ASSESSMENT OF URBAN AGRICULTURE AS A MEANS OF SUSTAINABLE URBAN LIVELIHOOD IN ENUGU METROPOLIS, ENUGU STATE NIGERIA

BY

IWUEKE, NYAINBAU TARINABO
PG/Ph.D/08/47619

CENTRE FOR ENVIRONMENTAL MANAGEMENT AND CONTROL (CEMAC)
UNIVERSITY OF NIGERIA (ENUGU CAMPUS)

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CENTRE FOR ENVIRONMENTAL MANAGEMENT AND CONTROL (CEMAC)
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IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D) IN ENVIRONMENTAL MANAGEMENT

SUPERVISOR: **PROF. J. C. NWAFOR**

SEPTEMBER, 2014

CERTIFICATION

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This is to certify that the work embodied in this thesis is original and has not been submitted in parts or full for any other degree of this or any other University.

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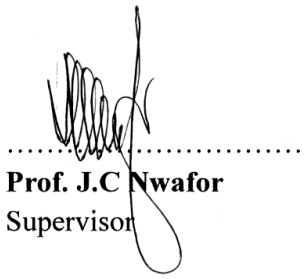

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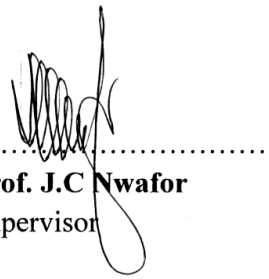
We certify that this thesis was carried out by **Iwueke, Nyainbau Tarinabo** and approved by the Centre for Environmental Management and Control (CEMAC), University of Nigeria, Enugu Campus as part of the requirements for the award of the Doctor of Philosophy in Environmental Management of the University of Nigeria, Nsukka.



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To

Chiedo, Ebubechi and Dabirichukwu

Thank you and God bless.

To God to be the Glory.

ACKNOWLEDGEMENT

When I decided on the study of the informal sector, and specifically urban agriculture, as a means of urban livelihood, it did not occur to me then that there was so much to study and write about the subject. That the pages of this thesis are about urban agriculture is testimony enough that I benefitted substantially from the insights into the subject and the support and contributions of many people not all of whom can be mentioned individually here though. However, let me start by saluting my most patient and erudite supervisor Prof. J.C. Nwafor for his guidance and supervision of my work. I remain ever grateful to him. Knowing that a Ph.D is a culmination of a long academic journey, I must acknowledge the mentorship role of Prof. J. C. Nwafor who kept telling me that I can do it. For that I remain forever grateful to him. Secondly, I salute my research assistants ï Kelechi, Ferdinand, Grace, Simon, Agatha and my son Ebubechi ï for the dedication and commitment they showed in the process of generating the data (questionnaire administering) that formed the basis of this thesis. Their efforts would have counted for nothing were it not for the co-operation of the many respondents who volunteered information; some of whom did it over and over again to validate data. To them I am grateful. Special thanks go to Kelechi for acting as my lead research assistant. I thank most sincerely my Statisticians - Ify Onuagha and Enyinnaya Aham-Ubani for the statistical guide I received. I unreservedly thank my employers, the Enugu State University of Science and Technology and in particular, my Faculty (Faculty of Environmental Sciences), for providing a stimulating research environment. I acknowledge the Enugu State Agricultural Development Project for the use of their library and materials at the initial stage of my research. To the lecturers at CEMAC, especially Prof. H. C. Mba and Dr. Hilary Eze I thank you for the constructive criticisms. I thank in a special way, the Director, CEMAC- Prof. Christian Madu for his approachability and concern for his students.

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work. To you all I dedicate this work. I greatly appreciate the sacrifices made by my parents Chief Hans and Irene Alagoa (The Ada I of Twon-Brass) in laying a sound academic foundation for me. I wished you were around to see me excel to this height. My profound gratitude I render to my brother, Engr. Ebire Hans-Alagoa for all of his assistance financially and materially. You are a brother most worthy of honour. I acknowledge the various friends I made during the course of my study, especially my Ph.D classmates Pat, Rose and Amaka who encouraged me a lot and have become very good friends. Finally and above all, I give God all the Glory for the enablement and health of mind and body throughout the study.

Iwueke, Nyainbau Tarinabo

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LIST OF ACRONYMS

AREX	-	Department of Agricultural Research and Extension Services, University of Zimbabwe
CFF	-	Cities Farming for the Future Program
CFP	-	Cities Feeding People
CGIAR	-	Consultative Group of International Agricultural Research
CIP	-	International Potato Centre
CIRAD	-	Centre International de Recherché pour le Development
COAG/FAO	-	Committee on Agriculture of Food and Agriculture Organization
CPV	-	Consumer Price Index Variation
CSOs	-	Community Based Organizations
DESAR	-	Decentralized Sanitation and Reuse
DRM	-	Disaster Risk Management
ECLAC	-	Economic Commission for Latin America
ENDA	-	Environmental Development Action in the Third World
ENY	-	East New York
EUFORIC	-	European Urban Forestry Research and Information Centre
FAO	-	Food and Agriculture Organization of the United Nations
FCIT	-	Food for the Cities Multi-Disciplinary Group
FFS	-	Farmersô Field School
HH	-	House Hold
HLC	-	High Level Conference

IBRD	-	International Bank for Reconstruction and Development
ICRAF	-	International Council for Research in Agro Forestry
IDPs	-	Internally Displaced Persons
IDRC	-	International Development Research Centre, Canada
IDWG-FFC	-	Inter-departmental Working Group - Food for the Cities
IFPRI	-	International Food Policy Research Institute
IIED	-	International Institute for Environment and Development
IIDS-CASL	-	International Institute for Development Studies-Centre for Sustainable Livelihoods.
IISD	-	International Institute for Sustainable Development
ILO	-	International Labour Organisation
PES	-	Promotion for Sustainable Development
IRDAS	-	Institute of Resources Development & Social Management
IRIN	-	Humanitarian News and Analysis, UN Office for the Coordination of Humanitarian Affairs
IWMI	-	International Water Management Institute
IWRM	-	Integrated Water Resources Management
LAC	-	Latin America and the Caribbean
MDGs	-	Millennium Development Goals
MCP	-	Municipal Consultation Platform
NEST	-	Nigeria Environmental Study/Action Team.
NEIC	-	National Environmental Information Centre
NEPAD	-	New Partnership for African Development
NGO	-	Non Governmental Organisation

NY	-	New York
PAHO	-	Pan American Health Organization
PUA	-	Peri-urban Agriculture
RUAF	-	Resource Centre for Urban Agriculture and Food Security
SPFS	-	Special Programme Food Security
SSA	-	Sub-Saharan Africa
SUDP	-	Strategic Urban Development Plan
UA	-	Urban Agriculture
UG	-	Urban Greening
UK	-	United Kingdom
UN	-	United Nations
UNCED (Agenda 21)	-	United Nations Department of Economic and Social Affairs, Division for Sustainable Development
UNCHS	-	Habitat, United Nations Centre for Human Settlements
UNEP	-	United Nations Environment Programme
UNFCC	-	United Nations Framework Convention on Climate Change

ABSTRACT

Urban agriculture is defined as the practice of farming within the boundaries of towns or cities. It is one of the most common informal sector activities of urban dwellers in Enugu. Farming in this sense involves crop cultivation, animal rearing and fish farming. In this definition of urban agriculture, the location of farms plays the most important role. Approximately half of the residents in Enugu are involved in the practice. This is similar to the rates in other towns/cities in sub-Saharan Africa. The nature of urban agricultural activities in Enugu was evaluated, and the benefit of the activities of urban agricultural practitioners in terms of income generation and poverty alleviation for a sustainable livelihood of the urban household was established. The three local government areas of Enugu North, Enugu South and Enugu East, were purposively selected for the study. This is because they all fall within the Enugu urban area. Purposive sampling technique was used to elicit information based on the perceived activities of Enugu urban farmers. Furthermore, stratified sampling technique was adopted in the study. The stratification was based on the prevalent farm types in the study area, viz: mixed farms, vegetable farms, fruit farms, floriculture, poultry, pig farms, goat-keeping and fish farms. The major urban agricultural activities are mixed crop cultivation (38.8 percent), Vegetable farming (27.2 percent), and production of fruits (1.7 percent), Fish farming (6.5 percent), Floriculture (1.6 percent), Poultry production (14.3 percent), Pig farming (6.6 percent), and Goat keeping (3.5 percent). In this study, women (52 percent) were found to be marginally more involved in urban agricultural activities than men (48 percent), perhaps because of the established central and cultural role of women in household food delivery. Three hypotheses were postulated and tested in the study. Hypothesis 1 stated that: The expenditure on farm inputs and income generated from urban agricultural activities has no significant relationship. Regression analysis was used to test this hypothesis. Although, the farm input: income ratio (percent) varied by farm type, there was a significant positive correlation ($r = 0.944$) between the expenditure on farm inputs and income generated from urban agricultural activities in Enugu Metropolis. Hypothesis 2 stated that: The incomes from urban agricultural activities by practitioners in Enugu Metropolis do not have significant effect on their household expenditure. The household expenditures considered included Labour, School Fees, Rent, Household Food and Savings. Regression analysis was also used to test for significant relationship between the income from urban agricultural activities by practitioners in Enugu Metropolis and their Household (HH) expenditure. There was a high correlation between income and labour ($r = 0.966$), income and total household food expenditure and savings ($r = 0.970$) the correlation between income and school fees was ($r = 0.677$) while income and rent was ($r = 0.653$). Hypothesis 3 states that: Incomes generated from urban agricultural activities do not significantly vary among the three Local Government Areas of Enugu Metropolis. This was tested using the One-Way Analysis of Variance (ANOVA). The incomes generated from urban agricultural activities did not significantly vary among the three Local Government Areas of Enugu Metropolis ($0.953>0.05$). The study concluded that urban agricultural activities can be operated as a viable and sustainable economic, environmental, social and political system. To ensure that the full potentials of urban agriculture in reducing urban poverty are realized in Enugu, the following recommendations were made: (a) Community participation in municipal key decisions on urban agriculture (b) The development of linkages with other sectors in Government. (c) Integration of urban agriculture into the Nigerian cities' planning vision should be accompanied by policies that seek to expand the water supply infrastructure to accommodate urban agriculture. (d) National and local government should support affordable urban land tenure reforms or long-term leases for poor urban farmers. (e) Zoning codes should be revised to support urban food production.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

With the increase in rural-urban drift, urban poverty, food insecurity and malnutrition, the strategies to improve urban livelihood, as well as urban food security and nutrition have taken centreï place in global discuss in sustainable environmental management (**Klemesu 2000, Van Veenhueizen, 2006)**. Urban Agriculture (UA) is increasing in cities in developed as well as in developing countries and the number of cities revising existing policies or formulating new policies and action programs on Urban Agriculture is growing rapidly **(Van Veenhueizen, 2006).** Urban Agriculture can be defined as an industry located within (intra urban) or on the fringe (peri urban) of a town, a city or a metropolis, which grows or raises, processes and distributes a diversity of food and non-food products. They use largely human and material resources, products and services found in and around that urban area, and in turn supply human and material resources, products and services largely to that urban area. **(Mougeot, 2000)**.

Madden and Chaplowe, (1997) defined urban agriculture as the practice of crop cultivation and livestock breeding 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, and rainfall in such localities. Inclusive are climate, exposure to sun, soil condition, plot size and distance from home. Furthermore, family and individual resources, land availability and location are critical determinants of the type of urban agriculture practiced. **UNDP** (1996), defined urban agriculture as an industry that produces, processes and markets food and ñwoodò 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 can be divided into five broadly defined farming systems: aquaculture, horticulture, animal husbandry, agro-forestry and other urban farming activity. **(Van Veenhueizen, 2006**).

In Nigeria for example, Urban Agriculture, though has been in existence, it was however, brought to the fore with the introduction of the ñOperation Feed the Nationò programme in 1976, when households were encouraged to plant food crops around their house. (**Olomola, 1998**). This, of course opened the eyes of urban dwellers, especially the poor to the prospects of growing food crops in the urban area in order to earn some income and at the same time provide much needed food for urban families **(Oruwari and Jev, 2004**). Since then in most cities in Nigeria, roadsides, open spaces around houses and large tracts of quasi-public land are used as vegetable and cereal farms. **Ahiadu** (2009), highlighted the potentials of Urban Agriculture in Awka, Nigeria as a source of employment, additional income, fresh and nutritious food, urban waste management measure, micro-climate regulator and environmental beautifiers.

According to **Smit (UNDP, 1996)**, approximately 800 million urban citizens Worldwide are involved in Urban Agriculture in one way or the other. Sixty-eight percent of the households are reported to be involved in Dar es Salaam, Tanzania **(Sawio, 1998**); 35 percent in Kampala, Uganda (**Maxwell, 1999**), 22 percent in Amman, Jordan (**Department of Statistics, 2002**) and 40 percent in Havana, Cuba **(Lappe, 2002; FAO, 2001**). In Nigeria the figure is as high as 45 percent (**FAO, 2001**).

The main feature of urban agriculture that distinguishes it from rural agriculture is its integration into the urban economic and ecological system, or ôurban ecosystemô. It is not its urban location which distinguishes urban agriculture form rural agriculture, but the fact that it is embedded in and interacting with the urban ecosystem. **Mougeot** (2000), states that the most important distinguishing feature of Urban Agriculture is not so much its location, or any of the above mentioned criteria, but the fact that it is an integral part of the urban economic, social and ecological system. It uses urban resources such as land, labour, organic wastes and water to produce food for the urban citizens. It is, however strongly influenced by the urban conditions like policies, competition for land, urban market forces, and makes a strong impact on the urban system (urban food security and poverty, urban ecology and health). This distinction was corroborated by **Zeeuw**, **(2004)**, to

emphasize closeness to the city centre, inclusion in the administrative municipal boundaries and type of products grown **(Mougeot, 2000; de Zeeuw, 2004**). Although, authors may differ in defining urban agriculture, the following key features that characterize the activity are shared by all: (a) urban agriculture involves crops and livestock production, and it may also include agro-forestry and wood fuel production; (b) urban agriculture is practiced both within the urban boundary (intra-Urban Agriculture) and its periphery (peri-Urban Agriculture). **Intra Urban Agriculture** takes place within the inner city. Most cities and towns have vacant and under-utilized land areas that are, or can be used for Urban Agriculture, including areas not suited for building (along streams, close to airports, etc.), public or private lands not being used (lands waiting for construction) that can have an interim use, community lands and household areas. Various types of Urban Agriculture are practiced; namely: community gardens (formal and informal), individual or group, home gardens, institutional gardens (managed by schools, hospitals, prisons, factories), cooperatives nurseries, roof top gardening, cultivation in cellars and barns (e.g. mushrooms and earthworms). **Peri-Urban Agriculture** on the other hand takes place in the urban periphery or city fringes.

Urban and peri-urban farmers generally already live in the city for long periods of time and have gained access to urban land, water and other productive resources. Some, however, are recent immigrants (**Drakakis-Smith *et al.*, 1995; del Rosario, 1999**). Although, the majority of urban farmers are from the poorer strata of the population, the lower and mid-level government officials, school teachers, as well as richer people seeking good investment for their capital, or for leisure also engage in Urban Agriculture. According to **Danso *et al.***, (2003), women are an important proportion of urban farmers as they tend to have more responsibility for feeding the households, while men tend to seek other forms of urban employment. He however, observed that women face more difficulties in accessing resources and services due to cultural constraints, which further limit their ability to contribute more to Urban Agriculture. If the plot is close to home, farming activities can be more readily combined with other tasks in the household.

A regional differentiation of Urban Agriculture is provided by an FAO-implemented study (FAO, 2001). It provides estimations per region of urban-based agriculture, as well as the population and main crop and livestock systems involved. In sub-Saharan Africa (SSA), for instance, it is estimated that ten percent or more of the urban Populations are active in Urban Agriculture. Urban farming in this region is found to be very heterogeneous, ranging from small-scale, but capital-intensive, market-oriented commercial vegetable growing or dairy farming, to part-time subsistence farming by the urban poor. In Northern Africa and the Middle East region, approximately six million urban residents are engaged in small-scale production of horticultural and livestock products- notably fruit, vegetables and poultry-in addition to off-farm work. In South Asia, 11 million urban residents are involved in Urban Agriculture, including intensive production of perishable high-value commodities such as milk and fresh vegetables. In this region, Urban and Peri Urban Agriculture contribute substantially to food security in the cities. In most large towns and cities throughout East and Southeast Asia, seven million people are engaged in Urban Agriculture activities, notably in intensive production of perishable, high-value commodities. The farming system was characterized as a high external input, commercial system with well-functioning links to the surrounding rural areas for livestock, feed and fodder supplies. In Latin America, Urban Agriculture systems include mainly horticulture, dairy and poultry. In Eastern Europe, farming is widespread by urban residents, but mostly for consumption (fruits, vegetables, pigs).

Thus, the **FAO** study (**s**) concluded that, this is a very dynamic farming system that has considerable growth potential and can contribute substantially to the Millennium Development Goals- **MDGs** particularly in **reducing urban poverty and hunger (MDG 1)** and **ensuring environmental sustainability MDG 7.** Despite this, many urban farmers around the world operate without formal recognition of their main livelihood activity, and lack the structural support of proper municipal policies and legislations. (**Van Veenhueizen, 2006**). Thus, the challenge is for Urban Agriculture to become part of a sustainable urban livelihood strategy, and to be valued for its social, economic and environmental benefits rather than seen as a liability or nuisance.

1.2 STATEMENT OF THE PROBLEM

The growing recognition of the importance of urban agriculture in the area of food supply and nutrition improvement, poverty reduction, income generation, employment generation, and environmental management has been a common point of agreement by most authors. The need for integration and incorporation of urban agriculture into city planning process to highlight the role of urban agriculture as a veritable strategy for sustainable livelihood in the city has remained unresolved in Nigeria. Enugu, like most state capitals in Nigeria, has been experiencing rapid urban growth. The 1991 National Population Census (NPC) shows that Enugu had a population of 465,072, (NPC 1991). By 2006, the population had grown to 794,283 (**National Population Commission, 2009**). This signifies a population increase of over 70% in 15years. World-wide, agricultural activities are increasing as part of the city landscapes, and Enugu has not been left out. The need for new jobs places huge demands on Enugu, a city struggling to provide the basic public services that population growth demands. This trend indeed, has serious implications for food security and has brought about the conscious need for agricultural activities in Enugu Urban area. Presently, these urban farmers in Enugu, like those in other parts of Nigeria have challenges that threaten their potentials. For example, (a) They operate without formal recognition of their main livelihood activity. (b) They lack the structural support to enhance their potential and mitigate environmental risks and hazards. **(Anosike and Fasona, 2005, Oruwari and Jev 2004).** (c) Urban agriculture is seen as an environmental nuisance by the municipal authorities (**Ahiadu, 2009**). (d) The real contribution of Urban Agriculture to the livelihood of most stakeholders is not quite understood, especially by urban and traditional Government authorities who control the acquisition and use of land in Enugu.

In Enugu therefore, the non-acceptance of urban agriculture as a means of alleviating urban poverty or a means of livelihood and a way of ensuring urban environmental sustainability is therefore the problem of study. This study therefore evaluates the practice of urban and peri-Urban agriculture in Enugu, with particular reference to its contribution as a means of sustainable urban livelihood in Enugu.

1.3 RESEARCH QUESTIONS

The following research questions were raised in the study:

a) What are the major urban agricultural activities by type and location in Enugu?

b) What proportion of urban farm income is spent on farm inputs?

c) What benefits do Urban Agricultural Practitioners in Enugu derive in terms of income and poverty alleviation?

d) What is the variation in the incomes from urban agricultural activities amongst practitioners in the three Local Government Areas in Enugu Metropolis?

e) What is the implication of urban agriculture activities for a sustainable urban development such that conflicts are reduced and synergies enhanced?

1.4 AIM AND OBJECTIVES OF THE STUDY

To carry out the study from the above research questions, the following aim and objectives were formulated:

1.4.1 Aim

The aim of the study is to assess Urban Agriculture as a means of sustainable urban livelihood in Enugu Metropolis, Enugu State, Nigeria.

1.4.2 Objectives

The specific objectives are:

a) To find out the major urban agricultural activities by type and location in Enugu.
b) To determine how much is spent on farm inputs by urban farmers in Enugu.
c) To evaluate the benefits of Urban Agricultural activities in Enugu in terms of income generation and poverty alleviation and as a means of sustainable livelihood.

d) To determine the variation in the income from urban agricultural activities amongst practitioners in the three Local Government Areas in Enugu Metropolis.
e) To assess the implications of urban agricultural activities for a sustainable urban development such that conflicts are reduced and synergies enhanced in Enugu.

1.5 HYPOTHESES

To investigate and test results from the above objectives, the following hypotheses were formulated:

a) **Hypothesis 1:** There is no significant relationship between incomes generated from urban agricultural activities and expenditure on farm inputs in Enugu Metropolis.

b) **Hypothesis 2:** The incomes from urban agricultural activities by practitioners in Enugu Metropolis do not contribute significantly to their household expenditure.

c) **Hypothesis 3:** Incomes generated from urban agricultural activities do not significantly vary among the three Local Government Areas of Enugu Metropolis.

1.6 SCOPE OF THE STUDY

The study assesses the contribution of urban agriculture as a means of sustainable urban livelihood in Enugu metropolis, Enugu State, Nigeria. Hence the scope of study was delimited to Enugu Metropolis, comprising the three Local Government Areas of Enugu North, Enugu South and Enugu East. This was to ensure that all urban agricultural practitioners who participated in the study were within Enugu metropolis.

1.7 LIMITATIONS OF THE STUDY

The primary data sources included the administration of self-administered questionnaires and interview sessions with major stakeholders in urban agriculture in Enugu. However, self-reports in questionnaires are not always accurate or free from bias. It is also difficult to cover all the required information in one document self-administered by a respondent but, multiple choice questions were used in the design to cover various aspects of the constructs in the study. Also the research assistants used checklists to cross-check some of the information gathered from respondents and gave a concise report of observation within the study area. There were trust issues between the research team and respondents in the pilot study. Based on that, some participants were not disposed to disclosing their income as exact figures. The literate respondents filled the questionnaire by themselves and the illiterate ones were assisted by the research assistants.

The use of research assistants was a source of limitation as well even though they were properly trained but it was the only option available given the number of questionnaires (1200) that were to be distributed in the study. The study involved the collection, collation, analyzing and presentation of information on the location, conditions and characteristics of urban agricultural practice and practitioners in the city. The study also recognized the cross sectarian nature of urban agriculture practitioners, and therefore did not assume that urban agriculture was their only source of income. As such, the study elicited information on the amount of contribution urban agriculture made to the income of practitioners. The population census figures for 2006 has been published but not yet disaggregated into localities. The 1991 census figures were used in projections for the determination of sample size for the different Local Government Areas.

These limitations not withstanding this has been a very extensive study in which the respondents responded to a validated measurement instrument and the obtained results can be subjected to further research as needed. The period covered by the study was from May 2012 to February 2013.

1.8 DEFINITION OF KEY TERMS

1. **Household -** This can be a person or a group of persons who make common provision for food or other essentials of living and often share a common budget (**Bartone *et al*,** 1994). It is also a group of people who normally live and eat together daily in the same dwelling and who generally consider themselves to be the unit for which plans and decisions about daily life are made. **(Moser *et al.* 1996)**.

2. **Livelihood -** This comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance capabilities and assets, while not undermining the natural resource base (**Chambers and Conway, 1992; Scoones, 1998)**.

   ***Livelihood strategies*:** These are the planned activities that men and women undertake to build their livelihoods. They usually include a range of activities designed to build asset bases and access to goods and services for consumption. Livelihood strategies include coping strategies designed to respond to shocks in the short term, and adaptive strategies designed to improve circumstances in the long term. Livelihood strategies are determined by the assets and opportunities available to men and women as well as by the choices and preferences of men and women.

   ***Livelihood outcomes*:** These are the results of women and menôs livelihood strategies and feed back into the vulnerability context and asset bases, with successful strategies allowing them to build asset bases as a buffer against shocks and stresses, as opposed to poor livelihood outcomes which deplete asset bases, thereby increasing vulnerability. Livelihood outcomes may therefore lead into either virtuous or vicious cycles.

3. **Seasonal farming -** These are farms that rely entirely on rainfall. This type is found all over Enugu Metropolis in open spaces, river flood plains, peri-urban fringes and in under- developed residential areas and educational institutions.

4. **Sustainable Livelihood Assets** - These are the building blocks of a sustainable livelihood. By building assets, individuals and households develop their capacity to cope with the challenges they encounter and to meet their needs on a sustained basis.

5. **Urban Agriculture or Farming -** This is an enterprise or industry located within (intra) or on the fringe (peri-urban) of a town, city or metropolis.

6. **Intra Urban Farming –** Farming that taken place with the inner-city most cities and towns have vacant and under-utilized land areas that are or can be used for farming.

7. **Peri-urban Farming -** Farming that takes place in the urban periphery or city fringes.

8. **Sustainable Development -** This is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCEI), 1987).

9. **Backyard Gardening -** This system basically comprises the cultivation of crops for home consumption. It is usually carried out within compounds and newly developing. Often, the whole family is involved and in most cases, labour is not hired, as plots are small. It is carried out throughout the year and household wastes are used as fertilizer. Intercropping is normal practice, as several crops are usually planted on the same piece of land.

10 **Millennium Development Goals -** The Millennium development goals and targets come from the Millennium Declaration signed by 189 countries, including 147 Heads of State and Government in September 2000 and from further agreement by member states at the 2005 World Summit (Resolution adopted by the General Assembly. The goals and targets are interrelated. They represent a partnership between the developed countries and the developing countries ñto create an environment at the national and global levels alike-which is conducive to development and the elimination of poverty.ò

Urban and peri-urban agriculture can directly and indirectly contribute in pursuing several of the MDGs. Urban and Peri-Urban Agriculture's main direct contribution (over half of its effort) is to Goal 1, which combines the reduction of poverty and the reduction of hunger. A significant proportion (about one-fifth) is directed to Goal 7 concerning environmental sustainability. Smaller percentages of resources are directed to empowering women (Goal 3). There are important indirect effects on goals covering primary education (Goal 2), child mortality (Goal 4), maternal health (Goal 5), and combating diseases (Goal 6), generated primarily by work addressing reduction of hunger and malnutrition. Focusing on food security, nutrition and right to food in urban and peri-urban areas should help urban dwellers to attain a better livelihood and allow municipalities to broaden their strategy towards achieving the Millennium Development Goals.

Crops and Vegetables of Interest

Common Name	**Local Name**	**Botanical/Scientific Name**
Bitter Leaf	Onugbu	*Vernonia amygdalina*
Water Leaf	Ogborodi	*Talinum trarigulare*
Fluted Pumpkin	Ugu	*Telfaira occidentalis*
African Spinach	Tete	*Amaranthus spinosus*
Okazi	Okazi	*Gnetum Africana*
Kerenkere	Ewedu	*Cochorus olitoris*
Okra	Okro	*Hibiscus esculentus*
Scent Leaf	Nnchuanu	*Occimum glatissimum*
Local green beans	Akidi	*Vigna spp*
Bambara nut	Okpa	*Voandzeia subterranea*
Utazi	Utazi	*Gongronema latifolium*
Pigeon pea	Fio-Fio	*Cajanus cajan*
Cassava	Akpu	*Manihot spp*
Maiza	Oka	*Zea mayas*

Source: *Author's Field Study, 2013*

CHAPTER TWO

THEORETICAL FRAMEWORK

2.1 INTRODUCTION

The ***sustainable urban agriculture concept*** and ***sustainable urban livelihood theories*** are used as theoretical framework for this study.

At the start of the twenty-first century, the problem of global sustainability became widely recognized by world leaders, and a common topic of discussion in many parts of the world. The World Summit on Sustainable Development **(WSSD, 2002)** confirmed that the first decade of the new century would be one of reflection about the demands placed by human kind on the biosphere. However, the idea of sustainability dates back more than 40 years, it was a key theme of the United Nations Conference on the Human Environment in Stockholm in 1972 **(McCormick, 1992)**. The concept was coined explicitly to suggest that it was possible to achieve economic growth and industrialization without environmental damage. In the ensuing decades, mainstream, sustainable development thinking was progressively developed through the World Conservation Strategy **(IUCN, 1980** and the **Brundtland Report, 1987)**.

In a world increasingly dominated by cities, the international community has started to address the issue of urban sustainability with international meetings and agreements, such as Agenda 21 in 1992, the 1996 UN City Summit in Istanbul, Turkey, and in the WSSD held in Johannesburg in 2002. Urban sustainability issues are also included in the MDGs-Goal 7 ï Ensure Environmental Sustainability.

Agriculturally based activities, namely production, processing and marketing are not new in urban areas. Global estimates of 800million people raise crops, livestock and fish in towns and cities **(Ganapathy, 1983 and Drechael *et al*, 2003)**. However, it was not until the 1960s, when a pioneering French geographical account of agricultural activities in the cities of central and east Africa were published that the term ñUrban Agriculture (UA) and Peri-Urban Agriculture

(PUA)ò emerged as a concept attracting research attention, particularly by Environmental Scientists **(Egziabher *et al*, 1994 and Mougeot, 2000)**. Thus the main research focus was the implication of agricultural activities in urban areas on sustainable urban development plans. The ever-increasing global phenomenon of rural-urban drift has made urban agricultural activities place extra pressure on urban environmental resources.

With Urban Agriculture increasing in cities in developed as well as developing countries, a number of cities are revisiting existing policies or formulating new policies and actions programs on Urban Agriculture; **(Veenhuizen, 2006).** Nigeria is participating in the Sustainable Cities Programme (SCP) under the Urban Management Programme (UMP) of the United Nations Centre for Human Settlement (UNCHS/World Bank/United Nations Development Programme (UNDP). Under the programme, Ibadan, Kano and Enugu have commenced their project. The Sustainable Cities Programme, emphasizes the two-way relationship between development and environment which promotes awareness and understanding of the priority issues to be addressed in urban environment and development, better understanding of modern urban and environmental management approaches, and the most effective and lasting impact.

2.2 SUSTAINABLE AGRICULTURE CONCEPT

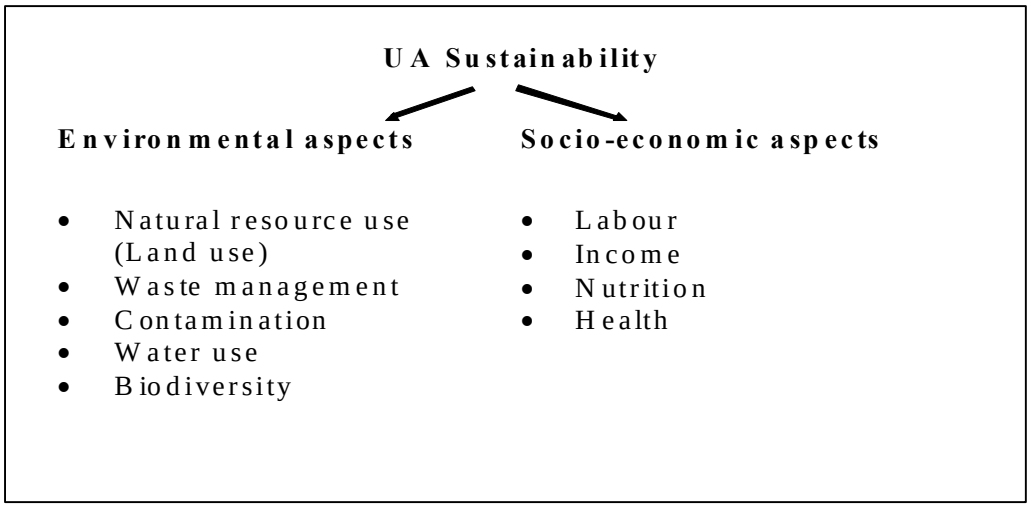
Sustainable agriculture integrates three main goals these are, environmental health, economic profitability, and social and economic equity. A variety of philosophies, policies and practices have contributed to these goals. People in many different capacities, from farmers to consumers, have shared this vision and contributed to it. Despite the diversity of people and perspectives, the following themes commonly weave through definitions of sustainable agriculture. Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. Therefore, *stewar*d*ship of both natural an*d *human resources* is of prime importance. Stewardship of human resources includes consideration of social responsibilities such as working and living conditions of labourers, the needs of rural communities, and consumer health and safety both in the present and the future. Stewardship of land and

natural resources involves maintaining or enhancing this vital resource base for the long term.

One of the claims made about urban and peri-urban agriculture is that they add to the ñsustainabilityò of urban areas. **Nugent** (2001) argues that this has been used as a selling point to encourage local, national and international policy-makers to pay attention to the phenomenon, to support its development with clear and fair policies, and to integrate it with other components of the food, planning, and agricultural systems under their jurisdictions. The common meaning of ñsustainabilityò is something that endures over time; but in the usage applied to Urban and Peri-urban Agriculture, it is meant to imply an association with ñsustainable development,ò an activity (or an objective, depending on definitions) that incorporates social, economic, and environmental components. Sustainable development or sustainability therefore presents a yardstick by which Urban and Peri-urban Agriculture can be described and analysed in terms of its contribution to individual communities. It also presents a means of formulating policy choices that move a community towards, rather than away from, lasting development.

The Habitat Agenda signed at the UN City Summit in Istanbul 1996, states that ñHuman settlements shall be planned, developed and improved in a manner that takes full account of sustainable development principles and all their components as set out in Agenda 21. The agenda further suggests that ñScience and technology have a crucial role in shaping sustainable human settlements and sustaining the ecosystem they depend uponò. In this respect urban agriculture can play an important role in contributing to this agenda and the scientific community has to face the future challenge to respond to the above.

Methods have been developed in many disciplines to assess the ñsustainabilityò of an activity or enterprise. Common elements are to examine the impacts over a relevant time period of the activity and to consider the linked interactions of social, economic, and environmental phenomena (**Nugent, 2001)**. From the available case experiences we can identify two main foci with regard to understanding sustainability. One takes into account more the ecological aspects whereas the other focuses more on socio-economic aspects.



Source: *(Nugent 2001).*

A *systems perspective* is essential to understanding sustainability. The system is envisioned in its broadest sense, from the individual farm, to the local ecosystem, *an*d to communities affected by this farming system both locally and globally. An emphasis on the system allows a larger and more thorough view of the consequences of farming practices on both human communities and the environment. A systems approach gives us the tools to explore the interconnections between farming and other aspects of our environment. A systems approach also implies *interdisciplinary efforts in research and education*. This requires not only the input of researchers from various disciplines, but also farmers, farm workers, consumers, policymakers and others. *Making the transition to sustainable agriculture is a process.* For farmers, the transition to sustainable agriculture normally requires a series of small, realistic steps. Family economics and personal goals influence how fast or how far participants can go in the transition. It is important to realize that each small decision can make a difference and contribute to advancing the entire system further on the "sustainable agriculture continuum." The key to moving forward is the will to take the next step. Finally, it is important to point out that *reaching towar*d *the goal of sustainable agriculture is the responsibility of all participants in the system,* including farmers, laborers, policymakers, researchers, retailers, and consumers. Each group has its own part to play, its own unique contribution to make to strengthen the sustainable agriculture community.

2.3 SUSTAINABLE LIVELIHOODS

2.3.1 Characteristics of Sustainable Livelihoods

Central to an understanding of the concept of sustainable livelihoods is an appreciation that poverty is not a stable, permanent or static condition. The poor move in and out of relative poverty as they respond to the opportunities, shocks and stresses - social, economic and environmental - which they experience (**Moser, 1996, Chambers, 1995**). In this light the concept of vulnerability, variously defined, but acknowledged to be a dynamic concept, is central to an understanding of the condition of the poor (**DFID, 1998, Chambers, 1995, Moser, 1996, 1998, Lipton and Maxwell, 1992 cited in Moser, 1998, Dersham and Gzirishvili, 1998**). The poor survive in their precarious state by employing a variety of livelihood or survival strategies (**Chambers, 1995, Rakodi, 1997, Wratten, 1995**). Such livelihood strategies are multifaceted as men and women draw on their assets (**DFID, 1998, UNDP, 1999, Moser, 1996, DFID, 1998**) which are both tangible and intangible (**Chambers, 1995**), and entitlements (**Sen, 1992, Moser, 1998***). There are a myriad (of) ways that individuals manage to build and contribute to the livelihood systems of families, communities and larger societies* (**UNDP, 1997**). In much of the developing world people are engaged in multiple activities rather than relying on a more limited range (e.g. one household member with full time paid employment) of livelihoods strategies to ensure their well being (**UNDP, 1997**). While such systems may incorporate paid employment this will not be the only, nor in many cases the most significant, strategy (**Wratten, 1995, Chambers, 1995, Potter and Lloyd Evans, 1998, Korten, 1996**). The more diverse and complex livelihood strategies become, the more they are likely to reduce vulnerability (**Rakodi, 1997**). Clearly, the livelihood opportunities offered by rural, peri-urban and urban areas are likely to be different from one another. While everywhere the livelihoods of the poor are diverse and complex, their content will vary according to the local opportunities available. Many authors suggest that livelihoods tend to be at their most complex in urban areas, with households drawing on a wide variety of activities to capture income and other resources (**Rakodi, 1999 Devas, 1999 Beall, 1997 Chambers, 1995**). There is

generally an explicit or implicit perception that livelihood strategies are household centred, (**Moser, 1998, Beall and Kanji, 1999, Satterthwaite, 1997**) and that each profile of social (household-individual) assets is distinctive (**Friedman, 1996**).

The household is a basic institution for reproducing society in its material as well as non-material aspects. This includes pooling and allocating labour and resources which, as has been widely noted, neither goes uncontested nor can be assumed to be egalitarian but is nonetheless an arena of social co-operation. This 'mini political economy' of decision making about status, power, property and work between men and women, generations and kin is multifaceted and dynamic in its formation and life. **(Douglass, 1998**).

In this light any analysis of livelihoods or policy decisions about poor households should take account of the differentiated contribution and roles which are related to the differences of power relationships and capabilities of individual household members (**Frazer, 1989** cited by **Beall, 1999**). A full appreciation of the character of livelihoods and the implications of exogenous changes for their viability can only be achieved through gender and inter-generation analysis of the contributions of household members and of their linkages into the wider fabric of society.

Further, as the profile of household assets changes over time (**Friedman, 1996, Rakodi, 1997**), livelihoods need to continually adapt to such changes (**Singh and Titi, 1994** cited in **IIDS-CASL, 1999**). If livelihoods are to be sustained they require the capability to respond to change. (**UNDP, 1997 Singh and Titi, 1994** cited in **IIDS-CASL**, **1999, Rakodi, 1997 Chambers, 1995**). Households and communities react to changing circumstances, external or internal pressures or shocks, by adapting how they use their portfolio of assets and capabilities and their traditional livelihood systems (**Chambers, 1995**). They may adopt either short-term responses or long-term adaptive strategies (**Singh and Titi, 1994**). Thus the capacity of households and communities is both reactive in responding to changes in conditions (e.g. policies, market conditions or environmental conditions), as well as proactive and dynamically adaptive as men and women develop and improve their strategies in an attempt to improve their livelihood outcomes (**ISSD, 1999**). It is therefore possible to say that *sustainable livelihoods are derived from*

people's capacity to make a living by surviving shocks and stress... This requires reliance on both capabilities and assets for a means of living. A livelihood is sustainable if it can cope with and recover from stress and shocks maintain and enhance its capabilities and assets and enhance opportunities for the next generation (**UNDP (A), 1997**).

2.3.2 Core Elements of Sustainable Livelihoods

A sustainable livelihood (SL) has been described as:

a) Incorporating the capabilities, assets (material and social) and activities which are available to poor men and women and together make up a living (**Chambers, 1995, Sen, 1992, UNDP, 1999**). The variety of opportunities available differs according to whether people live in, and/ or have access to resources in rural, periurban or urban areas (**Wratten. 1995, Satterthwaite, 1997, Tacoli, 1998**). Livelihoods may incorporate paid jobs but these are only one element, and not necessarily the most important, of the web of functional relationships which together comprise a living (**UNDP, 1997, ISSD, 1999**). Other elements include social networks and a variety of institutions which provide household support and access to resources **(de Haan, 1997 Dersham and Gzirishvili, 1998, Douglass, 1998)**.

b) Dynamic and adaptable. A SL has the capability to respond to change and is continually renewed through the development of adaptive strategies. Thus it can recover from stresses and shocks and is stable and sustainable over the long term (**Chambers, 1995, Chambers and Conway, 1992, ISSD, 1999, Singh and Titi, 1994, UNDP, 1998, UNDP, 1999**).

c) Related to poor peopleôs own priorities, interpretations and abilities (**DFID, 1998, Chambers, 1997**). People are at the centre of the livelihoods framework and are perceived as capable actors, not helpless victims. A livelihood therefore draws on the wealth, knowledge, skills and adaptive strategies of the poor (**UNDP, 1998**). While sustainable livelihoods reflect the priorities of poor people it should be noted that there may be a difference between their short term, pragmatic survival-oriented priorities and longer term priorities which aim at the development of sustainable

livelihoods. For example a short term priority of reducing household expenditures might lead to taking children out of school, or cutting out health care costs, but this does not mean that the same household might not value investments in health or education in the longer term.

d) Household and community centred, and thus location sensitive. Household members contribute in different ways depending on their various roles, responsibilities and capabilities (**Moser, 1996)**. Households draw on social capital and a mesh of obligations (**Putnam, 1993 Chambers, 1995 and Douglass, 1998**). They are therefore integrated into the wider social fabric, and draw on links with a variety of individuals and groups within the community as well as opportunities presented by local business and government (**Katepa-Kalala, 1997, Beall, 1997).** It should also be noted that some livelihood strategies may be based on individual rather than household activities, and others may draw on cooperation between family members who do not live together (e.g. cooperation between rural and urban extended family members).

2.3.3 Principles of a Sustainable Livelihoods Approach to Poverty Reduction

Sustainable livelihoods approach to poverty reduction is one that acknowledges that poverty is a condition of insecurity rather than only a lack of wealth (**Chambers, 1995 Moser, 1996, UNDP, 1997, IISD, 1999**). Further it recognises that the circumstances of the poor change constantly, and that they sustain themselves, despite precarious conditions, by employing a variety of assets (**Sen, 1992, Rakodi, 1997 Beall & Kanji, 1999, Moser, 1996**). It is therefore possible to improve their security, and thus contribute to the eradication of poverty, through a variety of wide ranging interventions which support their activities (**Satterthwaite, 1997, Wratten, 1995**) rather than merely attempting to provide paid employment (**Korten, 1996**). A number of principles have been identified as underpinning such an approach to poverty eradication. These include:

a) **A community sensitive** approach that, appreciating the importance of social links for sustainable livelihoods and thus the significance of stable social groups and location, fosters mutually beneficial relationships among

people by encouraging and supporting strong dynamic networks (**ISSD, 1999, Korten, 1996, UNDP, 1997**). Further, a sustainable livelihoods approach aims to strengthen the community by stimulating community investment and helping to retain resources within the local economy (**ISSD, 1999**).

b) S**ensitivity to the environment**.

Acknowledging the particular importance of the natural resource base for poor people, in accord with the Bruntland principles, a sustainable livelihoods approach aims to maintain the quality of the natural environment (**Chambers and Conway, 1992 UNDP, 1997, Douglass, 1998**) as well as addressing the environmental impact of poor local conditions on local residents. Thus the approach encourages a beneficial relationship between people and their environment (**ISSD, 1999 UNDP, 1997**). It aims to ensure that everyone has equitable access to safe and sufficient environmental resources in order to maintain a healthy life (**Korten, 1996, Werna *et al.*, 1998**). The environmental needs of the poor should be central to any urban environmental policy that seeks to enhance sustainable livelihoods. The livelihood activities of the poor also have an impact on the wider environment. Although there is often considerably more active re-cycling and a much reduced use of resources by poor communities, the sustainable livelihoods approach needs to be particularly sensitive to the environment to ensure that the broader issues of environmentally sustainable development are addressed.

c) Promotion of a living based on individual **men's and women's priorities**. Acknowledging that livelihoods are linked to peoplesô own priorities and interpretations a sustainable livelihoods approach demands the participation of poor people in all stages of the decision making process **(DFID, 1996, ISSD, 1999, Goldman, 1998**) and encourages local self reliance and the avoidance of external dependence (**Korten, 1996**).

d) Acknowledging and addressing **issues of equity**. The priority of a sustainable livelihoods approach is to contribute to satisfying the basic

needs of all poor men and women. In doing so it aims to provide security against deprivation and promote equity between diverse groups in relation to their access to wealth and resources. Consequently it aims when providing for one group not to foreclose options for others (**Korten, 1996 de Haan, 1997 UNDP, 1999**). However, catering for the livelihoods of the poor may also mean addressing those of other groups. The poorôs lack of access to various resources is often due to over consumption by wealthier groups (e.g. the use of water for private swimming pools by the rich in Mexico City where water is a crucially scarce resource). In this light, the livelihoods of the rich can be seen as having an impact on the livelihoods of the poor and affect the fairness of access to resources (**Stephens, 1996**). The sustainable livelihoods approach also aims to encourage the sharing of productive and reproductive roles and the transfer of knowledge and skills between groups of individuals (**IISD, 1999**). In seeking to encourage ways of making a living that are fulfilling it aims to provide everyone, whatever their position within the household or community, with opportunities to contribute meaningfully to meeting the needs of family, community and society as a whole (**Korten, 1996, UNDP, 1997**).

e) A **holistic integrated** approach to the achievement of sustainable livelihoods. A sustainable livelihoods approach acknowledges that the foundation of a sustainable livelihood is a complex mesh of activities which draws on multiple and varied assets and not just paid employment (Korten, 1996). Moreover a sustainable livelihoods approach appreciates that livelihood strategies are both dependent on the opportunities presented and affected by the social, economic, institutional/ governance and environmental contexts in which poor people live. This results in a need for across sectoral approach. Furthermore, a variety of authors make it clear that individual and household livelihoods are linked into the wider, social and political/economic fabric of society(**Katepa-Kalala, 1997, Beall, 1997, Douglass, 1998)**.

2.3.4 The Sustainable Urban Livelihoods Model

The central ideas in the sustainable urban livelihoods approach are:

1) Awareness that *vulnerability* to shocks and stresses, rather than just lack of wealth, is a defining factor of poverty

2) Awareness of the variety of assets that are used by the poor to overcome vulnerability

3) Awareness of the complex short and long term strategies used by the poor to mobilize these assets

4) Awareness of the dynamic character of poverty and adaptability of livelihood strategies

5) Awareness of the need to understand livelihoods from the point of view of poor women and men

6) Awareness of the focus on household/families as a key unit for organising livelihoods

Furthermore a sustainable livelihood approach to poverty eradication must be:

1) Sensitive to people and communities and appreciate the importance of social links for livelihood.

2) Be focused on the need for equity and the participation of the poor, who must be treated as citizens rather than clients.

3) Be related to other policy objectives and human right issues.

2.4 SUSTAINABLE URBAN DEVELOPMENT

The most serious problems confronting cities, towns and their inhabitants as identified in **Agenda 21** (1996) include the following: Inadequate financial resources, lack of employment opportunities, spreading homelessness and expansion of squatter settlements, increased poverty and a widening gap between the rich and poor, growing insecurity and rising crime rates, inadequate and deteriorating building stock, services and infrastructure. Other problems include lack of health and educational facilities, improper land use, insecure land tenure,

rising traffic congestion, increasing pollution, lack of green spaces, inadequate water supply and sanitation, uncoordinated urban development and an increasing vulnerability to disaster. All these have seriously challenged the capacity of government at all levels to realize socio-economic development and environmental protection, which are all components of sustainable development. Nigeria as a nation has been experiencing an accelerated shift of her populations from rural to urban areas. This rapid rate of urbanization has engendered several challenges and problems similar to situations in other parts of the world. The problems identified in Agenda 21 are prevalent in Nigeria. Todayôs Nigerian city, according to **Mabogunje** (2002) is typified by substandard and inadequate housing, slums, and lack of infrastructure, transportation problems, low productivity, poverty, crime and juvenile delinquency. Urbanization, according to him is the root cause of the high rates of environmental degradation, pollution and social delinquency. For instance, on the Human Development Index of 177 countries worldwide, Nigeria ranks 151st (**HDR, 2004)**.

In order to address the problem of poverty and promote sustainable development, the United Nations Millennium Declaration was adopted in September 2000, committing countries both rich and poor to do all they can to eradicate poverty, promote human dignity and equality and achieve peace, democracy and environmental stability. The goals include those dedicated to eradicating poverty, achieving universal primary education, promoting gender equality, reducing child mortality, improving maternal health, combating HIV/AIDS, malaria and other diseases, ensuring environmental sustainability and developing a global partnership for development. Nigeria is a signatory to the Millennium Declaration and has a responsibility to implement the goals.

Various scholars have studied the challenges of sustainability and urban development in Nigeria. Some of them include **Falade** (1999) whose study focused on the challenges of a sustainable Nigeria, **Abumere** (2002) whose research centered on urban governance and the challenges of urban poverty, **Odeyemi** (2002) who did a study on gender and urbanization and **Olanrewaju** (2003) who focused on sustainability and urban poverty.

CHAPTER THREE

LITERATURE REVIEW

3.1 INTRODUCTION

The contribution of Urban Agriculture to food security and healthy nutrition is probably its most important asset. Food production in the city is often a response of the urban poor to inadequate, unreliable and irregular access to food and lack of purchasing power. In urban settings, lack of income translates more directly into lack of food than in rural settings. The costs of supplying and distributing food from rural areas to the urban areas, or to import food for the cities, are rising continuously, and distribution within the cities is uneven. Consequently, urban food insecurity will increase (**Argenti, 2000**). In addition to enhanced food security and nutrition of urban producers themselves **(Nugent, 2000** and **Bourgue, 2000)**, large quantities of food are produced for other categories of the population. It is estimated that 200 million urban residents (FAO, 1999) produce food for the urban market providing 15 to 20 percent of the worldôs food (**Amar-Klemesu, 2000)**.

Urban Agriculture is also an important source of income for a substantial number of urban household. In addition to income from sales of proceeds, farming households save on household expenditures by growing their own food, which can be substantial since poor people generally spend a sizeable part of their income (50-70 percent) on food. It also enhances the development of microenterprises in the production of necessary agricultural inputs (e.g. fodder, compost, earthworms), the processing, packaging and marketing of products **(Homenm de Cavalho, 2001)** and the provision of services such as animal health services, transportation (**Moustier and Danso, 2006).**

Furthermore, Urban Agriculture may function as an important strategy for poverty alleviation and social integration of disadvantaged groups (e.g. HIV/AIDS-affected households, disabled people, female-headed households with children, elderly people without pensions, jobless youths), with the aim to integrate them more

strongly into the urban network, provide them with a decent livelihood, and prevent social problems such as drugs and crime **(Garnett, 2000; Gonzalez Novo and Murphy, 2000**). Urban and peri-urban farms may also assume an important role by providing recreational and educational activities to urban citizens or in landscape and biodiversity management and community building **(Smit and Bailkey, 2006)**.

Again Waste disposal has become a serious problem for most cities. Urban Agriculture can contribute to solving this and related problems by turning urban wastes into productive resources **(Cofie *et al.*, 2006)**: compost production, vermin culture, irrigation with wastewater. Urban Agriculture and forestry may also positively impact on the greening of the city, the improvement of the urban micro-climate (wind breaks, dust reduction, shade) and the maintenance of biodiversity (**Konijnendijk, 2004**). They may also reduce the cityôs ecological footprint by producing fresh foods close to the consumers, thereby reducing energy use for transport, packaging and cooling, among others. The problem of urban poverty and inadequate food supply, coupled with the need for employment and additional income outlet have attracted many urban inhabitants to engage in urban agriculture. Urban agriculture emerged because it can have an immediate impact among the urban poor and because it has the potential to provide for the unmet needs (fresh and nutritious food) of the urban population particularly the rich. A sustainable livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks maintain or enhance its capabilities and assets, while not undermining the natural resource base **(Chambers and Conways, 1992; Scoones, 1998)**.

There is a paucity of literature on the actual extent of urban agriculture (due in part to the difficulty of quantifying its impacts), and until recently there has been no concerted effort to publish research findings in this field. Thus, there exist very few case studies on the subject particularly in Nigeria. This chapter reviews some of the existing literature on urban agriculture with regards to sustainable livelihood. The review considered the concept of urban agriculture as a sustainable

livelihood, history of urban agriculture in Africa, importance of urban agriculture, gender and urban agriculture with a view to its characteristics, methods, organizational structures, perceptions, authority participations as well as its benefits and constraints.

3.2 HISTORY AND STATUS OF URBAN AGRICULTURE IN AFRICA

Today, urban farming in African cities is complex and diverse. It involves the cultivation of food and non-food crops as well as animal husbandry (including livestock, fowl, and fish) within (intra) and on the fringes (peri) of built-up areas of cities (**Ganapathy, 1983**). Historically, urban farming has been a major activity in African cities since pre-colonial days. According to **Winters** (1983), in hot, often humid regions such as tropical Africa, the problem of storing food compounded the problem of transporting it. The fact that urbanization is independent of trade was one more reason for cities to be self-sufficient in food (**Asomani-Bateng and Haight, 1999**).

Agricultural activities have influenced and determined urban land use and the morphology of cities in Africa. Cities such as Kumasi, Ghana and the Yoruba towns of western Nigeria are surrounded by a zone of intensive farming in which the majority of residents worked each day **(Bowditch, 1819; as quoted in Winters, 1983**). The fact that urban agriculture constituted an activity in which a significant proportion of the population in pre-colonial African cities participated, is one the reasons why these cities were classified as non-urban (**Bascom, 1955**), and hence referred to as a ñgroup of villagesò (**Winters, 1983**). Urban cultivation played a more important role in eastern and central African cities. The quarters of these cities were separated and the spaces between them used for farming (ibid). As one observer said of Kampala, ñit was less of a city than an immense gardenò (**Gutkind, 1963)**. The capital of Luanga in the Congo was so green that an eighteenth-century missionary remarked that ña missionary who was a bit nearsighted could have traversed the whole town without seeing a single houseò **(Balandier, as quoted in Winters, 1983**).

Colonial administratorsô response to urban cultivation in African cities could be described as negative and hostile. This was reflected in their colonial urban planning which modernized African cities by removing any vestiges of ñbackwardò and ñfilthyò activities. Urban cultivation was seen as a manifestation of rural habits or ña remnant of bush life,ò as **Naipul** (1981) described it. The colonizers who controlled African cities had ñconcepts of grandeur, precepts of cleanliness and a firm intent to distinguish them from the bushò (**UNDP, 1996**). Consequently, urban cultivation and rearing of animals were not permitted. Colonial administrators thought urban farming would compromise town and city health, and distract the so-called ñnativesò from working in the emerging formal economy. In addition, it was assumed that since urban agriculture could provide the food needs of towns and cities, cultivation in cities was not necessary (**UNDP, 1996**). The only plants that urban residents were permitted to grow were ornamental plants, plants that could beautify African cities and towns. Urban farming in contemporary African cities is largely unrecognized, unassisted, and in some cases, outlawed because of the supposed hazards associated with it. Furthermore, urban farming is seen as not conforming to zoning regulations because in planning African cities colonial administrators ignored urban cultivation. Therefore, ñthere has been a remarkable continuity from colonial practice in this sphere across the continentò (**Simons, 1979**). Contemporary urban planners and city managers associate development and modernization with industrialization, and ignore farming in urban areas, viewing food production as being ñexternal to citiesò **(Guyer, 1987)** and ñreal agricultureò as taking place in rural areas **(Drescher, 1994)**. Subsequently, hostility and repression have confronted the activities of urban farmers in a host of African countries. In Bamako, Mali, the authorities banned the cultivation of cereals in 1989 on the ground that the tall stalks provide hiding places for bandits **(Diallo, 1993**). Kenyan authorities view urban cultivation as blight on the urban landscape (**Asomani-Boateng and Haight, 1999**). In Zimbabwe, the harsh repression of urban cultivation in the 70s and 80s was justified on the grounds that urban farming facilitated the breeding of malaria-carrying mosquitoes (**Rakodi, 1988)**. Similarly, in Accra, Ghana, official skepticism towards urban agriculture is compounded by assertions that the practice leads to an increase in mosquitoes, and mosquito-

related diseases (**Obosu-Mensah, 1999**). Some officials advocated the banning of urban agriculture on the ground that the production of food in the polluted environment of cities is inherently unhealthy **(UNDP, 1996**).

Despite the official neglect from the colonial period to the present day, it is clearly apparent across contemporary Africa that urban agriculture is widespread and is becoming a permanent feature of the landscape of many cities. Proof of its persistence and stability is reflected in the acreage of land farmed within and around the built-up space of African cities and by the number of urban residents engaged in urban agriculture (**Mosha, 1991**). In Dar-es-Salam, Tanzania, satellite imagery has revealed that 23% of the metropolitan area is used for agricultural production; nearly 34,000 ha are devoted to crop production, with vegetables accounting for 500 ha **(DSM/ARDHI, 1992**). In Harare, Zimbabwe, land under cultivation increased from 5,000 ha in 1990 to 9,000 ha in 1993, representing between 15% and 20% of the cityøs total area (**Mbiba, 1995**). In Daloa, Cote de Ivoire, urban cultivation increased from 52 ha in 1954 ha in 1988 (**Mougeot, 1994**). An increasing number of urban residents are engaged in urban agriculture: two thirds of urban Kenyans are farmers **(Lee-Smith *et al*., 1987; Freeman, 1991)**; in Accra, Ghana, **Amuzu and Leitmann** (1991) estimate that 3% of the cityøs labour force is engaged in urban farming (including fishing) and 90% of the cityøs vegetable supplies (including radishes, cabbage, and cauliflower) are supplied by urban farmers. The words of the Accra Metropolitan Assembly (**Tetteh and Botchwey, 1989**) reveal the importance of urban agriculture in the city: *subsistence farming manifests itself in nearly every home and any unused space in the city. Vegetables and food crops which are commonly planted combine effectively with poultry, piggery and fish farming to supplement the income of the metropolitan dweller.* In Dar-es-Salaam, urban farming is the largest employer in the city, engaging 11% of the total urban population (**Bureau of Statistics 1988**). In Lusaka, Zambia, urban farming is so extensive that the city has been described as ñthe world capital of urban cultivationò (**Sanyal, 1984**).

The foregoing discussion establishes the fact that urban agriculture is an age-old activity which continues to expand. According to **Mougeot** (1994), current

conditions prevailing in African countries, including rapid urbanization, ineffective agricultural policies, crippled domestic food distribution, constrained government spending, removal of subsidies, wage cuts, soaring inflation, rising unemployment, natural disasters, and civil strife, will likely accelerate the growth of urban farming. **DGIP/UNDP** (1992) reported that a growing number of African countries have recognized the importance of urban farming and have taken steps to incorporate urban agriculture in their city plans. The new national capitals of Ivory Coast, Malawi and Tanzania have been planned to accommodate urban agriculture. Local governments in Maseru, Lesotho (**Greenho, 1994**), Kampala, Uganda (**NEIC, 1994**) and Dar-es-Salaam, Tanzania (**DSM/ARDHI, 1992**) were reported to have commissioned special sectorial studies on urban agriculture as part of their master planning process.

3.2.1 Urban Agriculture and Physical Planning in Nigeria

Physical-planning laws in Nigeria ignore Urban Agriculture. Thus, despite the potential benefits, Urban Agriculture is not recognized as an important activity. Studies of the Nigerian cities of Lagos (**Ezedinma and Chukuezi, 1999**), of Ibadan **(Tricaud, 1987**) and Kano (**Olofin and Tanko, 2003**) have identified planning laws as major constraint to Urban Agriculture. Legal constraint stem from various sources, including Nigeriaôs National Agenda 21, the National Policy on the environment, the land Use Act of 1978 (FRN, 1978) and Nigerian urban and regional Planning Decree (No. 88) of 1992 (FRN, 1992).

The power to control development, as defined by these acts, has not been substantially debated or revised *vis- a- viz*: Urban Agriculture is a relatively new topic. Where reference is made, Urban Agriculture is banned outright. For example, the cultivation of annual and perennial crops, as well as the raising of livestock in urban areas, is not permitted under Nigerian Law (Section 43, Land Use Act of 1978; FRN, 1978) except to preserve existing trees or plant new trees by the imposition of necessary conditions. These laws have generally made land right and tenure difficult to secure, especially for the poor. Thus, urban laws and regulation require reform in order to improve access to Urban Agriculture (**Tricaud, 1987; Ezedinma and Chukuezi, 1999; Olofin and Tanko, 2003**).

These concern have been brought forward more often by agricultural policy makers and geographers than by town planners. Little is known, however, about how to effectively implement such reforms and how they will affect physical planning and city development. The administrative responsibilities of federal, state and local governments, as enunciated the decree is that, the federal government formulates national policies for urban and regional planning, and prepares and implements national, physical, regional and subject plans. The national government also coordinates state and local governments on the implementation of their physical developments plans, as well as providing technical assistance to the states.

On the other hand, states are responsible for the development of urban and regional plans within their boundaries as well as for producing the stateôs development plans. States also control development of the land within their jurisdiction and conduct research in urban and regional planning. In contrast, municipal (local) governments are responsible for preparing and implementing town plans and for controlling development within their jurisdiction.

Section 1 of the Land Use Act of 1978 (**FRN, 1978**) notes that all land in each state is ultimately controlled by the Governor of that State, who hold lands in trust and administer it for the use and common benefit of all Nigerians. The State Governor is empowered to grant statutory rights of land occupancy to any person above the age of 21, for all purposes, regardless of whether or not the land is situated in an urban area (Section 5(4) of the 1978 Land Use Act). Under Section 6.1 of this Act, the Local Government is given the power to grant customary right of occupancy for the use of non-urban land for agricultural, residential and other purposes for a specific period of time. The Act does not define urban land; however, governors are required to publish in the State Gazette which areas in the state are designed as Urban or as ótherô land. Section 43.3.4. of the Act notes that any person who contravenes any of its provisionsô would be guilty of an offence and liable on conviction to imprisonment for One year or to a fine of ₦5,000.00. The Nigerian Urban and Regional Planning Decree of 1992 complement this 1978 Act. Urban Agriculture is not recognized except in Section 72, which relates to the

preservation or planting of trees. In fact, because no state in Nigeria has officially recognized Urban Agriculture, and it is therefore, considered as a contravening activity (**Olofin and Tanko,** 2003).

3.3 GENDER AND URBAN AGRICULTURE

Gender has long been recognized as a major factor that shapes urban agriculture and one that begs analysis if the functioning of the urban agriculture system is to be better understood (**Flynn 2001; Mbiba, 1995; Hovorka 2005; Foeken, 2006**). However, only a few studies have recently heeded this call (**Ngome and Foeken, 2012; Hovorka, 2005**) and the findings thus far remain only indicative. **Hovorka, *et al.*** (2009) have highlighted ôkey gender issuesô which underline gender differences and inequalities in urban agriculture, namely: womenôs predominance in urban agriculture; division of labour; gender differences in knowledge/preferences; access to and control of resources; decision-making power; and benefits and challenges. For example, of urban agriculture studies that have focused specifically on gender issues, (**Wilbers *et al*., (2004), Hovorka, (2005), Hovorka *et al*., (2009) and Ngome and Foeken (2012)**, urban agriculture has generally been described as a womanôs activity on the basis that most of the urban farmers are women, especially in eastern and southern African cities (**Mbiba, 1995; Freeman, 1991, 1993; Maxwell, 1995; Mudimu, 1996**). Even in West Africa where studies have indicated that men dominate urban farming (**Obosu-Mensah, 1999; Lynch *et al.,* 2001**), this latter characterization seems to be truer in respect to open-space farming than home-gardening where women are well represented and in some instances out-number men. For instance, **Obosu-Mensah** (1999) observed that more women than men were involved in home-gardening in Accra (Ghana) and that where only one spouse in a household was the gardener, it was always the wife. In a way, this validates the widely held view that women dominate subsistence farming (**Rakodi, 1988**).

The dominance of women in urban agriculture and indeed in the informal sector more generally (**Tinsley, 2003; Sardier, 2003**) ï and their presumed subsistence motive have been explained and rationalized variously (**Freeman, 1993; Mudimu, 1996; Dennery, 1996; Hovorka *et al.,* 2009**). They have been attributed to

womenôs comparatively low levels of education and lack of professional or other skills to effectively compete with the relatively more educated and skillful men for formal employment. This leaves women to settle for less paying informal income-generating activities, among which is urban agriculture. In particular, cultural expectations of women related to their traditional reproductive roles are popular explanations of womenôs motives and high participation levels in farming. For instance, **Dennery** found out from her study of urban agriculture in Nairobi that ñwomen see food production as part of their duty in feeding the familyò (**Dennery, 1996**). The general replication of the traditional division of roles in urban agriculture has been explained similarly, emphasizing home consumption and income earning as the primary motives for women and men, respectively (**Flynn 2001; Mbiba 1995; Rakodi, 1988; Obosu-Mensah, 1999; Freeman, 1993; Kiguli *et al*., 2003; Ngome and Foeken, 2012**).

It is argued that because of womenôs responsibility for household food preparation, childcare and home keeping, in the context of economic hardships and dwindling household incomes, women easily turn to farming in order to meet some household food needs, diversify the diet and generate extra income to meet other household obligations. This is partly because of their supposed altruistic nature, and partly because they can easily juggle between the various domestic chores and farming tasks (**Bryld 2003; Mougeot, 2000; Jacobi *et al*., 2000**) especially where they can access land within a short distance of the homestead and where agricultural activities and products can be integrated into their other income-generating activities. Consequently women are involved more with staple crops and vegetables (**Freeman, 1993; Foeken, 2006; Kiguli *et al.,* 2003)** and dominate home gardens or backyard farming. In contrast, men have tended to take more interest in crops and animals with high income value **(Ngome and Foeken, 2011**) and a ready market and to dominate off-plot or open space farming. In terms of livestock production, women concern themselves more with small livestock while men keep large livestock. This has informed suggestions that urban agriculture dominated by women holds greater prospects for household well-being than that controlled by men (**Jacobi *et al.,* 2000**). It should be noted however, that while womenôs participation in urban agriculture has primarily been driven by the

subsistence motive, for many women, and especially female household heads, any sale of surplus produce ends up constituting a major (sometimes the only) source of income (**Nabulo *et al.*, 2009**). In this circumstance, urban agriculture provides an important alternative employment for women.

Gender differences have also been documented in terms of division of labour. Studies have indicated that most labour requirements in urban agriculture are provided by women. Female labour is particularly critical among low income farming households who cannot afford hired labour (**Flynn, 2001; Maxwell *et al.*, 1998)**. **Obosu-Mensah** (1999) observes that if men are involved in other óoutdoorô activities, their role in urban agriculture may be limited to a supervisory one but that the converse is not tenable in the case of women. In conforming to traditional power relations, women have to alternate between their óoutdoorô activities, normal household chores and tending their gardens ñbecause a supervisory role (for them) at home may lead to conflicts between them and their husbandsò (***ibid***). The upshot is that women generally spend more time on work both inside and outside the home than men. For instance, **Sardier** (2003) estimated that women in Bamako spend 121 hours per week to menôs 87. In Harare, women were found to spend about five or six hours daily on farming activities at the peak of farming seasons while men assisted only occasionally, mostly ñduring the weekends and for limited time periodsò (**Mudimu, 1996**). To be sure, men sometimes spend longer hours than women in agricultural fields ï largely as a result of the often labour-intensive, if profitable, agricultural enterprises they engage in ï but because they are rarely involved in time-demanding household chores, they end up having more time for leisure than women (**Nabulo *et al.*, 2009)**. For all their sacrifice, women supposedly reap little personal benefits from urban agriculture (**Flynn, 2001; Hovorka *et al.*, 2009**).

In the context of Kampala, for instance, **Nabulo *et al.*** (2009) counted three household tasks performed by male for every ten tasks, with the rest being shouldered by women household members. Related to the overall labour contribution at the household level, the performance of specific urban agriculture tasks is more or less gendered. In most cases, men and women perform specific tasks related to, among other things, their knowledge and skills, physical strength

and time availability, and cultural norms. In most West African urban centres men perform most on-farm tasks including land preparation, watering, weeding, and spraying while womenôs role is mostly confined to harvesting and marketing (**Hope *et al*., 2009; Gaye & Touré, 2009**). Where women are the farmers, they hire male labour to perform most of the tough tasks. Studies in some East and Southern African towns have shown that on-farm tasks are shared, if unequally, between men and women. For instance, preparation of land and planting, respectively, are menôs and womenôs responsibilities in Kampala (**Nabulo *et al.*, 2009**), while women perform routine livestock related tasks in Kisumu and men are responsible for animal health (**Ishani, 2009**). But as a study in Buea (**Ngome and Foeken, 2012**) indicates, the extent to which men and women can cross gender boundaries in terms of performing activities traditionally performed by the opposite gender may also depend on the level of control one has over the agricultural enterprise, benefits associated with the activities, and marital status. It is reported in this particular context that if a married man was the gardener, he participated in a wider range of urban agriculture activities including those traditionally associated with women, but less so if his female spouse was the gardener. Yet in the latter case the man would show up at the time of harvesting and selling. Unmarried women also performed ñmenôs tasksò on their plots.

It has also been shown that women tend to be more constrained than men when it comes to accessing land partly because of patrilineal cultural practices that exclude them from inheriting land (**Gaya and Touré, 2009**), but also, and perhaps most importantly in the urban setting, because of womenôs relatively low financial endowments. As a result women farmers are only able to afford (if at all) small low-quality plots, sometimes in peripheral and contaminated locations (**Nabulo *et al.*, 2009**) or else, as is commonplace, they depend on men to access land for urban agriculture. In the latter case, womenôs expectations (in respect both of access to land and to other urban agriculture-related inputs) are not always met should the men undervalue urban agricultureôs contribution to house-hold well-being (**Toriro, 2009**). Thus although access to land in many urban centres may not be gender-biased in theory (**Hope *et al*., 2009; Toriro, 2009**), in reality women are disadvantaged relative to men.

Womenôs income poverty relates to their general underrepresentation in employment at all levels and to the fact that they have smaller asset stocks that can be transformed to financial capital. Studies have shown that men access credit to a greater extent than women on account, partly, of the latterôs lack of collateral such as land, but also because of the subsistence and small-scale nature of their agricultural enterprises (**Nabulo *et al*., 2009; Ishani, 2009; Toriro, 2009**). For a lack of financial capital, women gardeners are further constrained from improving the productivity of their plots and from engaging in agricultural activities that are more financially rewarding. **Mbaye and Moustier** (2000) attribute the absence of women from better-paying poultry and ornamental horticulture in Dakar (Senegal) to this reason. **Foeken's** (2006) study of urban agriculture in Nakuru (Kenya) revealed that women attained lower yields than men and that female household heads attained lower yields in comparison with both male heads and married women. Another study by **Ngome and Foeken** (2012) in Buea (Cameroon) indicated a much higher proportion of unmarried women among urban gardeners who could not afford improved seeds. Inability to hire labour for heavy tasks also results in women cultivating smaller uneconomic plots than men (**Hope *et al*., 2009)**.

Gender differentials have also been observed in terms of agricultural knowledge and information levels among men and women. If farmers in general have limited access to extension services and technical support as has been reported in the literature, then women are even more disadvantaged. Again, their low education levels mean that they cannot effectively comprehend advice and information provided in highly technical terms and in a language that requires higher literacy levels (**Hope *et al.,* 2009; Ngome and Foeken, 2012**); the targeting by extension service providers of household heads as has been reported in Buea excludes most women in conjugal households, although they may be the ones doing the actual farming (**Ngome and Foeken, 2012**); and the off-farm out-of-town seminar approach adopted by some technical advisors also limits womenôs participation in such in-valuable seminars because of womenôs reproductive responsibilities and cultural norms that tend to constrain their movement away from the home (**Hope *et al*., 2009**).

The situation in most West African cities is markedly different especially as regards womenôs mobility and participation in the market place. While menôs knowledge and information about agricultural production at the farm level is superior to womenôs, the latterôs dominance in the marketing of farm produce accords them an edge over men in terms of access to market information e.g. supply, demand and price trends (**Hope *et al.,* 2009**). Using this information, the women are able to advance their interests vis-à-vis male farmers in a manner that has sometimes been described by the latter ï especially those whose wives are not traders ï as exploitative (***ibid.***). As reported by **Hope *et al*** (2009), the women enter into informal credit arrangements with male producers whereby they pre-finance menôs agricultural production which binds the men to supply their produce to the market women at predetermined prices over which the men have little say.

Regarding decision-making, the general picture presented by the literature is that of both men and women playing key but varying decision-making roles in urban agriculture. The respective roles are mostly dependent upon the production systems they are involved in, which are in turn partly influenced by social norms and cultural expectations of men and women. Thus, women tend to play the major role in decision-making involving subsistence farming which they dominate (**Dennery, 1996**) while men are the main decision makers in income-oriented agriculture, also their preferred enterprise. As in crop cultivation so it is in live-stock keeping that men and women tend to exercise authority when it comes to the production systems they dominate, in this case large livestock and small live-stock, respectively (**Ishani, 2009**).

Womenôs level of access to urban agriculture productive resources, general socio-economic status and relative autonomy are also important influences in the decision-making matrix (**Dennery, 1996; Ishani, 2009**). In her study among live-stock keepers in Kisumu (Kenya), **Ishani** (2009) found out that women in male-headed households exercised control over small livestock; but for large livestock ñEven where the woman had bought the livestock, she neither owned it nor controlled it: in such cases there was joint ownership and controlò. In contrast, female household heads owned livestock even if they had adult sons, while an

increase in married womenôs contribution to their householdsô income in-creased their voice (***ibid***.; **Dennery, 1996**). But as **Dennery's** (1996) study in a different urban context indicated, womenôs role in decision-making ï whether they decided alone or consulted their spouses ï was dependent upon the importance/weight of the decision to be taken, which to a great extent related to traditional gender division of responsibility as well as intra-household power relations. Yet even where women wielded considerable bargaining power, owing to their socio-economic status or asset stocks commanded and which conferred a greater role in decision-making they still deemed it necessary to consult with their spouses even over decisions they had already made themselves, if ñonly to maintain good relations and keep him up-to-dateò (***ibid***). Men and womenôs decision-making responsibilities may also differ at different levels in the production chain. Studies in some West African cities indicate that men exercise control at the farm level while women make decisions regarding marketing of the produce (**Gaye and Touré, 2009**).

The overall picture that emerges from the preceding overview of menôs and womenôs participation in urban agriculture is one of ówomen feeding citiesô in a context of unequal power relations and gender inequalities. Yet urban agriculture carries greater significance for many women than it is generally recognized. It is more than just an activity that ñmeshes well with other expected household dutiesò (**Maxwell, 1995**), and that enables women to ñeasily (attend) to the produce if and when they have a break from other dutiesò (**Bryld, 2003**). Nor is it simply a burdensome activity to which women turn and get trapped for lack of good education and relevant work skills to find better opportunities, and from which they derive little personal benefits (**Flynn, 2001; Hovorka *et al.*, 2009**). On the contrary, many women seem to happily, if silently, embrace urban farming for various other motives and benefits that accrue to their participation in it. Some of the benefits include the potential for economic empowerment by way of earning some income out of the activity and by safeguarding their income from other sources, which they would otherwise spend on household needs if they did not undertake farming. But in order to reap the benefits, they must reinforce or at least not challenge menôs general view of urban agriculture as an activity of marginal

economic value for the household (**Maxwell, 1995; Dennery, 1996**). Economic empowerment enables women to meet their reproductive responsibilities and enhances a sense of independence and status among women both within the household and in the community. **Dennery** (1996) reports increased financial independence among female urban farmers in Nairobi as a result of which they ñdid not need to ask their husbands for cash to buy food or make small purchases.ò This contrasts with menôs perception of urban agriculture in the same context when they ñrepeatedly said that food production was not a businessò and that ñthe plots were too small to produce a substantial surplusò (***ibid.***). In a way this validates Maxwellôs (1995) observation about how menôs deficit perception of the value of urban agriculture provides women an important opportunity to maneuver.

By keeping women closer to their households, urban gardening also affords them the opportunity to provide proper parental care for their children. For some women, urban agriculture is also a means to capital formation necessary for entering other income generating activities as well as for building social capital by way of sharing their produce with friends and neighbours and meeting their obligations to social networks, including self-help groups and religious congregations. Some studies (**Dennery, 1996; Obosu-Mensah, 1999; Mbiba 1995; Max-well, 1995)** have also shown that due to its subsistence nature and its high dependence on female labour dictated by womenôs reproductive roles, urban farming, in an important way, vaults women in the vanguard of decision-making at the household level, enabling them to exercise some control over patterns of household resource use and allocation. A study of decision-making in urban agriculture in Nairobi concluded that at the intra-household level, conceptualization of the sexual division of labour translates into attitudes which shape the allocation of resources and producer practices. Women said that because they prepare food, they know the needs of the household and, therefore, decide how much produce to sell and what food to buy. The food production activities of women also shape their expectations as to how their spouses should allocate income from non-agricultural work. One of the reasons why some of the respondents expect their husbands to pay the childrenôs school fees is because their food production efforts largely eliminate household food expenditure **(Dennery,**

1996). Studies in Accra, Harare and Kampala also revealed that men provided or enabled their spouses to access necessary productive resources for urban farming and ceded decision-making ground to women in terms of choice of crops and use of produce on account of womenôs knowledge of household food requirements (**Obosu-Mensah, 1999; Mbiba, 1995; Maxwell, 1995**). Where income is gained from urban farming, womenôs traditional role of marketing farm produce especially in West African cities also enables them to exercise some control over the income (**Hope *et al.,* 2009; Gaye and Touré, 2009).** This does not only enhance their autonomy and bargaining power in the household, but as **Ngome and Foeken's** (2012) study revealed, it can also enhance womenôs sense of pride and self-esteem, as expressed by a female gardener who noted that the returns from her tomato garden made her feel financially better-off than a college teacher. Social networking and solidarity among female urban farmers, and related collective action for the betterment of their circumstances at the community level have also been reported (**Slater, 2001; Jacobs and Xaba, 2008**).

For all these (potential) benefits, contrary to popular opinion, urban agriculture might as well be considered, as **Freeman** (1993) does, as a ópro-active, constructive, and productive endeavor for women. This projection somewhat challenges the general conceptualization of the activity as mainly a household strategy. Instead, it somehow recasts it as a uniquely womenôs strategy to negotiate their social and economic spaces within the household. In particular, it enables women to enhance household food security by concealing from their husbands what they make from the activity in order to draw on their husbandsô support which would otherwise not be available were the latter to know the real worth of urban agriculture. This may be particularly true in situations where incomes of various household members are not pooled, as is borne out by **Maxwell's** Kampala respondents who repeatedly insisted that if their husbands knew the real value of their economic activities, the result would be a lower financial contribution on the part of the husband to the costs of maintaining the household, which would increase the financial strain on women and reduce their options for maintaining food security. (**Maxwell, 1995**) More accurately, however, this posturing by women illustrates the complexity of the processes involved in constructing

household livelihood systems and illuminates how the pursuit of gendered interests and goals by spouses underlies such processes. In particular, it shows how, ñin pursuing their own economic endeavors (in conforming to traditional roles) women exploit and/or create spaces of inclusionò (**Oberhauser *et al.*, 2004**). But this also challenges the dominant view that female labour in urban agriculture is largely unrewarded.

3.4 URBAN AGRICULTURE CHARACTERISTICS, TECHNIQUES, ORGANIZATIONAL STRUCTURE, AND AUTHORITY PERCEPTION

3.4.1 Characteristics

Urban agriculture has been evolving rapidly in response to changing demands. According to **RUAF** (2000), urban agriculture is not a relic of the past that will fade away (urban agriculture increases when the city grows) nor brought to the city by rural immigrants that will lose their rural habits overtime. It is an integral part of the urban system. Despite the lack of planning and government support in most cities, many have produced food effectively within their spatial confines. Others have enjoyed a great deal of policy guidelines and capital injection to promote food production within the urban area. As a general description, **Smit** (1980) characterized urban agriculture in developing countries in relation to urban agriculture as having the following characteristics: higher productivity per unit of space, low per capital unit of production, low energy consumption, low marketing cost, and freshness of the products.

Drechsel, Quansah and Penning (2003) recognize urban agriculture as being dynamic in space and time; highly intensive in nature; competing for land, water and labour with non-agriculture activities; having reduced fallow periods and increased nutrient mining (despite higher use of inputs); depending on the urban market; as well as polluting urban water resources.

Gbadegesin and Olawoye (2003) characterized urban agriculture as being transient in nature; while **Kleer** (2004); **Gbadegesin and Olawoye** (2003) and **Adeniyi** (1999) stated that urban agriculture is characterized by too small plots to

be recognized as farms proper; they do not constitute the principal source of income or maintenance of the gardening families; engaging only marginal labour; but utilizing land and other resources very intensively. Up to nine crops a year may be grown sequentially on a single urban field (**FAO, 2005**). The high productivity of small and marginal spaces in urban agriculture has been so well demonstrated (**FAO, 2001**; **Bulatao-Jayme, 1981**; and **Smith, 1986). Ganapathy** (1983), and **Gutaman** (1987) concluded that an area of six-hundred square meters van produce all vegetable needs for a family of four to six for a year; requiring about 1 to 1.5 working days per week.

According to (**FAO, 2005; Sachs and Silk, 1990; Brownrigg, 1985; Bulatao-Jayme, 1981; and Yeung, 1987**), it is practiced on small to medium size areas within the city for growing annual and tree crops, raising small livestock and fish for home consumption or sale. Skinner (1981) also noted that urban agriculture can take many forms from small micro gardens to large operations.

Gbadegeshin and Olawoye (2003) also reported that urban farming has neither age nor educational barrier in Ibadan metropolis. Similarly, **Ahiadu** (2009) affirmed that age, sex, marital status and educational attainment constitute no barrier to the practice of urban crop cultivation in Awka metropolis. In other words, participants in urban farming in the above studies cut across all working age, sex and educational strata. This is in the contrary to the view that most of those who move to the city and engage in farming are illiterates (**Delstra, 1987**).

It is also evident from various studies that majority of those who engage in urban farming are females (**Nugget, 2000; Smith, 1996; Rogerson (1998); Freeman, 1993 and Mougeot *et al.* 1998**). In the opinion of **Rogerson**, (1998) informal cultivation is primarily a survival niche of the most marginalized and most vulnerable groups in urban areas particularly, for older women. A similar conclusion is also reached by **Gabel** (2004) concerning older women in Harare.

3.4.2 Techniques of Urban Agricultural Production

Techniques and methods employed in urban food production may vary according to the environment and the level of development in the field. This section reviews

some of widely used technologies in urban food production. **Abd Razak and Mohamed,** (2007) identified integrated farming as a method vigorously promoted in Malaysia in order to support agriculture and reduce dependence on mineral fertilizers for crop production. The emphasis is on agro-forestry and mixed farming. **Abubakar** (2003) also reported rice cultivation integrated with vegetables, sweet corn, fruits, and fish and duck rearing; intercropping of coconut with fruits and vegetables; intercropping of rubber with banana, groundnut, maize, pineapple and vegetables; maize production nitrated with cattle feed lots. He further stated that integration of sheep in rubber growing smallholdings also contributes additional income, providing organic manure and reducing weeding cost.

Trough hydroponic is a simple method of growing vegetables without soil (**Abd Razak and Mohamed, 2007**). It uses water and dissolved nutrients in a plastic trough which can neither absorb heat nor rust, as container. The hydroponics container can be placed on a balcony where full sunlight can be received by the plants. It is a simple, low-cost technology, and is suitable for growing vegetables in areas where land is limited (**Abd Razak and Mohamed, 2007**). Planting can thus be done at any time of the year. **Wade (1984)** also noted that many Asian cities have succeeded in producing large quantities of food for their inhabitants through the use of their rooftops and fish ponds; employing trough hydroponic-like techniques.

Abd Razak and Mohamed (2007) also reported the cultivation of high value vegetables (e.g. cabbage, cauliflower, and broccoli) under rain shelters in Malaysia. Cultivation of leafy vegetables (e.g. choy sam, pak choy, Chinese kale) is carried out under netted structures. **Cruz and Medina (2003)** referred to it as fresh vegetable greenhouses in Havana. The rain shelter provides shade to the crops against effects of excessive solar radiation, exclude insects thus resulting in a decrease in the amount of pesticides used. It also protects the soil against erosion particularly in erosion prone soils **(Cruz and Medina, 2003; Abd Razak and Mohamed, 2007)**.

The practice of reusing waste in food cultivation in Africa is not new. Solid waste management experts, consultants and researchers on Africa are increasingly recognizing the great potential of waste reuse in urban farming to help reduce solid waste collection and disposal problems **(Chimhowu and Gumbo, 1993; Egziabher 1994; Lee-Smith and Menon, 1994)**. Most African countries have traditionally utilized various types of organic materials to maintain and improve the productivity, and fertility of agricultural soils **(Edmundson, 1981; Sridhar *et al.*, 1985; ILO/UNDP, 1991; Bertolini, 1992; Kramer *et al.*, 1994; Enfo News; 1990; Asomani- Boateng, 1994; and Cointreau, 1982).** The indigenous kitchen gardens, compounds and community gardening systems of West Africa have made extensive use of organic materials. In Havana, organic matter production centres were created, and charged with the responsibility for collecting, processing and distribution organic matter to all urban agriculture production modes **(Cruz and Medina, 2003).**

Lately, there has been resurgence in waste reuse urban farming- **RUAF (Asomani-Boateng and Haight, 1999; Kramer *et al.*, 1994)**. Urban cultivators ñmineò abandoned waste dumps for compost to be applied on farms, while garbage farming involving cultivation on abandoned waste dumps-is now common in African cities **(Edmundson, 1981; Chapamuriwo, 1990; DGIP/UNDP, 1992; Lewcock, 1995**). Food waste generated by restaurants and canteens is used extensively to feed pigs, goats, sheep and cattle (**Asomani-Boateng and Haight, 1999**).

Many studies on urban and peri urban agriculture identified the kitchen garden method of farming (**Chimhowu and Gumbo, 1993; Egziabher, 1994; Lee-Smith and Menon, 1994**). This involves cultivating a small parcel of land within the home or living compound immediately outside the dwelling unit. The kitchen gardens, which are operated as backyard gardens because of their proximity to the home, benefit from household organic refuse, manure and other organic waste materials to ensure continuous cultivation **(Asomani-Boateng and Haight, 1999**). Crops grown are those frequently required by the kitchen or household of the operator and usually consist of vegetables. **Egziabher (1994)**; **Cruz and Medina**

(2003) noted the compound gardening which centres on the household compound. The land immediately surrounding the compound is intensively cropped with vegetables and staples using organic solid regeneration techniques which involve the use of household refuse and manure from livestock (**Asomani-Boateng and Haight, 1999**) reported the practice of community gardening in Havana, made possible and functioned by government campaign to motivate the urban population to use all the available spaces in the city for the production of food for direct consumption. In Kano and Zaria, Nigeria, the practice of using ñtakiò (compost manure, household waste, street sweepings and ash) as fertilizing material by the cityôs peri-urban farmers has gone on for centuries (**Lewcock, 1995; Binn and Fereday (1996**). **Mortimore (1972)** revealed that in 1969 and 1972, 1,137 and 1,447 donkeys respectively carried ñtakiò out of the old walled city of Kano. This represented between 140 and 1180 tonnes of compost per day for peri-urban farms.

3.4.3 Organizational Structure of Urban Agriculture

Despite the lack of planning and government support in some cities, many (especially Asian cities) have enjoyed a great deal of policy guidelines and capital injection to promote food production within the urban areas (**Yue-man, 2004)**. During the 1960s and 1970s Lae, Papua New Guinea for example, experienced rapid urban and population growth resulting into widespread destruction of forested lands surrounding the city, leading to heavy dependence on imported food supplies etc. To combat these problems, a comprehensive plan to increase food and fuel production was developed. The major elements consisted of allotment gardens, composting, agro-forestry, nutrition education, and regulation of food imports (**Yue-man, 2004)**. The allotment gardens of small plots, averaging one-tenth of a hectare, were constructed on city lands and assigned to low-income residents by the city government. The crops are fertilized with locally produced compost. Technical assistance is provided by the city horticultural staff for crop selection, planting techniques, and the like. Land security is guaranteed by leases and use permit granted by the city council, so that the choice of cultivation techniques is compatible with long term productivity. Compost production is intended as a method both to recycle solid wastes for nutrients that can be applied

in allotment gardens and to reduce the amount of wastes at landfill sites (**ibid, 2004**).

Wade (1984) reported that the Philippine government encouraged food production within the urban area by providing home garden areas around new low-income housing, including multi-storey housing estates in metropolitan Manila. **Cruz and Median (2003)** in their study of Havana, Cuba; reported a similar situation whereby local governments authorize people to use free of charge, state-owned vacant lots of land in and around the city. Government also provided technical support for training and motivating citizens in the agricultural management of these empty lots as well as arranging for the sale of hybrid seeds; and common tools such as watering cans to the farmers. NGOs and professional bodies were also said to be in collaboration with farmers, promoting urban agriculture and replicating it in other parts of the country as well as encouraging complementary interactions between government agencies and non-governmental organizations. **Ledogar** (1978) reported that in addition to increased community cultivation of ñdistant gardensò on vacant land in Lusaka, two programmes to encourage home garden production were initialed in the late 1970s with the assistance of the American Friends Service Committee (AFSC) and UNICEF. The second programme, in the township of Jack Extension, was begun by AFSC in 1978-1980. The AFSC staff and a local coordinator helped to secure a 20-hectare plot adjacent to the townshipôs housing area. Technical assistance on production methods was provided, and the programmeôs nutritionists worked with the community to improve knowledge of nutrition and the benefits of home produce. Seeds and fertilizers were provided by the project organizers. The AFSC terminated their involvement in the project once it was off the ground, and the leadership was assumed entirely by the local coordinator.

3.4.4 Authority Perception of Urban Agriculture

The precarious food situation the world-over, particularly the developing nations suggests that urban agriculture should be a potential area for encouragement and development in the city. So why is urban agriculture still largely unrecognized and unassisted if not outlawed or harassed even in years of food shortage? **(Mougeot,**

1993). This section of the research discusses the main reasons why urban agriculture has not always been encouraged.

Obosu-Mensa (1999); Goodland, Watson, and Ledec, (1984) reported that in the past, government officials did not encourage urban agriculture because of the supposed hazards associated with the use of biocides for pest and disease control which may have negative effects on human health and the environment. The use of biocides in urban agriculture has been linked to the bioaccumulation of synthetic organic compounds in aquatic life, particularly fish which is hazardous to health (**Chimhowu and Gumbo, 1993**). Similarly, the World Resource Institute (WRI) notes that runoff of fertilizers, herbicides and pesticides into urban rivers or streams are a significant source of water pollution. The use of chemicals in food production is also though to contaminate soils and crops **(WRI, 1992**). Biocides like DDT have been linked to the death of birds and have been banned in many Western nations (**Hardin, 1972**).Official skepticism towards urban agriculture is compounded by assertions that the practice leads to an increase in mosquitoes. It is generally believed in the Ghanaian community that rainwater accumulates in the axils of maize leaves and provides breeding places for mosquitoes and so urban agriculture should be discouraged **(Obosu-Mensah, 1999). Watts and Bransby-William** (1978) however successfully refuted this claim. Other officials advocated the banning of urban agriculture on the grounds that the production of food in the polluted environment of cities is inherently unhealthy **(UNDP, 1996**). **Anku, Doe, and Tetteh**, (1998) amplified this concern when they warned about the potentially harmful impact on human health of growing vegetables in the urban environment. In addition, some officials argue that uncontrolled animal husbandry within urban areas compromise public health **(Mosha, 1991)**.

Kenyan authorities view urban cultivation as blight on the urban landscape (**Diallo, 1993; Asomani-Boateng and Haight, 1999**). In Zimbabwe, the harsh repression of urban cultivation in the 70s and 80s was justified on the grounds that urban farming facilitated the breeding of malaria-carrying mosquitoes **(Rakodi, 1988**). Similarly, in Accra, Ghana, official skepticism towards urban agriculture is compounded by assertions that the practice leads to an increase in mosquitoes, and

mosquito-related diseases (**Obosu-Mensah, 1999**). Some officials advocated the banning of urban agriculture on the ground that the production of food in the polluted environment of cities is inherently unhealthy (**UNDP, 1996**).

Urban agriculture, like other informal activities, does not always conform to official zoning and licensing laws **(House, 1978**). Contemporary urban planners and city managers associate development and modernization with industrialization, and ignore farming in urban areas, viewing food production as being ñexternal to citiesò **(Guyer, 1987**) and ñreal agricultureò as taking place in rural areas (**Drescher, 1994**). The activity is perceived as ignoring city-planning codes. To some planners and administrators, agriculture in an urban setting is not desirable. Economists tend to treat the many benefits that may be accrued from such practice as ñexternalities.ò Urban agriculture is thus viewed as backward and something to be minimized and as such, never figures in the master plans of many cities (**Ganapathy, 1983; Obosu-Mensah, 1999**). Consequently, hostility and repression have confronted the activities of urban farmers in a host of African counties **(Diallo, 1993; Asomani-Boateng and Haight, 1999; Rakodi, 1988; Obosu-Mensah, 1999; UNDP, 1996**). Another important factor in understanding why some officials reject the practice is the socio-economic background of the farmers. Earlier studies show that mainly poor, uneducated, and unemployed people in squatter areas were involved in urban agriculture (**Sawio, 1994; Ganapathy, 1983; Obosu-Mensah, 1999**). Such studies seem to infer that official resentment toward the practice was due, at least partly, to the low socio-economic status of the farmers. **Sawio** (1993) has argued that the increased involvement of highly educated people in urban agriculture would help legitimize it, stating ñthe more educated the players in the enterprise, the more likely will they be interested in protecting their investments by influencing policies and regulations in its favourò.

3.5 URBAN AGRICULTURE DYNAMICS

The development of Urban Agriculture is strongly influenced by the dynamics of the urban social, economic, political, ecological and spatial systems with which it is connected, for instance:

3.5.1 Urbanization

People increasingly live in and around cities throughout the world. In **'State of the World Cities' (2004/2005), UN-HABITAT** predicts that by 2030, 60% of the worldôs population will live in cities. The growth of cities, or urbanization, is caused by migration from the rural areas added to the citiesô natural growth of the urban population (**Drescher and Iaquinta,** 1999).The latter is gradually becoming the dominant one in most cities including Enugu.

Urban agglomerations and their resource use is becoming the dominant feature of the human presence on earth, profoundly changing humanityôs relationship to its host planet and its eco-systems. Massive and rapid urbanization takes place predominantly in urban areas of the worldôs least developed regions. **The 'State of the World Cities,'** shows important regional differences in the urbanization process. Latin America as of 2005 was the most urbanized region in the developing world, 75%, or 391 million, of its people lived in cities. It is estimated that by 2020 the urban population in the region will approach 539 million, or 81%, of its projected total population of 665 million. With the exception of Brazil, the urbanization pattern in most countries in the region typically involves one very large city that accounts for much of the countryôs urban population. In 2005 in South Saharan Africa, urban areas accounted for 34% of the total population of 611 million, which will approach 440 million, or 46 percent of its projected total of 952 million, by 2020. Global economic processes have stalled in South Saharan Africa, while the urban population is quickly growing, bringing severe consequences for livelihoods in urban areas. In Asia and the Pacific, urban areas accounted for 35% in 2005; this is expected to grow to 46% by 2020. An increasing number of the regionôs poor live in urban areas.

3.5.2 Urbanisation and Food Insecurity

City authorities around the world face enormous challenges in creating sufficient employment, providing basic services such as drinking water, sanitation, basic health services and education, as well as planning and maintaining open green spaces. Other challenges include managing urban wastes and wastewater, as well

as social inclusion, decentralization and local autonomy, among other issues. UN-HABITAT calculated that in 2001, nearly 32% of the worldôs urban population lived in irregular settlements without sufficient access to decent food, shelter, water and sanitation, and predicted that in the next 30 years the number of slum dwellers worldwide will increase to two billion if no action is taken (**UN-Habitat, 2001**). Many cities cannot cope with the massive growth of its population, which leads to a decrease in urban shelter and security of tenure, backlogs in delivery of basic services, increasing inequality and segregation, degradation of the urban environment, and increase in poverty, malnutrition and food insecurity. In many countries, the situation is aggravated by a very unstable macro-economic and/or political situation.

As urbanization develops, there is an increase in urban poverty, food insecurity and malnutrition, shifting from rural to urban areas. Urbanization of poverty occurs everywhere, but is deeper and more widespread in developing countries. For instance, a massive 40 percent of the population of Mexico City, Mexico, and one-third of the population of São Paulo, Brazil, are at or below the poverty line. In 2001, there were 128 million slum dwellers in Latin America and the Caribbean (14 percent of the worldôs total), 187 million in Africa (20 percent) and 554 million in Asia (or 60 percent). People without resources and social networks are most vulnerable to food insecurity. Food has become increasingly difficult to access for the urban poor, especially in the bigger cities (**Mougeot**, 2005). The size and urgency of these challenges require innovative ways of managing cities and their related infrastructure and service requirements. There is a renewed interest in alternative strategies for improving urban livelihoods, local governance, urban design, and waste management, as well as for urban food security and nutrition.

3.5.3 Urbanism

The rapid urbanization process also accelerates the extension of the city into the rural areas, bringing larger areas under the direct influence of the urban centres. In the formerly rural areas, now peri-urban areas, the following changes are gradually becoming more intense:

i) Rural customary land rights slowly get pushed aside or dominated by urban statutory rights.

ii) Traditional systems for land distribution are disrupted by urban newcomers seeking to buy land.

iii) Competition for land of prices and land sales increases; social cohesion is weakened.

iv) Some farmers give up farming, sell their land and switch to other income-earning activities; in other households, generally the men have urban jobs, while women become responsible for the farming operations.

v) There is an increase of land subdivision.

vi) Some farmers start to intensify their farming systems and adapt to the new, increasingly urban conditions ï i.e. change crops, become more market-oriented, use new technologies such as production under cover, take up direct marketing or processing; and use urban organic wastes or wastewater.

vii) There is an increase of urban power groups and land-grabbing, invasions by urban poor seeking land for housing and subsistence farming, etc.

viii) Areas become part of the administrative city area and must comply to urban norms and regulations.

ix) Environmental problems (soil and water pollution) increase.

3.5.4 Other Urban Dynamics

The city is in a constant process of building and decay. Open spaces get built on and their formal or informal temporary users become evicted (as is regularly happening to many urban farmers); they are forced to find an alternative location or give up farming. Meanwhile, degenerated residential, office or industrial areas are demolished, creating new open spaces that may stay vacant for a long time until given a new use and the required investments become available. New roads and power lines are built, creating new vacant open spaces. Often, such newly created open spaces are gradually occupied by urban producers (informal

occupation or temporary leases).The above explains how, to a certain extent, Urban Agriculture can be characterized as ósshifting cultivationô (**Drechsel *et al*.**, 2006) since, although a permanent element of the urban system, its locations within the city may vary over time. Some cities even formalize this by making lease agreements with organized farmer groups, allowing temporary use for longer periods. They may also provide alternative lands (often also on a temporary basis) when these sites are needed for other purposes before the lease ends and encourage private and institutional owners of vacant open spaces in the city to do the same (e.g. through tax incentives). This dynamic puts a high value on continuous technological innovation to maintain or enhance productivity and sustainability (**van den Berg and van Veenhuizen,** 2005; **Prain**, 2006). Pollution from urban traffic and industry may force Urban Agriculture to move to sites further away from the sources of pollution or make adaptations in the farming (e.g. crop choices, irrigation methods, etc.). A good example is shown by urban farmers along the Musi River in Hyderabad, India, where river water used for irrigation increasingly became polluted and within a short period, farmers shifted from vegetables and rice growing to fodder and tree crops (**Buechler and Devi**, 2006).

Other city dynamics that directly influence Urban Agriculture development, where and how it is carried out and by whom, result from: changes in access to organic wastes and wastewater produced by the city; new demands from urban citizens (e.g. the need for recreational spaces, new products); changes in urban zoning and related norms and regulations; and shifts in the urban labour market, among others.

3.6 URBAN AGRICULTURE AS A RESPONSE TO URBAN DYNAMICS AND CHALLENGES

Urban Agriculture is a response to the urban dynamics in three main ways:

i) The urban poor and unemployed respond to these urbanization processes and the related growth of urban poverty and food insecurity/malnutrition by turning to Urban and Peri-Urban Agriculture.

ii) The urban environment provides opportunities and relative advantages for producers: direct access to urban consumers and markets, availability of

cheap inputs such as urban organic wastes and wastewater, closeness to institutions that provide market information, credit and technical advice and so on.

iii) Through conducive urban policies, norms and regulations, Urban Agriculture can fulfil certain functions required for sustainable city development (in addition to food supply and income generation: recycling, greening, buffer zones, land management, recreational services, mitigation of HIV-AIDS, social inclusion), depending on local needs and development priorities. Despite urbanization, Urban Agriculture persists in the city, even in city centres, and adapts to new economic and spatial conditions. Consequently, there is a great variety in Urban Farming Systems and the people involved. These systems adapt to the cityôs continuously changing local conditions, and Urban Agriculture takes on new functions. Food supply and income generation remain a major function, but increasingly Urban Agriculture also operates in environmental management, landscape and biodiversity management, and provision of recreational services.

3.7 URBAN FARMING SYSTEMS CLASSIFICATIONS

Several authors describe local urban farming systems, but unsystematically, with localized definitions and descriptions, so that comparisons between cities cannot be made. A consistent typology and research approach is lacking. Most Urban Agriculture researchers have developed their own approach, leading to a large variety of definitions and subdivisions of local farming systems. **Mougeot** (2000) indicates that most authors define Urban Agriculture in general terms only and rarely use their findings to refine the Urban Agriculture concept, refine typologies or analyse how this concept is related to urban development. **Drechsel *et al*.** (2005) point out that the selection of particular criterion is often based on the authorsô discipline or on the use of the study. One reason for the lack of a consistent research and typology is that Urban and peri-urban Agriculture is relatively new and its study aims are diverse. Also, there is a lack of an institutional home for Urban Agriculture studies and planning in the various countries, hampering the systematization of research results. Another important factor, however, is the

diversity in farming conditions within the urban setting and the high dynamism in Urban Agriculture, which makes it difficult to characterize and compare Urban Farming Systems. An overview of the various approaches to classify urban production systems and the possibilities for developing an operational typology are explored below. The main challenge is to arrive at a typology that will form a sound basis for identifying adequate development strategies for each type of Urban Agriculture and related policy development and action planning. Classification of Urban Agriculture systems differs in criteria used, such as location and size of holdings, production aims, predominance of crops or animals, or intensity of production. Most of these classifications only capture part of the reality and suffer from a lack of clarity and differences between regions or cities, and with an overlap among systems.

3.7.1 Single Criteria Classifications

Many studies differentiate between urban farming systems using single criterion to discuss important differences between different types of Urban Agriculture. Common determinants are

3.7.1.1 Location

The location where the activity is carried out is often used as an important criterion, since this point to specific constraints and opportunities such as degree of land access, the land tenure situation, costs and time related to travelling to and from the production site, closeness to markets and risks (e.g. theft, contamination by traffic and industry).(**Mougeot**, 2000). The activities may take place ón-plotô (in the homestead-, backyard, kitchen, balcony and rooftop- gardening) or on land away from the residence (óoff-plotô), which influences the possibilities of combining agricultural tasks with non-agricultural tasks, e.g. household chores and other small businesses (**Waters-Bayer**, 2000).

Other authors (**Dubbeling**, 2004) distinguish between Urban Agriculture on óprivateô land (owned, leased), ópublicô land (parks, conservation areas, along roads, streams and railways), and ósemipublicô land (on yards of schools, hospitals, prisons, etc.). The land tenure situation influences the degree of formality of UA

and the possibilities for its sustainability on this location as well as specific cultivation conditions, especially organizational (**Mubvami and Mushamba**, 2006).

3.7.1.2 Main Crops Produced and Animals Raised

The choice of what to produce and how, is determined by a variety of social, economic and physical determinants. In most cities the predominant crops grown in UPA are a result of often specific urban and peri-urban diets and food consumption patterns, which are influenced by culture, climate, soil conditions, socio-economic circumstances, proportion of expatriate market and political economy. The same applies to urban livestock, in addition to the influence of religion and the climate.

Food production may include different types of crops (grains, root crops, vegetables, mushrooms, fruits) and/or animals (poultry, rabbits, goats, sheep, cattle, pigs, guinea pigs, fish, earthworms, bees, etc.) or combinations of them. Often, the more perishable and high-valued vegetables and animal products and by-products are favoured. Non-food products include aromatic and medicinal herbs, ornamental plants, tree products (seed, wood, fuel, etc.) and tree seedlings. Production units in Urban Agriculture in general tend to be more specialized than rural enterprises, and exchanges take place across production units. In urban production systems, crop production and livestock production tend to be taken up by separate households, and mixed crop-livestock systems tend to be less common than in rural agriculture, especially in intra-urban agriculture. Important linkages are often maintained between (often peri-urban or even rural) crop production systems producing fodder and other feed ingredients and sub- or intra-urban livestock enterprises (**Bradford *et al.*,** 2002 **Buechler *et al.*,** 2002 and **Nsiah-Gyabaah and Adam,** 2001). **Vagneron *et al.*** (2002) identified three main production systems:

i) Specialized production systems devoted to a single crop or animal: rice, vegetables, fruit, fish, shrimp, chicken;

ii) Mixed production systems, which combine two activities (two main crops or mixed crop/ animal); and

iii) Hybrid production systems, which combine more than two main activities (crops and/or animals).

Kessler (2003) characterized farming systems in five West African capitals ï Lomé, Cotonou, Bamako, Dakar and Ouagadougou ï using crops cultivated and main cultivation practices.

3.7.1.3 Market-Orientation of Urban Agriculture

According to **Nugent** (2000), Urban and Peri urban Agriculture consists of two ódisparate and possibly segregatedô subsectors: *commercial horticulture* and the *livestock industry* (mainly located in the peri urban areas), and scattered subsistence production. Both types have a positive effect on food security (**Armar-Klemesu**, 2000). In most cities in developing countries, an important part of UA production is for self-consumption, with traded surpluses. However, the importance of market-oriented Urban Agriculture, both in volume and economic value, should not be underestimated. Products are sold at the farm gate, by cart in the same or other neighbourhoods, in local shops, in local farmersô markets, or to intermediaries and supermarkets. In general, fresh products are sold, but some are processed for own use, cooked and sold on the streets, or processed and packaged for sale to one of the outlets mentioned above.

The distinction between subsistence and commercial Urban Agriculture is not as disparate as **Nugent** states, and many mixed types can be found in small-scale enterprises producing partly for the market and partly for home consumption, which is even the most common farming type in many cities. Segregation is stronger between the small-scale sector and the capital-intensive, large-scale enterprises. Even if farming is undertaken on a slightly larger or fully commercial scale, the urban households often combine farming activities with other urban occupations, generating off farm income. Indeed, agricultural production in urban areas is rarely the only livelihood activity of a household (**Prain**, 2006).

3.7.1.4 Urban Agriculture- Scale and Intensity of Production

Schiere (2001) describes livestock systems in terms of subsistence small-scale, semi-commercial small-scale, and large-scale industrialized. He observes that the

intensive industrialized systems in particular tend to concentrate the advantages of Urban Agriculture in a few hands (income, tax benefits, etc.) and disperse the associated disadvantages (odour, pollution, etc.). The less intensive, small scale subsistence and semi-commercial systems provide income and food for households and tend to be important for social relations at the community level**. Coche**ôs classification of aquaculture systems (**FAO**, 1982) is based on production intensity and management demands, and describes the transition from extensive to semi intensive and intensive aquatic production systems as attributable to various factors. Greater demand from markets combined with improved marketing channels, increased competition for land, and access to production inputs (such as urban wastes and wastewater) and to credit are other important factors stimulating intensification in urban (aquatic) production (**Leschen *et al.***, 2005).

This intensification and specialization process creates shifts in the local farming systems. In Bangkok, Thailand, for instance, shrimp farming is by far the most rewarding activity, followed by fish farming, vegetable growing, and fruit trees and rice cultivation. Rice is therefore progressively displaced by horticulture, fish and shrimp cultivation, which require higher investment costs and hence wealthier city dwellers (**Vagneron *et al.***, 2003).

Further intensification of peri-urban and urban production systems is not always necessary, inevitable, or the most desirable. Increasingly, especially in larger cities in Europe, Latin America and Asia (notably China), a combination is sought in which the producers can make a good living and create pleasant landscapes for recreation that maintain biodiversity and possibilities (**Deelstra *et al.***, 2001).Intensification of production in urban horticulture, dairy and aquaculture not only increases profits for the producer, but may also be necessary for surviving in the urban setting and its strong competition from urban developers (**Van den Berg *et al.***, 2005). Intensification in an urban setting needs maximization of output from an often minimal space (**Prain,** 2006), which often involves input technologies and labour. The technological level of most Urban Agriculture enterprises in developing countries is still low because of often restrictive urban policies on agriculture in the past decades and the low level of attention to UA by agricultural

research, extension and credit organizations (**Mougeot**, 2000), among other reasons. Once UPA is acknowledged and supported, however, the overall tendency is towards more technically advanced and intensive agricultural systems, various examples of which can be found in all cities.

3.7.2 Multiple Criteria Classifications; Farming Systems

Many other authors use a combination of the above-mentioned and additional determinants to distinguish the local production systems. **Danso *et al.*** (2002b) use access to irrigation water and location next to crop choice as the criteria to distinguish the crop production systems in Accra, Ghana:

a) Rural or peri-urban rain fed maize or maize/cassava;

b) Peri-urban dry-season irrigated vegetables only (garden eggs, pepper, okra, cabbage);

c) Peri-urban dry-season irrigated vegetables and rain fed maize or vegetables;

d) Intra-urban year-round irrigated vegetable farming (lettuce, cabbage, spring onions).

Access to irrigation water turns out to be an important determinant of income raised in Urban Agriculture. In their study of dairy production systems in Addis Ababa, Ethiopia, **Tegegne *et al***. (2000) use degree of market-orientation, size, and degree of crop-livestock interaction and intensity of production as the main criteria to distinguish the various urban livestock systems.

In Chicago United States, the following three models were distinguished as most applicable convenient to use in city planning and advocacy, based on the variables of location, size, type of management and degree of commercial orientation (**Advocates for Urban Agriculture**,2004):they are:

i) **Home gardens** —they are usually small and adjacent to a house or apartment, managed by residents, with production primarily for home use. Small-scale income generation from produce or value-added products is possible.

ii) **Community-based gardens** – The large garden plot is subdivided into several small plots. They are located on other city or community-owned land or on grounds of schools, churches, community centres, food pantries and housing developments. They are either managed by members of the community (with production mainly for use by the membersô households) or by the institution involved (for feeding school children, hospital clients or prisoners, or for income generation).

iii) **Commercial gardens and small farms** – Plots vary in size, but are usually larger than those in homes or community gardens worked by households. They are usually located in vacant lots in commercial or residential areas either owned or leased by the producer.

A study under the Urban Harvest Programme in Cameroon identified six major types of farming systems, with the use of the following variables: location/land tenure, crop mixture, technology used (open pollinated or improved varieties), degree of commercialization of products and intensity of production. Other authors use similar combinations of variables and varying degrees of specification of farming systems identified (**Drescher**, 1999, Kenya; **Jacobi *et al.,*** 2000; **Zakariah *et al.,*** 1998 and **Buechler and Devi**, 2002). **Moustier and Danso** (2006) summarize different attempts to arrive at UPA typologies by using multiple criteria for four major types of Urban Agriculture:

i) subsistence home intra-urban farmers;

ii) family-type (semi-) commercial farmers (intra- and peri-urban);

iii) intra- and peri-urban agricultural entrepreneurs (intra- and peri-urban); and

iv) Multi-cropping peri-urban farmers (mainly former rural producers who are influenced by the city, adapt their production system to the demands of the nearby city, and diversify their livelihood with other occupations).

The latter category refers to the group of former rural producers who have adapted to the city that took over their lands by diversifying their livelihoods with other occupations, but still grow food crops for themselves. The difference between the second and third group relates to the size of business and the use of salaried labour.

The latter, the urban entrepreneurs, invest in intensive temperate vegetable production, poultry, fish farms, and fruit growing, etc.

Smit and Bailkey (2006) similarly distinguish between what they call community-based Urban Agriculture from other proactive forms of Urban Agriculture such as subsistence farming by individuals for themselves and their families; entrepreneurial, market-oriented Urban Agriculture, often consisting of privately-owned, profit making businesses; and leisure or recreational gardening. Community-based Urban Agriculture is then seen as producing food, and other services as a shared activity focused on building communities.

3.8 FRAMEWORK FOR THE ANALYSIS OF URBAN AND PERI URBAN AGRICULTURE

Most of the classifications reviewed only capture part of the reality and suffer from a lack of clarity (overlap among systems and differences between regions or cities). In addition, the different authors do not provide sufficient information for data comparison. It is helpful to group together those Urban Agriculture systems that enhance urban livelihood strategies and Sustainable Urban Development. The main challenge, as mentioned, is to arrive at a typology that not only serves research purposes, but will form a sound basis for identifying adequate development strategies, action planning and policy development.

3.8.1 Research and Local Relevancy

Mougeot (2000) voices the need for an agreed typology of Urban Agriculture systems for thorough data gathering and comparative analysis, which was the reason for the above-mentioned FAO studies. But several authors, including **Vagneron *et al.*** (2002), discuss the difficulty in making generalizations on the urban farming systems distinguished and comparisons between them. **Schiere** (2001) stresses the importance of establishing locally relevant criteria for characterizing locally relevant farming systems. He argues that urban farming in and around urban areas occurs in varying forms and has various functions. Perceptions on their relevance and occurrence differ between stakeholders (owners, neighbours, consumers, disciplinary trained officials, governments) and

according to context (urban fringes vs. inner cities, cities in arid vs. wet zones, etc.). Such patterns require tailor-made attention and regulation/ incentives to ensure that maximum benefit is gained from agriculture in the specific local urban conditions. This does not exclude drawing from lessons learned. Principles elaborated in one place can be applied elsewhere, but it is generally a good idea that they be locally elaborated and adapted to specific local conditions. However, **Schiere** (2001) rejects a typology of farming systems to be used in all cities as not meaningful and impractical. Local characterization of urban farming seems to be the keyword rather than a uniform typology of different systems. He also states that more emphasis should be given to a dynamic assessment of farming systems, an analysis on how and why Urban Farming Systems change over time in form and function, and an identification of ways to support the positive aspects, and cope or counteract the more negative characteristics of specific farming systems (**Schiere**, 2004; 2006).

The concept of the farming system was developed in the 1970s and 1980s to capture the diversity in rural agriculture and to identify similarities between different systems in order to clarify issues for technological intervention and to strategize the development of rural agriculture. Although Urban Agriculture could be described in a similar way, the weakness of farming system analysis is its agro-centrism and the difficulty in characterizing feedback loops between the farm, farm household and wider urban systems (**Danso *et al*., 2003, van Veenhuizen, 2006, Prain, 2006**). The more recent emergence of the sustainable livelihoods approach takes a broader perspective.

3.8.2 Livelihood Strategies; Non-Agricultural Activities

Agriculture is most often not the only or even the dominant activity of urban households. The sustainable livelihoods approach **(Farrington and Carney, 1999**) focuses on the integral assessment and discussion of the major livelihood assets of the households concerned, the livelihood strategies they apply with the help of these assets, their vulnerability to stresses and shocks, the constraints and opportunities, and the support received from local institutions and policies (**www.livelihoods.org**). Generally, five types of assets are distinguished: natural

capital (such as land and water); physical capital (animals, equipment, animals); financial capital (money, infrastructure); human capital (skills and ability); and social capital (social networks, support by other households, etc). Constraints and opportunities may lie in each of these spheres. There are variations: **Smit and Bailkey** (2006), for instance, specify seven types of capital to point out the building up of urban community capitals. In addition to natural, human, social, physical (ôbuilt capitalô) and financial capital (óeconomic capitalô), the authors add ópoliticalô and ócultural capitalô. The core principles underlying this approach are the focus on people and their strengths, a good understanding of local dynamics, and making links between local issues and wider concerns about policies, institutions and processes. The sustainable livelihoods approach may facilitate identification of competing and complementary non-agricultural activities within farm households and the recognition of alternative or complementary development options. Using this approach may result in a classification of urban farm household livelihood systems that incorporates the non-agricultural activities of the farm-household and needs other than just food and income (e.g. access to basic services, empowerment). A growing number of publications use this approach in analysing urban farming, which is especially useful at the household level in a specific city. It remains difficult, however, to assess the economic impact of Urban Agriculture at the city level and compare typologies between cities.

3.9 URBAN AGRICULTURE'S MULTIPLE FUNCTIONS

The various classifications in the available literature are often related to the analysis of production and income levels in the distinguished urban farm systems and to the identification of production constraints and possibilities for improvement. Much less, if any, attention is paid to the design and use of classifications of Urban Farming Systems that include other functions of Urban Agriculture that can be used to identify effective strategies. In addition to food production, can have other functions, such as enhancing social inclusion of marginalized categories of the population, providing recreational services, maintaining landscapes and biodiversity, and creating better living conditions in the cities. Urban farmers assume management of urban green and open spaces.

With its multiple functions, urban agriculture adapts or should adapt to the needs of the city and its stakeholders (**Berg van den and van Veenhuizen**, 2005). Understanding of this will facilitate the development of new systems, institutions and policies.

3.9.1 Urban Food Systems

Another focus that might be of help in characterizing urban production systems is food system analysis, which is the analysis of all processes, formal and informal, involved in fully answering nutritional needs of a population: growing, harvesting, processing, packaging, transporting, marketing, consuming and disposing/ recycling food, and also includes the inputs needed and outputs generated at each step (**Brown and Carter, 2003**). A food system operates within, and is influenced by, the urban social, economic and natural environment of a city. It can be analysed at the household, community and city level, and relates to the production, processing and marketing of food produced in and around the city, as well as food from other channels (rural areas, imports) and their linkages and relative contributions to the health and nutrition of the population and to the local economy and environment. In this way, strategies for the development of certain types of Urban Agriculture can focus on strengthening the urban food systems, complementing other components of the urban food system. Food system analysis is also particularly useful in including a wide range of stakeholders in the process of policy development.

3.9.2 Urban Development Policy Implications of Urban Agriculture

Urban Agriculture has multiple functions; according to stakeholders many perceive these functions differently in relation to the implications to sustainable city development. In keeping with this, a classification of Urban Agriculture, focusing on its main policy implications was developed. **Cabanners (2004) and Dubbeling (2004, 2006).** These are:

i) The social policy dimension which refers mainly to sustenance-oriented type of Urban Agriculture which form part poor. It focuses mainly on producing food and medical parts for home consumption, merely reducing

family expenses in food and medicine surpluses are sold to generate income. According to these authors, direct profitability is not the main motive of the practitioners, but the system has important social impacts such as social inclusion, poverty alleviation, community development and HIV-AIDS motivation.

ii) The economic policy dimension for which main motive of practitioners is to produce for the market. The small-scale, family based enterprises or large-scale farms produce a variety of crops, livestock and ornamentals. They are involved also in processing input delivery and marketing. These types of Urban Agriculture, have more economic impact and high profitability, but their extremities further city and urban population tend also to be higher (e.g. risk of contamination of soils and what caused by intensive use of agro-chemically, health risks derived from the use of contaminated water for irrigation and risks of Zoology).

iii) The ecological policy dimension for which the motive of practitioners is multifunctional firstly, to provide food and generate income, and in addition to play a role in environmental management and provide other services demanded by urban dwellers such as:

   a) Decentralized composting and re-use of organic wastes and waste water
   b) Urban greening and improvement of the urban climate (shade, oxygen reduction)
   c) Landscaping (parks, buffer zones, flood control etc)
   d) providing opportunities for leisure and recreational activities
   e) Water storage.

In order to allow such a combination of functions, the authors argued that multifunctional Urban Agriculture should adopt agro-ecological production methods linked with eco-sanitation and sustainable waste management, as well as with the planning and management of perks, nature and recreation areas. They further opined that a local government concerned about the poor urban living climate, growing waste management problems, or the negative environmental or

health effects of market-oriented Urban Agriculture, may concentrate on the environmental dimension of Urban Agriculture, or promote a shift from high input commercial agricultural production towards sustainable and multifunctional agriculture.

3.10 SALE OF URBAN AGRICULTURAL PRODUCTS

According to **Cruz and Medina (2003)**, the training and technical assistance provided to urban producers, together with the recovery of traditional agricultural experience led to a progressive increase in the yields of crops such as tubers, roots, grains and vegetables in Havana. At first it was directed to providing food support to social institutions (schools, day-care centres, homes for mothers, nursing homes, homes for the handicapped and others). However, as the surplus continued to increase, the first form of trading appeared. The sales outlets of the farmers include their work centres, production units, production areas, agricultural support stores and state-owned companies Cruz and Medina (2003).

According to **Akiyama, Bafes, Larson and Varangis** (2001), since 1980s many countries have redefined the role of government in their agricultural commodity markets; and most governments intervened in primary commodity markets (**Cruz and Medina**, 2003). This intervention was due because many governments in Asia and newly independent Sub-Saharan Africa became convinced that control of the food crop sector was necessary in order to maintain food security and sustainable livelihood **(Cruz and Medina, 2003**; **Akiyama, Bafes, Larson and Varangis, 2001**). The forgoing suggests that government intervention particularly in the processing and storage of urban food crop through marketing boards, of which production is necessary.

Not all economists however agreed with the prevailing views of commodity markets. **Johnson** (1947) argued that agricultural sectors were highly adaptive and required few interventions. **Friedman** (1954) disputed the benefits of managing commodity income variability. Early on, in the context of West Africa, these authors challenged the notion that output markets were inefficient and argued that marketing boards were largely a mechanism for exploiting small farmers. They

revealed the political and political and social roots and consequences of marketing systems in many countries in Sub-Saharan Africa. **Johnson and Mellor** (1961; quoted in **Johnson, 1947**) were among the first economists to attack the pro-urban policies and subsequent neglect of agriculture prevalent in most developing counties, arguing that development in most poor countries depended largely on the agricultural sector. **Schultz** (1964); argued that agricultural households in developing countries, while poor, were efficient and responded to economic incentives. **World Bank** (1995) gave these arguments an institutional voice, concluding that policy interventions slow down Welfare losses were therefore attributable to agricultural policy interventions in both industrial and developing countries. **Krueger, Schiff, and Valdes (1992; quoted in Cruz and Medina, 2003**) also confirmed the distortions introduced through sector-specific and macroeconomic policies affecting the agricultural sector in 18 developing countries.

3.11 URBAN AGRICULTURE'S BENEFITS

The importance of urban agriculture for many urban inhabitants in African cities and towns has been noted by many authors despite its relatively low level of development (**Sachs and Silk, 1987; Deelstra, 1987**). A major advantage is in its potential to improve the socio-economic situation of the people, particularly the poor (**Sachs and Silk, 1987**). This is reflected in the opportunity provided to raise some of their own food, improve nutrition, stabilize residence and morale, as well as increased security enabling them to integrate themselves more fully with the city (**Sachs and Silk, 1987; Deelstra, 1987; FAO, 2001**). This was the case in Zaire, where **Streiffler** (1987) observed that men adapted all too quickly to city ways when it became evident that urban land could be used for intensive production of lucrative vegetables as cash crops.

Urban agriculture can provide some residents with up to 40 per cent of their daily needed calories; 30 per cent protein including most of the vitamins and minerals crucial for health **(Soemarwoto, 1981; Yeung, 1987; Thama, 1987** cited in **Carter, 1994**). UNDP estimates that as many as 800 million urban farmers produce about 15% of the worldôs food (**Mougeot, 2006**).

According to FAO (2001), urban agriculture employs 800 million urban residents worldwide, thus contributing to poverty alleviation. Urban agriculture as a source of employment, means of improving food security and earning extra income is not only attractive to women who need to combine productive and domestic activities satisfactorily **(Mougeot, 2006**); but also lower and mid-level government officials, school teachers and the richer people who are seeking good investment for their capital (**Streiffeler, 2000; Swindell in Binns *et al.*, 1998; Pernia, 1983; Jackson, 1979; Ganapathy, 1983; Addisons, 2000; Song and Lee, 1984; Binns and Lynch, 1998**). The production of food in urban areas reduces the need for environmentally and economically expensive transportation of perishable foods, as well as eliminating wasteful processing, packaging, and storage requirement of commercial foodstuff (**Sachs and Silk, 1990**). This means savings on roadways, trucks, fuels, trains, boats and warehouses as well as storage and refrigeration installation (**Sachs and Silk, 1987**)

Urban agriculture can be of great importance in environmental health maintenance. City farmers play major roles in waste recycling; creating a closed system in which organic wastes from food, manufacturing, human, and sewage are reused in crop cultivation, animal rearing and aquaculture, thus reducing environmental pollution **(Pernia, 1983; Wade, 1987**). The conversion of vacant plots into productive green space can help to moderate the microclimate, reduce noise and dust levels in addition to improving atmospheric oxygen, air circulation and humidity levels in the city (**Sachs and Silk, 1990; 1987; FAO, 2001**).

3.12 CONSTRAINTS OF URBAN AGRICULTURE

A significant proportion of the urban agriculturists, particularly crop farmers, regarded inadequate access to land and competition from non-agricultural land uses, lack of agricultural credits and theft of produces as the main threats to urban agriculture (**Gbadegesin and Olawoye, 2002; FAO, 2001**). According to **Drescher** (1994), steady access to land at affordable prices is almost unknown to urban farmers. Both men and women are under constant threats of losing their plots and being forced out of business. **Yue-man** (2004) and **Wade** (1984) stated that as an inevitable result of urban growth and sprawl, urban-fringe farmland has

been disappearing fast. In Taipei, urban farmland once provided 70 per cent of the vegetables consumed by the cityôs population. By 1974 this proportion had declined to 30 per cent because of reduction of agricultural holdings in the face of urban expansion Wade (1984). Similarly, in South Korea a total of 1,016 square km of agricultural land has been converted to non-agricultural uses and a similar amount will be lost to urban expansion according to the predications of the South Korean Second National Comprehensive Development Plan (**Song and Lee, 1984**).

According to **Yue-man** (2004), the loss of fertile farmland is accompanied by considerable vacant or under-used land in the urban area that has become inaccessible for various reasons, including speculation. **Ganapathy** (1983) states that to some planners and administrators, agriculture in an urban setting are undesirable and reveal backwardness. As a result, investment in urban agriculture has been low, and in fact, never figures in the master plans of Indian cities. **Obosu-Mensah** (1999) identified harassment and crop destruction by authorities, loss through theft and predation as drawbacks to urban agriculture development. **Di-castri** (1981) identified lack of overall policies and goals, information systems to collect and process information, managerial skills, multi-level coordination, understanding of the aspirations of local people, and democratic participation. Other problems relate to sectoral administrative structures and funding patterns not conducive to urban agriculture (**FAO, 2001**). Furthermore, scientists, planners, and managers are isolated from each other and cannot devote their collective energies to improving food production in the cities (**Ganapathy, 1983; Wade, 1981**).

Richards (1985) identified the slimness of ñsurvival marginsò of urban farmers as a serious constraint which would not allow them to experiment with new crops or techniques. While **Sachs and Silk**, (1990) identified lack of tools, particularly those needed to work soils hardened by draught and erosion.

3.13 THE GAP IN LITERATURE TO BE FILLED

The growing recognition of the importance of urban agriculture in the area of food supply and nutrition improvement, poverty reduction, income generation,

employment, and environmental management has been a common point of agreement by most authors. The need for integration and incorporation of urban agriculture into city planning process which highlight the importance of urban agriculture as a sustainable livelihood in the city also featured prominently in the literature. A very important aspect of the subject which has not been adequately addressed is how much contribution urban agriculture makes to the livelihoods of the city residents. The current study attempts to provide an answer to this question in the study area in order to fill this gap in literature. Consequently, this study assesses the amount of income spent on food produced from the city farms (vegetables, seasonal crops, poultry, fish, animal husbandry and ornamental/flowers) and how much income is generated by the inhabitants through these agricultural activities. Furthermore it determines the proportion of the income from urban agricultural activities spent on farm inputs.

CHAPTER FOUR

THE STUDY AREA

The study area is Enugu metropolis, the capital of Enugu State. This chapter therefore profiles the city using the following indicators - location, historical development, climate and vegetation, population, culture, economic and infrastructural development and the state of urban agriculture in the city.

4.1 GEOGRAPHICAL LOCATION

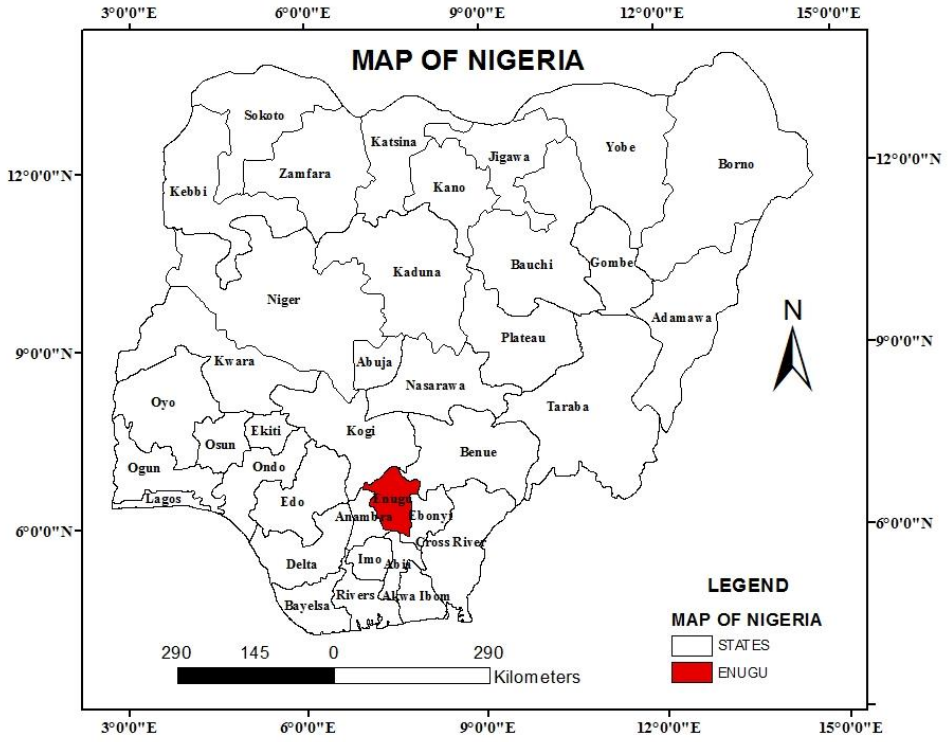


Fig: 4.1: Geographical Location of Enugu State

Enugu is an important, industrial and commercial centre in the eastern part of Southern Nigeria. It is located between latitudes 6027ôN and 7028ôN and longitude 7030ôE and 8019ôE (**Enugu Master Plan, 1978)**. Enugu has served at various times as the headquarters of the Eastern Provinces (1939), capital of the Eastern Region (1951), the East Central State (1967), Anambra State (1976) and Enugu

State (1991). It should also be mentioned that in 1967 a series of political crisis led to secession of the Eastern Region from the rest of Nigeria and the declaration of the independent state of Biafra, with Enugu as capital. The Civil war broke out and lasted for nearly three years, at the end of which the Biafran resistance was crushed and Nigeria remained one **(Ikejiofor, 2004).**

Figure 4.1 shows the location of Enugu State on map of Nigeria while figure 4.2 shows the location of Enugu Urban Area within Enugu State. The spatial growth increased from less than $5km^2$ in 1924 to about $72km^2$ in 2005 due to urbanization. Enugu is known for its coal mine. Coal seams in the Enugu coal district measures between 1 and 2 meters (3.3 and 6.6ft) in thickness and the reserved have been estimated to be more than 300 million tones but as of 2005, there are no significant coal mining activities left in the city.

Fig. 4.2: Map of Enugu State Showing the Study Area.

Source: *Enugu Development Authority. 2010*

4.2 ORIGIN AND HISTORICAL DEVELOPMENT

According to **Isichei (1976),** Enugu, which means literally means hilltop, derives its name from its position among the Udi hills at an altitude of about 223 meters above the mean sea level. In fact, the origin of Enugu dates back to the discovery of a rich seam of coal in the area in 1999 by a geological exploration team led by a British mining Engineer, Mr. **Kitson (ENSG, 1991).** In 1914 another British mining Engineer, **Mr. W.J. Leck** arrived in hilltop while **Mr. Alfred's** group settled in nearby camp (the present ñUgwu Alfredò). The whites later shifted to what later became European quarters (now called Government Reservation Area (GRA) (**ESG, 1991).** In his own account **Isichei (1976)** opined that the two communities of Ngwo and Ogui Nike are the original owners of Enugu. The then colonial government got the people of Ngwo and Ogui to cede ten square miles of their land freely and voluntarily to enable the administration set up a colliery and railway station (**Njoku, 2001).**

In 1915, the first coal mine was opened at Udi siding. In 1917 the second coal mine was opened in Iva-valley (Iva mine). In that same year Enugu attained a second-class township status under Lord Lugardôs Township Ordinance with the name ñEnugu Ngwoò. In 1923, Ngwo was dropped from the name to distinguish with the township from the Ngwo village. Meanwhile, construction work commenced in 1914 in the Enugu-Port-Harcourt rail line with the discovery of deep-sea harbor in Port Harcourt. It was not until 1916 that the first freight of coal was transported by the rail Port-Harcourt. As the coal mine attracted more workers another settlement was established for indigenous workers at coal camp otherwise known as Ogbete.

Ikejiofor (2004) went further to state that bereft of mechanical devices; the industry relied mostly on manual labour in its early days. Most of the workers were recruited form towns, villages, clans and hamlets around Enugu. Thus, the muscles of the native people provided the force as well as the paid labour for the establishment and consolidation of colonial infrastructure and industries **(Nnamani, 2002).** Between 1916 and 1920 the city developed as a by-product of coal mining activities, hence the appellation ñcoal cityò, which it has retained till

today **(Ikejiofor, 2004)** By 1923, China town developed as a special residential area for railway workers and European quarters (today called GRA) was carved out for the whites. Later other residential areas of Asata, Ogui New Layout, Uwani, Achara Layout, New Haven, Abakpa, Emene, Trans-Ekulu, Independence Layout, Idaw River, etc developed as more and more people migrated into Enugu in search of greener pastures **(Enechukwu, 1983)**.

Mining activities brought about the development of commercial activities to service the growing population. These commercial activities are going on in the parts of Coal Camp (metal works), Main Market, Aria Market, Kenyatta Market, Timber Shed and other neighbourhood markets in the town. Again along some major streets such as Okpara Avenue, Ogui Road, Chime Avenue, Zik Avenue, Agbani Road, Presidential road, Obiagu Road, Nike Road, Abakaliki Road, (and other major streets in Enugu) foreign and indigenous companies, banks, business units, etc are booming and growing with commercial activities **(Aniagolu, 1996).**

4.3 CLIMATE AND VEGETATION

The mean annual temperature of Enugu is about 30.80C and the variation with season is normally less than 10^{o}C. The total annual rainfall within Enugu is about 2,200mm with a monthly rainfall ranging from 15mm in dry season, to about 380mm during the wet season **(Irem, 1994)**. Normally there is a long wet season from April to October. This long wet season interrupted by a short dry season in August (called the ñAugust Breakò) is followed by a long dry season in November to March. Enugu is covered by a secondary plant cover referred to as forest savanna mosaic, the primary forest cover having been drastically reduced as a result of urban development, logging, agriculture and other human activities. Vegetation cover of Enugu (Guinea Savanna) is a by-product of centuries of deforestation by man **(Nwafor, 2003, Iyi, 2003).**

The soil is well drained and is mostly hydromorphic **(Jackson**, 1977). Enugu urban is drained by two main rivers, the Ekulu and Nyaba Rivers. The escarpments are very much indented by deep river valleys and intense gully erosion at the headwaters of these rivers. The presence of these rivers allows for irrigation

farming of vegetables along the riverbanks during the dry season. The greening effect of this urban agriculture practice has been long standing. The floristic composition of Enugu urban is derived from four principal factors; it being a natural transition between the tropical grassland of Northern Nigeria and the lowland rainforest zone to the south; extensive cultivation in this reduced rainfall area; consistent and seasonal slash and burn which edge herbaceous species and the introduction of exotic vegetation on the densely settled areas (**Anyadike**, 2002).

4.4 URBAN AGRICULTURE IN ENUGU

There are two main types of urban cultivation in Enugu, enclosed cultivation and open-space cultivation. To understand enclosed cultivation one needs to be familiar with building patterns in Enugu. Normally, a building is constructed on a plot of land that is fenced or walled. People who cultivate in the enclosed areas around their residences are called enclosed cultivators. Since it is expensive to own houses in urban Nigeria (especially in state capitals like Enugu), only successful business people, high government officials, and the relatively wealthy can afford enclosed cultivation. Although some enclosed cultivation occurs in the centre of Enugu, most is done in the suburbs in the three local Government Areas.

The term open-space cultivation is used for any cultivation away from the individualôs residence. Cultivated land is not enclosed by any wall or fence. Open-space cultivators are usually of lower socio-economic status, i.e., unskilled workers and/or formally unemployed. Most open-space cultivators do not know the owners of the land they cultivate because they cultivate any land that is currently unused. Open-space cultivation occurs mostly around the flood plains of rivers as well as undeveloped land around Enugu. Enclosed and open-space farmers have different reasons for farming. Most enclosed cultivators get involved in urban agriculture to cultivate vegetables for home consumption, but for open-space cultivators, urban cultivation is a source of livelihood. While the enclosed cultivators largely consume their harvest, open-space cultivators sell most of theirs. Plate 1 shows a birds-eye view of Enugu. Its rich greenery cannot but be noticed as a characteristic of the city.

Plate 1: A Birds Eye View of Enugu Town Showing Its Greenery

In Enugu there are various farm types. These are vegetable farms (Plate 2), open space seasonal farms (Plate 3), and urban forest reserve in the heart of town and beautiful landscape terrains like that which exists at the University of Nigeria, Enugu Campus. (Plates 4 and 5)

Plate 2: Vegetable Growing on the Banks of River Ekulu in Enugu North LGA.

Furthermore, there exists Backyard gardening (plate 6), goat keeping (plate 7), poultry farms (Plates 8 and 9) and pig farms (Plate 10). Others are urban farms located at the frontage of houses (plate 11), fish farms (plate 12) and flori culture and hoticulture farms (plate 13).

Plate 3 Open Space Seasonal Farming in Asata, Enugu North LGA

***Plate 4: Urban Forest Reserve in Independence Layout, Enugu North* LGA**

Plate 5: Urban Landscaping- University of Nigeria, Enugu Campus

Plate 6: Back Yard Gardening- Enugu East LGA

Plate 7: Goat Keeping – Enugu South LGA

Plate 8: Commercial Poultry Farming –Enugu East LGA

Plate 9: Eggs Stacked for sale From an Urban Poultry Farm –Enugu East LGA

Plate 10: Pig Farm –Enugu East LGA

Plate 11: Urban Farm –Enugu East LGA

Plate 12: Urban Fish Farm- Enugu South LGA

Plate 13: Floriculture and Horticulture

Earlier studies on the practice of urban agriculture in Enugu identified the following constraints in the practice of urban agriculture; inadequate water supply, inadequate tools, and lack of capital, inadequate labour supply, pest incidence, and theft. Others were lack of information, no land, poor soil fertility harassment by government officials or others, and destruction of crops by stray animals.

4.5 POPULATION

The national population census of **1991** show that Enugu had a population of **465,072**. This was made up of **233,818** males and **231,254** females spread in about 28 residential settlements **(NPC, 1991).** Similarly, the National Population Census of **2006** shows that the population of Enugu State increased to **3,257,298** people, made up of **1,624,202** males and **1,633,096** females. Table 4.1 shows the population of Enugu State by Local Governments, according to the **1991** and **2006** census figures.

Table 4.1: Population Distribution of Enugu State by Local Government Area

S/No	L.G.A.	1991 Pop.	2006 Pop.	2010 Pop.
1.	Igbo-Eze North	139,290	259,431	285,142
2.	Igbo-Eze South	73,641	147,328	161,929
3.	Nsukka	220,411	309,633	340,319
4.	Uzo-Uwani	88,112	124,480	136,814
5.	Igbo-Etiti	138,401	209,248	229,985
6.	Udenu	80,235	178,466	196,153
7.	Isi-Uzo	117,090	148,415	162,794
8.	Enugu East	181,125	279,089	309,748
9.	Enugu North	146,339	244,852	269,118
10.	Enugu South	137,050	198,723	218,417
11.	Nkanu West	125,103	146,695	161,233
12.	Nkanu East	84,381	148,774	163,518
13.	Ezeagu	112,754	169,718	186,538
14.	Udi	160,500	234,002	257,193
15.	Oji River	86,381	126,587	139,132
16.	Awgu	136,625	198,134	217,770
17.	Aninri	95,620	133,723	146,976
Total		**2,125,148**	**3,257,298**	**3,579,779**

Source: *NPC 2009*

4.6 CULTURE

According to **Okafor and Emeka (1998)** culture is a term that instantly generates debate and emotion even a feeling of deep, personal crisis in many part of the world. It has been defined by many scholars in many ways. (**Malinwoski, 1931, Good, 1954, Cappalettio, 1971, FGN 1988, Hunter and Whitten, 1979).** However it is simpler and clearer to define customs, values, ideas and skills available in a society and by which society can be compared to or differentiated from other **(Okafor and Emeka, 1998).** The people of Enugu are ethnically Igbos and are widely known to be very resourceful and hardworking. They are friendly and sociable. They also show great respect to visitors and those who come to live and work among them. The vernacular spoken is ñIgboò, but English Language is widely used to the extent that people now find it difficult to separate the two. Hence you could often hear the expression that someone is speaking ñEngli-Igboò.

Perhaps that is what **Okin (1968)** in his search for a satisfactory new African environment described as the urbanized Africanôs middle-of-the-road attitude. Further, apart from common language (Igbo), which is spoken by all with minor variations from one zone to the other, the family is a common factor discernable in Enugu State generally. At the head of the family traditional political system is the ñOkpalaò or the head that holds the symbol of political and religious authority (the ñOfoò).

Finally, two important festivals are observed by not only the people of Enugu, but also by the people of Enugu State generally. They are the masquerade festival and the New Yam festivals. Conversely the Ibos are great lovers of music **(ENSG, 1991).**

4.7 ECONOMIC AND INFRASTRUCTURAL DEVELOPMENT

Infrastructural development in Enugu will be discussed under the headings of Road Network, Electricity supply, Water supply, Educational facilities, Health facilities, Communications and Industries.

(a) Road Network

Enugu has a good network of roads that are covered with asphalt. The dual carriage way could be seen in Enugu ï Onitsha expressway, Enugu-Port-Harcourt expressway, Okpara Avenue, Garden Avenue, Abakaliki Road, Ogui Road, Independence Avenue, Presidential Road, etc. The network of roads ensure a smooth flow of traffic in the town although hold-ups are experienced during the peak periods at major commercial areas such as Ogbete Area, Agbani Road, Chime Avenue, Artisan market and Nike Road, Abakpa, Link road and Fly-overs are strategically located to further ease the flow of traffic.

(b) Electricity Supply

Electricity is supplied by the Power Holding Company of Nigeria (PHCN) grid. Unfortunately, electricity supply from the PHCN grid is terribly epileptic. Hence, big commercial ventures, banks, hospitals, industries, and even individuals procure stand-by generators as an alternative to PHCN supply.

(c) Water Supply

Enugu State Water Corporation (ESWC) supplies pipe-borne water to the town. Currently only very few layouts like the GRA, New Haven, Ogui, Uwani and some parts of Asata are enjoying pipe borne water supply. This is because of the menace of erosion at the Ajali Water intake, which is a major source of water supply to the town. Alternatively, water is supplied to residents through shallow wells, a few natural springs and mobile water tankers. Recently, the Enugu State government has embarked on the Oji River Water Project with the intention of tapping natural water from deep wells in Oji River.

(d) Educational Facilities

Enugu enjoys a good number of educational institutions at the primary and secondary school levels and also at the tertiary level. These tertiary institutions ensure the training of intermediate and senior management manpower levels that are required for the development of not only the town but also the state and nation in general. Worthy of note are Enugu State University of Science and Technology (ESUT), University of Nigeria, Enugu Campus, Institute of Management and Technology (IMT), Enugu State College of Education (Technical), Institute of Ecumenical Education, Our Saviour Institute of Science, agriculture and Technology (OSISATECH), Caritas University, Renaissance University and School of Dental Technology. The town equally enjoys the services of a good number of libraries that sustain the educational activities.

(e) Health Facilities

In terms of health facilities, Enugu is not lacking University of Nigeria Teaching hospital (UNTH) and National Orthopedic Hospitals are Federal Government Hospitals. Recently, the Enugu State Government has upgraded the Park Lane General Hospital to the status of a Teaching Hospital for ESUT, Enugu. The town also enjoys the services of a Psychiatric Hospital in New Haven, Enugu. Apart from these, Enugu is blessed with a quite a good number of Cottage Hospitals, Health Centres and privately owned hospitals.

(f) Communication

Communication has been defined in many ways by **(Ndolo, 1996, Okenwa, 1998, Odogwu 1998 and Bittner, 1998).** However **Okuuna (2000)** defined communication as an interaction process through which persons or groups relate to each other and share information, experiences and culture. In terms of communication, Enugu is sometimes referred to as the ñEastern Gatewayò. This is explained under the following headings:

1) **Roads:** Enugu is linked to other important towns in the country by main trunk roads. For instance, Enugu is linked to Onitsha and Lagos (two very popular commercial/industrial towns) by a dual carriage expressway. Again Aba and Port-Harcourt (two very popular commercial/industrial towns) are linked by another dual carriage expressway. Enugu is equally linked to the northern part of the country by the Enugu-Makurdi expressway that needs to be dualised.

2) **Railway:** A line of Eastern Unit of the Nigeria Railway Corporation runs through Enugu to Port-Harcourt in the South and Markudi in the North.

3) **Airport:** Enugu has a local airport which is controlled by the Nigeria Airports Authority (NAA). The airport is serviced by Local airlines such as, Arik Airlines, Aero-Contractors, and Virgin Nigeria. Recently the Federal Government has awarded a contract to upgrade the airport to international standard.

4) **Telecommunication and Postal Services:** Telecommunication and postal faculties and services abound in Enugu. NIPOST is the major operator of postal/courier services although its services are complemented by some private operators such as DHL, UPS, Fed Ex, IFEX, etc. With the advent of GSM, service providers such as MTN, Globacom, Air Tel, VISAFONE, etc are now providing telecommunication services in Enugu. Internet facilities/services are also provided in Enugu. Thus, more Cyber-cafes are springing up in many parts of the towns with most service providers new provision personal moderns for homes; schools and offices

5) **Radio and Television Services:** Enugu enjoys the services of about three radio stations namely Radio Nigeria (which is a part of Federal Radio Corporation of

Nigeria) Enugu State Broadcasting service (196.1 FM) and Caritas FM Radio. Radio Nigeria apart from transmitting on the Medium and Short wave Bands also operates an FM studio called ñCoal City FMò (92.8 FM). There also exist in Enugu, a National Television Station, NTA, which provides programmes on channel 8. The state government has in addition established its own television station to add colour and variety to the existing NTA services. The state television is called ETV (Star Television), a division of Enugu State Broadcasting Services (ESBS). A local private cable television Multi TV also operates in Enugu. Finally a number of cable service providers are currently operating in Enugu. Worthy to mention are DSTV, AIT, HI TV, MY TV, MULTI TV, GO TV and CTL.

6) **Print Media*:*** Several print media circulate freely in Enugu.

7) **Industries:** Emene is the major industrial layout for manufacturing industries in Enugu. Other assembly and service industries could be seen in other layouts in the town. **Nwafor (2003)** enumerated some of the industries operating in Enugu as follows: Niger Steel Company, Emenite, Sunrise Floor Mill, Benmax Cable, ANAMCO, Innoson Industry and Niger Gas all in Emene. Others are Federal Science Equipment Manufacturing Centre - Akwuke, Project Development Institute-Emene/Iva Valley. Others are Nigeria Flour Mills and Nigeria Construction Furniture Company-Onitsha Road.

CHAPTER FIVE

METHODS AND PROCEDURES

This chapter deals with the types and sources of data, procedure for gathering data as well as the types of instruments used to gather data, including the statistical methods used in the analysis. It covers the methods and procedures under the following headings:

(a) Types and sources of data.

(b) Techniques of data collection.

(c) Data Analyses techniques.

5.1 TYPES AND SOURCES OF DATA

The study made use of the survey research method. **Nwabuokei (1986)**, states that survey research studies use large and small populations or universe by selecting and studying samples chosen from the population to discover the incidence, distribution and interrelationships of sociological and psychological variables. Furthermore, this design approach is adopted because the study is an effort geared towards a specific existing issue of sustainable livelihoods in Enugu Urban area of Enugu State, Nigeria. This research design adopted therefore satisfies the three major purpose of research design which is:

a) To provide the needed answers to research questions and problems;

b) To control variance in a manner that variables of interest under investigation consistently vary in accordance with the hypotheses, thereby ensuring that extraneous factors or variables are controlled; and

c) To ensure that the research procedures were systematically followed, objectively examined and appropriately displayed.

5.1.1 Secondary Data Source

The secondary data sources were published and unpublished articles, online research articles, library research (from journals, book, Newspapers and magazines). The data

of previous research findings and base line population data from the National population commission were also used.

5.1.2 Primary Data Source

The main primary source of data was from a structured questionnaire in accordance with the research questions and hypotheses, administered to respondents within the sample frame.

5.2 TECHNIQUES OF DATA COLLECTION

5.2.1 Research Instruments and Variables of Interest

5.2.1.1 Research Instruments

Instruments and techniques used in data collection were qualitative and quantitative techniques. The quantitative technique involved the use of household sample questionnaire as well as oral interview. A reconnaissance survey of the study area was also carried out, observing, asking questions and listening to responses about urban agriculture in the study area.

5.2.1.2 Variables of Interest

Osuala (2001), posits that a variable is a property that takes on different values or that which varies. The items on the questionnaire therefore reflected on the components of the variables of interest that had direct (independent) and indirect (dependent) relationships with the research questions. The variables of interest in the assessment of the contributions of urban agriculture to sustainable urban livelihood include the following:

a) Socio-economic and demographic characteristics

b) Farmland location, size, farm input and type of farm

c) Labour use, water source, frequency of crop cultivation

d) Contribution of urban agriculture to livelihood

e) Perception of urban agriculture

f) Impact on environment

g) Constraints

Table 5.1: Breakdown of the Variables of Interest for Questionnaire Focus

S/N	Variables of Interest	Components/Types
1.	Socio-economic and demographic characteristics	Household size, Gender, age, marital status and educational background.
2.	Farmland location, size and type	Land size, mixed farming, vegetable growing, horticulture, poultry, floriculture, aquaculture, piggery and goat keeping
3.	Labour use, water source frequency of crop cultivation	Labour (hires or not), farming experience.
4.	Contribution of urban agriculture	Nutrition, income (part or full)
5.	Perception/view of urban agriculture	Fresh food, income supplement, employment, traditional occupation, Hobby, recreation.
6.	Impact on Environment	Soil fertility maintenance, Erosion control, Aesthetics, Pollution, Solid waste reduction.
7.	Constraints	Access to land, water, finance.

Source: *Fieldwork, 2013*

Further breakdown of the variables into component moderating variables so as to make the needed access to data generation possible is shown on table 5.1.

5.2.2 Population, Sampling Technique and Sample Size

5.2.2.1 Population

The population of study comprised the 2011 projected population of 1,029,664 for Enugu urban **(NPC, 2009)**. This translates to about 183,437, households, given an assumption of an average of 6 persons per household. From this 45% (FAO, 2001 estimate of urban farmers in Nigerian cities) was estimated amounting to approximately 82,546 farming households.

5.2.2.2 Sampling Technique

The three local government areas of Enugu North, Enugu South and Enugu East, were purposively selected. This is because they all fall within the Enugu urban location. Purposive sampling technique was also used to elicit information on the perceived activities of the urban farmers. Farms in the following neighbourhoods were randomly selected.

i)	Enugu North L.G.A	a)	Iva valley/Ngwo
		b)	Asata River Layout/Artisan Quarters
ii)	Enugu East L.G.A	a)	Emene
		b)	Abakpa
		c)	Ugwuogo/Ibagwa Nike
iii)	Enugu South L.G.A	a)	Idaw River Layout
		b)	Mary Land.

The population was then stratified based on the prevalent farm types in the study area, viz: mixed farms, vegetable farms, fish farms, fruit farms, floriculture, poultry, pig farms and goat-keeping. Respondents were subsequently selected randomly.

5.2.2.3 Sample Size

Using the growth rate of 2.3 percent which is the acceptable rate for Nigeria **(NPC, 1991)** the population for the three Local Government Areas was projected from the 2006 census. Thus: $P_t = Po\ (1 + r\ \%)^t$

Where: P_t = Population projected to year t.

P_o = Population of the based year

r = Growth rate of population at (2.3%)

I = Mathematical constant

t = Year interval between base year P_o and projected P_t.

Table 5.2: Local Government Areas Showing 2011 Projected Population and Projected Households

S/N	Local Government Areas	Base Population	Projected Population 2011	No of Households 1991	Projected No of Households 2011	Projected No of Farming Households 2011
1.	Enugu North	137,050	219,509	24,390	36,585	16,463
2.	Enugu South	146,339	301,510	22,842	50252	22,613
3.	Enugu East	181,125	579,600	30,188	96,600	43,470
	Total	**464,514**	**1,029,664**	**77,419**	**183,437**	**82,546**

Source: *NPC, 2009 and Study Projections*

The sample populations therefore from the three Local Government Areas were as indicated on Table 5.2.

The specific sample for each local government area was determined using the Taro Yamani Formula $S= N/(1+N(e)^2)$

Where N = Population.

1 = Constant.

e = Allowable Error (set at 3% as the total population is very large).

Therefore the sample population is:

$$n = \frac{82,546}{1+82,546(0.03)^2}$$

$$= 1096.354$$

Adding an attrition rate of 10%, to accommodate failed responses, the sample size is:

$$n = 1096.354 + 109.635$$

$$= 1205.989$$

Therefore, the study sample size is 1206.

The sample sizes for the individual local government areas are determined, using the Bowleysô proportionate formula:

$$nh = \frac{nNh}{N}$$

Where nh = individual/group sample size

Nh = individual/group population size

n = sample size

N = population size

Sample Size for Enugu North LGA

$$nh = \frac{1206 \times 16462}{82546}$$

$$= 241$$

Sample Size for Enugu South LGA

$$nh = \frac{1206 \times 22610}{82546}$$

$$= 330$$

Sample Size for Enugu East LGA

$$nh = \frac{1206 \times 43470}{82546}$$

$$= 635$$

Table 5.3: Local Government Areas Showing 2011 Projected Farming Households Population and Sample Size

S/N	Local Government Areas	Projected No of Farming Households 2011	Sample Size
1.	Enugu North	16,463	241
2.	Enugu South	22,613	330
3.	Enugu East	43,470	635
	Total	**82,546**	**1206**

Source: *Study Projections, 2013*

In the administration of the research instrument, the following was the actual number of questionnaires retrieved per selected study neighbourhood:

Enugu North	240	urban farmers
Enugu South	310	urban farmers
Enugu East	630	urban farmers
Total	**1180**	**urban farmers**

5.2.3 Validity of Measurement Instruments

The measurement instruments designed were assessed for three types of validity; face validity, content validity and construct validity. To take care of the face validity, the questionnaire was pre-tested in a pilot survey. Observations were made in the way respondents handled the questions on farm size and income generated from farms.

The construct and content validity was done to ensure that the series of questions asked in the various sections in the instrument would address the research questions raised for the study and that the theoretical foundations underlying the theories explain the phenomenon of contribution of farms to livelihoods. Some of

the questions that were not addressing specific research questions were also removed.

5.2.4 Reliability of Measurement Instrument

The reliability is the degree of consistency with which an instrument measures the attributes it is designed to measure and yields consistent results over time. Data collection bias was minimized as the researcher solely conducted interviews at the Ministry of Agriculture and the Enugu State Agricultural Development Project. Ten research assistants were trained to help administer the questionnaires. The reliability test was conducted through a pilot test in the 3 local government areas. The reliability was determined using a Test-Retest method to measure the consistency and stability of responses of the respondent in relation to the variables of interest. The data were analyzed to determine the reliability and internal consistency of the instrument.

5.2.5 Data Collection Procedure

Data were collected through self-administered questionnaires. The 10 research assistants trained by the researcher helped to administer the questionnaires to the respondents. During the training the researcher was able to estimate the length of time it took a respondent to self-administer one questionnaire. Thus, each research assistant was assigned 100 questionnaires to administer.

5.3 DATA ANALYSIS

The data collected underwent three management strategies, namely collation, primary and secondary processing and data analysis. The data from the various sources and instruments were collated and put in groups as they relate to the research questions, hypotheses and objectives. The data were further subjected to tabulations according to their frequency of occurrence. Proportion and percentages of the data were obtained as primary data transformations. Graphical presentations and representation of data (bar graphs and pie charts) were made. Photographs were also used to present certain features of the study area.

Inferential statistical analytical tools were applied to gain information about the population characteristics from the information generated from the sample size. To compute the mean from the generated responses the following formulas were applied **(Osuala, 2005)**:

(a) For grouped data:

$$\bar{x} = \frac{\Sigma x}{n} \quad \text{or} \quad \bar{x} = \frac{\Sigma fx}{\Sigma f}$$

Where

Σx = Sum of all the x variables

n = Number of occurrence

Σfx = Summation of the product of frequencies

Σf = Summation of the frequencies

For measures of dispersion, the standard deviation was used

(b) For Ungrouped data:

$$S^2 = \frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1}$$

Where

S^2 is variance of the group and

S is standard deviation

$$S = \sqrt{\frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1}}$$

(c) For grouped data:

$$S^2 = \frac{\Sigma fx^2 - \frac{(\Sigma fx)^2}{\Sigma f}}{\Sigma f - 1}$$

$$S = \sqrt{\frac{\Sigma fx^2 - \frac{(\Sigma fx)^2}{\Sigma f}}{\Sigma f - 1}}$$

Where

S = Sample standard deviation

$\bar{x}$ = Mean of x

x = x-variable

Ɛ = Summation

n = Sample size.

Three hypotheses were postulated and tested in the study. Hypotheses 1 and 2 were tested using Regression analysis. Regression measures the quantitative relationship between associated variables. The regression analysis provides the estimating equation that expresses the functional relationship between variables such that one can predict the variable constant given the values of the other variable. When a straight line is fitted in a set of data points, it would effectively describe the pattern. In the scatter plot, the independent variable is on the X-axis and the dependent variable on the Y-axis. The line in a two-variable space is defined by the equation: Y = a+bx. The Y variable can be expressed in terms of a constant and slope b (**Osuala,** 2005). In general, multiple regression would estimate a linear equation of the form; $Y = a + b_1 x_1 + b_2 x_2$ é é é é é $b_n x_n$. This line expresses the best prediction of the dependent variable Y given the independent variable X.

However, nature is rarely perfectly predictable. When the variability of the residual values around the regression line relative to the overall variability is small, the prediction from the regression equation is good. If there is no relationship between the X and Y variables, then the ratio of the residual variability of the Y variable to the original variance is equal to unity (1) and the coefficient of determination (R^2) would be zero (0). If X and Y are perfectly related and there is no residual variance and the ratio of variance would be zero, R^2 would be unity. In most cases the ratio and R^2 would fall between the extremes of 0.0-0.1. Regression analysis therefore discovers the nature of association between related variables.

Hypothesis 1 was used to test for significant relationship between the proportions of income from Urban Agriculture spent on farm inputs.

Hypothesis 2 was used to test for significant relationship between the income from urban agricultural activities by practitioners in Enugu Metropolis and their household expenditure Hypothesis 3 was tested using the One-Way analysis of variance (ANOVA). The ANOVA is a collection of statistical models used to analyze the differences between group means and their associated procedures such as variation among and between groups in which the observed variance in a particular variable is partitioned into components attributable to different sources of variation. In the simplest form ANOVA provides a statistical test of whether or not the means of several groups are all equal. ANOVA can be used in both parametric and non-parametric data. It calculates the Group means, Overall mean, Within Group variation and Between Group variation and finally produces the F-Statistic which is the ratio Between Group Variation to the Within Group Variation. In ANOVA one can manipulate the independent variables and measure the resulting change in the dependent variable. At 95 percent confidence interval a p-value of less than 0.05 is statistically significant. If the Between Group variation is significantly greater than the Within Group Variation, then it is likely that there is a statistically significant difference between the groups **(Osuala, 2005**).

Hypothesis 3 was elicited from the 4th research objective to determine the variation in the incomes from urban agricultural activities amongst the three Local Government Areas in Enugu Metropolis. The objective generated the research question; is there a variation in the incomes from urban agricultural activities amongst the three Local Government Areas in Enugu Metropolis?

CHAPTER SIX

RESULTS AND DISCUSSIONS OF FINDINGS

6.1 INTRODUCTION

This chapter deals with the presentation of data and analysis of findings, validation of hypotheses and discussion. The data were subjected to tabulations according to their frequency of occurrence. Proportion and percentages of the data were obtained as primary data transformations. Graphical presentations and representation of data (bar graphs and pie charts) were made. Non-graphical presentations in form of photographs were also made. Parametric tests and inferential statistics were used for analysis using a computer program; Statistical Package for Social Sciences (SPSS version 17). Both qualitative and quantitative responses were collected and analyzed to address the relationship of the data to the research questions as basis for testing the hypotheses.

6.2 RESTATEMENT OF RESEARCH OBJECTIVES

The following were the objectives of study:

a) To find out the major urban agricultural activities by type and location in Enugu.

b) To determine how much is spent on farm inputs by urban farmers in Enugu.

c) To evaluate the benefits of Urban Agricultural activities in Enugu in terms of income generation and poverty alleviation and as a means of sustainable livelihood.

d) To determine the variation in the income from urban agricultural activities amongst practitioners in the three Local Government Areas in Enugu Metropolis.

e) To assess the implications of urban agricultural activities for a sustainable urban development such that conflicts are reduced and synergies enhanced in Enugu.

Based on the above objectives of the study, the questionnaire captured information on demographic and socio-economic variables, Farmland location, size, farm input and type of farm, Labour use, water source, frequency of crop cultivation, Contribution of urban agriculture to livelihood, Perception of urban agriculture, Impact on environment and constraints.

6.2.1 Socio-Economic and Demographic Characteristics

Table 6.1: Number of Questionnaires Retrieved in Study Area

LGA		**Number**
Enugu North	Iva Valley	130
	Asata/Artisan	110
	Total	240
Enugu East	Emene	330
	Abakpa	118
	Ugwuogo/Ibagwa	182
	Total	630
Enugu South	Idaw River	200
	Maryland	110
	Total	310
	Total	**1180**

Source: *Fieldwork, 2013*

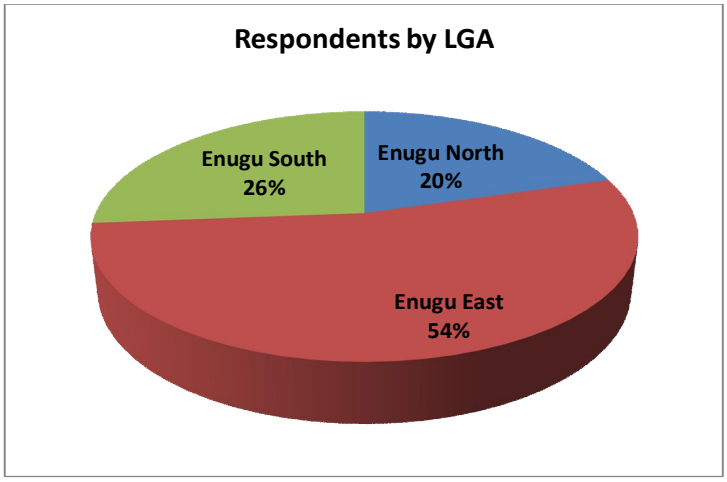


Fig. 6.1: Respondents by LGA

Source: *Table 6.1*

Table 6.1 and Fig.6.1 show the number of questionnaire retrieved from the study areas. A total of 240 urban farmers were sampled in Enugu North LGA while 630 urban farmers were sampled in Enugu East LGA. In Enugu South 310 urban farmers were sampled. A total of 1,180 (98%) out of 1,200 questionnaires were retrieved.

6.2.1.1 Gender, Marital Status, Age and Educational Level

Table 6.2: Distribution of Respondents by Gender, Marital Status, Age Group and Educational Level

	Variables	Frequency	Percentage (%)
Gender	Male	571	48.4
	Female	599	51.6
	Total	1180	100.0
Marital Status	Married	878	74.6
	Single	257	22.0
	Widow/widower	45	3.4
	Total	1180	100.0
Age Group	15-25	112	9.3
	26-35	282	23.8
	36-45	378	32.2
	46+	408	34.7
	Total	1180	100.0
Educational Level	Primary	368	31.3
	Secondary	484	41.0
	Tertiary	272	23.0
	Informal Education	56	4.7
	Total	1180	100.0

Source: *Fieldwork, 2013*

Table 6.2 shows that 48.4 percent of the respondents were males while 51.6 percent were females. Furthermore the table showed that 74.6 percent were married, 22.0 percent were single and 4.4 percent widowed. The age group of 46 years and above constituting 34.7 percent dominated the distribution of respondents followed by the 36-45yearolds accounting for 32.2 percent while 15-25 year age range was the least with 9.3 percent. With respect to the respondentsô educational level, the table showed that urban farmers with secondary level education account for 40.7 percent of respondents followed by those with primary level education being 31.4 percent. Those with tertiary education were 22.9 percent; and those with informal education were 5.1 percent.

The difference in the gender composition of the respondents suggests that more women (51.6%) in the study area engage in urban agriculture than the men (48.4%). This could be attributed to the fact that women are more directly responsible for the care of the familyôs nutrition and therefore require backyard gardens for the provision of vegetables and so on.

In terms of marital status, the high percentage of 74.6 percent for married persons engaging in urban agriculture reveals the need for supplementing income. Furthermore, the highest percentage of 34.7 percent in the 45years and above age group engaging in urban agriculture further substantiates the need for a more sustainable livelihood as this category of persons have children and other dependents to cater for. To achieve this, requires some form of ñlivelihood enhancing activityò which urban agriculture provides. Meanwhile, the other age groups could be attributed to unemployment or as a means of family support. The study further revealed that urban agriculture is practiced by all adult age groupings.

Regarding respondents education level, those with tertiary education are often formally employed with a fairly high income, thus requiring less supplementary income. While those with, secondary and primary educational levels might also be formally employed, but with lower incomes.

6.2.1.2 Occupation of Respondents

Table 6.3: Distribution of Respondents by Occupation

Category	Frequency	Percentage (%)
Public Sector	222	18.6
Organized Private Sector	146	11.9
Self employed	744	63.6
Others	68	5.9
Total	1180	100.0

Source: *Fieldwork, 2013*

Table 6.3 shows the distribution of respondents by occupation. The public sector employed 18.6 percent while the private sector accounted for 11.9 percent. Those that were self employed were 63.6 percent of the population and 5.9 percent of respondents were into other non specific occupations.

6.2.3 Occupation, Income and Household Size

There is now clear evidence that agriculture is no longer the single activity of families, nor even in many cases, the main activity (**Ellis, 2000; Bebbington, 1999**). In peri-urban and urban areas, the diversity of livelihoods is in evidence. Keith Hart, a British anthropologist who coined the term ñinformal sectorò to describe the employment situation in African cities, provided the following description from 1960s Accra: *Mr. "A. D. worked as a street-cleaner ... as an afternoon gardener ... and as a night watchman ... In addition to this annual income of approximately £320, he grew vegetables on his own plot of land which brought in another £100 or so."* (**Hart, 1973**) This person had been 20 years in Accra. Showing such behaviour is not restricted to short-term migrants. In fact, it is a way of life for millions of urban Africans. Hart points out the rarity of a single income stream for low-income urban families.

6.2.3.1 Income Level

Table 6.4: Distribution of Respondents into Income Levels

Category	Frequency	Percentage (%)
5,000-15,000	320	27.1
15,001-30,000	286	24.6
30,001-45,000	204	16.9
45,001 and above	370	31.4
TOTAL	1180	100.0

Source: *Fieldwork, 2013*

Table 6.4 shows the income level of respondents. In Enugu metropolis, people with an income of ₦5,000-15,000 account for 27.1 percent, the income group of ₦15,001-30,000 account for 24.6 percent, income group of ₦30,001-45,000

account for 16.9 percent while those in the income group of ₦45,000 and above account for 31.4 percent of the population.

The findings that urban agriculture generally catered for only a small portion of household food and income needs no doubt emboldens critics of urban agriculture policy advocacy who hold that the real significance of urban agriculture is only speculative if not exaggerated, and that the practice is therefore not deserving of any special policy support (**Webb, 2011; Ellis and Sumberg, 1998**). However, for most of those who participate in urban agriculture, the benefits, limited as they may seem, are clearly demonstrable and greatly valued. Moreover, as long as economic hardships of urban residents persist ï characterized by falling incomes, declining purchasing power and rising food prices ï own food production will remain an important strategy of improving their household food situations, even if only marginally. As has come to be recognized, following **Sen, (1975)** availability of food in the market does not necessarily translate into food availability at the household level for those who lack financial resources to establish entitlement over the food.

Moreover, it is now widely recognized in livelihood studies that poverty and well-being are better understood not just from the point of view of economic and material concerns, but from the totality of poor peopleôs live experiences and livelihood goals ï including non-material and social concerns ï as expressed by the poor themselves (**Chambers, 1995; Scoones, 1998; Chambers and Conway, 1992**).

6.2.3.2 House Hold Size

Table 6.5: Distribution of Respondents into House Hold Size

House Hold Size	Frequency	Percentage (%)
1-2	28	2.5
3-5	752	63.6
6-8	356	29.7
9+	44	4.2
TOTAL	1180	100.0

Source: *Fieldwork, 2013*

Table 6.5 shows the house hold size of respondents in Enugu metropolis. From the study, 2.5 percent of respondents have a house hold size of between 1 and 2 persons, 63.6 percent of respondents have a house hold size of 3-5 persons, 29.7 percent of respondents have a house hold of 6-8 persons while 4.2 percent of respondents have a house hold size of 9+ persons.

Table 6.6: Distribution of Respondents by Farm Location, Farm Size and Rent Payment

Variables		**Frequency**	**Percentage**
Farm location	In the Compound	405	33.9
	On public land	257	22.0
	In the work place	84	6.8
	Undeveloped private land	434	37.3
	Total	1180	100.0
Farm Size	Above 465sq. m	263	22.0
	465sq. m	317	27.1
	232.5sq. m	376	32.2
	Any other	225	18.6
	Total	1180	100.0
Pay Rent	Yes	291	24.6
	No	889	75.4
	Total	1180	100.0

Source: *Fieldwork, 2013*

Table 6.6 shows the distribution of respondents by the farm location, size and type of farms, and if they pay rent for their farms. Thirty-three point nine percent of respondents have their farms located in their compounds, 22 percent farm on public land, and 6.8 percent farm in the work place while 37.3 percent of respondents farm on undeveloped private land. Twenty-two point two percent of respondents use above 465sq. meters (a standard plot) while 18.6 percent use any other size. On rent payment only 24.6 percent pay rent.

6.2.3.3 Major Urban Agriculture Activities by Type

Table 6.7: Major Urban Agriculture Activities by Type and Location in Enugu

Agric Activity	Enugu North	Enugu East	Enugu South	Total	
1. Mix Crop	76	258	122	456	38.6%
2. Vegetables	70	173	78	321	27.2%
3. Fruits	6	7	7	20	1.7%
4. Fish Farms	25	32	20	77	6.5%
5. Floriculture	6	8	5	19	1.6%
6. Poultry farms	35	87	47	169	14.3%
7. Pig Farms	13	44	22	79	6.6%
8. Goat Keeping	9	21	9	39	3.5%
9. TOTAL	**240**	**630**	**310**	**1180**	**100%**

Source: *Fieldwork, 2013*

The major urban agricultural activities were found to be mixed crop cultivation (38.6 percent), Vegetable farms (27.2 percent), and production of fruits (1.7 percent), Fish farms (6.5 percent), Floriculture (1.6 percent), Poultry production (14.3 percent), Pig farming (6.6 percent), and Goat keeping (3.5 percent). (Table 6.7).

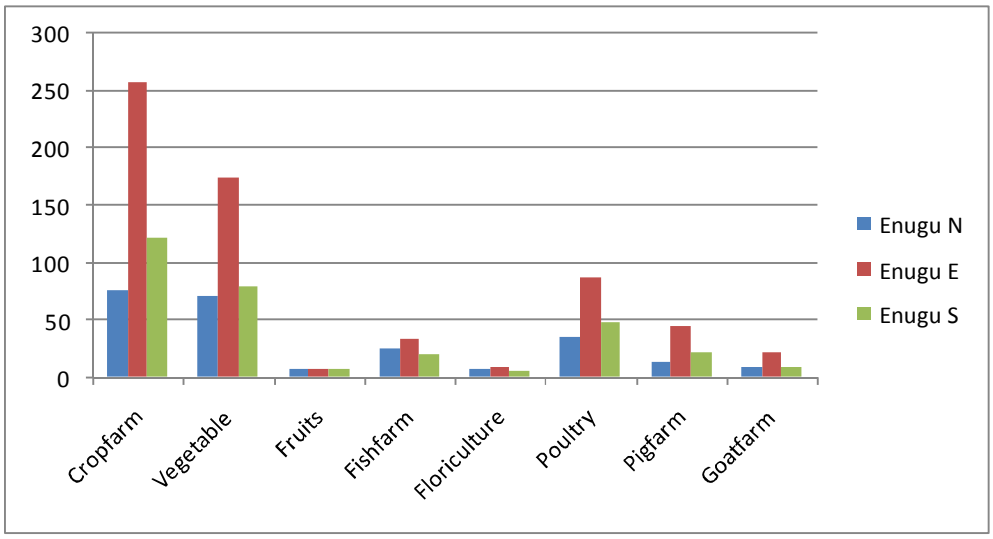


Fig. 6.2: Major Farming Activities in Enugu Metropolis

(Source: *Table 6.7)*

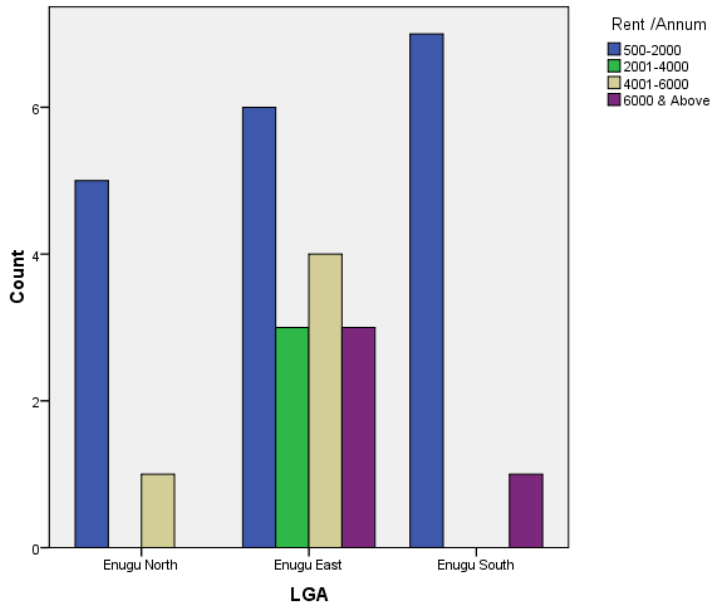


Fig.6.3: Farm Rent Payment in Enugu

Source: *Table 6.6*

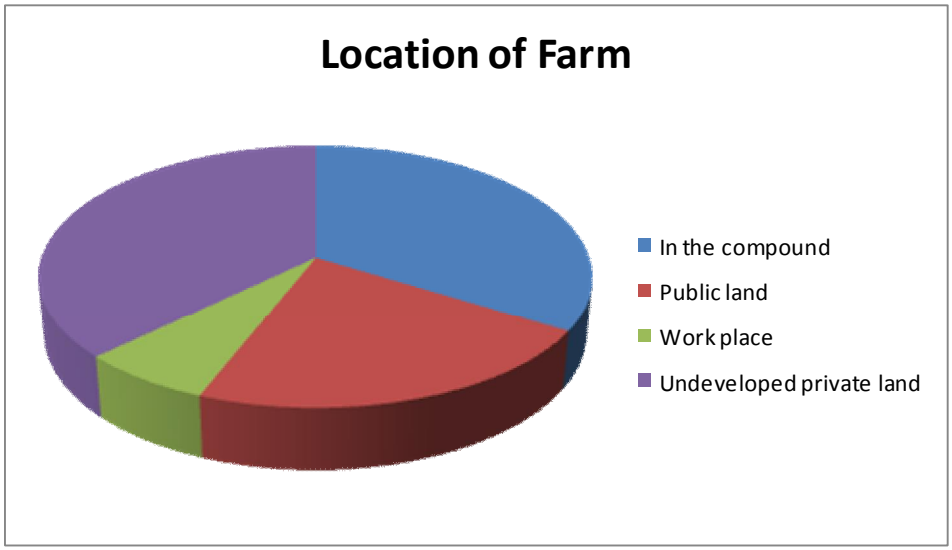


Fig. 6.4: Location of Farm

Source: *Table 6.6*

6.2.3.4 Labour Source and Frequency of Crop Cultivation

Table 6.8: Distribution of Respondents into their Source of Labour and Frequency of Crop Cultivation

Variable	Category	Frequency	Percentage (%)
Labour Source	Self effort	437	37.3
	Family Support	258	22.0
	Hired Labour	485	40.7
	Total	1180	100.0
Frequency of Cultivation	Rainy Season	379	32.2
	All Year round	682	57.6
	Others	124	10.2
	Total	1180	100.0

Source: *Fieldwork, 2013.*

Table 6.8 shows source of labour, and frequency of crop cultivation of respondents. The labour source of 37.3 percent of respondents is from self effort, 22 percent is from family support, 40.7 percent is from hired labour. Frequency of cultivation of crops as well as other farming activities varied from 57.6 percent for all year round to 32.2 percent for rainy season cultivation and 10.2 percent for others.

6.2.4 Respondents Benefits from Urban Agriculture

6.2.4.1 Distribution of Respondents into Food Expenditure Brackets Percentage Contribution of Farm to Income

Table 6.9: Distribution of Respondents into Food Expenditure Brackets and Percentage Contribution of Farm to income

Variable	Category	Frequency	Percentage (%)
Percentage of income spent on food	Less than 20%	302	25.4
	21-40%	608	51.7
	41-60%	222	18.6
	61% and above	48	4.3
	Total	1180	100.0
Percentage Contribution of farm produce to income	Less than 20%	178	15.2
	21-40%	418	35.6
	41-60%	418	35.6
	Greater than 61%	166	13.6
	Total	1180	100.0

Source: *Fieldwork, 2013*

Table 6.9 shows the estimated percentage of income spent on Food and percentage contribution of farm to income. Urban agriculture accounts for less than 20 percent of Income spent on food of 25.4 percent of respondents, it accounts for 21-40 percent of that of 51.7 percent of respondents while it accounts for 61 percent and above of 4.2 percent of respondents. Urban agriculture accounts for less than 20 percent of the income of 15.3 percent of respondents, 21-40 percent of the income of 35.6 percent of respondents, it accounts for 41-60 percent of the income of 35.6 percent of respondents and for 61 percent and above of the income of 13.6 percent.

6.2.4.2 Contribution of Farm to Livelihood

Table 6.10: Contribution of Farm to Livelihood

Category	Frequency	Percentage (%)
Enriches Nutrition	276	23.7
Provides proportion of income	622	52.6
Main Source of Income	282	23.7
Total	**1180**	**100.0**

Source: *Fieldwork, 2013*

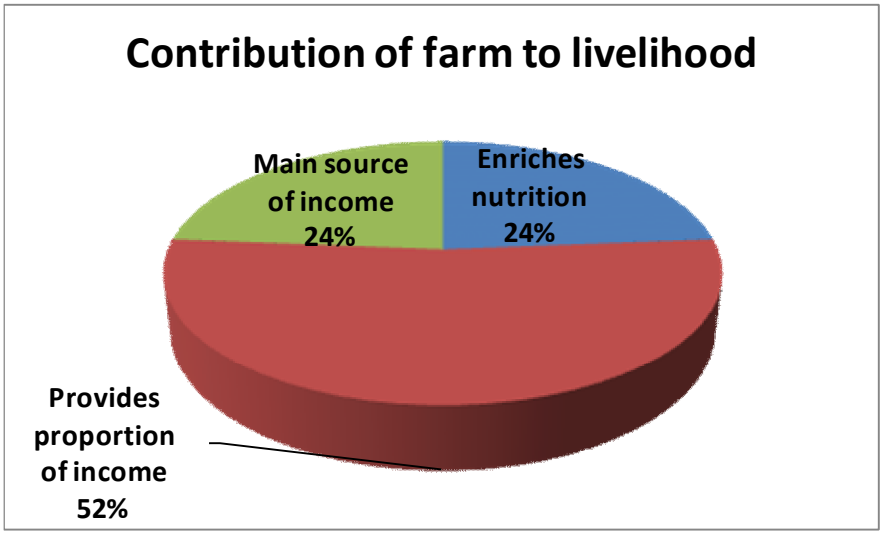


Fig 6.5: Contribution of Farm to Livelihood

Source: *Table 6.10*

Table 6.10 and Fig 6.5 show the contribution of urban agriculture to the livelihoods of urban farmers in Enugu metropolis. Urban agriculture enriches the nutrition of 23.7 percent of respondents, provides a proportion of income for 52.6 percent of

respondents and accounts for the main source of income of 23.7 percent of respondents.

Table 6.11: Contribution of Urban Agriculture to Household Expenditure of Selected Farms

S/N	Type	Income	Labour	Sch.Fees	Rent	HH Food	Savings
1	Mixfarm	45000	5000	7000	0	5000	5000
2	Pigfarm	150000	5000	5000	10000	40000	15000
3	Pigfarm	240000	15000	0	0	45000	15000
4	Pigfarm	40000	5000	10000	1000	15000	5000
5	Mixfarm	7500	1000	0	0	3500	2000
6	Vegetable	5000	0	0	0	1500	1500
7	Poultry	300000	20000	25000	20000	50000	50000
8	Mixfarm	15000	4000	0	2500	5000	5000
9	Fishfarm	75000	10000	18000	0	25000	32000
10	Vegetable	7500	500	1000	0	3000	2000
11	Vegetable	7500	1000	5500	0	4000	2000
12	Mixfarm	60000	1500	10500	0	15000	10000
13	Fruitfarm	55000	1500	12000	0	4500	10000
14	Goatfarm	45000	2000	10500	0	2500	10000
15	Poultry	350000	20000	10000	0	60000	80000
16	Floriculture	25000	3000	10000	0	3500	15000
17	Pigfarm	150000	5000	10000	2500	35000	30000
18	Mixfarm	25000	2000	0	0	5000	1500
19	Fishfarm	80000	3500	1500	2500	10000	5000
20	Goatfarm	15000	1500	2000	0	2000	2000
21	Mixfarm	10000	2000	0	1500	1500	1500
22	Poultry	35000	0	0	0	2500	6000
23	Mixfarm	20000	1500	0	0	3000	2000
24	Fruitfarm	10000	1500	1000	0	3000	3000
25	Vegetable	15000	1500	0	0	2500	2000
26	Poultry	300000	25000	4000	2500	60000	25000
27	Mixfarm	40000	10000	8000	0	5000	5000
28	Vegetable	15000	1500	1000	0	5000	5000
29	Goatfarm	25000	1000	1500	0	5000	2000
30	Vegetable	25000	2000	0	0	5000	2500
31	Mixfarm	50000	10000	10000	0	10000	5000
32	Goatfarm	150000	20000	10000	0	50000	25000
33	Poultry	250000	20000	0	5000	50000	25000
34	Poultry	400000	20000	0	10000	30000	50000

Source: *Fieldwork, 2013*

6.2.5 Access to Farm Input and Capital

6.2.5.1 Source of Water Supply for Farm

Forty point two percent of respondents source their water from government provided sources, 44.1% get their water from rainfall and 15.3% source their water from swampy land. Also 28% buy water while 8.5% use well water.

Table 6.12: Source of Water Supply for Farm

		Frequency	Percent
Water Supply	Government provided sources	46	4.2
	Rainfall	518	44.1
	Swampy land	183	15.3
	Buy water	331	28.0
	Well	102	8.5
	Total	**1180**	**100.0**

Source: *Fieldwork, 2013*

6.2.5.2 Assistance from Government if any

Table 6.13: Assistance from Government

	Frequency	Percent
Farm inputs	68	5.9
Provision of land	18	1.7
None	1094	92.4
Total	1180	100.0

Source: *Fieldwork, 2013*

Government assistance was gotten by Only 7.6 percent of respondents got government assistance in the area of subsidy on farm inputs and provision of land. 1.7 percent; A whopping 92.4 percent got no assistance at all (Table 6.13).

6.2.5.3 Membership of Farmers Association or Cooperative

Table 6.14: Farmers Association Membership

Belong	Frequency	Percent
Yes	75	5.9
No	1105	94.1
Total	1180	100.0

Source: *Fieldwork, 2013.*

Respondents were asked if they belonged to any Farmers Association or Cooperative. Only 5.9 percent replied in the affirmative while 94.1 percent do not belong to any (Table 6.14).

6.2.5.4 Benefits Derived as Member of a Farmers' Cooperative

Table 6.15: Benefits Derived as Member of Farmers Cooperative

	Frequency	Valid Percent
Not Applicable	1105	94.1
Access to bank loan	45	4.2
Subsidized farm input	13	0.8
None	17	0.8
Total	1180	100.0

Source: *Fieldwork, 2013.*

The benefits derived from being a member of a Farmersô Association ranged from access to bank loan, 4.2 percent to none all (0.8 percent) and receiving of subsidized farm inputs 0.8 percent. (Table 6.15) However 94.1 percent of urban farmers in Enugu do not belong to any cooperative at all.

6.2.5.5 Perception of Urban Agriculture in the Study Area

Table 6.16 Distribution of Respondents into how they Perceive Urban Farming

Perception	Frequency	Percent
A rural occupation	333	28.0
A poor man's job	177	15.3
Dirty job meant for illiterates	125	10.2
Source of income	545	46.6
Total	1180	100.0

Source: *Fieldwork, 2013*

Table 6.16 shows how the respondents regarded farming in the city. Twenty-eight percent regard it as a rural occupation, while a high 46.6 percent regarded it as a source of income and a low 10 percent saw it as a job for illiterates, and 15 percent as a poor manôs job.

Table 6.17: Respondents Perception of Urban Agriculture in the Study Area

VIEW ABOUT URBAN AGRIC.	ENUGU NORTH	ENUGU EAST	ENUGU SOUTH	TOTAL FROM LGAS
A Lucrative Job	70	191	161	422 (35.8%)
Crops Receive High Patronage	30	93	70	193 (16.4%)
An Employment Opportunity	121	346	30	497 (42.1%)
Others	19	10	39	68 (5.8%)
Total	240	630	310	1180 (100%)

Source: *Fieldwork, 2013*

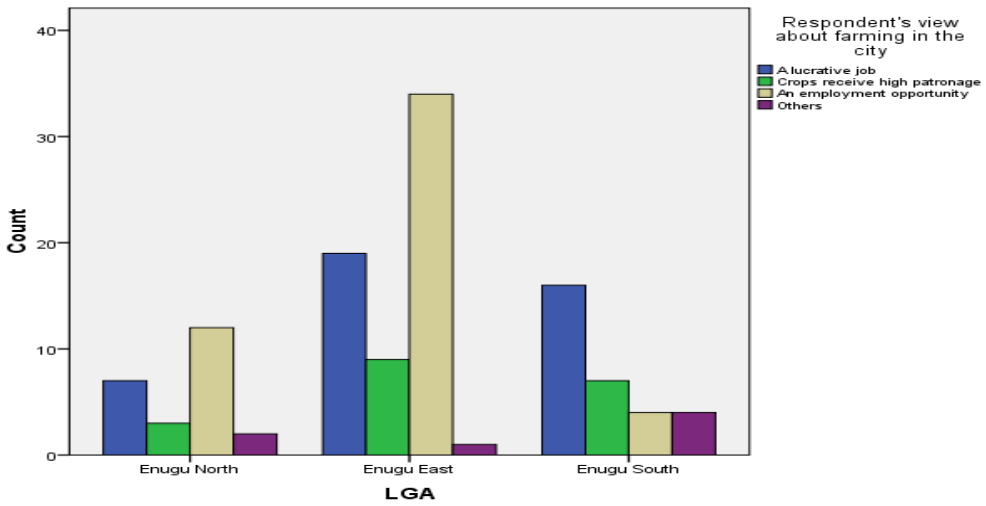


Fig 6.6: View About Urban Farming

Source: *Table 6.17*

Table 6.17 and Fig 6.6 shows respondentsô perception of urban agriculture; 35.8 percent of respondents consider urban agriculture a lucrative job, 16.4 percent say their crops receive high patronage, it provides employment for 42.1 percent of respondents while 5.8 percent could not specify their perception about urban agriculture.

6.2.6 Why Farm in the City?

Table 6.18: Why Farm in the City?

	Frequency	Percent
Need for fresh & nutritious food	178	15.3
Supplementary source of income	572	48.3
Lack of employment in formal sector	246	20.3
A traditional occupation	47	4.2
Hobby & Recreation	119	10.2
Others	18	1.7
Total	1180	100.0

Source: *Fieldwork, 2013.*

When asked why respondents farm in the city, 48.3 percent needed it as supplementary source of income, 20.3 percent due to lack of employment in the formal sector. Ten point two percent saw it as recreation while 4.2 percent said it was traditional to them. (Table 6.18)

6.2.7 How the Soil Fertility is Maintained

Table 6.19: How the Soil Fertility is Maintained

	Frequency	Percent
Not Applicable	663	-
Chemical fertilizer	288	55.7
Animal manure	159	30.3
Compost/ waste	70	14.0
Total	1180	100.0

Source: *Fieldwork, 2013*

How the fertility of the soil is maintained by farmers varied from the use of chemical fertilizers by all crop farmers (55.7 percent), use of animal manure (30.3 percent) to use of compost from waste (14 percent) (Table 6.19).

6.2.8 Problems Encountered by Urban Farmers in Enugu

Table 6.20: Major Problems Faced in Farming in Enugu

Problem Type	Frequency	Percent
Land tenure	155	12.7
Water supply	328	27.1
Finance	447	38.1
None	85	7.6
Others	175	14.4
Total	1180	100.0

Source: *Fieldwork, 2013.*

The problems encountered by farmers as itemized on Table 6.20 were finance (38.1 percent), water supply (27.1 percent), others like theft, access to inputs (14.4 percent), and Land tenure (12.7 percent).

6.2.9 Impact of Farming on the Environment in the Area

Table 6.21: Ways Farming Impacts on the Environment in the Area

	Frequency	Percent
Erosion control	297	25.4
Aesthetics	243	20.3
Ground or water surface pollution	162	13.6
Urban solid waste reduction	478	40.7
Total	**1180**	**100.0**

Source: *Fieldwork, 2013.*

The way farming impacts on the environment especially positively include erosion control (25.4 percent), urban waste reduction (40.7 percent), aesthetics (20.3 percent), and ground and surface water pollution (13.6 percent).

6.3 TEST OF HYPOTHESES

There were three hypotheses postulated and tested in the course of this study. The Sig or p-value measures the amount of statistical evidence that supports the alternative hypothesis. The smaller the p-value the more statistical evidence exists to support the alternative hypothesis. The rule of thumb in translating p-value is as follows if Alpha is between 0.01 and 0.10:

a) If the p-value is less than 0.01 we say that there is overwhelming evidence to infer that the alternative hypothesis is true or also say that the test is highly significant.

b) If the p-value lies between 0.01 and 0.05 there is strong evidence to infer that the alternative hypothesis is true or also say that the test is deemed to be significant.

c) If the p-value lies between 0.05 and 0.10 we infer that there is weak evidence to indicate that the alternative hypothesis is true.

d) If the p-value is above 0.10 we infer that there is no evidence to infer that the alternative hypothesis is true.

The level of significance is interpreted bearing the alpha level in mind which in this case is .05. The correlation coefficient r is the measure of the strength of the relationship between the criterion and predictor variables are usually cautiously interpreted. The coefficient of correlation has both lower and upper limit; -1 and +1. When the coefficient of correlation r equals -1, there is a negative linear relationship. When r equals +1, there is a perfect positive relationship. When r equals zero, there is no relationship. All other values are judged in relation to these three values. However the rule of thumb is as follows;

i.	Above 0.80	Very High Correlation
ii.	0.6 ï 0.8	High Correlation
iii.	0.4 ï 0.6	Moderate Correlation
iv.	0.2 ï 0.4	Low Correlation
v.	Below 0.2	Very Low Correlation

6.3.1 Hypothesis 1

There is no significant relationship between expenditure on farm inputs and incomes generated from urban agricultural activities in Enugu Metropolis.

Table 6.22: Mean Farm Input and Incomes

Farm type	Total Farm Input		Income	
	Mean	CV	Mean	CV
Mix farm	1740.833	0.671	30277.78	0.627
Vegetable	540.278	0.475	12500.00	0.593
Fruit farm	750.000	0.471	32500.00	0.979
Floriculture	500.000	15.233	25000.00	5.081
Poultry	44133.333	0.788	272500.00	0.466
Fish farm	2833.333	0.166	77500.00	0.046
Goat farm	1729.167	1.151	58750.00	1.057
Pig farm	8375.000	0.644	145000.00	0.565
Total	10001.566	2.145	89485.29	1.248

Source: *SPSS 17.0 Output File*

The mean farm input and income is presented in table 6.22.

Total expenditure on farm inputs was ₦10001.566 constituting 11.2 percent of the Total income of ₦89456.29 generated from urban agricultural activities. From the coefficients of variations, it was observed that there were very high variations from the mean. In the case of the total farm input, fish farm had the least standard deviation which is 16.6% of the sample mean (₦2,833.333) while floriculture had the highest standard deviation which is 1523.3% of the sample mean (₦500.00). Also, in the case of Income, Fish farm had the least standard deviation which is 4.6% of the sample mean (₦77,500.00) while Floriculture also had the highest standard deviation which is 508.1% of the sample mean (₦25,000.00). Thus these values show that individual farm inputs and income greatly varied from one another.

Table 6.23: Linear Regression of Farm Input against Income by Farm Types

Dependent Variable	R	r^2	Regression Sum of Squares	Residual Sum of Squares	F	T	p	a	β
Mix Farm	0.698	0.487	7.151E10	7.528E10	431.257	20.767	0.000	13288.411	3.629
Veg. Farm	0.807	0.651	9.554E9	5.126E9	594.613	24.835	0.000	-1810.889	10.925
Fruit Farm	0.882	0.778	7.874E9	2.251E9	62.969	7.935	0.000	-1172.772	29.409
Floriculture	0.767	0.588	2.936E7	2.059E7	24.243	4.924	0.000	11759.956	27.411
Poultry	0.846	0.716	1.630E12	6.453E11	421.861	20.539	0.000	129368.953	1.030
Fish Farm	0.963	0.927	4.403E8	3.470E7	938.942	30.642	0.000	68103.002	0.746
Goat Farm	0.997	0.933	1.064E11	7.376E8	5338.017	73.062	0.000	16987.859	9.550
Pig Farm	0.293	0.086	3.450E10	3.676E11	7.228	2.689	0.009	95616.352	3.786

Independent Variable: Farm Input
Source: *Appendix 4*

As presented in table 6.23 in the cases of Vegetable, Fruit, Floriculture, Poultry, Fish and Goat farm types, the regression sum of squares is greater than the residual sum of squares. This indicates that in the case of these farm types, more of the variations in this dependent variable (farm income) are explained by the model. The significance values of the F statistics for these farm types are less than 0.05, which means that the variation explained by the model is not due to chance. However, in the case of Mix and Pig farms, the regression sum of squares is less than the residual sum of squares, indicating that fewer of the variation in income is explained by the model but these variations are not due to chance as the significance values of the F statistics for these farm types are less than 0.05.

Table 6.24: Summary of Regression Analysis of Farm Input against Income

r	=	0.944
r^2	=	0.891
Regression Sum of Squares	=	4.813E10
Residual Sum of Squares	=	5.894E9
F-value	=	48.999 (sig. value p = 0.000)
t-value	=	7.000
Ŭ	=	39863.611
ɓ	=	5.530

(See appendix 3 for details of result)

The regression sum of squares (4.813E10) is greater than the residual sum of squares (5.894E9) (table 6.24). This indicates that more of the variations in the dependent variables are explained by the model, not due to chance ($P_F < 0.05$). The correlation coefficient (R) is 0.944 indicating that there exist a very strong relationship between the independent variables (farm input) and the dependent variable (income). r^2 (the coefficient of determination), shows that at least 89.1% of the variation in the dependent variable (income) is explained by the model. The coefficients of farm input (ɓ = 5.530, p= 0.000) indicates that there is a positive relationship between the dependent variable (income) and the independent variable (farm input). This result is significant as $p < 0.05$.

The regression coefficients (r) for Vegetable, Fruit, Floriculture, Poultry, Fish and Goat farm types are very high, with coefficients of at least 0.7. This indicates that there exist very strong relationships between the independent variable (income) and the dependent variable (farm input) for these farm types. R square, the coefficient of determination, shows that at least 58% of the variations in the dependent variable are explained by the model. However, in the case of Mix farm, the regression coefficient of 0.698 indicates an average relationship between farm input for mix farm and its corresponding income, with its coefficient of determination showing that 48.7% of the variation in the dependent variable is explained by the model.

In the case of the Pig Farm, the regression coefficient of 0.293 indicates a weak relationship between farm input for the pig farm and its corresponding income, with the coefficient of determination showing that 8.6% of the variations in the dependent variable are explained by the model.

The ɓ coefficients of mix farm (ɓ = 3.629, p=0.00), vegetable farm (ɓ = 10.925, p=0.00), fruit farm (ɓ = 29.409, p=0.00), floriculture farm (ɓ = 27.411, p=0.00), poultry farm (ɓ = 1.030, p=0.00), fish farm (ɓ = 0.746, p=0.00), goat farm (ɓ = 9.550, p=0.00), pig farm (ɓ = 3.786, p=0.009), and indicates that there is positive relationship between the dependent variable (income) of these farm types and the independent variable (farm input). These results are significant as their respective p-values are less than 0.05.

It is therefore established that a relationship exists between the dependent variable (farm income) and the independent variable (farm input). Therefore, **there is significant relationship between expenditure on farm inputs and incomes generated from urban agricultural activities in Enugu Metropolis.**

Resolution

Hence the Null hypothesis Ho which states that: there is no significant relationship between expenditure on farm inputs and incomes generated from urban agricultural activities in Enugu Metropolis is therefore rejected. Then, the alternative is accepted.

6.3.2 Hypothesis 2

The second hypothesis states that the incomes from urban agricultural activities by practitioners in Enugu Metropolis do not contribute significantly to their household expenditure.

Linear regression analysis was used to test if income from urban agricultural activities by practitioners in Enugu Metropolis contributes to their household expenditure.

Table 6.25: Mean Contribution by Farm Type (Naira) to Household Expenditure

Farm type		Income	Labour	School Fees	Rent	HH Food	Savings	HH Exp & Savings
Mix farm	Mean	30277.78	4111.11	8875.00	2000.00	5888.89	4111.11	18500.00
	Std. Dev	18975.496	3577.515	1652.019	707.107	4128.996	2747.474	12514.99
Vegetable	Mean	12500.00	1083.33	2500.00	0.00	3500.00	2500.00	8333.33
	Std. Dev	7416.198	735.980	2598.076	0.00	1414.214	1264.911	3829.708
Fruit farm	Mean	32500.00	1500.00	6500.00	0.00	3750.00	6500.00	18250.00
	Std. Dev	31819.805	.000	7778.175	0.00	1060.660	4949.747	13788.58
Floriculture	Mean	25000.00	3000.00	10000.00	0.00	3500.00	15000.00	31500.00
	Std. Dev	7616.552	735.750	1250000	0.00	3000.00	9500.00	12500.00
Poultry	Mean	272500.00	17500.00	13000.00	2625.00	42083.33	39333.33	107166.6
	Std. Dev	127033.460	8803.408	10816.654	1701.715	22271.993	26089.58	55581.17
Fish farm	Mean	77500.00	6750.00	9750.00	2500.00	17500.00	18500.00	53750.00
	Std. Dev	3535.534	4596.194	11667.262	0.00	10606.602	19091.88	44194.17
Goat farm	Mean	58750.00	6125.00	6000.00	0.00	14875.00	9750.00	36750.00
	Std. Dev	62098.712	9259.005	4915.960	0.00	23453.411	10843.58	46167.26
Pig farm	Mean	145000.00	7500.00	8333.33	1500.00	33750.00	16250.00	64875.00
	Std. Dev	81853.528	5000.000	2886.751	866.025	13149.778	10307.76	20397.61
Total	Mean	89485.29	6544.12	7886.36	2150.00	16676.47	13441.18	42397.06
	Std. Dev	111689.470	7520.042	5940.041	1203.005	19508.694	17660.41	45234.03

Source: *SPSS 17.0 Output File*

Table 6.25 presents the Household Expenditures (Labour, School Fees, Farm Rent, Household Food and Savings).

The average total income generated from agricultural activities by farms was ₦89,485.29 while the average overall expenditure was ₦42,397.06 comprising

46.9 percent of the income. Based on the data presented in table 6.25, the various expenditures are regressed against income. The results are presented in table 6.26.

Table 6.26: Regression of Income against Household Expenditures

Dependent Variable	R	r^2	Regression Sum of Squares	Residual Sum of Squares	F-value	t-value	p-value	α	B
Labour	0.966	0.933	1.793E8	1.278E7	84.152	9.173	0.000	1236.85	0.058
School Fees	0.677	0.458	3.175E7	3.758E7	5.069	2.251	0.065	6138.00	0.024
Rent	0.653	0.426	4.300E6	5.791E6	4.455	2.111	0.079	348.74	0.009
HH Food	0.960	0.921	1.439E9	1.237E8	69.779	8.353	0.000	2264.36	0.163
Savings	0.920	0.847	8.238E8	1.486E8	33.256	5.767	0.001	3897.60	0.123
HH Savings & Expenditure	0.970	0.941	6.863E9	4.318E8	95.360	9.765	0.000	13252.92	0.356

Independent Variable: Income

Source: *Appendix 2*

The summary regression analysis of income against house hold expenditures is presented in table 6.26 above. For the dependent variables namely; labour, household food, savings and household savings and expenditure, the regression sum of squares is greater than the residual sum of squares. This indicates that in the model has largely explained the variations in these dependent variables. The significance values of the F statistics for these variables are less than 0.05, which means that the variation explained by the model is not due to chance. However, in the case of school fees and rent, the regression sum of squares is less than the residual sum of squares, indicating that fewer of the variation in school fees and rent are explained by the model and are due to chance.

The correlation coefficients (r) for labour, household food, savings and household savings and expenditure are very high, with coefficients of at least 0.9. This indicates that there exists very strong relationship between the independent variable (income) and the dependent variables (labour, household food, savings and household savings and expenditure). The coefficient of determination (r^2) shows that at least 84 percent of the variations in these dependent variables are

explained by the model and therefore affected by income. However, is not the case with the dependent variables school fees and rent, where the R^2 is 45.8 and 42.6 respectively.

The coefficients of income against labour (ɓ = 0.058, p=0.000), household food (ɓ =0.163, p=0.000), savings (ɓ =0.123, p=0.001) and household savings and expenditures (ɓ = 0.356, p=0.000) indicates that there is a positive relationship between these dependent variables and the independent variable (income). These results are significant as their respective p-values are less than 0.05. However, this is not the case with school fees and rent as the coefficients of school fees (ɓ = 0.024, p=0.065) and rent (ɓ = 0.009, p=0.079) while indicating positive relationships between them and the independent variable (income) are not significant as their respective p-values are greater than 0.05.

Resolution

Hence the Null hypothesis Ho which states that: the incomes from urban agricultural activities by practitioners in Enugu Metropolis do not contribute significantly to their household expenditure is therefore rejected. Then, the alternative is accepted.

6.3.3 Hypothesis 3

Incomes generated from urban agricultural activities do not significantly vary among the three Local Government Areas of Enugu Metropolis.

Hypothesis 3 was tested using the One-Way analysis of variance (ANOVA). This was used to test the difference if any between the types of urban agricultural activities amongst the three Local Government Areas of Enugu Metropolis.

Table 6.27: Income from Farm types across the three Local Government Areas

Farm Type	AREA(Income and % in Area)			Total
	Enugu North	Enugu East	Enugu South	
Mix farm	1,665,593.2 (28.3)	2,154,237.3 (36.6)	2,070,169.5 (35.1)	5,890,000 (7.0)
Vegetable	175,770.5 (35.7)	165,537.2 (33.6)	151,692.3 (30.8)	493,000 (0.6)
Fruit farm	275,423.7 (42.4)	121,186.4 (18.6)	253,389.8 (39.0)	650,000 (0.8)
Floriculture	1,018,519.0 (46.3)	529,629 (24.1)	651,851.9 (29.6)	2,200,000 (2.6)
Poultry	4,633,658.0 (33.5)	4,379,759 (31.7)	4,824,083 (34.9)	13,837,500 (16.3)
Fish Farm	5,412,727 (47.3)	2,654,318 (23.2)	3,382,955 (29.5)	11,450,000 (13.5)
Goat Farm	17,548,400 (38.0)	15,239,400 (33.0)	13,392,200 (29.0)	46,180,000 (54.5)
Pig Farm	1,106,308 (27.7)	1,434,103 (35.9)	1,454,590 (36.4)	3,995,000 (4.7)
Total	**31,836,399 (37.6)**	**26,678,171 (31.5)**	**26,180,930 (30.9)**	**84,695,500 (100.0)**

Source: *Fieldwork, 2013*

Table 6.28: Analysis of Variance of Income from types of urban agricultural activities amongst the three Local Government Areas of Enugu Metropolis

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.717E12	2	4.358E12	.048	.953
Within Groups	2.190E15	24	9.123E13		
Total	2.198E15	26			

Source: *SPSS 17.0 Output File*

The Interpretation of ANOVA includes:

Sum of Squares (between groups) = 8.717E12

Sum of Squares (within groups) = 2.190E15

Mean Square (between groups) = 4.358E12

Mean Square (within groups) = 9.123E13

F-value = 0.048

p-value = 0.953

The summary of the analysis is as presented in Tables 6.28 and 6.29. The model summary shows that the mean squares were 4.358E12 (between groups) and 9.123E13 (within groups). The $F_{calculated}$ is 0.048 and is less than the $F_{critical\ (2,24)}$ of 3.40. This result is not significant as $p = 0.953 > 0.05$. This indicates that variation in the incomes generated from urban agricultural activities among the three Local Government Areas was not statistically significant.

Resolution

Hence Null hypothesis which states; Ho: Incomes generated from urban agricultural activities do not significantly vary among the three Local Government Areas of Enugu Metropolis is therefore accepted. Then, the alternative hypothesis is rejected. From this analysis a map has been generated showing the major farm types in the three local Government Areas of Enugu metropolis as shown in figure 6.1.

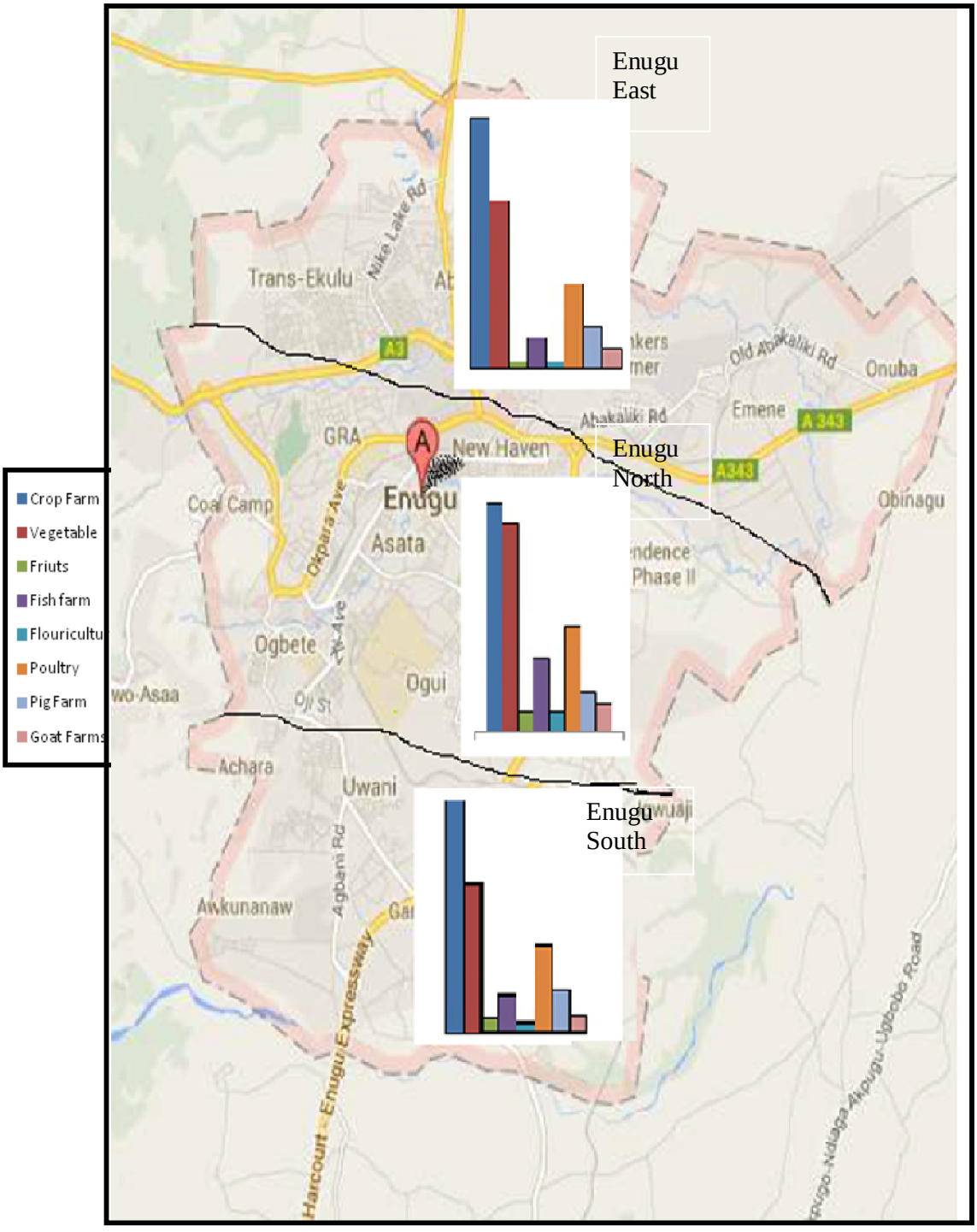


Fig. 6.7: Map of Enugu Metropolis Showing the 3 LGAs and Major Farm Types

6.4 DISCUSSION OF FINDINGS

Urban agriculture is of great benefit to the sustainable development of Enugu Urban. The study established the substantial contributions that urban agricultural activities have made. These and other findings are hereby discussed.

6.4.1 Contribution of Income to the Household

Null hypothesis H_0 I states that the incomes from urban agricultural activities by practitioners in Enugu Metropolis do not contribute significantly to their household expenditure.

The model summary of the correlation analysis showed a significant correlation between the overall income generated and overall total household expenditure. There was a very high relationship between income and labour (R= 0.966), income and household food (R = 0.960), income and savings (R = 0.920) and income and total household expenditure and savings (R= 0.970). The regression coefficient of income and school fees was R= 0.677 while income and rent was R= 0.653. (Table 6.26). The average total income generated from agricultural activities by farms was ₦89,485.29 while the average overall expenditure was ₦42,397.06 comprising 46.9 percent of the income, even though, the mean income generated from agricultural activities and the total household expenditures differ by type of farm, as shown in table 6.25. Thus, the incomes from urban agricultural activities by practitioners in Enugu Metropolis have significant effect on the household expenditure, except School fees and farm rent.

Because urban dwellers must buy most of their food, urban food security depends mostly on whether the household has adequate effective purchasing power given the prevailing prices and incomes **(Garrett, 2000**). According to Engel's law on the relationship between income and the amount allocated to food **(Duly, 2003**), as income increases, the proportion of spending devoted to food decreases. Contrary to this law, the analysis of household monthly income and food expenditure in the study area showed that food expenditure soared with an increase in household income. The study indicated that monthly household income had a significant effect on household food expenditure. In general, the findings from literature show

that the urban poor spend between 60-80 percent of their income on food **(Baudoin and Virik, 2001**). This is corroborated by this study.

6.4.2 Relationship between Expenditure on Farm Inputs and Income from Farms

Null hypothesis two H_0 II states; there is no significant relationship between expenditure on farm inputs and incomes generated from urban agricultural activities in Enugu Metropolis.

The average total expenditure on farm inputs was ₦10001.566, constituting 11.2 percent of the average total income of ₦89456.29 generated from urban agricultural activities in Enugu Metropolis (table 6.22). Although, the farm input: income ratio (percent) varied by farm type, there was a significant positive coefficient of R= 0.944 and significant relationship between the expenditure on farm inputs and income generated from urban agricultural activities in Enugu Metropolis.

Literature shows that urban agriculture contributes to household income and which includes fungible income through the sale of urban agricultural produce and savings by not purchasing foods they already produce (**Maxwell, 2000**). Economic benefits of urban agriculture include the total income earned from urban agricultural production and how the households used the income. All reported incomes are sums of monthly cash earned from farming activities minus the production costs. Despite the prohibitive legislation and insignificant number of farmers involved in livestock production, the study showed that poultry rearing is a major income source for farming households. Urban agriculture constitutes a form of semi-proletarianism, as the producers rely on both subsistence and cash income. Household monthly income and farm income was regressed to further explore the relationship between household incomes of urban farmers to give an indication of the contribution of urban agricultural income to total household income.

6.4.3 Comparison of the Incomes from Urban Agricultural Activities in the Three Local Government Areas

Null hypothesis three H_0 III states that; Incomes generated from urban agricultural activities do not significantly vary among the three Local Government Areas of Enugu Metropolis.

The income to the major urban agricultural activities were found to be mixed crop cultivation (₦5.89m), Vegetable farms (₦0.49m), and production of fruits (₦0.65m), Fish farms (₦11.45m), Floriculture (₦2.20m), Poultry production (₦13.84m), Pig farming (₦3.99m), and Goat keeping (₦46.18m). (Table 6.27).

The model summary of the analysis of variance ANOVA showed that the mean squares were 4.358E12 (between groups) and 9.123E13 (within groups). The F-value was 0.048 and was not significant with a p-value = 0.953 > 0.05 indicating that variation in income generated from urban agricultural activities between the 3 Local Government Areas was not statistically significant.

When respondents were asked why they had engaged in urban agriculture, the results show that the most important reason for practicing urban farming was as supplementary source of income, (48.3 percent) (Table 6.18). The other reasons cited by the respondents included farming to improve household food supply and nutrition (28.8%), lack of formal employment (20.3%) and to comply with cultural values (4.2 percent). The most commonly expressed primary motivation for urban agriculture was the need to avert hunger by producing staple crops, because family monthly incomes cannot keep pace with rising food prices. This is in agreement with the assertions of other studies (**Flynn, 2001**).

If people produce their own food, they can spend less income on food and the money earned from the sales of urban agricultural produce is normally used for other household food needs (**Mougeot, 2005**). Although, backyard gardens were regarded as the major type of enterprise in all the three areas, the study showed that the importance of backyard gardens decreased with an increase in household size. Larger families tend to be more engaged in open space and urban fringe farming. The popularity of backyard gardens could be attributed to the fact that gardening

can be done with virtually no economic resources, using locally available planting materials, green manures, and waste water. It is therefore a production system that can be afforded by the poor city dwellers. These are similar to the findings by **Schippers** (2006), and **Averbeke** (2007). The major crops grown throughout the study area are maize, sweet potatoes, yams, and leafy vegetables such as African spinach (***Amaranthus ssp***), Bitter Leaf (***Vernonia amygdalina***), Water Leaf (***Talinum trarigulare***), Fluted Pumpkin (***Telfaira occidentalis***), Kerenkere ***(Cochorus olitoris***) and Okra (***Hibiscus esculentus)***. The dietary importance of year-round availability of traditional leafy vegetables cannot be over emphasized. They are an important source of nutrients for urban consumers, providing for example 8 percent of protein and 40 percent of calcium intake. For the very poor, with low consumption of animal-source foods, they are even more important. About 27 percent of consumption of these vegetables by Enugu households comes from their own home gardens.

How people generally regard urban farming was elucidated from the respondents as well as their own perception of urban agriculture. In this regard twenty-eight percent saw it as a rural occupation, while 46.6 percent regarded it as a source of income and 10 percent saw it as a job for illiterates while 15 percent perceived it as a poor manôs job. Furthermore, respondentsô perception of urban agriculture was that 35.8 percent consider urban agriculture a lucrative job, 16.4 percent say their crops receive high patronage, and it provides employment for 42.1 percent of respondents while 5.8 percent could not specify their perception about urban agriculture. A significant number of respondents (66.1 percent) indicated that they farmed purposely for home consumption, while 33.9 percent farmed for both sale and consumption. A substantial number (50 percent) of the farming households used farm income to purchase food, 30 percent attested to using the money to supplement household income; 10 percent for school fees and another 10 percent for procuring medicine.

The cultivation of food crops on a large scale in the public and private open spaces of cities in the developing world is common but has not attracted the research attention it deserves. Therefore, the practice remained has unacknowledged by

policy-makers and city planners in general. Despite its enormous potential, a range of urban planning regulation constraints limits the contribution urban agriculture could make to urban food supply and food security. Integrating urban agriculture into the broad framework of urban planning will be crucial for its potential to be fully realized, which includes considering land rights and water access issues. Additionally, socio-cultural biases against urban agriculture, often influenced by perceptions of urban modernity, are persistent and become institutionalized through the policy and regulatory regimes **(Mireri *et al.* n.d.**). The failure to formally integrate urban agriculture into urban development policies often translates into coercive measures detrimental to its promotion, particularly by city officials. These conditions lead to a lack of clarity about the legality of urban agriculture and some ambiguity about its legitimacy as a permissible activity in areas where it is practiced. As **Bryld** (2003) observed, this status has left a governance vacuum that needs to be filled by policy formulation and institutionalized management through stakeholder participation and consensus building. Most urban activities are given legitimacy by various legislative instruments, such as by-laws and regulations, but the potential of urban agriculture is inhibited by an absence of legal provisions in most urban contexts. As **Cisse *et al.*** (2005) noted, urban agriculture is marginalised in the statutory and legal codes of most African countries. Even in cases where some provision exists for this activity, those provisions are inadequately implemented. For example, in Tanzania, where agriculture is categorized as an urban land use, little evidence suggests that the legislative provisions are being enforced (**Mireri *et al.* n.d.**). **Bryld** (2003), noted that where no laws directly prohibit urban agriculture, authorities use other laws, such as environmental and habitation laws, to criminalize urban farmers, citing the example of Harare. Thus, despite the enormous potential of urban agriculture, a range of urban planning regulation constraints limits the contribution urban agriculture could make to urban food supply and food security. Integrating urban agriculture into the broad framework of urban *planning* will be crucial for its potential to be fully realized, which includes considering land rights and water access issues.

6.4.4 Implications for Sustainable Development - Waste to Wealth in the Study Area

Urban Agricultural practices provide a classical example of ñWaste to Wealthò in the study area; a concept of sustainable environmental management. This is because the crop farmers heavily depended on organic fertilizer (poultry and pig manure). There is therefore a well established market system between poultry and pig keepers on one hand and crop and vegetable farmers as well as horticulturists on the other hand who utilize great quantities of organic manure in 50kg bags with incomes adding up to ₦30,000 a month on sale of manure. The use of poultry entrails in aquaculture was also established with generated income as high as ₦15,000 monthly. This symbiotic relationship has recently attracted the attention of the Municipal Environmental Sanitation Authority (ESWAMA) as a welcomed development.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 SUMMARY

Urbanization is increasing in most countries especially in Nigeria. In 2000 the United Nations reported that 38 percent of Africans lived in urban areas. This figure is expected to increase to 55percent by 2030. (**United Nations, 1995**) Urbanization presents both opportunities and challenges, but indications for Nigeria are that the challenges outweigh the opportunities. Unlike many other parts of the world, Nigeriaôs increasing urbanization has not been matched by infrastructural and economic development. As **Stren (1989)** noted, across much of the continent, basic urban services and infrastructureð housing, water supply, garbage removal, road repair, public transportation, health, and educational are inadequate and in a deteriorating state. Difficult economic conditions have shrunk job opportunities especially in urban areas. Consequently, many migrants to urban Nigeria face the reality of unemployment, inadequate accommodation, lack of good drinking water, etc. In the face of an increasing unemployment rate in the urban formal sector, many urban dwellers get involved in informal sector activities to sustain themselves. This is not to suggest that the formal sector is a more important job provider than the informal sector. Data from various sub-Saharan African countries show that the informal sector has always employed more people than the formal sector. However, most of the people who migrate from rural to urban areas hope to secure jobs in the formal/public sector.

This study is about urban agriculture as one of the most common informal sector activities chosen by urban dwellers in Enugu and its contribution to urban livelihoods, which is Urban agriculture is defined as the practice of farming within the boundaries of towns or cities. Farming in this sense involves crop cultivation, animal rearing and fish farming. In this definition of urban agriculture, the location of farms plays the most important role. A high percentage (over 50%) of Enugu residents are involved in urban agriculture. This is similar to the rates in other towns/cities in sub-Saharan Africa. According to the **UNDP** (1996), 80percent of

families in Libreville (Congo), 68 percent of urban dwellers in six Tanzanian cities, 45 percent in Lusaka (Zambia), 37 percent in Maputo (Mozambique), 36 percent in Ouagadougou (Burkina Faso), 35 percent in Yaoundé (Cameroon) are involved in urban agriculture. In their study of Kampala (Uganda), **Maxwell and Zziwa (1992)** estimated that 36 percent of the population was involved in urban agriculture. The involvement of so many people in urban agriculture indicates its centrality amongst informal sector activities. (**UNDP, 1996; Lee-Smith and Memon, 1994; Diallo, 1993; Mougeot, 1993; Maxwell and Zziwa, 1992; Freeman, 1991**). There are many reasons why people in urban areas go into agriculture, but declining purchasing power for many urban workers is the most important contributing factor. This study established that furthermore, urban agriculture is potentially lucrative. The risks of harassment and crop destruction by authorities, loss through theft and predation, and other drawbacks are outweighed by the perceived advantages and gains from urban cultivation. The rural background of many Enugu residents is another reason why many of them choose urban farming over other informal sector activities. Many of them are migrants from rural areas who already possess agricultural skills. Consequently, they choose the informal sector activity in which they have the most experience.

Purposive sampling technique was used to elicit information based on the perceived activities of Enugu urban farmers. The three local government areas of Enugu North, Enugu South and Enugu East, were also purposively selected. This is because they all fall within the Enugu urban location. Stratified sampling technique was adopted in the study. The stratification was based on the prevalent farm types in the study area, viz mixed farms, vegetable farms, fish farms, fruit farms, floriculture, poultry, pig farms and goat-keeping. The major urban agricultural activities are mixed crop cultivation (38.8 percent), Vegetable farming (27.2 percent), and production of fruits (1.7 percent), Fish farming (6.5 percent), Floriculture (1.6 percent), Poultry production (14.3 percent), Pig farming (6.6 percent), and Goat keeping (3.5 percent). The nature of urban agricultural activities in Enugu was evaluated and the benefit of the activities of urban agricultural practitioners in terms of income generation and poverty and alleviation for a sustainable livelihood of the urban household was established. From the

distribution of farm types, mixed crop farming is mostly practiced in Enugu metropolis, followed by Vegetable farming and then poultry farming. In this study, women (52 percent) were found to be more involved in urban agricultural activities than men, (48 percent) mostly because of their central and cultural role in household food delivery. The study showed that there were no gender disparities in terms of land ownership. There was no statistical difference in land sizes between men and women (p=0.809). Most cultivation in town heavily depends on organic fertilizer (poultry or pig manure). There is a well-established exchange system between poultry keepers and vegetable producers, but at times the demand is higher than the supply. The study explains why officials hold negative attitudes toward urban agriculture.

Three hypotheses were postulated and tested in the course of this study. Hypothesis 1 stated that- The incomes from urban agricultural activities by practitioners in Enugu Metropolis do not have significant effect on their household expenditure. The household Expenditures considered included labour, School Fees, Rent, Household food and Savings. The average total income generated from agricultural activities by farms surveyed was ₦89,485.29 while the average overall expenditure was ₦42,397.06 comprising 46.9 percent of the income. Regression analysis was used to test for significant relationship between the income from urban agricultural activities by practitioners in Enugu Metropolis and their household expenditure. There was a very high relationship between income and labour (r= 0.966), income and household food (r = 0.960), income and savings (r = 0.920) and income and total household expenditure and savings (r= 0.970). The regression coefficient between income and school fees was r= 0.677 while income and rent was r= 0.653.114 Hypothesis 2 stated that- The expenditure on farm inputs and income generated from urban agricultural activities has no significant relationship. The average total expenditure on farm inputs was ₦10001.566 constituting 11.2 percent of the average total income of ₦89456.29 generated from urban agricultural activities by farms sampled in Enugu Metropolis. Although the farm input: income ratio (percent) varied by farm type, there was a significant positive relationship p= 0.944 and significant relationship between the expenditure on farm inputs and income generated from urban agricultural activities in Enugu Metropolis.

Hypothesis 3 was tested using the One-Way analysis of variance (ANOVA). This was used to test the difference if any between the types of urban agricultural activities amongst the three Local Government Areas of Enugu Metropolis. The model summary shows that the mean squares were 4.358E12 (between groups) and 9.123E13 (within groups). The $F_{calculated}$ is 0.048 and is less than the $F_{critical\ (2,24)}$ of 3.40. This result is not significant as $p = 0.953 > 0.05$. This indicates that variation in income among the local Government Areas was not statistically significant.

7.2 CONTRIBUTION TO KNOWLEDGE

This research has contributed to knowledge in articulating the concept of urban agriculture, hitherto unknown as a veritable means of sustainable urban livelihood in Enugu. Specifically, the study:

a) Characterised the major types of farm activities practiced in Enugu and a map generated to document this.
b) Evaluated the nature of urban agricultural activities in Enugu and the benefit of the activities of urban agricultural practitioners in terms of income generation and was established.
c) Assessed the amount of income spent on food produced from the city farms (vegetables, seasonal crops, poultry, fish, animal husbandry and ornamental/flowers) and how much income is generated by the inhabitants through these agricultural activities.
d) Finally established the relationship between expenditure on farm inputs and incomes generated from various farm types.

7.3 CONCLUSION

7.3.1 Impact of Urban Agriculture on Enugu Economy

The major urban agricultural activities in Enugu are mixed crop cultivation (38.6 percent), Vegetable farms (27.2 percent), and production of fruits (1.7 percent), Fish farms (6.5 percent), Floriculture (1.6 percent), Poultry production (14.3 percent), Pig farming (6.6 percent), and Goat keeping (3.5 percent). Urban Agriculture is of great benefit to the sustainable development of Enugu Metropolis.

It has contributed to poverty alleviation and waste reduction in the metropolis. That between 60% - 90% of household expenditure was supported by income from farm enterprises underscores the popularity of urban agriculture as a poverty reduction strategy among the urban poor of Enugu. Reasons for the practice of urban agriculture in order of importance were: to supplement source of income (48.3%); to improve house hold food supply and nutrition (29%); lack of formal employment (20.3%) and to comply with cultural values (4.2%). Back yard farms are the most common practice. The popularity of back yard gardens was attributed to the fact that gardening can be done with virtually no economic resources, using only locally available planting materials, green manure and waste water. It is therefore a production system that can be afforded by the poor city dwellers.

The income from the major urban agricultural activities were mixed crop cultivation (₦5.89m), Vegetable farms (₦0.49m), and production of fruits (₦0.65m), Fish farms (₦11.45m), Floriculture (₦2.20m), Poultry production (₦13.84m), Pig farming (₦3.99m), and Goat keeping (₦46.18m).

7.3.2 Challenges of Urban Agriculture

Like urban farmers everywhere, farmers in Enugu encounter a number of challenges in their farming operations. Finance (38.1 percent) and water supply (27.1 percent) are the biggest challenges encountered. Water supplies remain intermittent with most depending on shallow wells and rain because most residential areas in Enugu lacked municipal water supply.

The marketing of farm produce, especially vegetables, is also a major challenge facing farmers. There are profound fluctuations in prices resulting from supply and demand inequalities. Usually, households residing near the urban farms purchase the biggest share of the produce but in most cases at low prices which do not reflect the effort of the farmers. Farmers therefore depend on middle men who purchase their harvests at very low rates.

7.3.2.1 Limited Access to Urban Land for Agriculture

Severe pressure is exerted on land in Enugu for agricultural purposes. This has been aggravated by the physical planning in Enugu. On the open market in Nigeria, potential urban farm land is viewed as a tradable commodity that competes with other land uses. Most farmers who cultivate in open spaces, urban fringes and along roadsides in the city, inherited land from family and friends or had acquired the land by ñfirst claimò. The first person who found a vacant piece of land and started using it became the de facto owner. However, these farmers have limited security of tenure because the actual owners of the land (private or public institutions) can decide to use it at any time. First possession of land and inheritance of land from family and friends is strongly associated with the number of years the household had farmed in the area.

7.3.2.2 Urban Agriculture and Human Health Concerns

Urban agriculture can cause long-term adverse impacts on environmental quality. Nearly half of the households lacked access to good drinking water. Good quality drinking water and a safe healthy environment are essential prerequisites for food safety. Their absence will pose a serious health risk to the larger proportion of urban households. Although urban agriculture has the potential to recycle waste water and organic materials and thereby contribute to solving waste disposal problems in urban areas, the uncontrolled use of untreated waste water in backyard gardens can become a breeding ground for diarrheal diseases and increases income spent on medical expenses. Excessive accumulation of heavy metals in agricultural soils may not only result in environmental contamination, but lead to elevated heavy metal uptake by crops, which may affect food quality and safety.

In conclusion, this study argues that urban agriculture can be operated as a sustainable economic, environmental, social and political system. Urban agriculture in Enugu acts as a safety net for low income households and helps to absorb some of the negative impacts on the unstable socio-economic environment in Nigeria.

Despite the fact that urban agriculture has the proven capacity to contribute to food security and income generation, it faces a large number of constraints that impede the achievement of these goals. The environmental and human health challenges associated with urban agriculture show that at the current level of practice, the sustainability of urban agriculture is highly compromised. Food security does not only involve the amount and type of food available but also the element of food quality and safety.

The study also shows that urban farmers are in a permanent state of insecurity because of non availability of agricultural resources such as land, water and inputs. There is inadequate farmland since most farmers depend mostly on backyard gardens and illegal open spaces. On the other hand, the production-nutrition systems tended to be influenced by the lack of both capital and crop intensity. The research established that most urban farmers farmed on small pieces of land and did not invest much in terms of applying fertilizers to the land. This resulted in poor yields, a vicious cycle of low productivity and food poverty.

This study argues that the role of urban agriculture in reducing food poverty is not marginal and should therefore be accorded more attention in urban development policies and planning process. Although, local authorities in Enugu in recent times recognise the role of urban farming as an important survival component for the urban poor, it is necessary to translate this awareness into by-laws and ordinances. While specific statistical findings in this study cannot be generalized beyond Enugu, some important points should be considered in other urban households. The first is the importance and growing reliance on urban farming for household food consumption. The second is the need to understand that urban food security goes beyond just food supply and access to include the environmental context in which the food is obtained. The food situation in Enugu suggests that urban agriculture should be a potential area for encouragement and development in the city. As stressed in this study, urban agriculture can have a significant impact on various levels of a nation's economy. The effect can be both immediate (e.g., food security, nutrition, dietary movement, employment creation, income generation) and long term (e.g., transmission of agricultural knowledge to subsequent generations,

health and environment improvements). The contribution to food security is arguably the most important asset of urban agriculture.

The study therefore concludes that although sustainable urban agriculture is not a panacea to economic decline or poverty alleviation, it is a positive and appropriate way of improving urban livelihoods. The success and expansion of urban agriculture will therefore depend on the ability of policy makers, administrators and urban farmers to use integrated social, economic and environmental strategies that effectively address food security and urban poverty.

7.4 RECOMMENDATIONS

To ensure that the full potentials of urban agriculture in reducing urban poverty is realized in Enugu, the following recommendations are made:

a) Community participation in municipal key decisions on urban agriculture

b) The development of linkages with other sectors in Government. Appropriate structure of incentives to promote urban agriculture, including policies aimed at stimulating more effective market chains should be put in place. This can only happen if urban agriculture is viewed as an integral part of a broad national food security policy.

c) Integration of urban agriculture into the Nigerian cities' planning vision should be accompanied by policies that seek to expand the water supply infrastructure to accommodate urban agriculture.

d) National and local government should support affordable urban land tenure reforms or long-term leases for poor urban farmers.

e) Zoning codes should be revised to support urban food production. This means that policy makers need to identify and reformulate aspects of municipal statutes that are detrimental to city farming in order to properly integrate Urban Agriculture into the overall city planning and development policies.

7.5 AREAS FOR FURTHER RESEARCH

Despite the expansion in knowledge about urban agriculture, several areas remain poorly understood, and several new trends require investigation. First, significant evidence suggests that urban agriculture has become less a strategy of poor households as more middle and upper-class families have become involved. Urban agriculture may be moving away from being a food access strategy of the poor towards a more commercialised strategy of the middle class. In a few cases, urban agriculture may have been the means of the poor reaching the middle class, and in some cases, changes may reflect broader growth and improvement in the overall urban economy. But more often this trend appears to reflect a change in access to resourcesð with more powerful urban interests realizing the value of underutilized urban land and the profit of urban production. Further research is required to test this hypothesis, and if true, to identify its consequences.

Secondly, where urban agriculture remains (or has become) a viable strategy of the urban poor to achieve food and nutrition security, more must be understood about the constraints faced by low-income urban farmers. Often these include legal and regulatory issues, as well as the question of accessð often informal accessð to urban land. The fact that so many urban farmers are women increases these concerns since women often have less access to resources. There is widespread but poorly understood evidence that the manner in which urban authorities deal with a variety of urban problemsð crowding, health, and the widespread failure of urban services and infrastructure to keep up with population growthð end up undermining the livelihoods of the urban poor. Knowledge and examples of best practices in this area have grown, but much remains to be done.

Thirdly, advocates of urban agriculture need to take one step back from time to time and consider more broadly the overall role of urban agriculture *vis- à-vis* rural production. Urban agriculture advocates tend to see endless possibilities and demand; agricultural planners and economists, on the other hand, tend to be less excited about an overall strategy for urban agriculture. The goal, after all, is not to promote urban agriculture *per se*, but rather to promote food and nutrition security for the urban poor as well as middle class consumers, and to promote sustainable

urban environmental systems. Urban agriculture will undoubtedly continue to have a role to play, but strategies must be developed locally, and must take into account a broader picture than is sometimes presented. This not only ensures that urban agriculture contributes to sustainable strategies for achieving food security and nutrition, but also to the policies that will sustain the practices required for achieving those goals.

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APPENDIX 1

SAMPLE QUESTIONNAIRE

Centre for Environmental Management and
Control (CEMAC),
University of Nigeria, Enugu Campus

Dear Respondent,

I am a doctoral degree student at the above named Centre at the University of Nigeria, Enugu Campus and working on the topic, ñThe Contribution of Urban Agriculture on the Livelihood of Urban Dwellers in Enuguò. The Questionnaire is designed to generate information and data that would be relevant to the study. Your response would be treated in strict confidence and you are not expected to disclose your identity. Thank you for your anticipated co-operation.

Iwueke Tari.

Socio-Economic and Demographic Characteristics
Please tick [✓] or fill in the appropriate response.

1. Which part of Enugu do you reside (address)? é é é é é é é é é é
2. Sex? (a) Male [ ] (b) Female [ ]
3. Marital Status?
   (a) Married [ ] (b) Single [ ]
   (c) Divorced [ ] (d) Widow [ ]
4. Age group? (a) 15-25 [ ] (b) 26-35 [ ]
   (c) 36-45 [ ] (d) 46 and above [ ]
5. Educational background?
   (a) Primary education [ ]
   (b) Secondary education [ ]
   (c) Tertiary education [ ]
   (d) Informal education [ ]

6. Occupation? (a) Public sector [ ] (b) Organized private sector [ ]
   (c) Self employed [ ] (d) Others [ ]
7. Income level per month?
   (a) ₦1,000- ₦ 15,000 [ ]
   (b) ₦15,001- ₦ 30,000 [ ]
   (c) ₦30,001- ₦45,000 [ ]
   (d) ₦45,001 and above [ ]
8. How many are you in your household? é é é é é é é ..é é ..
9. What is your position in the household?
   (a) Head [ ] (b) Mother [ ] (c) Dependant [ ]

Respondents' data on Farmland

10. Do you have a farm? (a) Yes [ ] (b) No [ ]
11. If yes where?
   (a) In your compound [ ]
   (b) On a public land [ ]
   (c) In your place of work [ ]
   (d) On an undeveloped private land [ ]
12. What is the size of your farmland?
   (a) Half of a standard plot (232.4sq.m) [ ]
   (b) One plot (465 sq.m) [ ]
   (c) Above one plot (465 sq.m) [ ]
   (d) Any other é é é é é é é é é é é é
13. Do you pay any rent for the land on which your farm?
   (a) Yes [ ] (b) No [ ]
14. If yes, how much per annum? é é é é é é é é é é é é é .....
15. What type of farm do you have?
   (a) Cassava/plantain/maize [ ]
   (b) Fruits [ ] (c) Vegetables [ ]
   (d) Fish [ ] (e) Flowers [ ]
   (f) Poultry [ ]
16. How do you get labour?
   (a) Self effort [ ]
   (b) Family support [ ]
   (c) Hired labour [ ]

17. How often do you cultivate your crops?

(a) Rainy season [ ]

(b) All year round [ ]

(c) Others, specifyé é é é é é é é é é ..

Respondents Benefits from Urban Agriculture

18. Do you only feed from the harvest of your farm?

(a) Yes [ ] (b) No [ ]

19. If no, do you take some to the market for sale?

(a) Yes [ ] (b) No [ ]

20. How much income do you generate monthly from your urban farm?

21. How much of this income do you spend of the following?

(a) Farm Labour [ ] (b) School Fees [ ]

(c) Farm rent/house rent [ ] (d) Savings [ ]

(e) Others State [ ]

22. Estimate the percentage of your income spent on food items (vegetable, poultry products, and fruits) produced from your Enugu farm per month

(a) Less than 20% [ ] (b) 21%-40% [ ]

(c) 41%-60% [ ] (d) greater than 61% [ ]

23. What can you say about the contribution of your farm to your livelihood?

(a) It enriches my nutrition [ ]

(b) It provides a great proportion of my income [ ]

(c) It is my main source of income [ ]

24. Estimate the percentage contribution of farming to your income

(a) Less than 20% [ ] (b) 21%-40% [ ]

(c) 41%-60% [ ] (d) greater than 61% [ ]

25. Please indicate how much you spend on the following farm inputs per month;

(a) Labour [ ] (b) Fertilizer [ ] (c) Seeds [ ]

(d) Chicks/fingerlings [ ] (e) Fish/Chicken Feed [ ]

(f) Pig Feed [ ]

26. Please indicate what other type of farm input and the quantity used per month:

(a) Chicken droppings [ ] (b) Chicken entrails [ ]

(c) Palm Kernel Cake [ ] (d) Fruit peelings [ ]

(e) Others (State) [ ]

Access to Capital

27. How do you meet your water needs for farming?
    (a) Government provided sources [ ]
    (b) Rainfall [ ] (c) Swamp lands [ ] (d) Others é

28. In what way do you receive assistance from government?
    (a) Subsidy on farm inputs [ ]
    (b) Accessible government loan [ ]
    (c) Provision of land [ ]
    (d) None [ ]

29. Do you belong to any farmersô association or cooperative?
    (a) Yes [ ] (b) No [ ]

30. If yes, what benefit(s) do you derive as a member?
    (a) Access to bank loan [ ]
    (b) Source of labour supply [ ]
    (c) Subsidized farm Input [ ]
    (d) None [ ]

Respondents Perception of Urban Agriculture

31. How do people regard farming in city?
    (a) A rural occupation [ ]
    (b) A poor manôs job [ ]
    (c) A dirty job meant for illiterates [ ]
    (d) Othersé é é é é é é é

32. What is your view about farming in the city?
    (a) A lucrative job [ ]
    (b) Crops receive high patronage [ ]
    (c) It is an employment opportunity [ ]
    (d) Others specifyé é é é .

33. What led you into farming in the city?
    (a) Need for fresh and highly nutritious food [ ]
    (b) Supplementary source of income [ ]
    (c) Lack of employment in the formal sector [ ]
    (d) It is a traditional occupation [ ]
    (e) Hobby and recreation [ ]
    (f) Others specifyé é é é é é é

34. How do you maintain the fertility of the soil?

(a) Use of chemical fertilizer [ ]

(b) Use of animal manure [ ]

(c) Compost manure [ ]

(d) None [ ]

(e) Others specify é é é é é é é é é é

35. What major problem do you face in farming within Enugu?

(a) Land tenure or land ownership [ ]

(b) Water supply [ ]

(c) Finance [ ]

(d) None [ ]

(e) a, b and c options [ ]

(f) Others specifyé é é é é é é é é

36 Which of the following ways do you think farming impacts on the environment in your area?

(a) Erosion control [ ]
(b) Aesthetics [ ]
(c) Ground or surface water pollution [ ]
(d) Urban solid waste reduction [ ]

Thank you.

APPENDIX 2

REGRESSION RESULTS FOR TEST OF HYPOTHESIS ONE

Regression Results for Income against Labour

Descriptive Statistics

	Mean	Std. Deviation	N
labour	5946.1800	5237.86354	8
income	81753.4725	87850.73732	8

Correlations

		labour	income
Pearson Correlation	labour	1.000	.966
	income	.966	1.000
Sig. (1-tailed)	labour	.	.000
	income	.000	.
N	labour	8	8
	income	8	8

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.966[a]	.933	.922	1459.53665	1.698

a. Predictors: (Constant), income

b. Dependent Variable: labour

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.793E8	1	1.793E8	84.152	.000[a]
	Residual	1.278E7	6	2130247.238		
	Total	1.920E8	7			

a. Predictors: (Constant), income

b. Dependent Variable: labour

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1236.845	727.891		1.699	.140
	income	.058	.006	.966	9.173	.000

a. Dependent Variable: labour

Regression Results for Income against School Fees

Descriptive Statistics

	Mean	Std. Deviation	N
school fees	8119.7913	3146.98119	8
income	81753.4725	87850.73732	8

Correlations

		school fees	income
Pearson Correlation	school fees	1.000	.677
	income	.677	1.000
Sig. (1-tailed)	school fees	.	.033
	income	.033	.
N	school fees	8	8
	income	8	8

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.677[a]	.458	.368	2502.60781	2.218

a. Predictors: (Constant), income

b. Dependent Variable: school fees

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.175E7	1	3.175E7	5.069	.065[a]
	Residual	3.758E7	6	6263045.831		
	Total	6.932E7	7			

a. Predictors: (Constant), income

b. Dependent Variable: school fees

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6138.002	1248.085		4.918	.003
	income	.024	.011	.677	2.251	.065

a. Dependent Variable: school fees

Regression Results for Income against Rent

Descriptive Statistics

	Mean	Std. Deviation	N
rent	1078.1250	1200.70199	8
income	81753.4725	87850.73732	8

Correlations

		rent	income
Pearson Correlation	rent	1.000	.653
	income	.653	1.000
Sig. (1-tailed)	rent	.	.040
	income	.040	.
N	rent	8	8
	income	8	8

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.653[a]	.426	.330	982.47422	2.104

a. Predictors: (Constant), income

b. Dependent Variable: rent

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4300263.329	1	4300263.329	4.455	.079[a]
	Residual	5791533.546	6	965255.591		
	Total	1.009E7	7			

a. Predictors: (Constant), income

b. Dependent Variable: rent

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	348.736	489.973		.712	.503
	income	.009	.004	.653	2.111	.079

a. Dependent Variable: rent

Regression Results for Income against Household Food

Descriptive Statistics

	Mean	Std. Deviation	N
hh food	15605.9025	14940.22744	8
income	81753.4725	87850.73732	8

Correlations

		hh food	income
Pearson Correlation	hh food	1.000	.960
	income	.960	1.000
Sig. (1-tailed)	hh food	.	.000
	income	.000	.
N	hh food	8	8
	income	8	8

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.960[a]	.921	.908	4540.78171	.721

a. Predictors: (Constant), income

b. Dependent Variable: hh food

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.439E9	1	1.439E9	69.779	.000[a]
	Residual	1.237E8	6	2.062E7		
	Total	1.562E9	7			

a. Predictors: (Constant), income

b. Dependent Variable: hh food

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2264.360	2264.550		1.000	.356
	income	.163	.020	.960	8.353	.000

a. Dependent Variable: hh food

Regression Results for Income against Savings

Descriptive Statistics

	Mean	Std. Deviation	N
savings	13993.0550	11786.44723	8
income	81753.4725	87850.73732	8

Correlations

		savings	income
Pearson Correlation	savings	1.000	.920
	income	.920	1.000
Sig. (1-tailed)	savings	.	.001
	income	.001	.
N	savings	8	8
	income	8	8

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.920[a]	.847	.822	4977.10403	1.342

a. Predictors: (Constant), income

b. Dependent Variable: savings

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.238E8	1	8.238E8	33.256	.001[a]
	Residual	1.486E8	6	2.477E7		
	Total	9.724E8	7			

a. Predictors: (Constant), income

b. Dependent Variable: savings

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3897.595	2482.150		1.570	.167
	income	.123	.021	.920	5.767	.001

a. Dependent Variable: savings

Regression Results for Income against HH Savings and Expenditure

Descriptive Statistics

	Mean	Std. Deviation	N
HH savings and expenditure	42390.6163	32280.82779	8
income	81753.4725	87850.73732	8

Correlations

		HH savings and expenditure	income
Pearson Correlation	HH savings and expenditure	1.000	.970
	income	.970	1.000
Sig. (1-tailed)	HH savings and expenditure	.	.000
	income	.000	.
N	HH savings and expenditure	8	8
	income	8	8

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.970[a]	.941	.931	8483.22229	1.865

a. Predictors: (Constant), income

b. Dependent Variable: HH savings and expenditure

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.863E9	1	6.863E9	95.360	.000[a]
	Residual	4.318E8	6	7.197E7		
	Total	7.294E9	7			

a. Predictors: (Constant), income

b. Dependent Variable: HH savings and expenditure

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13252.917	4230.699		3.133	.020
	income	.356	.036	.970	9.765	.000

a. Dependent Variable: HH savings and expenditure

APPENDIX 3

REGRESSION RESULTS FOR HYPOTHESIS TWO FARM INPUT AGAINST FARM INCOME

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
income	81753.4725	87850.73732	8
farm input	7575.2425	14995.09315	8

Correlations

		income	farm input
Pearson Correlation	income	1.000	.944
	farm input	.944	1.000
Sig. (1-tailed)	income	.	.000
	farm input	.000	.
N	income	8	8
	farm input	8	8

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.944[a]	.891	.873	31341.34251	.726

a. Predictors: (Constant), farm input

b. Dependent Variable: income

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.813E10	1	4.813E10	48.999	.000[a]
	Residual	5.894E9	6	9.823E8		
	Total	5.402E10	7			

a. Predictors: (Constant), farm input

b. Dependent Variable: income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	39863.611	12593.540		3.165	.019
	farm input	5.530	.790	.944	7.000	.000

a. Dependent Variable: income

APPENDIX 4

ADDITIONAL REGRESSION RESULTS ON FARM INPUTS AGAINST INCOME BASED ON FARM TYPES

Mix Farm

Descriptive Statistics

	Mean	Std. Deviation	N
mix farm income	30345.3947	17961.45753	456
mix farm input	4699.6491	3454.12687	456

Correlations

		mix farm income	mix farm input
Pearson Correlation	mix farm income	1.000	.698
	mix farm input	.698	1.000
Sig. (1-tailed)	mix farm income	.	.000
	mix farm input	.000	.
N	mix farm income	456	456
	mix farm input	456	456

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.698[a]	.487	.486	12876.93452	2.036

a. Predictors: (Constant), mix farm input

b. Dependent Variable: mix farm income

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.151E10	1	7.151E10	431.257	.000[a]
	Residual	7.528E10	454	1.658E8		
	Total	1.468E11	455			

a. Predictors: (Constant), mix farm input

b. Dependent Variable: mix farm income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13288.411	1018.952		13.041	.000
	mix farm input	3.629	.175	.698	20.767	.000

a. Dependent Variable: mix farm income

Vegetable Farm

Descriptive Statistics

	Mean	Std. Deviation	N
vegetable farm income	12445.4829	6773.17686	321
vegetable farm input	1304.9844	500.17817	321

Correlations

		vegetable farm income	vegetable farm input
Pearson Correlation	vegetable farm income	1.000	.807
	vegetable farm input	.807	1.000
Sig. (1-tailed)	vegetable farm income	.	.000
	vegetable farm input	.000	.
N	vegetable farm income	321	321
	vegetable farm input	321	321

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.807[a]	.651	.650	4008.54153	1.728

a. Predictors: (Constant), vegetable farm input

b. Dependent Variable: vegetable farm income

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.554E9	1	9.554E9	594.613	.000[a]
	Residual	5.126E9	319	1.607E7		
	Total	1.468E10	320			

a. Predictors: (Constant), vegetable farm input

b. Dependent Variable: vegetable farm income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1810.889	625.993		-2.893	.004
	vegetable farm input	10.925	.448	.807	24.385	.000

a. Dependent Variable: vegetable farm income

Fruit Farm

Descriptive Statistics

	Mean	Std. Deviation	N
fruit farm income	32500.0000	23084.51292	20
fruit farm input	1145.0000	692.23133	20

Correlations

		fruit farm income	fruit farm input
Pearson Correlation	fruit farm income	1.000	.882
	fruit farm input	.882	1.000
Sig. (1-tailed)	fruit farm income	.	.000
	fruit farm input	.000	.
N	fruit farm income	20	20
	fruit farm input	20	20

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.882[a]	.778	.765	11182.48868

a. Predictors: (Constant), fruit farm input

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.874E9	1	7.874E9	62.969	.000[a]
	Residual	2.251E9	18	1.250E8		
	Total	1.013E10	19			

a. Predictors: (Constant), fruit farm input

b. Dependent Variable: fruit farm income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1172.772	4925.343		-.238	.814
	fruit farm input	29.409	3.706	.882	7.935	.000

a. Dependent Variable: fruit farm income

Floriculture

Descriptive Statistics

	Mean	Std. Deviation	N
floriculture income	25947.3684	1665.78924	19
floriculture farm input	517.5789	46.59198	19

Correlations

		floriculture income	floriculture farm input
Pearson Correlation	floriculture income	1.000	.767
	floriculture farm input	.767	1.000
Sig. (1-tailed)	floriculture income	.	.000
	floriculture farm input	.000	.
N	floriculture income	19	19
	floriculture farm input	19	19

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.767[a]	.588	.564	1100.47871

a. Predictors: (Constant), floriculture farm input

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.936E7	1	2.936E7	24.243	.000[a]
	Residual	2.059E7	17	1211053.393		
	Total	4.995E7	18			

a. Predictors: (Constant), floriculture farm input

b. Dependent Variable: floriculture income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11759.956	2892.487		4.066	.001
	floriculture farm input	27.411	5.567	.767	4.924	.000

a. Dependent Variable: floriculture income

Poultry Farm

Descriptive Statistics

	Mean	Std. Deviation	N
poultry farm income	273254.4379	1.16379E5	169
poultry farm input	139750.2959	95672.97170	169

Correlations

		poultry farm income	poultry farm input
Pearson Correlation	poultry farm income	1.000	.846
	poultry farm input	.846	1.000
Sig. (1-tailed)	poultry farm income	.	.000
	poultry farm input	.000	.
N	poultry farm income	169	169
	poultry farm input	169	169

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.846[a]	.716	.715	62161.77129	2.391

a. Predictors: (Constant), poultry farm input

b. Dependent Variable: poultry farm income

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.630E12	1	1.630E12	421.861	.000[a]
	Residual	6.453E11	167	3.864E9		
	Total	2.275E12	168			

a. Predictors: (Constant), poultry farm input

b. Dependent Variable: poultry farm income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	129368.953	8481.738		15.253	.000
	poultry farm input	1.030	.050	.846	20.539	.000

a. Dependent Variable: poultry farm income

Fish Farm

Descriptive Statistics

	Mean	Std. Deviation	N
fish farm income	77500.0000	2516.61148	76
fish farm input	12602.6316	3249.49119	76

Correlations

		fish farm income	fish farm input
Pearson Correlation	fish farm income	1.000	.963
	fish farm input	.963	1.000
Sig. (1-tailed)	fish farm income	.	.000
	fish farm input	.000	.
N	fish farm income	76	76
	fish farm input	76	76

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.963[a]	.927	.926	684.78527

a. Predictors: (Constant), fish farm input

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.403E8	1	4.403E8	938.942	.000[a]
	Residual	3.470E7	74	468930.868		
	Total	4.750E8	75			

a. Predictors: (Constant), fish farm input

b. Dependent Variable: fish farm income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	68103.002	316.569		215.128	.000
	fish farm input	.746	.024	.963	30.642	.000

a. Dependent Variable: fish farm income

Goat Farm

Descriptive Statistics

	Mean	Std. Deviation	N
goat farm income	56410.2564	53100.55900	39
goat farm input	4128.2051	5541.37304	39

Correlations

		goat farm income	goat farm input
Pearson Correlation	goat farm income	1.000	.997
	goat farm input	.997	1.000
Sig. (1-tailed)	goat farm income	.	.000
	goat farm input	.000	.
N	goat farm income	39	39
	goat farm input	39	39

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.997[a]	.993	.993	4464.78936	3.438

a. Predictors: (Constant), goat farm input

b. Dependent Variable: goat farm income

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.064E11	1	1.064E11	5338.017	.000[a]
	Residual	7.376E8	37	1.993E7		
	Total	1.071E11	38			

a. Predictors: (Constant), goat farm input

b. Dependent Variable: goat farm income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16987.859	895.701		18.966	.000
	goat farm input	9.550	.131	.997	73.062	.000

a. Dependent Variable: goat farm income

Pig Farm

Descriptive Statistics

	Mean	Std. Deviation	N
pig farm income	144936.7089	71788.03232	79
pig farm input	13025.3165	5553.87295	79

Correlations

		pig farm income	pig farm input
Pearson Correlation	pig farm income	1.000	.293
	pig farm input	.293	1.000
Sig. (1-tailed)	pig farm income	.	.004
	pig farm input	.004	.
N	pig farm income	79	79
	pig farm input	79	79

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.293[a]	.086	.074	69082.97212	2.639

a. Predictors: (Constant), pig farm input

b. Dependent Variable: pig farm income

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.450E10	1	3.450E10	7.228	.009[a]
	Residual	3.675E11	77	4.772E9		
	Total	4.020E11	78			

a. Predictors: (Constant), pig farm input

b. Dependent Variable: pig farm income

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	95616.352	19923.536		4.799	.000
	pig farm input	3.786	1.408	.293	2.689	.009

a. Dependent Variable: pig farm income