	Production specialists	4.000	-1.476	0.140
> Secondary	Marketing specialists	2.500	-1.597	0.110
	Interpersonal	0.000**	-2.449	.014
	Electronic	0.000	-1.826	0.068
	Print	7.000	-0.292	0.770
Age	Broadcast	4.000	-0.232	0.817
<=39	Production specialists	7.500	-0.615	0.539
>39	Marketing specialists	4.000	-0.707	0.480
	Interpersonal	5.000	-1.225	0.221
	Electronic	1.000	-1.000	0.317
	Print	3.500	-1.340	0.180
Farming experience	Broadcast	4.000	-0.218	0.827
<=9 years	Production specialists	3.000	-0.655	0.513
>= 9 years	Marketing specialists	4.000	-0.707	0.480
	Interpersonal	8.000	-0.490	0.624
	Electronic	2.000	0.000	1.000
	Print	1.000	-1.950	0.051

**Group means are different at the P<0.05

Farmer preferences for marketing decisions, means were different (P<0.05) between small and large Income groups for production specialists, marketing specialists, interpersonal and

print categories. Analyses of information source preference by operator age resulted in response differences that were statistically significant for only print category. Similarly, response distributions differed among farmers by education Table 19.

Table 4.18: Differences for marketing decisions

Farm and farmer characteristics	Source Categories	Mann-Whitney U	Z- value	Sig (2-tailed)
Income	Broadcast	0.000	-1.732	0.083
<=1363$	Production specialists	0.000**	-2.309	0.021
>1363$	Marketing specialists	0.000**	-2.309	0.021
	Interpersonal	0.000**	-2.323	0.020
	Electronic	0.000	-1.633	0.102
	Print	0.000**	-2.309	0.021
Education	Broadcast	0.000	-1.732	0.083
<=Primary	Production specialists	3.500	-1.307	0.191
>=Secondary	Marketing specialists	1.00**	-1.986	0.047
	Interpersonal	2.000	-1.732	0.083
	Electronic	1.500	-0.408	0.683
	Print	0.000**	-2.323	0.020
Age	Broadcast	2.000	-0.645	0.519
<=39	Production specialists	2.000	-1.786	0.074
>39	Marketing specialists	6.000	-0.450	0.653
	Interpersonal	4.500	-0.900	0.368
	Electronic	0.000	-1.777	0.076
	Print	0.000**	-2.323	0.020
Farming experience	Broadcast	3.000	0.000	1.000
<=9 years	Production specialists	6.500	-0.438	0.661
>9 years	Marketing specialists	7.000	-0.292	0.770
	Interpersonal	7.000	-0.290	0.772
	Electronic	1.500	-0.408	0.682
	Print	7.500	-0.145	0.885

A Mann-Whitney non-parametric test was used to test the hypothesis that response distributions for most useful source for making production and marketing decisions were identical for subgroups. **Group means are different at the P<0.05

CHAPTER FIVE

DISCUSSION

5.1 Socio- economic characteristics

The average age of respondents was 39 years. The findings almost agree with (Maxwell, 2001) who noted that the average age of respondents was 40.2 years. This indicates that there is good potential for labour. Age is one of the factors that affect production decisions and efficiency of carrying out farm activities. Majority (60.8%) of respondents were in age brackets of 28-48 which is considered to be productive age of most societies. This age group because of its relatively low experience in farming aspect would have a high demand for information. This is supported by (Engoru and Bashaha, 2001) who noted that younger farmers are more dynamic in adopting new technologies than their old counterparts.

With education status, this is generally described as an essential element in any development process in any country. It is claimed that educated farmers understand agricultural instructions including extension services, technology adoption procedures and information more than uneducated ones (Abdi, 2003). Education further makes farmers more able to deal with technical recommendations and synthesise the new information obtained and apply it to the farming situation (Engoru and Bashaha, 2001). This further implied that passing technical information through channels like print is likely to help technology diffusion. Similarly (Mokotjo and Katusopa, 2010) observed that farmers who had some form of formal education find relevance in the information that they get than those who did not go to school.

The average length of time that the farmers had been involved in urban farming (Farming experience) was 9.5 years, but varies from less than one year to nearly fifty years this agrees with (Maxwell, 2001) results, average years that respondents had engaged in urban farming were 9.5 years. (Abdi, 2003) noted Farmer experience may work against or for information adoption. If experience of farmers with new information has been bad, they may take time to use that information, and vice versa. Experience also reduces the number of years a farmer will take to adopt a new technology.

With type of agriculture practiced, majority of commercial farmers engaged in poultry. This however, disagrees with (Maxwell, 2001) who found out that the most common activity is staple crops cultivation, and the most common crops are cassava, Bananas, potatoes, coco-yams and maize. Virtually all farming respondents (95%) note that access to food for direct consumption is their primary reason for engaging in agricultural production in the city. But this some what agreed with (Karanja, et al., 2006) who found out that Commercial production

constitutes a major part of some sectors of urban agriculture poultry in particular. This could be perhaps poultry rearing does not require large chunks of land.

Majority of farmers were female, this could be attributed to women in Uganda are the one who are left at home as men get themselves engaged in other economic activities. The findings agrees with (Maxwell, 2001) who noted that urban farming is primarily an activity of urban women; nearly 80% of the labour is provided by women, and both production and consumption decisions are largely made by women. (Karanja, et al., 2006) further stressed that men are more likely to be involved in helping to pay for cash inputs, and in gaining access to land for cultivation. It further agrees with (Okitoi *et al.*, 2007) who noted that women were more involved in the day to day activities whist men would contribute in the activities that involved cash such as buying of inputs and selling of the chicken.

The average farm size was 0.36 acres. This was generally very small, but typical of urban farms since land in urban settings is scarce and has a lot of competition from other land uses that are more profitable like residential and commercial land uses. This could partly explain why majority of respondents practice poultry farming which doesn't require a lot of land as compared to crop agriculture.

5.2 Spatial locations of farms

Majority of crop farmers were located in Nakawa and Kawempe. This is mainly due to the two division still have large chunks of land that have not been put to residential and commercial use. In addition, the divisions have a number of swamps that are used for agricultural purposes especially around Kyebando in Kawempe. Majority of poultry farmers were found in Rubaga and Makindye divisions probably the divisions lack land for crop agriculture that tend to be bigger than those for poultry. A good number of farmers had mixed ventures especially poultry and cattle, poultry and crop and piggery cattle. Perhaps this could be linked to the need to diversify just in case one venture is not doing well the other will be able to compensate for the losses in the other. Spatial analysis further revealed that in Rubaga division crop farmers were located close to the boundary of the city near Wakiso district this is probably these are areas where a lot of land could be obtained.

5.3 Perceived importance of information sources

The high ranks obtained by farmer workshops (Table 4.5) could be attributed to during the engagement; farmers meet experts in different fields and other farmers who are knowledgeable in different aspects of agriculture. Participants in farmer workshops have the opportunity to meet experienced successful farmers as well as other prospective farmers. They learn about different successful farm enterprises, and are able to ask questions about the genesis and development of farm businesses. This is further supported by (Thompson, 1999) who noted that the workshop covers resource assessment, goal-setting, financial planning and marketing options, in addition farmer workshops are a common way in the city through which new innovations are passed onto farmers for adoption as asserted by one of the farmers interviewed, ***'Workshops are the main source of our information here. They help us to share experiences and at the end of it all we are given hard copies for future reference'.***

The high ranks for demonstration plots (Table 4.5) could be attributed to the practical way through which information is provided, simplified and ready to use by the farmers. A good number of farmers interviewed from Kawempe division obtained their information and training from AGRO MAX agri-businesses here they have demonstration farms for poultry, crop agriculture, cattle goat and piggery. (Khan, 2009) further stresses that demonstration plots are not only successful in creating awareness among farmers about modern technologies but also motivates them to apply these on their farms. Moreover, farmers participate in these activities to gain practical know-how about improved farming practices. (Osborn, 1996) also stressed that they have resulted in increased productivity and income of the farmers Overall the demonstration plots were successful because of their practical nature, which make the practices easy to understand

Extension networks popularity could be attributed to fact that this is the main source through which farmers get technical information. This is in line with (Oleru, 2004) who noted that they provide information to farmers in contact with the extension officers and flexible way through which information is obtained. The low regard of website amongst farmers could be attributed to the high cost of computers, high levels of computer illiteracy. In addition (Mubangizi *et al.*, 2004) contended that there are low levels of Internet use in Uganda currently at 7.8% of the population and unreliable and expensive bandwidth. A low ranking for Veterinary officers was attributed to the fact that these were popular with livestock farmers who were few and the means were computed out of the total number of respondents.

5.4 Perceived accuracy of information sources

The high mean value for demonstration plots Table 4.5 in addition to their practical way of relaying the information to farmers, farmers participated in these activities to gain practical know-how about improved farming practices. These have resulted in increased productivity and income of the farmers. This concurs with (Khan, 2009) who noted that overall the demonstration plots were successful because of their practical nature, which made the practices easy to understand. In addition the theory behind demonstration method is that people will have confidence in the information they get if they are assured that the recommendations are practical and will want to see the results before accepting the technologies therefore, very accurate. This is further supported by (Oleru, 2004) who noted that farmers will be hesitant to adopt a technology unless they see its performance and value. Farmer field schools, extension networks and farmer workshops relatively high mean value could be partly due to involvement of experts who train farmers on various aspects of agriculture. The relatively low scores for other farmers, neighbours, family and friends could be partly attributed to the information get distorted as it moves from one person to another. This is supported by (Oleru, 2004) who noted that not many farmers have confidence in what other farmers tell them. The low means for radio and television could be partly attributed to mainly giving the same information especially about market prices for almost the whole week without being updated. This is supported by a good number of farmers who complained that ***' we don't know what TV and radios are doing as regards to agricultural information for example they give the same commodity prices for the whole week so we cant rely on the information that they provide to us'***

5.5 Perceived ease of obtaining information from sources

Farmer's perception that it is easy to receive information from family and friends and radios than any other sources (Table 4.5), could be due to majority of the people in the city owning radios. The radios also had a wide coverage and the most popular radio stations like Central Broadcasting Service have weekly programmes on agriculture practices and daily briefs on prices offered in different markets across the city divisions. This was probably because most of the information generators target the radio and television for dissemination of information. Information received from the radio and televisions was however mixed and did not focus on specific topics. (Shepherd, 2001) noted that in Africa, radio is the most appropriate

communication channel available to a majority of rural farmers. This also is supported by (Rohana, 1998) who noted that mass media was a critical channel for information dissemination.

In addition family and friends give information for free and it is readily available. In addition the body that is responsible for providing extension services, National Agricultural Advisory services has not done much to see that the demonstration plots are widely established within the city. The low mean value for perceived ease of obtaining information for newspapers is partly due to the fact that most newspapers in Uganda do not have weekly issues on agriculture related aspects and many respondents do not read newspapers because they are expensive and majority of them are not in local languages (Engoru and Bashasha, 2001). The low mean score for internet could be attributed to the fact that few people in Uganda have embraced the use of Internet and majority are computer illiterate.

5.6 Perceived Clarity of information obtained from the sources

Demonstration plots had the highest mean as regards clarity of information (Table 4.5). This is partly attributed to the fact that information is provided practically thus, many farmers could easily observe what is being provided, in addition explanations are given in local languages making the information provided easy to understand. The low mean ranks of internet could be due to the fact that many farmers can not afford the use of internet due to resources constraints, and that many farmers don't have internet. This concurs with (Mubangizi *et al.*, 2004), confirms this by noting that many staff service providers and individual service providers could not access information from internet due to resource constraints and unavailability of internet in sub-counties where the study was carried out.

5.7 Information needs of commercial urban farmers

Respondents needed more information on new innovations (technologies) and pest management; this could probably be due to the need to improve their farms and production since they were mainly producing for commercial purposes. This agrees with (Hu, *et al.*, 2006) who found out that farmers needed more information about new technologies and pesticides, and (Okwu, 2009), who revealed that farmers needed information on pesticide and fertilizer application and improved farm inputs. It however, disagrees with (Sabo, 2006),

who noted that farmers needed majorly information on weather patterns and soil management and fertilizer availability, and (Yahaya, 2000), who noted that farmers generally needed information on how to increase farm income and prices of products from other states and market prices. In addition, it also concurs with findings from (Zhao and Zhang, 2009) who noted that most small farmers regarded policy and market information to be of more use to them than information about technologies.

5.8 Assessment of information accessed by farmers

The results for information on market demands for Nakawa, Lubaga and Kawempe divisions Table 4.11 could partly be due to majority of the farmers interviewed hold meetings with other farmers to discuss market demands, location of markets among other things which is not common in the other two divisions.

In addition the findings for information on polluted areas in the city, could be attributed to the zones where the information was collected in central division (Kamokya II, III and Kifumbira) farmers here mainly grow crops more specifically grow vegetables and yams along River Nsooba. These were banned for consumption by the authorities in the country due to high pollution levels of most of the wetlands in this area with heavy metals and human waste. In addition, urban agriculture has been ignored by the Ministry, directing all its efforts to rural agriculture which is taken to be more important. As a result, extension services like NAADs have been directed to rural agriculture. The low proportions where farmers said obtained information could be attributed to farmers efforts to establish farmers groups especially in Lubaga division that sit on a bi-weekly basis to share experiences on new innovations, prices, market conditions, demands and locations.

The findings for Kawempe division could be attributed to a few farmers who have private arrangements with veterinary officers, agro traders and many farmers in this division (Kawempe) visit private Agri-businesses located in this area specifically they mentioned AGRO-MAX agri-business that have demonstrations for poultry, cattle, pigs, goats and crops who give them information. They also mentioned private seed companies like SUPA seeds Uganda limited and FICA seeds that also give them information.

5.9 Information retention capabilities of farmers

The results for family members and other farmers (Figure 4.11) could perhaps be due to the information using this pathway is provided in form conversations where farmers are not given a chance to note down anything thereby denying them a chance for future reference. Results for websites (Figure 4.11) could probably be partly explained by the cost involved that has led to few people in Uganda use the internet as there source of information. The popularity of newspapers, farmer workshops, farmer field schools and extension networks could partly be attributed to the ability of the sources to act as a reference point in the future, local language used and better demonstration of information from extension officers and extensive training. Demonstration plots were picked because of their practical way of providing information; radio and TV were mentioned because of repetitiveness, convenience and audio visual abilities respectively.

5.10 Channel that takes less time to exchange information

The results for broadcast media (TVs and Radios) Figure 4.12, could perhaps be due to the coverage of the two medium and ability to pass on information to many people at once. This concurs with (Rohanna, 1998), who stressed that radios and TV have a wide coverage, less time is needed to reach all farmers. Farmer field schools (FSS) and demonstration plots were the least perceived pathways that take less time to communicate information this could partly be attributed to FSS coming once in a long period time and demonstration plots have specific places where they are located, therefore involve movements and costs.

5.11 Information sources

The popularity of other farmers, family and friends and radios Figure 4.9 is partly due to access to information from any given source depended on private service provider's initiative and pre existing personal friendship with people from the source. The findings partly agrees with (Okwu, 2009), who revealed that farmers got their information from their husbands and fellow women farmers and (Marvin *et al.*, 1990), who acknowledged that sources of information for grain and corn farmers were radio broadcasts and (Rees, et al., 2000) in his study of information systems in Kenya found out that the major local sources of agricultural

knowledge for farmers were neighbours, family, markets and community based organisation. Though other sources of information were named here including non governmental organisations, Churches, community meetings, family and friends and agricultural companies. However, it does not agree with (Zhao and Zhang, 2009) and (Zhao, 1998) who found out that Television was the main channel by which farmers received their information, followed by information from village government officials, neighbours and milk stations, with very little information coming from radios, newspapers and the Internet.

Newspapers were among the least used information sources this could be attributed to the cost involved and lack of daily agricultural related topics in most local newspapers leaning towards agriculture. Internet (websites) a modern information source was the least information source used by commercial farmers in Kampala district, attributed to high installation costs and lack of usability skills within the farmers in Kampala. However, the findings disagrees with (Jiang, *et al.*, 2006) and (Geng, 2001) who noted that the Internet was becoming an important information channel for farmers. This further agrees with (Demiryurek, *et al.*, 2008) who concluded that certainly, in most economically advanced countries, the Internet and farmers' associations have become important information sources because of its convenience and affordability in such countries.

5.12 Farmer's rating of the degree of need of various information categories

The high mean rank for dosage and pesticide application Table 4.12 implies that farmers being solely commercial they would like to use pesticides' on their farms so that they maximise output on their farms. The rank for Location of markets and high yielding varieties of both animals and crops could be attributed to farmers being commercial; they always strive to increase their turn over so that they increase their profits they would vigorously look for information on location of markets to sell off their products. A poultry farmer asserted that, ***'We need the authorities concerned to give us more information on high yielding varieties of chicken; especially layers and broilers where to get them, their cost, how to rear them, their pros and cons and the cost of rearing them but unfortunately at the moment we don't get that'.*** Many farmers intimated further that they needed information on location of markets and the prices offered by the different markets so that they make a decision on where to take their producesin order to get maximum profits. In addition most of the urban farmers deal in the production of highly perishable products like vegetables (tomatoes, cabbages, and

amaranths) and animal products like milk that need ready markets this is in line with (Karanja, et al., 2006) who noted that mainly urban farmers in Nairobi produce highly perishable products like milk, therefore needs ready market. It could also be attributed to the fact that poultry products especially eggs are cumbersome to store and very vulnerable. In addition keeping poultry products like broilers and off layers for extra days would mean incurring extra costs. A high rank for sources of credit facilities could be partly attributed to the fact that urban agriculture is capital intensive and the small size of urban farms means that the venture to be profitable, farmers needs a lot of capital to invest in fertilizers, high yielding varieties like fresian cows for milk Production. In addition a lot of money is needed by poultry farmers to construct vertical elevated buildings due to lack of space and purchasing of feeds and drugs for their birds.

The last four types of information (methods of weed control, seed treatment, land preparation and harvesting and storage) Table 4.12 got lower means, this perhaps could be explained by few respondents practiced crop agriculture majority reared birds and animals therefore, this could have affected the mean values. In addition a good number of farmers noted that they received information on these type of information from private seed companies like SUPA seeds and AGRO MAX agri-business therefore the need for the same information is not high. In addition being located in urban centres where it is easy to get the markets it is not very paramount to get information on storage. The farmers also revealed other information needs these included weather and policy information. The latter was mostly needed by commercial farmers with primary and secondary education.

5.13 Farming experience and information needs of CUFs

The need for information was high in the farmers with 1-10 years of farming experience and low with farmers of 11years and above. This could partly be attributed to low urge among aged farmers to further improve their farms. In addition farmers who have done farming for some years, and are advanced in age, are less mobile and tend to think that they have seen it all therefore tend to use the information they have accumulated over the years in making decisions on their farms.

5.14 Farmer education level and information needs

It is also important to note that farmers with no formal education trailed in every category of information needed and in some categories like information on polluted areas in the city and market locations there was not even a single response from them (Figure 4.14). This is partly attributed to their lack of awareness of the importance of the two categories of information.

Farmers with 11 years and above of education their need for information cut across the whole spectrum of categories of information. This reflects the fact that more highly educated individuals could more easily understand the benefits of having information since information is power. This partly agrees with (Zhao and Zhang, 2009) who found out that farmers with high education levels, needed more information on markets and innovations. In addition farmers with11 years and above of education most of them asserted that they get market prices using mobile telephone services and improved breeds from places like Kawanda Agricultural Research Institute, and agro dealers like farm input suppliers and agri-business like AGRO-MAX limited, therefore, catered for needs.

5.15 Type of agriculture practiced and information needs

Poultry farmers dominated information categories of market locations, disease management and dosage, sources of credit facilities and market prices and demand (Figure 4.15). This could be explained by the fact that majority of the farmers surveyed kept poultry. This is agrees with (Maxwell, 2001) who noted that poultry farmers are the majority in Kampala among commercial farmers, and that poultry production is the most common form of commercial urban agriculture, and an estimated 70% of all poultry products consumed in Kampala are produced in the city. Therefore they would be specifically interested in information in information on high yielding varieties to improve their farms. Information on sources of credit facilities was high and almost level amongst poultry, cattle and crop farmers; this could be due to the need to buy feeds, drugs and high yielding varieties like fresian cows and hire of labour to help them on their farms respectively.

5.16 Factors that influenced access to information

Education had positive coefficients and was statistically significant at 5% significance level. This implies that education of the farmer was influential in farmer's access behaviour of new information and its impact was significant. The results imply that farmers with high level of education had more chances of accessing information than their counterparts with less levels of education mainly because educated people know the importance of information and could get information from sources that those with low levels of education couldn't like websites. This automatically dictates the probability of highly educated farmers accessing information to be high compared to farmers with low education levels thus influencing the decisions made. This slightly agrees with (Abdi, 2003) findings for access of information groundnuts technology. He noted that education of the household head was influential in the farmer's access behaviour and contributes to speed of adoption of information but the impact was not significant.

Farming experience had a negative and significant influence on the choice and accessing of both types of information that were highly needed by farmers. This could imply that the more experienced the farmer, the more relaxed them became to access particular information and those with less experience were the opposite. This signifies that experienced farmers use their own experience in farming rather than seeking for other information. All in all, the probability of highly experienced farmers to access information is less than those with less experience.

Farm size similarly had a negative relationship on the choice to access information on high yielding varieties and dosage and pesticide application and its impact was not significant. In other words, a farmers' land holding does not directly dictate the farm output reason being that one farmer could have a large piece of land with less output and another farmer less land but much output depending on how much inputs this farmer investments in his small piece of land thereby influencing the amount of information needed.

The type of agriculture practiced by farmers had a positive relation and its impact was significant for access to information on high yielding varieties, and had a negative relationship relation and its impact on access to information on dosage and pesticide application was not significant. This meant that both categories of farmers sourced for the former in an effort to achieve maximum output. The negative and non-significance of the

variable to the latter meant that perhaps farmers who looked after livestock did not want information on how administer pesticides and their dosage.

In addition access to extension and farm income, both have a positive relationship but there impact on farmer's decisions to access any particular type of information was not significant. Perhaps farmers who had access to extension were more likely to access the two types of information studied, but the insignificant impact to influencing the decision could be linked to the fact that very few farmers accessed extension services in Kampala.

5.17 Information sources for making marketing decisions

The information source most frequently cited as "most important for marketing decisions" was the cooperative extension services and other farmers (Table 4.15). The two sources ranked first among the 18 information sources as the most useful. This is partly attributed to the fact that other farmers having experience in marketing information. They know where best farmers would market their produces and get suitable prices, provide information for free, readily available through one on one exchange of information and through meetings. Cooperative extension services do provide accurate information collected over a long period of time, the information provided to members at a small fee. Therefore farmers trust these two sources

Radio broadcasts and marketing consultants respectively received the second and third ranks. Availability and type of information provided by these two sources differ. Radio broadcasts provide price quotes almost on an immediate basis. Radio is primarily useful for pricing and other operational marketing decisions. Radio market reports are issued frequently. They reflect local market conditions and may include some analyses of trends. However, radio broadcasts give limited analysis of market conditions. Marketing consultants are usually readily available, give very accurate information though very expensive. They provide more extensive analysis of market conditions than do radio broadcasts. One type of information is price quotes needed on an immediate basis. The second type of information provided by marketing consultants is additional analysis of market conditions. These sources tend to be presented in prescriptive (action recommendations) rather than descriptive form. They also tend to have a longer timeframe of analysis than do radio market reports. This is in line with (Marvin, *et al*, 1990) sentiments that marketing consultants often address strategic marketing plans for the marketing season or longer.

The low frequency of citation of local newspapers, government publications, agricultural networks, general farm magazines (4.1%, 3.1%, 2.7% and 2.1%), respectively, suggest that farmers use such sources more for other services than as a source of marketing information. In addition some of them are inaccessible like government publications and others like general farm magazines are non-existent in Uganda.

Electronic sources (video and internet) received the least ranking this is mainly due to the fact that they are not popular with the farming community in Kampala city, expensive and many farmers do not have the expertise to access information from the internet. Again, additional market analysis is needed less frequently than are price quotes. Videos highest rank in the least useful category, could be attributed; videos more especially don't carry marketing information mainly carry information on new innovations and farming practices. Internet is not popular with commercial farmers in Kampala because of the cost and the content provided is not in local languages.

5.18 Information sources for making production decisions

Other farmers obtained the highest rank as the most useful source of information for making production decisions; this may be linked to other farmers being very experienced in agricultural production aspects and providing information for free. Salesmen generally provide specific information concerning a product and are generally highly experienced in a particular area. This source is readily available, more at times free, and gives prospective farmers a chance to obtain hands on information. This source however does not give farmers in-depth analysis of production trends, demand driven production and weaknesses of production techniques employed by a given farmer may not be pointed out.

Cooperative extension services, farmer workshops, farmer organisations and agricultural networks rank second through fifth, respectively. These sources provide general information useful for making strategic decisions. This suggests a dichotomy of information needs; either product-specific information is needed or general information is desired.

In category least most important source for making marketing information decisions, newspapers ranked first, general farm magazines ranked second, internet and videos ranked third and fourth respectively. This could be attributed; videos more especially are not readily available. Internet is not popular with commercial farmers in Kampala because of the cost and the content provided is not in local languages.

The print media especially the local newspapers rarely have agricultural related publications, and when they have them are too general and therefore, not problem tailored making them less useful to farmers. In addition, the farmers in Kampala perceive them to be expensive and therefore rarely used. Government publications are very rare in Uganda generally; those that are existent do not reach the common farmers. The City Agricultural Department in Kampala has no publication for disseminating new innovations to farmers and general farm magazines are non-existent in Uganda. Those who use them get them from overseas, therefore very expensive, not relevant to local farmers and the language in which the information is provided can not be read by majority of the farmers in Uganda generally and Kampala in particular. The benefits of using printed information materials as stated by farmers is that they provide a permanent record and important aid to memory, confirming (Leach's, 2001a) and (Carter's, 1999) findings. One farmer said: "*You can go back to read it again because you can forget what you are told.*" Another farmer said that printed materials could be passed on to children, "even if you are dead." These comments confirm (Meyer's, 2002,) view that people may not accurately recall information shared verbally or may not disperse such information to those who were not within hearing of the verbal exchange.

It appears that the majority of farmers did not use printed information, not only because of low levels of literacy but also because of limited access to printed materials. Confirming (Hewins, 1990) findings that selection of an information source depends in part on the ease with which it can be accessed. The reasons for such inaccessibility seem to be a lack of finance to purchase materials, unavailability of suitable literature in their local villages, and failure on the part of intermediaries to pass on relevant, appropriately repackaged printed materials, especially material translated into local languages. Many illiterate farmers interviewed mentioned that their children read English texts to them. Farmers also mentioned that relatives and other farmers assist with reading printed materials. These findings indicate the important role that family literacy plays in rural areas. One farmer described how she called farmers together to share information from an agricultural newsletter, confirming that literate farmers pass on information, accessed through printed materials, to other farmers more especially through farmer workshops and weekly meetings.

Electronic just like the print media, to Kampala farmers is not popular as a source of information to making production decisions (Table 4.16), internet use is a new phenomenon to most of the farmers in Kampala, as majority of the farmers interviewed did not have a computer and were computer illiterate. Those that at least use internet to obtain information asserted that the charges are high (100 Ugandan shillings per minute), organisations that

would provide production related information some don't have websites, others their websites most of the time are not running and others the information contained in there is irrelevant and take along period of time to get updated. A visit to Kampala City Council websites revealed that there is no content related to agriculture, though the City has a Department charged with urban agriculture. Videos just like internet are not readily available to farmers in Kampala, expensive and the content is not user specific, more often in languages that are not friendly to farmers in Kampala.

5.19 Differences in Information Source Preference

Small income farmers more frequently ranked production specialist, interpersonal and print categories as their most useful source of production information as compared to the large income farmer category. This could be due to less income leads minimal resources to obtain information from formal sources like cooperative extension services. These sources do give farmers in-depth analysis of production trends, demand driven production and weaknesses of production techniques employed by a given farmer may be pointed out

Farmers with some tertiary and secondary education, as compared to those with educations of primary school or less, were more likely to indicate interpersonal and electronic sources as their most useful information source. The results for electronic could be due educated farmers would use electronic sources like internet far more easily than their counterparts. This is not in line with (Marvin ,et. al., 1990) who indicated that farmers with some college education, as compared to those with educations of high school or less, were more likely to indicate a professional consultant as their most useful information source.

Small income farmers more frequently ranked production specialist, marketing specialist interpersonal and print categories as their most useful source of marketing information as compared to the large income farmer category

Farmers with tertiary and secondary education, as compared to those with educations of primary school or less, were more likely to indicate marketing specialists and print sources as their most useful information source of marketing information. This could be partly attributed to their ability to read and comprehend information provided through these sources. These sources does give farmers in-depth analysis of marketing trends, demand driven production and weaknesses of marketing techniques employed by a given farmer may also be pointed out. The results agree with (Murage, et al., 2010) indicate that more educated

farmers preferred print materials and radio. These results agree with what has been reported in literature. However, farmers with secondary and post secondary education preferred print materials and radio probably because print materials contain more technical information that would require at least a farmer to have some formal education in order to be able to discern the contents (Gloy, et al., 2000; Ngathou, et al., 2005). It has been argued that some farmers with high levels of education tend to rely more on outside sources of information other than on their own experience and therefore are likely to get more knowledge through reading than from other sources(Ngathou, et al., 2005).

Younger farmer's ranked print media as the most useful source of their marketing information partly linked to their versatility and eagerness to find out new ideas and knowledge. This does not conform to (Marvin *et. al.*, 1990) who concluded that older farmers more frequently cited broadcast as their most useful source of marketing information as compared to younger farmers.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Socio-economic factors contributed to the use and access of a particular type of information, but the extent of influence however varied. Factors that influenced the access and use' of information on high yielding varieties and dosage and pesticide application were education, gender, farming experience and type of agriculture practiced. The same factors are generally important for passing on agriculture knowledge and information in the sector.

Farmers needed information on a wide variety of aspects of agriculture, but they needed more information on high yielding varieties and dosage and pesticide applications. Therefore, agents of CAD extension unit and other agencies responsible for transfer of technology should intensify efforts at training of farmers on improved crops and animal breeds, and pesticides management and applications.

Demonstration plots, farmer workshops extension networks and farmer field schools were perceived to be more effective dissemination pathways than the rest of the information pathways that respondents use to obtain agricultural information

Small income farmers preferred production specialists, interpersonal and print as their most useful sources of information for making production decisions. Educated farmers preferred Inter personal sources as their most useful sources of information for making production decisions.

In addition small income farmers preferred production specialists, marketing specialists, interpersonal and print categories as their most useful sources of information for making marketing decisions. More still educated farmers preferred marketing specialists and print as their most useful sources of information for making marketing just is the case for younger farmers as regards print.

6.2 Recommendations

6.2.1 Research

A detailed examination of information characteristics which farmers prefer also may be valuable. For instance, the study address did not address why farmers prefer interpersonal forms of information neither did it examine the entire range of information sources a farmer might use.

Finally, variables other than those studied here, such as an individual's risk preferences or managerial style, may impact information source preference. Examining individual characteristics, perhaps through case studies, may provide useful insights

The study examined information needs and preferences of commercial urban farmers in one city. Differences may exist across cities, towns and indeed general agriculture, particularly regarding preferences for the Extension Service.

6.2.2 Policy

There is need for the local government and the underlying ministry of agriculture to work together and commit resources for the establishment of a spatial database showing location, farmer and farm characteristics to help in information dissemination and decision making processes.

The local government should ensure that every division is provided with a community library well stocked with relevant adequate and timely agricultural information materials for consultation by farmers and agricultural officers at the division.

Urban farmers should be encouraged to enroll in adult literacy classes so that they can take advantage of agricultural information captured in print media that government once in a while puts in local news papers and research publications by agricultural research organisations.

The city agricultural department should establish demonstration plots and model farmers and poultry study sites in every division to help farmers to get more practical information from them. Extension agencies should gather first the needs of information of farmers, and provide information areas of need that is the information should be demand driven.

The main implication of the results from our study is that government agencies and private suppliers of information, need to work together with urban farmers in the city to better define the specific needs of information that would assist them to improve the economic efficiency of their production and to find more effective communication channels in which to deliver this information.

The CAD needs to establish a local radio programme that targets urban farmers. Through this programme technologies will be passed on to the farmers, information on markets, trends in production, quality and quantities needed will be able to be aired out to farmers in the city.

The city agriculture department should use a mixture of sources when disseminating production and marketing information to farmers. Especially use other farmers and cooperative extension services.

There is need to consider aspects like education, farming experience and gender when packaging information for dissemination. The information should cater for educated and non-educated farmers and should be gender specific.

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APPENDICES

Appendix 1: FIELD BOOKING SHEET FOR DATA COLLECTION

Zone (LC1)										
Parish							**Coordinates X**			
Division							**Y**			
Variables										
Attributes	Land size	Registered *(YES/NO)*	Household Size	Type of ownership	Land Tenure	Own or Rent	Access to extension	Have a computer	farm size	Amount obtained from selling produces per month
CROP FARMERS										
POULTRY										
CATTLE FARMERS										
HORTICULTURE										
FLORI CULTURE										
FISH FARMERS										
OTHERS SPECIFY										

Appendix 2: SURVEY TOOL

Introduction

My name is Ssegujja Fred a postgraduate student at Egerton University. As a requirement for my M.sc in Agricultural Information and Communication management at the Faculty of Agriculture, Egerton University, am undertaking a study titled '***factors that influence access to agricultural information and preferences of commercial urban farmers in Kampala*** This interview schedule is aimed at generating useful information about farmer information needs, channels of communication and assessing the usefulness of agricultural information in the city department that will serve to improve management and communication and improvement of information flow between the stakeholders. The findings from this study are solely for academic purposes and will not be disclosed to any third party without the approval of the relevant authorities. I kindly request you to support me by responding to the following questions. The enumerator should assure the respondent of the confidentiality of the information provided as being purely for the purpose of the survey.

'***Examining Dissemination Pathways of Urban Agriculture Information in Kampala City, Uganda'***

Date of Interview.....Name of Enumerator.....

Coordinates

X							
Y							

PART A: SOCIAL ECONOMIC CHARACTERISTICS

1 Division.....

2 Parish.....Zone.....

3 Name of Respondent.....Telephone number.....

4 Sex 1 Male 2. Female

5 Marital Status **(Please Tick Appropriately)**

1 Married 2. Single 3. Widowed 4. Divorced

6 Age of Respondent .....

7 Level of Education

1. No formal education
2. Primary
3. Secondary
4. Tertiary
5. Others (specify) total years in school

8 Number of years in practicing urban agriculture.....

9 Annual farm income.....

10 Major occupation of the respondent .....

11 Do you access extension services?

1Yes 2 NO ...

If yes, how do they access these services?

12 Indicate the size of your farm.....

13 Nature of ownership

1. Sole owner 2 Multiple Owners

14 Do you use records in farm management?

1 Yes 2 No

15 Do you use a computer in farm management?

1 Yes 2. NO

If no, why?.....

PART B Information Dissemination pathways (sources)

A) What is your source of agricultural information? You may tick more than one channel indicate also the frequency of obtaining this information on the same table

Sources		Frequency of Use			
		Bi - weekly	Monthly	1-2times a year	Once every two years
Inter personal					
Extension networks					
Farmer field schools					
Demonstration plots					
Farmer workshops					
Other farmers					
Neighbours					
Family and friends					
Electronic					
Websites					
Films /Videos					
Broadcasts					
Television					
Radio					
Print					
Newspapers					
Local newsletter					
Bulletins					
Booklets /leaflets					

B) On a scale of 1-5 rank the importance of the sources below in disseminating agricultural information effectively

Sources	Rank	Sources	Rank
Inter personal		Vet officers	
Extension networks		**Electronic**	
Farmer field schools		Websites	
Demonstration plots		Films /Videos	
Farmer workshops		**Broadcasts**	
Other farmers		Television	
Neighbours		Radio	
Family and friends		**Print**	
		Newspapers	

C) Give reasons for the best ranked channel in terms of effectiveness.....

D) Is it easy to receive information from the city agriculture department?

1. Yes 2. No

E) If yes how easy is it?

1 Very easy 2 quite easy 3 fairly easy 4 Easy 5 Poor 6 Very poor

F) Do you understand the agricultural information obtained

1 Yes 2 No

Give reasons for the answer given above.....

On a scale of 1-5 indicate the ease of obtaining agricultural information from the following sources? Where 5= very easy 1=not easy at all

	Channels	1	2	3	4	5	6	7	8	9	10
1	Radio										
2	Television										
3	News papers										
4	Websites										
5	Farmer field schools										
6	Demonstration plots										
7	Vet officers										
8	Posters										
9	Others specify										
10	Farmer workshops										
11	Other farmers										
12	Neighbours										

H) On a scale of 1-5 how would you rate the usefulness of information obtained from the following sources. Please tick appropriately.

6=Excellent 5=Very good 4=Good, 3=Fair 2 poor 1= Very poor

	Channel	**1**	**2**	**3**	**4**	**5**
1.	Extension networks					
2.	Television					
3.	Radio					
4.	Vet officers					
5.	Newspapers					
6.	Websites					
7.	Family and friends					
8.	Neighbours					
9.	newspapers					
10.	Farmer field schools					
11.	Demonstration plots					
12.	Farmer workshops					

I) Clarity of information obtained

I) indicate on a scale of 1-5 the clarity of information obtained from the following sources. Where 1=never clear, 2=seldom clear, 3=sometime clear, 4=often clear, and 5= Very clear

	Dissemination pathway	**Rank**				
		1	**2**	**3**	**4**	**5**
1	Extension networks					
2	Television					
3	Radio					
4	Newspapers					
5	Websites					
6	Family and friends					
7	Technical manuals					
8	Farmer field schools					
9	Demonstration plots					
10	Farmer workshops					
11	Other farmers					

12	Neighbours					

J). Reasons for using the selected channels of communication (You can select more than one reason if applicable).

1. Low cost ☐
2. Timely information about an innovation ☐
3. Low overhead and establishment costs ☐
4. Low maintenance costs ☐
5. Low employee training costs ☐
6. Convenient ☐
7. Easy to manage/edit information ☐
8. Effective ☐
9. Efficient ☐
10. Can combine with other media such as DVDs, Sound Video Camera ☐
11. 11 Others please specify ☐

K) Indicate on a scale of 1-5 the accuracy of information obtained by the following channels where 1=not at all accurate, and 5= very accurate.

	Channels	1	2	3	4	5
1.	Extension networks					
2.	Television					
3.	Radio					
4.	Newspapers					
5.	Websites					
6.	Neighbours					
7.	Family and friends					
8.	Other farmers					
9.	Vet officers					
10	Farmer field schools					
11	Demonstration plots					
12	Farmer workshops					

L) Which of the used channel above leads to long-term information retention?

……

M) Explain your answer above……

N) Indicate the channel that takes less time to obtain and exchange information?

……**O)**

Why?……

Part C: Information Needs of Urban Farmers

I) What kind of information do you need to effectively carry out farming activities on your farm?

……

II) Is the information on urban farming readily available to farmers?

……

III) Do you receive information on the following issues?

	Type of information	**Yes**	**No**
1	Market demands		
2	polluted areas in the city urban agriculture		
3	Location of markets for your products		
4	Sources of farm inputs/implements		
5	Sources of credit facilities for funding inputs		
6	Levels of competition		
7	Quality and quantity of product		
8	Agronomic practices (Innovations and best practices)		
9	Methods of weed control		
10	Pests and disease management		
11	Seed treatment		
12	Land preparation		
13	Harvesting and storage		
14	High yielding varieties		
16	Dosage and method of pesticide application		

IV) On a scale of 1-5 indicate the degree of need of the following information.
1= very low 2= Medium 4=High 5=Very high (Tick where appropriate).

	Type of information	**1**	**2**	**3**	**4**	**5**
1	Market demands					
2	Polluted areas in the city urban agriculture					
3	Location of markets for your products					
4	Sources of farm inputs/implements					
5	Sources of credit facilities for funding inputs					
6	Retail prices and whole sale agro prices					
7	Quality and quantity of product					
8	Agronomic practices (Innovations and best practices)					
9	Methods of weed control					
10	Pests and disease management					
11	Seed treatment					
12	Land preparation					
13	Harvesting					
14	Storage					
15	High yielding varieties					
16	Dosage and method of pesticide application					

V) Do you ask for this information?
1. Yes 2. NO

VI) If yes, how often do you ask for this information?
a. Once a week ☐ Bi weekly ☐ Monthly ☐ Quarterly ☐

Once every six months ☐ others specify ☐

VII) Where do you get this information from?.....

VIII) How frequent would like to receive this information?
Weekly ☐ Biweekly ☐ Monthly ☐ Quarterly ☐

Once every six months ☐ others specify... ☐

Part D. Useful Information Sources for Production and Marketing Decisions

I) On a scale of 1-3 indicate which of the following sources are: **1=Third most useful, 2=Second most useful, 3= Most useful in making**

A) Marketing decision making, B production decisions?

	A : Marketing Decisions	**Rank**			**B:Production Decisions**	**Rank**		
	Source of information	**1**	**2**	**3**		**1**	**2**	**3**
1	**MARKETING SPECIALISTS**							
2	Cooperative extension services							
3	Commercial news letters							
4	Marketing consultants							
6	**PRODUCTION SPECIALIST**							
7	Sales men							
8	Veterinarian							
9	Other farmers							
11	**PRINT MEDIA**							
12	Local news papers							
13	General farm magazines							
14	Government publications							
15	Agricultural news letters							
	BROADCAST							
	Television							
	Radio							
	INTER PERSONAL SOURCES							
	Family members							
	Friends and neighbours							
	Other farmers							
	Extension personnel							
	Trade fairs & exhibitions							
	Farmer organisations							
	Electronic sources							
	Websites							
	Video /CD							

II) Give reasons for the selected sources of information

.....

III) What kind of information do you need to make marketing decisions?

.....

IV) What kind of information do you need to make production decisions?

.....

Appendix 3: Table Farmer characteristics and type of agriculture practiced

		Type of agriculture practiced (Frequencies)					
Division	%	Poultry	Piggery	Cattle	Goat	Crop	Total
Kawempe	38.2	15	12	21	1	27	76
Lubaga	23.1	27	3	10	1	5	46
Central	8	6	0	1	2	7	16
Makindye	11.6	11	4	7	0	1	23
Nakawa	19.1	7	3	3	7	18	38
Age							
18-29	24.1	19	3	12	2	12	48
30-40	37.2	28	7	9	4	26	74
41-51	21.1	11	7	11	2	11	42
52-60	13.1	7	4	7	1	7	26
62-92	4.5	1	1	3	2	2	9
Marital status							
Married	68.8	48	13	29	5	42	137
Single	22.1	17	3	7	4	13	44
Widowed	6.5	0	3	5	2	3	13
Divorced	2.6	1	3	1	0	0	5
Access extension services							
No	83.9	54	18	28	11	56	167
Yes	16.1	9	3	13	0	2	27
Gender							
Female	53.3	41	16	15	4	30	106
Male	46.7	25	6	27	7	28	93
Main Occupation							
Student	6.0	5	0	1	3	3	12
Business	21.1	12	3	9	3	15	42
Farming	47.7	39	12	23	3	18	95
Professionals	12.6	7	3	4	1	10	25
Others	12.6	2	1	3	0	6	25
Level of education							
0 (no formal education)	11.1	6	1	5	2	7	21
7 (primary)	21.1	16	6	10	3	8	43
11(secondary)	45.2	31	8	14	4	28	85
16(tertiary)	22.6	13	7	12	2	15	49
Farming experience							
1-5	38.2	24	12	15	2	23	76
6-10	34.2	29	5	13	5	16	68
11-16	12.1	6	3	5	1	9	24
18-25	13.5	7	2	7	3	8	27
30+	2.0	0	0	2	0	2	4

Source: data from the survey 2010

Appendix 4: farm characteristics and type of agriculture practiced

	%	Type of agriculture practiced (Frequencies)					
Farm size (acres)		**Poultry**	**Piggery**	**Cattle**	**Goat**	**Crop agriculture**	**Total**
0.0494-0.0124	**10.6**	11	3	5	1	1	21
0.0125-0.0222	**6.0**	1	6	4	0	1	12
0.0223-0.0618	**24.6**	9	5	14	7	14	49
0.0619-0.25	**26.1**	22	1	10	2	17	52
0.26-0.87	**19.6**	16	**5**	**5**	**0**	**13**	**39**
0.88-4	**13.1**	7	2	4	1	12	26
Farm Income ($)							
$318-682	**43.2**	32	5	14	5	30	86
$683-982	**36.2**	19	11	15	4	23	72
$$983-1364	**5.0**	3	0	4	1	2	10
$1365-2273	**6.0**	2	1	6	0	3	12
$$2274-3273	**2.0**	2	1	0	1	0	4
$3274-4091	**2.0**	2	2	0	0	0	4
$4092-5909	**1.6**	3	0	0	0	0	3
$5910+	**4.0**	3	2	3	0	0	8
Use records							
No	37.2	38	7	17	1	11	74
Yes	62.8	28	15	25	10	47	125
Total		66	22	42	11	58	199
Use computer							
Yes	1.5	2	0	1	0	0	3
No	98.5	64	22	41	11	58	196
Total		66	22	42	11	58	199
Farm Ownership							
Sole	66.3	47	17	35	7	26	132
Multiple	33.7	19	5	7	4	32	67
Total		66	22	42	11	58	199

Appendix 5: Policy and legal frame work of urban agriculture in Kampala

A legal framework for regulating urban and peri-urban agriculture activities was enacted in 2005 (KCC, 2006). The framework provides guidelines for, controlling, regulating and legalizing urban agriculture activities in the city. Ordinances clearly specify permitted agricultural activities in designated zones of the city. The five Kampala Urban Agriculture Ordinances therefore are,

a) *The Local Governments (Kampala City Council) (Urban Agriculture) Ordinance, 2006:* This Ordinance addresses general issues surrounding growing crops and keeping livestock within the jurisdiction of Kampala City Council. *The Local Governments (Kampala City Council) (Livestock & Companion Animal) Ordinance, 2006;* this ordinance governs the keeping of all animals that are kept for food production and income as well as animals that are kept as companions. It aims to keep things clean and well organized with animals within the City.

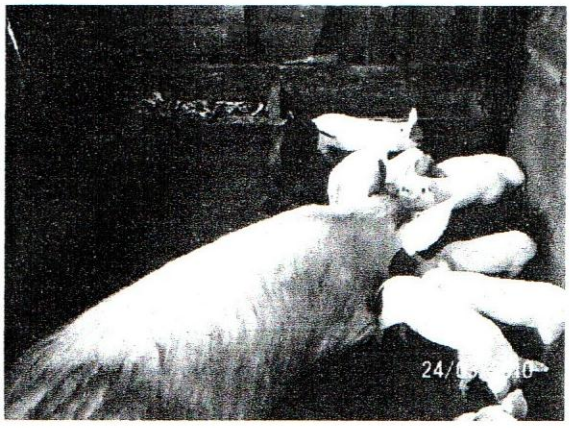
b) *The Local Governments (Kampala City Council) (Meat) Ordinance, 2006:*

The slaughtering of animals, transport, processing and marketing of meat in urban areas are related to urban agriculture.

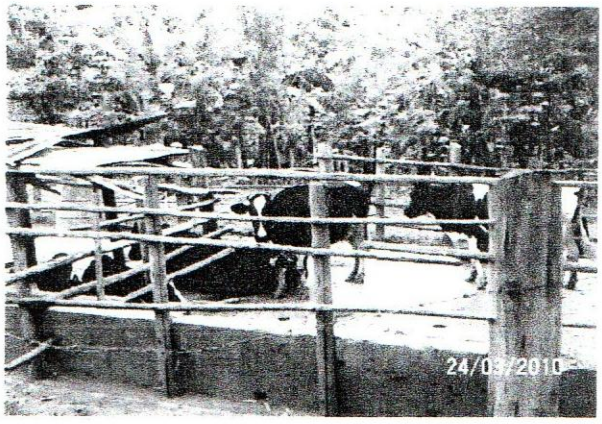
c) The Local Governments (Kampala City Council) (Milk) Ordinance, 2006:This Ordinance therefore, regulate permits and licenses for dairies, establish standards for milk and milk products, and prevent the spread of disease to the benefit of residents and the city population in general.

d) *The Local Governments (Kampala City Council) (Fish) Ordinance, 2006 the* farming, capture, handling, processing and marketing of fish in urban areas are part of urban agriculture. This Ordinance will, therefore, regulate anyone dealing with fish and fish products as a business (e.g., fish farmer, fisher-man, fish monger, or transporter). (Urban Harvest, 2005).

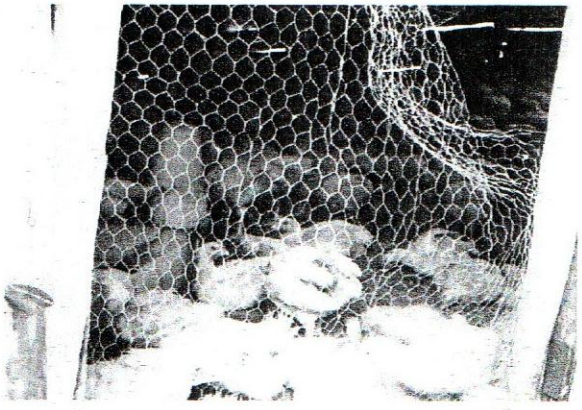
Appendix 6: plate showing types of agriculture in Kampala



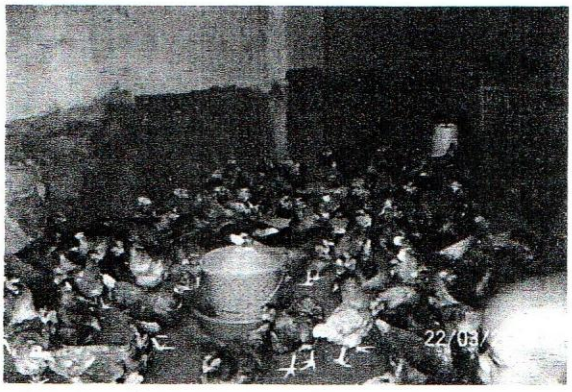
(1) Piggery in Rubaga division



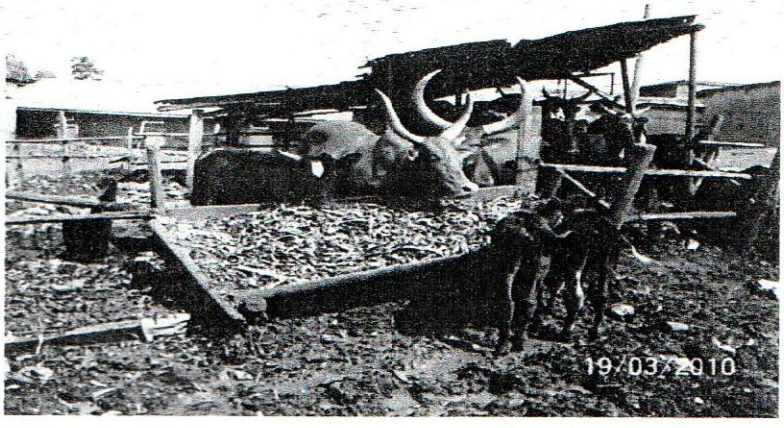
(2)Exotic cattle in Makindye



(3) Broilers in central division



(4) Layers in Rubaga division



Indigenous cattle in Kawempe Source: Taken in the field during the study.