Thesis

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UNIVERSITY OF IBADAN

GENDER CONSIDERATIONS IN THE RESOURCE ALLOCATION AND FOOD PRODUCTION BEHAVIOUR OF FARMING HOUSEHOLDS IN SOUTH-EASTERN NIGERIA

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MARSHALL A.C.A. ODII

A THESIS SUBMITTED TO THE DEPARTMENT OF AGRICULTURAL ECONOMICS, FACULTY OF AGRICULTURE AND FORESTRY UNIVERSITY OF IBADAN IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY UNIVERSITY OF IBADAN

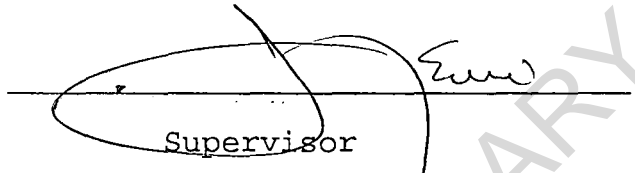
DEDICATION

This Thesis is dedicated to my loving mother,

Mrs Maria Obaji Odii

CERTIFICATION BY SUPERVISOR

I certify that this project work was carried out by Mr. Marshall Alphonsus Chibueze Ajaegbo Odii, in the Department of Agricultural Economics, University of Ibadan, Ibadan, Nigeria.



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ABREVIATIONS

1. ADP = Agricultural Development Project
2. NACB = Nigerian Agricultural and Cooperative Bank
3. MANR = Ministry of Agriculture and Natural Resources
4. BLPRW = Better Life Programme for Rural Women
5. LGA = Local Government Area
6. LDCs = Less Developed Countries
7. FAO = Food and Agricultural Organisation

ABSTRACT

The study analysed gender in relation to household resource allocation, food production and consumption as well as profit optimization behaviour in South-eastern Nigeria. The aim is to identify appropriate pattern of gender resource allocation that would simultaneously achieve food security and optimize farm returns at the house hold level.

Data on one hundred and fifty (150) farmers selected through a multi-stage random sampling procedure were analysed using a combination of statistics, econometrics and the normalized profit function. The major resources considered include labour, land, fertilizer, farm credit and farm implements.

The results revealed that male farmers were older and hence more experienced than female farmers. Male members of the household generated more income from both farm and non-farm activities than the female members of the household.

Women farmers were predominantly engaged in food crop production mainly for household subsistence and little for the market while male farmers mainly engaged in the production of commercial crops, largely for the market and little for household food consumption. There was little or no division of labour in the performance of cultural practices. Thus agricultural activities are gender specific while cultural practices are hardly gender specific. In general, females spend more time than males in household agriculture.

Women depend purely on men in all matters concerning land negotiation. The male farmers cultivated larger hectarage than female farmers. This is probably because men had more access to all majority of the agricultural inputs studied than women. Men contributed significantly more than women in the purchases of both recurrent and capital items in the household. The magnitude, sign and the significance of the included gender variables shows that gender factors are important

in analysing household food consumption demand.

The marginal propensity to consume appear to be related more with changes in female farm output, male income, and size of male members of the household than for male farm output, female income, and size of female members of the household.

The magnitude, sign and the level of statistical significance of the included gender variables in the normalised profit function shows that gender factors are very important determinants of household farm profit particularly when resources are pooled together as in the joint farm normalized profit function. The normalized profit function for male and female farmers differed significantly statistically.

The demand equation for labour and tractor hire shows that male farmers are relatively more efficient in their use of both male and female hired labour as well as tractor hiring services than female farmers. There is no statistically significant gender difference in the relative

efficiency of fertilizer use.

On the whole, male farmers are relatively technically and economically more efficient in allocation of farm inputs than female farmers in their farms. Both male and female farmers did not succeed in the same degree in profit maximizations. In fact, the test of absolute price efficiency shows that male farmers maximized profit while female farmers did not maximize profit.

Problems such as high cost of farm inputs, scarcity of farm inputs, inadequate funds for purchasing farm inputs, frequent changes in government policies, corruption among government officials were identified as major obstacles in input acquisition in the household. However, interest rate liberalization, subsidies, use of cooperatives, application of the provisions of the Land Use Decree, use of Task Forces, development of appropriate technologies and overall reduction in input prices were suggested by the farmers studied as measures that could alleviate the

problem of inadequate farm input acquisition at the household level.

Generally adequate food production, consumption and profit optimization would only take place at the household level if male and female issues concerning resource allocation are not treated in isolation. This is because their activities at the household level are rather complementary than competitive. A holistic approach in resource allocation, job specification at the household level would improve the nutrition, and hence welfare of the household members. This is because there would be a balance between food consumption, and profit maximizing goals as shown in the behaviour of the gender variables for the joint farm normalized profit function.

CHAPTER ONE

INTRODUCTION

1.1 The Problem of The Study

The low level of household income in Nigeria which often results in low level of nutrition stems partly from low level of output which in turn is partly due to poor access to productive farm inputs. Numerous case studies such as Okore (1987), Olawoye (1989) and Osuntogun (1976) also indicate that rural development policies directed at households may not have their intended effects or might even produce unintended negative out comes, unless the role and position of gender in rural households are explicitly taken into account.

According to Sorenson and Bulow (1990), gender inequality in the distribution of benefits within the household is an important factor in explaining the low level of productivity among rural farming households.

They claim that most major means of production and economically significant resources have become privatized and controlled by the male household heads, thereby accentuating women's dependence upon men for access to critical farm inputs.

Thus, the restricted access of women to some productive farm inputs is considered to be a major source of inequality between the sexes. This situation, they claim, could account for differnces in household welfare status, enterprise combinations, farm sizes cultivated and consequently, their profit optimisation behaviour. The evidence of increasing levels of female poverty and its implication for household welfare, according to Buvinic (1983), has been instrumental in promoting a wide ranging reassessment of rural women's access to productive resources.

This reassessment has to be further strengthened through the protection of women's existing sources of livelihood; elimination of discriminatory legislation in the ownership

and control of productive assets; promotion of equitable access to agricultural inputs; extension services and education; support for intra-household forms of organisation of women's labour and the encouragement of an increased capacity for political empowerment and organisation of women. Lin (1988) and Aidoo (1988) opined that although agriculture is the major source of hope for the recovery of poor household economy as well as long term and sustainable development, the facilitation of the role of the people whose creativity, hard work, productivity and life style will turn the hope into reality has not been sufficiently dealt with. The vast majority of these people, according to Aidoo are women who are at the same time overwhelmingly poor and neglected.

The factors producing this paradox according to her are many. Historically, development has been conceptualized and planned mainly by men to whom women are invisible. Rural women were presumed to grow

and process food largely because they must feed their families and not because it was necessary as a source of employment for them. Thus, women were type-cast as fulfilling only their natural roles in social reproduction for which no real value was thought necessary. The paradox is also made more complex by the basic structural imbalances in Africa's development strategies which marginalised the vast agricultural and rural sector where development potentials and women's participation are greatest. This is because development strategies have concentrated disproportionate resources, assets and power in the small urban sector dominated by men, leaving the bulk of the population, made up largely women to subsist under a growing rural poverty.

It has been argued that the imbalance may even persist if nothing serious is done. This is because it is often still assumed that development that benefits men would automatically benefit women and that

development that benefits one stratum of rural society would benefit the rest through the trickle down effect (Heyzer, 1988). The reality, however, is that the negative effects of development processes have been felt more acutely by rural women because of gender-based hieriarchies which, on the one hand, limit women's access to resources and participation and on the other hand impose a gender-based division of labour that allocated to women the most tedious, labour intensive and poorly rewarded work. Women's low position in decision making in the family and household economy as well as in development planning adversely affects their productivity. Thus, it would appear that women's workload in the economy is increasing, their productivity and benefits decreasing while the population is growing at such a rapid rate as to outstrip the rate of food production for which the same women are partly responsible.

A commitment to and an opportunity for women's full and effective economic

participation are, therefore, required not only for equity but also for accelerated development. The fundamental questions to be answered in this study include the following. First, how are farm inputs such as land, labour and credit aquired, controlled and allocated by both sexes? Second, what benefits do household members derive from increases in farm production and productivity? Third, what proportion of the appropriated income of each sex is devoted to household consumption needs? Fourth, what do farmers do with the time gained by the introduction of labour-saving technologies?

1.2 The Ojectives Of The Study

The broad objectives of this study is to analyse gender access to farm inputs and the impact it has on the household farm output, farm income, food supply and the profit optimisation behaviour. This is with a view to developing appropriate strategies for household food production and supply in Imo

and Abia States in particular and Nigeria in general. The specific objectives of the study are to :

(i) determine the proportion of male and female farmers engaged in different food and cash crop production enterprises as well as in various cultural practices in these enterprises in south-eastern Nigeria.

(ii) determine the use of farm input by gender in the household with a view to determining and comparing efficiency of resource use by each sex.

(iii) determine the quantities of farm output by gender and shares of incomes devoted to household consumption needs by gender;

(iv) isolate and compare the determinants of household food consumption, food production and profit optimisation behaviour by gender;

(v) derive input demand functions and identify factors that constrain input acquisition by gender

(vi) suggest gender-oriented agricultural

and food production strategies that would ensure adequate food availability and optiomal agricultural growth pattern at the household, state and national levels.

1.3 The Need for The Study

Discussion on gender relations and in particular, relations between husband and wife/wives within the household are crucial in determining both agricultural production efficiency and ability to ensure adequate consumption of food at the household level. Specifically, the relevance of the study stems from the following considerations.

(i) There is the need to investigate whether there are sex differences in the management efficiency of farms at different scales of production. This is to generate useful proposals for efficient farm management at both household and state levels.

(ii) Since farm productivity is linked with input acquisition, there is the need to find out appropriate input distribution

mechanisms that would optimize farm profit and household food security status based on gender considerations. This issue is very important if the twin problems of poor nutrition and low productivity in agricultural production are to be solved. (iii) There is the need to improve the understanding of gender roles in the economy so as to put the notion of gender inequalities in social and economic matters in its proper perspective as well as provide a more accurate and comprehensive basis for social and economic planning within a development framework of the state, region and country. The perspectives of both men and women must be included in such analysis so that any developmental policy derivable from the study will be gender responsive.

(iv) There is the need to accord appropriate recognition to the respective economic, social and cultural roles of men and women from the point of view of complementarily in development.

(v) The existing literature appears to address the proportion of men and women engaged in agricultural production, rather than by their productivity or efficiency levels. This study, therefore, aims at bridging some of the current gap in the literature.

(vi) The results generated from the study will act as a useful guide for efficient resource allocation and farm management strategies at the household, state and national levels.

1.4 The Hypotheses of The Study.

The hypotheses to be tested in this study are as follows: (i) There is no significant difference in the proportion of male and female farmers that engage in different farm enterprises and various cultural operations on farms;

(ii) There is no significant difference in the proportion of farm input contributed by male and female farmers to their household farming activities.

(iii) There is no significant difference in

the proportion of farm output and income by gender devoted to household consumption needs.

(iv) There is no significant difference in gender resource allocative behaviour and, hence, no significant difference in their impact on farm output.

(v) There is no significant difference in the level of household food consumption behaviour by gender.

(vi) There is no significant difference in male and female farmers profit optimisation behaviour.

1.5 The Plan of The Thesis Report

This report has been structured into six chapters and the chapter that follows is chapter two which presents the literature review and theoretical framework with particular attention to gender roles in household food consumption expenditure, gender access to farm inputs, gender productivity differential in agricultural production and

intra-household time allocation. It also examines the theoretical framework for the study with particular emphasis on concepts relating to the household, concept of gender, a theory of household food production model, determinants of gender resource allocation behaviour, determinants of household consumption behaviour and schematic framework of analysis.

Chapter three deals with research methodology where agricultural background of the study area, sample selection, data sources and types of data collected, data collection procedure, measurement and test of efficiency, analytical techniques and model specification are reported.

Chapter four presents the results on gender socio-economic characteristics and roles in agriculture, gender resource acquisition and allocative behaviour.

Chapter five examines household food consumption and production patterns.

Chapter six summarises the major

findings from the study, their policy implications and recommendations as well as areas for further research.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 LITERATURE REVIEW

2.1.1 Gender Role in Agricultural Production

The recent emphasis on sex differentiation in the role of smallholder rural farmers stems from the fact that women smallholder farmers contribute significantly not only to household food consumption, but also to overall agricultural growth and development (Ajose - Harrison, 1987, Accati 1983).

Several studies by the FAO (1984), Sivard (1985), Walker et al. (1985), Ikpi et al. (1986) and Ikpi (1988) indicate that Nigerian women contribute between 46 and 65 percent of the total hours spent on traditional agriculture and processing. In eastern Nigeria, particularly in Imo state,

men and women in the rural areas have always been predominantly known as farmers with trading as a secondary occupation (Okore, 1987).It is therefore no exageration to say that women in developing countries are the backbone of the rural food system.

The situation about the Caribbean women in agriculture appears to be slightly different because Powell (1984) had maintained that, in all the three territories studied, women's employment in agriculture was very minimal. His data for Jamaica drawn from a census also present a similar picture. He observed that between 1960 and 1970, there had been a marked shift out of agriculture towards white collar occupations.

2.1.2 Gender Productivity Differentials in Agricultural Production

As regards the efficiency of women farmers, Moock (1976) reported that, on the average, the output per acre in Kenya was smaller for women than for men,but, however,

observed that the difference was not significant at 10 percent level of probability. He suggested that the absence of a significant difference may be due to the fact that women generally use smaller bundles of physical inputs than their male counterparts. But Ram and Singh (1988) pointed out that there is large difference between the productivities of male and female labour in favour of the females. Infact they maintained that at the sample mean, an hour of female labour seems to be six times as productive in farming as an hour of male labour. However, Boserup (1970) pointed out that the difference in agricultural productivity between men and women depends on differences in their physical strength. Janelid (1975), in her own contribution, opined that rural women in Africa have been known to be productive in subsistence agriculture, but are not usually recognised as economically active population. Their activities are often underestimated, devalued, and not often

measured in economic terms (Rogers, 1980; Spiro, 1984) .

2.1.3 Gender Access to Farm Resources

Preliminary results from IDRC(1991) studies in African countries show that legal and cultural constraints placed on women's access to inputs hamper their ability to make effective contribution to agricultural production and, hence, household food supply. Despite the significant contribution of rural women to agricultural production as revealed by the existing literature, their access to productive farm inputs appears to be low relative to the men's. (Odie - Ali 1986, Schuh 1987). Rural women can play a more predominant role in agriculture if they are given the necessary farm resources at the appropriate time. (Odii, 1989; Olawoye, 1989). Huston (1989) indicated that efforts towards agricultural development will remain marginal if women's access to land, credit and other agricultural inputs continue

to remain limited. In order to break the cycle of poverty, hunger and restricted opportunities, poor rural women need access to and control of major productive farm resources.

2.1.4 Intra-Household Gender Time Allocation

Rural men and women work within different sets of time constraints and this has major implication for food production and family nutritional status (Enberg and Sabry and Beckerson 1988).

Time allocation between members of a family are considered to derive from their comparative advantages in the production of market and home goods and services. It is generally assumed that men work in the labour market while the women specialize in work at home. Gronau (1973) and Kirkpatrick (1977) attributed this to differences in male and female wages.

Khandker (1987) maintained that gender time allocation in the household may differ

as a result of their different needs. He pointed out that women whose husbands manage their rice farms preferred to allocate more time to sorghum crop and less to rice and that they allocate their time in these enterprises in order to maximize total agricultural income.

2.1.5 Gender Role in Food Consumption

Research in most sub-saharan Africa shows that the activities of women in support of their families usually determine how much food is availlable for family consumption and hence the nutritional status of the family members living at home (Huffman, 1987). According to him, women are generally responsible for providing certain foods for the household and these complement the foods and other goods for which men are responsible. Longhurst (1983) had revealed that in sub-saharan Africa women produce minor crops that provide up to 15 to 20 percent of the family total energy intake. Some of the

crops, such as maize, cocoyam and others, have special timing and varieties such that they are produced when the main household foodstock is low. This is an important aspect of gender role in household food Consumption.

Odie - Ali (1986) found that women in Guyana contribute 68 percent and men contribute 2 per cent, while the remaining 30 percent is jointly shared between the husband and the wife towards the daily upkeep of the household. Huffman (1987), in his own contribution, reported that two-thirds of the total expenditure on basic food and supplies are financed by women's self-earned incomes. Whether a working man is present or not, in the developed or developing countries, much of the reponsibilities for the well-being of the family has been shifted to women while, at the same time, the opportunity for them to earn adequate income is severely constrained. Women are increasingly significant with regard to household food supply even when they are not the

primary breadwinners of the household.

The increasing direct control over productive farm inputs by women according to Kandiyoti (1990), stems from the assumption that women are more likely to use these resources to further improve the immediate welfare of their families, especially the nutrition and health aspects of their children. This was highlighted by the FAO (1989) when it maintained that inappropriate input distribution mechanisms in relation to gender could bring about negative consequences for household food consumption.

2.2 THEORETICAL FRAMEWORK

2.2.1 The Concept of Gender

Doku (1989) distinguished between sex and gender. She defined sex as a static biological attribute based on natural characteristics and reproductive role, while gender is a dynamic social construct that describes feminine and masculine behaviour.

She argued that the use of sex and gender interchangeably by most African researchers may becloud the fact that gender roles can change from time to time and from place to place. She noted that gender relations have been shaped by traditional and modern institutions and that the behaviour of men and women has been conditioned by the nature of these relations.

Dewar (1987), in his own contribution, defined gender in different constructs. First, when gender is defined in biological and behavioural sciences, it is examined as a personal attribute and the focus is on how differences between males and females explain the gap in their performance levels. Second, when gender is defined in socio-cultural sciences, it is viewed as a social issue and the focus is on the analysis of the ways in which plays, games and sports have been socially constructed to produce and legitimize male hegemony. In treating gender as an issue of sex differences, he opines

that it explains gaps that exist in performance capabilities. He focused on the problem of resource allocation and the distribution of opportunities as issues of gender in-equality.

2.2.2 The Theory of Household Production Model

The household which is defined as a group of people who produce and eat together as one economic and social unit is therefore considered as the unit of production and consumption (Bullow and Sorenson 1988).

The production model derived from it is also referred to as the economic theory of the family (Willis 1973). The framework was first formulated formally by Becker in (1965). The major element of the model is that the technology of household production is described by a production function or functions and a list of resources is utilized in the production process .

According to Okojie, (1981), it allows

economic theory to cope more with human capital, allocation of time and non-market household behaviour than the traditional economic model which incorporates only money and prices. This is because factors such as family size, age structure, race, education, occupation and socio-economic status are often more important than monetary prices or income as explanatory variables in empirical studies (Okojie, 1981).

An important feature of the model is its recognition that the labour supply of household members, especially that of the wife is associated with a host of non-market decisions including fertility, marriage, human capital and so on. If expanded the traditional concept of opportunity cost of time allocation to market work is not simply foregone leisure by also foregone non-market poduction (Devaney, 1977).

The main criticism of the household production theory has been that the theory

does not take into account the economic, cultural and institutional organisations of less developed countries, such as Nigeria (Fapohunda, 1978 and Shields 1976). The theory treats the household as a production and consumption unit in which the welfare of all members is taken into consideration in the utility function of the decision maker. The argument is that the concept of the nuclear household is nebulous in many less developed countries where polygamy and extended families predominate. Sheilds, (1976) therefore argues that an individual utility-maximizing function may be more relevant.

The theory assumes that children are time-intensive of mother's time and thus the opportunity cost of bearing children is very high. This assumption according to Okojie (1981) does not necessarily hold in LDCs where children are not regarded as the exclusive responsibility of the mother. In the LDCs, market work and household production

(Child Care) may be treated as joint activities and not necessarily alternative uses of time as assumed by the household production theory.

The assumption that family income is pooled is not realistic. In Africa for example, the husband's income is spent not only on his immediate family, but also on the members of the extended family. In addition, many women do not know their husband's income. (Okojie 1981). Thus the husband's income and other family income are not perceived as parameters influencing the womens' labour force decision. Also the existence of polygamy means that the wife's relationship to her husband may be tenuous. In such a unit, each wife and her children form a sub-household for whom she may have primary responsibility.

The central role of wages in the household production theory implies that there is an organised labour market where wages affect labour productivity as well as supply and

demand conditions for labour. But in LDCs, the labour market is unstructured because of the prevalence of the informal sector. Also in the formal sector, wages tend to be fixed by government commissions and are therefore rigid downwards, irrespective of labour supply and demand conditions. In such economies, opportunities for employment may be more important than wage rates (Cain, 1967).

2.2.3 Determinants of Gender Resource Allocation Behaviour

From the findings of researchers who had applied the household productive model to LDCs, certain factors have been identified as major determinants of gender resource allocation. These factors can be grouped into individual, household and resource market characteristics (Standing 1980) Each category of variable could further be sub-divided into micro and macro variables. At the micro level,

socio-economic variables considered by the household production model are child-status, educational attainment, husband's income, occupation, and education. Other micro variables more specific to LDCs include marital status, presence of domestic or househelp in the household, migrant status, women's relationship to the household head, proportion of informal sector job opportunities marital status and income distribution (Standing and Sheehan, 1978, Onyemelukwe 1977).

Okojie (1981) maintained that cultural variables are also important in any analysis of gender resource allocative behaviour. Such cultural variables include religion, ethnic origin (race, caste) marriage type (polygamy or monogamy), household type (nuclear or extended families).

Empirical findings show that there is an inverse relationship between fertility and labour supply (Standing 1978). The relationship between education and gender

resource allocation, according to Standing (1978), is more positive than negative.

Labour supply is a positive function of own prospective wage and a negative function of husband's or other family income (Standing, 1978). In general, according to Okojie (1981), female labour supply responds to employment opportunities and that female labour supply is more responsive to changes in female wages than to changes in other family income.

Evidence on the actual relationship between migration and female labour force participation is fragmentary. Some studies show that female migrants are more likely to have higher labour force than non-migrants (Standing, 1978; Okojie 1981). They maintained that married women tend to withdraw from the labour force when they have young children, given the assumption that children are more female-time intensive than other commodities produced within the home.

2.2.4 Determinants of Household Consumption Behaviour

There are both income and non-income determinants of household consumption behaviour. They include prices, household size, quantity of output supplied and qualitative factors such as psychological attributes (Diulio, 1974). There have been conflicting views on whether the more appropriate explanatory variable should remain income or total expenditure because income concept is elusive in both theory and practice since people tend to understate or overstate their income depending on the individual circumstances (Adeyokonnu, 1972).

Also regression coefficients obtained when total expenditure is used has been reported to be more reliable than those estimated directly with income (Reid, 1975).

The concensus, according to Adeyokonnu (1972), is that total expenditure could

therefore be used as an alternative because it is believed that expenditures are reported with less error than earnings. Thus income variable was estimated using expenditure in the present study. Household expenditure here means payment on all items, food and non-food. Imputed prices were used for food items produced and consumed in the home.

Household size is another very important and quantifiable variable affecting household food consumption behaviour. It can be direct variable as in Onyenweaku (1978) or an inverse variable as in Abah (1979). Any omission of this demographic factor may lead to upward bias in the estimated parameter (Devoretz 1982, Paris and Houthankr, 1955).

Prices of food commodities studied and those of their immediate substitutes are important variables that account for diffe-rences in household food consumption behaviour. However, since price differences hardly exist in a cross sectional survey according to Koutsoyianis (1977),Olayemi and

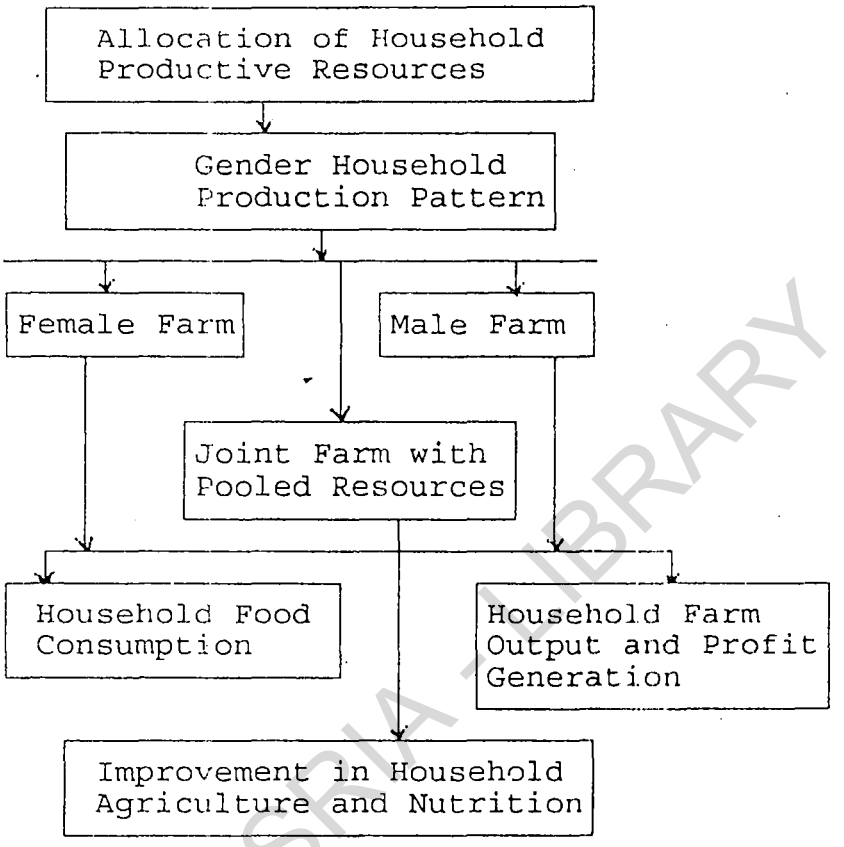
Olayide (1981), the variable was not considered a worthwhile explanatory variable and therefore was dropped.

2.2.5 Schematic Framework of Analysis

In order to achieve the objectives of this study, a diagramatic schema explaining both the theoretical assumptions and the operational hypotheses have been formulated and shown in figure 2.1.

The argument is that if resources are allocated to both men and women according to their comparative advantages, normal profits and adequate food consumption can be achieved even when they engage in their individual farm activities at the household level. Alternatively, both gender are conceived to strive at achieving the same goal and then the resources are pooled for joint farm production. Again, normal profits and adequate household food comsumption can be achieved using this path.

Figure 2.1 Diagramatic Framework of Analysis



CHAPTER THREE

METHODOLOGY

3.1 Agricultural Background of the Study Area

Imo and Abia States are located in the former Imo State in the South-east of Nigeria and share boundaries with Enugu and Anambra States to the north, Cross River and Akwaibom to the east, Rivers to the south and Delta to the west.

The two states cover a total area of about 12,689 Square Kilometers which is about 1.268,900 hectares of land area. About 1,065,300 hectares representing 84 percent of the land area are potentially cultivable.

As in other parts of the country, there are two seasons in the year, namely the rainy season from march to October and the dry season which commences in November. The annual rainfall is between 1,800mm - 2.000mm. The soils are sandy and green vegetation persists throughout the year as a result of the even distribution of rainfall. Large parts of the states are however affected by gully and sheet erosion owing to the nature of

soils and heavy rainfall (IMSG 1983).

The mean annual temperature lies between 22°c and 31.5°c. The relative humifity ranges between 81 and 92 percent. In 1982, the population of the two states was estimated as 5.8 million. About 80 percent of the total population lived in the rural areas and 62 percent were farmers. The potentialy economically active population aged between 16 and 65 years were estimated at 2.5 million or 53 percent of the rural population (IMSG 1993).

According to Imo State Government (1983), a household in the study area had on the average 9.9 persons consisting of a head of household, 1.2 wives, 4.9 children and 2.8 other dependent relatives. But the result of a CBN/NISER SAP survey conducted in Imo State in 1990 indicated that the average household has about 6.7 persons consisting of the head of the household, 1.6 wives, 2.9 children and 1.3 other dependent relatives. Thus the average household size appears to be on the decrease.

As also indicated by the Imo State Government (1983), about 60 man-days of the average farm household labour supply were devoted to farming per month. These were made up of 19 men - days contributed by the male head of household, 13 man-days contributed by the wives and 28 man-days contributed by the dependants. On annual basis, there was an estimated labour capacity of 1440 man-days per household. Over 50% of this available labour was actually utilised in agriculture. The indications are that agriculture provides a significant amount of employment and income in the two states that now constitute the former Imo State.

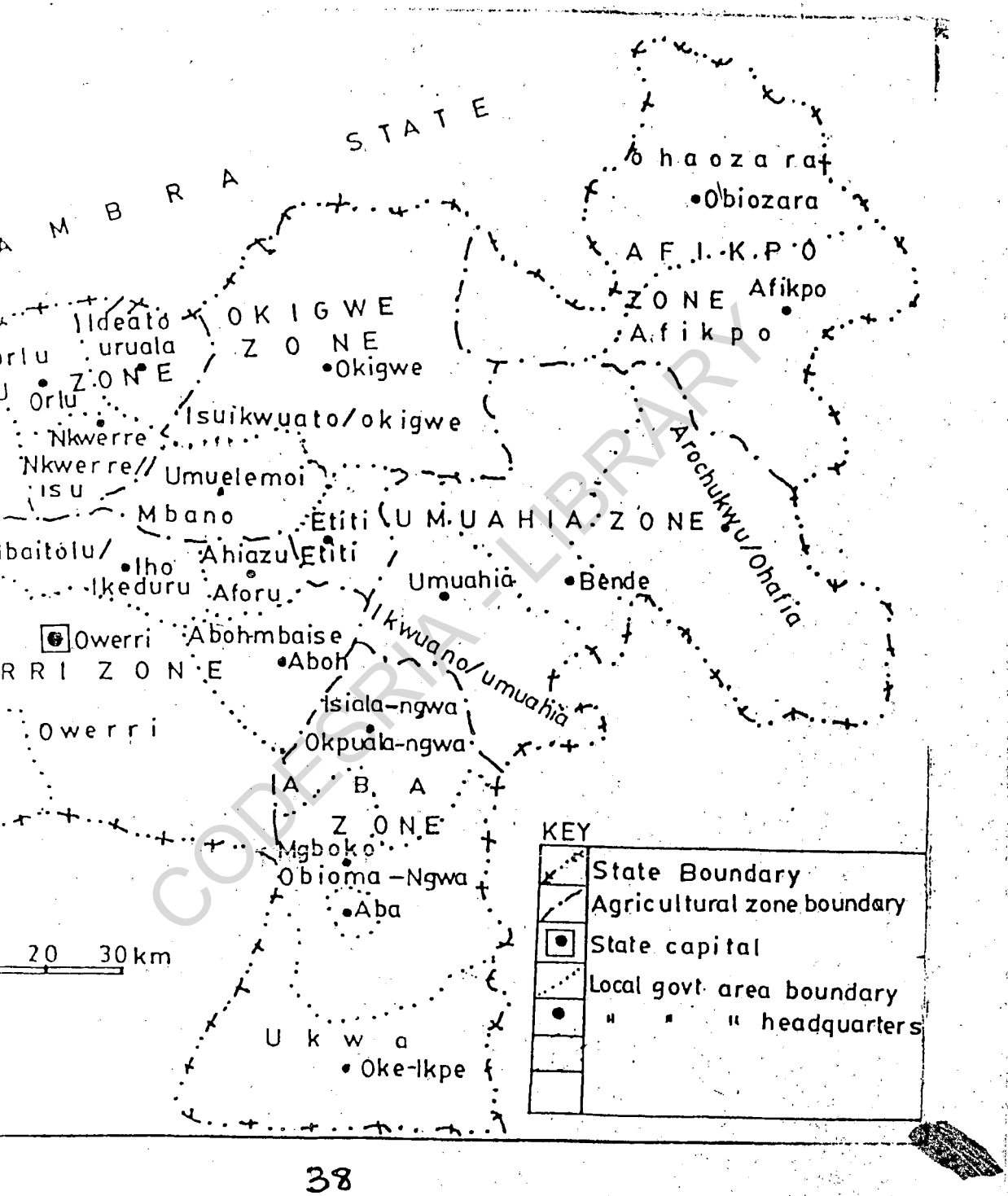
The natural vegetation consists of tropical rain forest which covers the greatest part of the State and the derived savannah which exists in a narrow axis between Okigwe in Imo state and Afikpo in Abia state. The two states are however divided into six agro-ecological zones namely Afikpo, Aba and Umuahia zones in Abia state and Okigwe, Owerri

and Orlu zones in Imo state (see fig 3.1). The crops produced and the cropping patterns are, nevertheless distinct for each zone.

In the household farms, in the study area could be classified into two distince types, although slight variations exist among household. The first is communal or family farm which is worked collectively by all household members. The second is a set of private fields that are cultivated on individual basis and often separable into male and female owned farms.

Figure 3.1

Map showing the agricultural zone of the study area



In both monogamous and polygamous households, farm ownership partterns or even the contribution of each person within the household towards farm production can be delineated. But, generally, both men and women play important roles in crop and livestock production.

3.2 Sample Selection

The study was restricted to only farming households and was conducted in Imo and Abia states that make up the former Imo State. The two states are made up of six agricultural zones and thirty-eight local government areas as shown in figure 3.1. The zones have distinct agricultural activities. Thus major agricultural activities by sex in each zone were used as basis for sample selecion.

Six local government areas, each from a zone were selected. They include Ohaozara, Okigwe, Isiala Ngwa, Ngor Okpala, Orlu and Umuahia. The selected local government areas represent the area that has major

agricultural activity for which the zone is known. In each of the selected local government area one village was chosen. At the village level, 34 farmers were selected and studied. The selection of the household was based on the enlistment of the co-oporation of both the man and his wife simultaneusly.

On the whole, a total of 204 farmers made up of 102 women and 102 men were selected and studied in the two states after pretesting with about 40 respondents. The pretesting was to validate the data collection instruments.

3.3 Data Sources and Types

Both primary and secondary data were collected. The primary data were generated through a cross-sectional survey of both men and women farmers in the households selected for study. Secondary data were collected from published and unpublished materials, local leaders of men and women groups, government officials and agencies as well as other opinion leaders. Data were also

collected from the zonal offices of the Agricultural Development Project, the Nigerian Agricultural and Cooperative Bank, State Ministry of Agriculture and Natural Resources and Better Life Programme for Rural women in the study locations.

Data on socioeconomic characteristics, institutional factors, farming operations, quantities of inputs used and outputs produced by farmers engaged in various types of food and cash crop production were obtained from the primary data collection exercise. Detailed data on the proportion of farm output and farm and non-farm incomes that were allocated to household consumption were also collected from farmers interviewed.

3.4 Data Collection Procedure

The households selected were visited several times by well-trained enumerators who were closely supervised by the author for primary data collection for both the preliminary survey and data collection proper. Structured questionnaires were applied to

male and female farmers to obtain information on family structure, farming practices, non-farm activities, the organization of food preparation and consumption, investments and cultural norms. Ten (10) fields of male and female farmers in each selected local government area were carefully measured using tapes and compasses in order to ensure the accuracy of crop yield and input data. The averages obtained from this subsample were used to compute relevant statistics from other household data collected in the various localities. Open-ended questionnaires were used to record farming activities, income and expenditure flows and other farm and household data at regular intervals throughout the study year 1991/92.

The information collected was verified and cross-checked through continuous bi-weekly interaction with members of each household throughout the 1991/92 farming season. Discussions were frequently held in the fields by the researcher in all day-to-day

activities, including farming activities. Women were generally interviewed by female enumerators while men were interviewed by the male enumerators. Thus, two enumerators were always found in a household at any time an interview was scheduled.

It is pertinent to point out that 54 of the sampled farmers representing 27 households and about 26 percent of all households in the sample were rejected because of either non-response or incomplete information. The interview lasted for a whole farming season. In the end, data from 150 farmers, representing 75 farming households were found to be sufficiently complete and consistent to be used for the analysis.

3.5 The Measurement and Test of Efficiency

The conventional variants of efficiency can be classified as technical, price or allocative and economic efficiencies. A firm is considered more technical efficient than another, if given the same quantities of

measurable inputs, it consistently produces a large output (Lau and Yotopoulos 1971). The conventional measurement of technical efficiency concentrates on the neutral displacement of the production function either between groups of firms or over time (Hoch, 1965 and Mundlak 1961).

Price or allocative efficiency traditionally rests on an index or marginal products or opportunity cost. If among all inputs, the ratios of marginal products to opportunity costs are equal to one, a firm is price efficient (Lau and Yotopoulos, 1971). A price efficient firms is a profit maximizer. That is if it equates the value of the marginal product of each variable input to its price. A firm which fails to maximize profit is, by definition, price inefficient (Lau and Yotopoulos 1971; Adegeye and Dittoh 1982). Contrary to technical efficiency which is purely an engineering concept. price efficiency is purely a behavioral concept.

Economic efficiency is the product of

both technical and allocative efficiencies whose policy implications permeates both the micro and the macro economic levels. If two firms face identical prices but varying degrees of technical and price efficency, then a firm with higher profits within a certain range of price is considered relatively more ecnomic efficient firm (Lau and Yotopoulos 1971).

The inter-ralaionships of the concepts of techincal efficiency, price efficiency and economic efficiency can be explained by considering two firms with identical production functions up to a neutral displacement parameter as follows

$V^1 = A^1 F (X^1, Z^1)$ 3.5.1

$V^2 = A^2 F (X^2, Z^2)$ 3.5.2

where

V = output

A = technical efficiency parameter

X = vector of variable inputs

Z = vector fixed inputs

F = production function

Superscript denotes firm

Given comparable endowment, identical technology and normalized input prices, the UOP profits of the two firms should be identical if they both maximize profits. To the extent that one firm is more price efficient or more technically efficient than the other, the UOP profits will differ even for the same normalized input prices and endowment of fixed inputs.

The marginal conditions from equations 3.5.1 and 3.5.2 are as follows:

$$\frac{\delta A^1 F(X^1, Z^1)}{\delta X_j^1} = K_j^1 C_j^1 \quad \ldots\ldots\ldots \quad 3.5.3$$

$$\frac{\delta A^2 F(X^2, Z^2)}{\delta X_j^2} = K_j^2 C_j^2 \quad \ldots\ldots\ldots \quad 3.5.4$$

$$K_j^1 \geq 0 \ , \ k_j^2 \geq 0 \ , \ j = 1, \ \ldots \ m$$

If the two firms are equally technical efficient, $A^1 = A^2$. The two firms are equally

price-efficient with respect to all variable inputs if and only if $k_j^1 = k_j^2$, (j=1...., m). Since econonic efficiency encompasses both technical and price efficiency, the null hypothesis of equal relative economic efficiency for firms 1 and 2 implies that $A^1 = A^2$ and $K^1 = K^2$. In this formulation, the K's reflect a general systematic rule of behaviour - a decision rule that gives the profit maximizing marginal productivity conditions as a special case. The elements of K^i may be interpreted as the first order coefficients of a Taylor's series expansion of arbitrary decision rules of the type

$$\frac{\delta F}{\delta X_j^i} = f_j^i(c_j^i), \quad i=1,2; \; j=1,...m \qquad ....3.5.5$$

Where $f_j^i(0) = 0$ and

$$f_j^i(c_j^i) \geq 0$$

Recall that the right hand side of equations 3.5.1 and 3.5.2 may be interpreted as the effective prices facing the two firms. The

behaviour of the two firms can be viewed as profit maximization subject to these effective prices and can be represented by the behavioural UOP profit function as follows.

Let $G^*(c, z)$ be the UOP profit function corresponding to $F(X,Z)$.

By a theorem proved in McFadden, the UOP profit fucntion corresponding to a production function $V = AF(X,Z)$ is

$$\pi^* = AG^*(C/A, Z) \quad \ldots\ldots\ldots\ldots 3.5.6$$

Since the $K_j^i C_j^i$ may be interpreted as the effective prices, the behavioural UOP profit functions for the two firms, respectively can be written as

$$\pi_b^1 = A^1 G^*(K_1^1 C_1^1/A^1, \ldots K_m^1 C_m^1/A^1, Z_1^1, \ldots Z_n^1) \quad 3.5.7$$

$$\pi_b^2 = A^2 G^*(K_1^2 C_1^2/A^2, \ldots K_m^2 C_m^2/A^2; Z_1^2, \ldots Z_n^2) \quad 3.5.8$$

Differentiating the behavioural UOP profit functions with respect to the effective prices $K_j^1 C_j^1$ and $K_j^2 C_j^2$ we obtain the demand functions as given by Shephard Uzawa-McFaddan Lemma as follows:

$$X^i_j = - \frac{A^i \delta G^*(K^i C^i/A^i, Z^i}{\delta K_j^i \, C_j^i}$$

$$= - A^i \frac{\delta G(K^iC^i/A^i, Z^i)}{\delta K_j^i C_j^i} \quad \ldots.3.5.9$$

$$i = 1,2 \; ; \; j = 1.....m$$

By correspondence, the supply functions are given by

$$V^i = A^iG^*(K^iC^i/A^i, Z^i) - A^i \sum_{j=1}^{m} K_j^iC_j^i \frac{\delta G^*(K^iC^i/A^i, Z^i)}{\delta K_j^i C_j^i}$$

$$= A^iG^*(K^iC^i/A^i, Z^i) - A^i \sum_{j=1}^{m} C_j \frac{\delta G^*(k^iC^i/A^i, Z^i)}{\delta C_j^i} \quad 3.5.10$$

The X_j^i and V^i as given in equatations 3.5.9 and 3.5.10 are the actual quantities of inputs demanded and output supplied respectively by firm i, given the firm specific A^i and K^i. When appropriate functional forms are specified for G, statistical tests can be devised to test the null hypothesis of equal economic efficiency. First, one can test the null

hypothesis of equal relative economic efficiency. This hypothesis is equivalent to testing whether

$$\frac{\delta F}{\delta X_j^i} = f_j^i(C_j^i) \quad , \quad i = 1,2 \quad \ldots 3.5.11$$

or

That $A^1 = A^2$ 3.5.12

and

$$K^1 = K^2 \quad \ldots\ldots\ldots 3.5.13$$

That is if there exist significant differences between the two profit functions. Second, it is possible to test separately the hypothesis of equal technical efficiency, that is if $A^1 = A^2$ and of equal price efficiency, that is if $K^1 = K^2$. However one can have equal relative economic efficiency without necessarily having both $A^1 = A^2$ and $K^1 = K^2$ (Yotapoulos and Lau (1973).

3.6 Analytical Tools and Techniques

The data collected were analyzed using a combination of statistical and econometric tools. The statistical tools used include descriptive statistics such as mean, variances , standard deviations and coefficient of variation. The econometric techniques used were those of correlation and regression. The analytical models most appropriate for this study are the household food production and consumption models. In order to analyze the consumption behavior of the household, a household food consumption model specified below was estimated.

3.6.1 The Household Consumption Function

The general form of the household consumption equation is as follows.

$C_j = f(Q_{mj}, Q_{wj}, Y_{mj}, Y_{wj}, H_{mj}, H_{wj}, e)$ 3.6.1

where

C_j = quantity of food consumed by the house hold (in calories)

Q_{mj} = male farm output

Q_{wj} = female farm output

Y_{mj} = male farm and non-farm income

Y_{wj} = female farm and non-farm income

H_{mj} = number of male members of the household.

H_{wj} = number of female members of the household

e = stochastic error farm.

The above equation was estimated using four functional forms, namely the linear, semi-log, double-log and exponential forms. The lead equation was chosen using economic , econometric and statistical criteria. They include. First the level or magnitude of the regression coefficient and the explanatory power as revealed by the value of the adjusted coefficient of multiple determination (R^2). Second, the sign of the coefficient of the exogenous variables as they determine the economic interpretation of the function within the framework of economic theory. Third, the significa2nce of the explanatory variables as revealed by the

value of their test statistics (ie the t- and F-tests). Fourth, the simplicity of its computation.

3.6.2 Formulation of the Cobb Douglas Case of The UOP Profit Function

The household production activity was analyzed with a Cobb Douglas profit function. This model has been used extensively in many past studies and the results have been satisfactory in most of these studies. For instance, Lau and Yotopoulas (1972), Yotopoulas et al (1976), and Kalijavan (1981) used the profit function of the Cobb Douglas form in determining relative economic efficiencies of farmers.

In formulating the normalized profit function we start with a neoclassical production function stated in a general form as:

$$Q = f(x, z) \quad \ldots\ldots\ldots\ldots 3.6.2$$

where

Q = total farm output

X = vector of variable inputs

Z = vector of fixed inputs

Gross profit can be stated as .

$$\pi = PQ - \sum_{i=1}^{m} C_i X_i \quad \ldots\ldots\ldots\ldots\ldots 3.6.3$$

where

P = Price of output

C_i = Price of the ith variable input

X_i = Quantity of the ith variable input

m = number of variable inputs

For a profit maximizing household,

$$\frac{\delta f}{\delta X_i} = \frac{C_i}{p} = q_i$$

or

$$C_i = Pq_i \quad \ldots\ldots\ldots 3.6.4$$

where

q_i = normalized price is the nominal price of the ith variable input. The normalized price is the nominal input price divided by the price of output. From equations (3.6.3) and (3.6.4), a profit function may be defined as:

$$\pi = P(Q - \sum_{i=1}^{m} q_i X_i) \qquad \ldots\ldots 3.6.5$$

Equation (3.6.5) implies that gross profit is the total value of output minus the total cost of the variable inputs of production. It is a gross margin or surplus appropriated by fixed inputs of production (Lau and Yotopoulos, 1972). But demand for the ith variable may be given as:

$X_i^* = q_i(q,z)$ for i = 1,...m 3.6.6

where

X_i^* = the optimum quantity of the ith input

q^* = the vector of normalized price of variable inputs.

The optimum quantity gives the maximum profit. When equations (3.6.3) and (3.6.6) are substituted into (3.6.5), the normalized profit (π^*) function is obtained as follows:

$$\pi^* = \frac{\pi}{p}$$

If $Q=f(X,Z)$ and $X_i = f_i^{gi}2(q,z)$,

then equation 3.6.5 should be

$$\pi^* = f[f_i^{gi}(q,z), Z] - \Sigma q_i f_i(q,z) \quad \ldots\ldots 3.6.7$$

This implies that

$$\pi^* = h(Q,Z) \quad \ldots\ldots\ldots\ldots 3.6.8$$

Thus, normalized profit is a function of the normalized prices of variable inputs and the physical quantities of fixed inputs. Similarly the unrestricted profit function (π) expresses unrestricted profit as a function of a vector of variable input prices, output price and quantities of fixed inputs.

For the Cobb Douglas case, equation (3.6.8) can be written as

$$\text{In } \pi_j^* = \text{In } A^* + \sum_{i=1}^{n} \alpha_i^* \text{ In } q_{ij} + \sum_{k=1}^{m} \beta_k \text{ In } Z_{kj} \quad \ldots\ldots 3.6.9$$

where

π_j^* = restricted profit (normalized)

q_{ij}^* = normalized price of i^{th} variable input for the j^{th} household

Z_{kj} = k^{th} fixed factor for the j^{th} household

A^* = intercept (neutral displacement or efficiency parameter)

Demand functions for variable inputs (X_i) are obtained by differentiating the normalized profit functions with respect to respective normalized factor prices. These factor demand equations are then estimated simultaneously along with the profit function with the assumption that the firm is a profit maximizer. The hypothesis of profit maximization of the firm asserts that the common parameters of the profit function and factor demand equations are equal (Chand and Kaul 1986). Under the Cobb Douglas formation, they maintained that the estimating equations for factors are factor share equations.

Therefore

$$\frac{q_i^* X_i^*}{\pi^*} = \frac{\delta \mathrm{In}\pi^*}{\delta \mathrm{In} q_i^*} = \alpha_i^* \quad \ldots.3.6.10$$

Equations 3.6.9 and elasticiy coefficient in 3.6.10 are estimated simultaneously with the restriction that α_i^* in (3.6.9) = α_i^* in (3.6.10).

Normally, there is a one-to-one correspondence between the production function and the normalized profit function. Thus given a production function, the normalized profit function can be determined from it and vice versa. This one-to-one correspondence implies that if the assumption of profit maximization is maintained, the analysis can start with a normalized profit function because there must exist a production function which gives rise to the normalized profit function (Mbata 1988). The advantage of starting with a normalized profit function, however lies in the fact that the demand function for input can be obtained by simple differentiation. In addition, technical efficiency, price efficiency and effective price difference which underline the concept of economic efficiency can be more easily analyzed by

using the profit function.

The normalized restricted profit function introduced by Yotopoulos and Lau (1973) belong to the category of neoclassical production functions but it differs from the traditional production function in the following respects.

(i) the normalized restricted profit function uses the prices of the variable inputs and quantities of the fixed inputs as independent variables.

(ii) supply and demand functions are derived from the normalized profit functions

(iii) effects of institutional characteristics which include the influence of imperfect markets, size and method of farm operation as well as the ability to command resources are introduced directly into the normalized profit functions.

(iv) Under standard assumptions, the traditional direct production function estimates may be subject to simultaneous equation bias and inconsistency when estimated by ordinary least square method. By contrast and under

standard assumptions, the profit function approach yields statistically consistent estimators (Mbata 1988).

3.6.3 Model Specification for Empirical Estimation

For this study and for ease of expirical estimation, the Cobb Douglas form of the normalized profit function is formulated and linearized as follows

$$\ln \pi_j^* = \ln A^* + \alpha_1^* \ln q_{1j}^* + \alpha_2^* \ln q_{2j}^* + \alpha_3^* \ln q_{3j}^* + \alpha_4^* \ln q_{4j}^* + \beta_1^* \ln z_{1j}^* + \beta_2^* \ln z_{2j}^* + \beta_3^* \ln z_{3j}^* + \beta_4^* \ln z_{4j}^* \quad \ldots 3.6.11$$

where

π_j^* = Normalized or restricted profit of the jth household and is computed as total revenue less total variable cost of production, normalized by unit output price (UOP)

q_{1j}^* = Normalized price for hired male labour, calculated by dividing the total wage paid to hired male labour by total man days of hired labour used, and by

dividing the result by the UOP. On a priori basis,

$$\frac{\delta \pi^*}{\delta q_{1j}} < 0$$

q_{2j}^* = Normalized price for hired female labour, calculated by dividing the total wage paid to hired female labour by the total man days equivalent of hired female labour used, and then dividing the result by the UOP. On a priori basis,

$$\frac{\delta \pi^*}{\delta q_{2j}} < 0$$

q_{3j}^* = Normalized price for purchase inputs, represented by the price of fertilizer used. This was obtained by dividing the total expenditure incurred by the farmer on fertilizer input by the total quantities (in kg) of the fertilizer used by him and further dividing the ratio by the UOP. On a priori basis,

$$\frac{\delta \pi^*}{\delta q_{3j}} < 0$$

q_{4j}^* = Normalized price of tractor hire. This was obtained by dividing the total expenditure incurred on tractor hire by the total hectares of tractorized farmland and by further dividing the ratio by the UOP. On a priori basis,

$$\frac{\delta \pi^*}{\delta q_{4j}} < 0$$

Z_{1j} = Quantity of male family labour (in mandays equivalent) used in the household. On a priori basis,

$$\frac{\delta \pi^*}{\delta z_{1j}} > 0$$

Z_{2j} = Quantity of female family labour (in man days equivalent) used in the household. On a priori basis,

$$\frac{\delta \pi^*}{\delta z_{2j}} > 0$$

Z_{3j} = Area of farmland cultivated (in ha).

On a priori basis,

$$\frac{\delta \pi^*}{\delta z_{3j}} > 0$$

Z_{4j} = Value of farm implements such as hoes, cutlass, wheel barrow etc. On a priori basis,

$$\frac{\delta \pi^*}{\delta z_{4j}} > 0$$

α_i^* ... α_4^* = elasticities of the normalized profit with respect to the variable inputs.

β_1^* ... β_4^* = elasticities of the normalized profit with respect to the fixed inputs.

There are five basic characteristics of this model according to Chaud and Kaul (1988). First the own-price elasticity of factor demand is always elastic with the Cobb Douglas type of the profit function. Second, all variable factors are complementary to each

other and hence the substitutive relation is ruled out by this function. Third, price elasticity of factor demand with respect to output price is always more than one or elastic. It is simply one plus output supply elasticity and it is the same for all factors. Fourth, cross-price elasticity of all the factors with respect to the price of any other factor is the same in magnitude and sign. Fifth, the effects of change in any fixed factor is symmetric on all the variable inputs. This is an important limitation of the Cobb Douglas form of the normalized profit function. To elaborate it further, for example, when farm size increase, the factor intensities do not change.

3.7 Indirect Estimation of Production Function Parameters

Given the following parameter estimates of a normalized profit function,

α_i^* (i = 1, ...m)

β_i^* (i = 1, ...n)

One can obtain the corresponding estimates of the parameters of the production function through the following indentities (Mbata, 1988)

$$\alpha_i^* = -\alpha_i (1 - \mu)^{-1}, \quad i = 1, \ldots m \quad \ldots \quad 3.7.1$$

$$\beta^*_i = \beta_i (1 - \mu), \quad i = 1, \ldots n \quad \ldots \quad 3.7.2$$

where

$$\mu = \sum_{i=1}^{m} \alpha_i \quad \ldots\ldots\ldots\ldots \quad 3.7.3$$

Summing the first identity across the variable inputs, one obtains

$$\sum_{i=1}^{m} \alpha_i^* = -\mu(1 - \mu)^{-1} \quad \ldots\ldots\ldots \quad 3.7.4$$

$$\text{Let } \mu^x \equiv \sum_{i=1}^{m} \alpha_i^*, \quad \ldots\ldots\ldots \quad 3.7.5$$

$$\text{Then } \mu^* = -\mu(1 - \mu)^{-1}, \text{ or }, \quad \ldots\ldots \quad 3.7.6$$

$$(1 - \mu)\mu^* = -\mu, \text{ or }; \quad \ldots\ldots\ldots \quad 3.7.7$$

$$-(1 - \mu)\mu^* = \mu, \text{ or }, \quad \ldots\ldots\ldots\ldots \quad 3.7.8$$

$$-\mu^* + \mu\mu^* = \mu, \text{ or }, \quad \ldots\ldots\ldots\ldots \quad 3.7.9$$

$$-\mu^* = \mu - \mu\mu^*, \text{ or } \quad \ldots\ldots\ldots\ldots \quad 3.7.10$$

$$-\mu^* = \mu (1 - \mu^*) \text{ or } \quad \ldots\ldots \quad 3.7.11$$

$$\mu = -\mu^* (1 - \mu^*)^{-1}, \quad \ldots \quad 3.7.12$$

Thus

$$\alpha_i = -\alpha_i^* (1 - \mu^*)^{-1}, \quad i = 1, \ldots, m \qquad 3.7.13$$

$$\beta_i = \beta_i^* (1 - \mu^*)^{-1}, \quad i = 1, \ldots, n \qquad 3.7.14$$

Since $(1 - \mu) > 0$ in equation 3.7.7 by concavity and $\mu > 0$ by monotonicity, then the value of $(1-\mu)$ must strictly be greater than one and μ must be strictly negative.

3.8 The Limitations of the Study

The study was confined to the selected rural farming households in Imo and Abia states of Nigeria. The problems encountered during the survey and which imposed some limitations on the study include the following:

First, it was difficult to enlist the cooperation of both the male household head and his wife simultaneously and this was the most important condition required to choose a household. Thus, households in which either sex refused to cooperate were rejected and

replaced.

Second farmers lacked standard measurements. Third the exclusion of non-gender variables from the equations may render the results of the study to be of limited application. Therefore the results should be interpreted with caution. Fourth, the inability to include some essential gender induced variables such as culture and religion in the equations may tend to limit the application of the results generated therefrom.

Fifth, male and female resource use efficiency was evaluated on the assumption that they face the same input and output markets as well as the same level of technology and risk. These assumptions may limit the findings of the study as male and female farmers may not necessarily face identical prices, technology and risks.

CHAPTER FOUR

FARMERS' SOCIOECONOMIC CHARACTERISTICS, THEIR RESOURCE CONTROL AND ALLOCATION PATTERNS IN AGRICULTURAL ACTIVITIES

4.1 Gender Socioeconomic Characteristics

4.1.1 Farmers' Age

As shown in Table 4.1, about 57 percent of the male farmers fell within the age bracket of 26 and 55 years, while about 88 percent of the female farmers fell within the age bracket of 26 and 55 years. This indicates that male farmers were, on the average, older than female farmers. This is consistent with the findings of Ram and Singh (1988) who reported that wives are typically much younger than men among the houshold residents.

TABLE 4.1

Distribution of Farmers Age by Gender

Age Interval (Years)	NO. of Males	Rel. Freq. of Males %	NO. of Females	Rel. Freq. of Females %
≤ 25	1	1.00	5	7.00
26 - 35	10	13.00	23	31.00
36 - 45	13	17.00	30	40.00
46 - 55	20	27.00	13	17.00
56 - 65	25	34.00	4	5.00
66 - 75	5	7.00	0	0.00
> 75	1	1.00	0	0.00

Source: Field survey data 1991/92

Mean age of males = 51.29 years.

Standard deviation of age of males = 12.61 years.

Mean age of females = 39.33 years

Standard deviation of age of females = 9.06 years.

4.1.2 Farmers' Level of Education

The frequency distribution of the farmers' level of education is shown in Table 4.2. Table 4.2 suggests that only about 13 percent and 14 percent of male and female farmers respectively did not have any formal education. Although the percentage of female farmers who had no formal education was greater than that of male farmers, the difference was not statistically significant. However, about 67 percent of the female farmers terminated their formal education at the primary school level. On the contrary, while larger proportion (50%) of the male farmers terminated their formal education at the primary school level, a substantial proportion (37%) pursued their formal education beyond the primary school level. The result appears to suggest that the farmers were gradually becoming more literate contrary to previous studies that had tended to show that larger proportions of farmers had no formal education.

TABLE 4.2

Distribution of Farmers' Level of Education by Gender

Category	Years	MALES No.	MALES Rel. Freq. %	FEMALES No.	FEMALES Rel. Freq. %
No Formal Education	0	10	13.00	11	14.00
Primary School	2-8	37	50.00	50	67.00
Secondary School	9-11	14	19.00	5	7.00
Teacher Training	12-14	13	17.00	6	8.00
Poly./ Univ.	15-above	1	1.00	3	4.00
TOTAL	-	75	100.00	75	100.00

- Not applicable

Source: Field Survey data 1991/92.

4.1.3 Occupational Types

Empirical evidence shown in Table 4.3 indicates that more men were in wine tapping, black smithing, driving, civil service and teaching occupations than women, while more women were in hair dressing, catering, tailoring, trading, weaving and farming than

men. Generally, men tended to engage in occupations that were more strenous and that which took them away from house hold activities than the females. Similarly, relatively more of the female farmers were full-time farmers than the male farmers.

TABLE 4.3

Gender Distribution by Primary Occupations

Types of Occup.	Number of Male Resps	% of Total Resps	Number of Female Resps.	% of Total Resps.	Total Resps
Farming	27	36.00	38	50.67	65
Trading	3	4.00	11	14.67	14
Teaching	6	8.00	3	4.00	9
Tailoring	2	2.67	6	8.00	8
Driving	8	10.67	0	0.00	8
Hair Dressing	0	0.00	7	9.33	7
Civil Service	7	9.33	2	2.67	9
Wine Tapping	6	8.00	0	0.00	6
Weaving	2	2.67	3	4.00	5
Blacksmitting	3	4.00	0	0.00	3
Catering	1	1.33	4	5.33	5
Others	10	13.33	1	1.33	11
TOTAL	75	100.00	75	100.00	150

Source: Field Survey Data, 1991/92

4.1.4 Farmers' Farming Experience

With regard to farming experience, Table 4.4 shows that the male farmers were more experienced than the female farmers. While only about 29 percent of the female farmers had farming experience exceeding 19 years, about 53 percent of the male farmers had farming experience exceeding 19 years. This is consistent with the age structure of the farmers which shows that the male farmers were, on the average, older than the female farmers.

TABLE 4.4

Distribution of Farming Experience by Gender

Interval (Years)	No. of Males	Relative Frequency of Males %	No. of Females	Relative Frequency of Females %
1-9	13	17.00	23	31.00
10-19	22	29.00	31	41.00
20-29	16	21.00	8	11.00
30-39	13	17.00	8	11.00
40-49	8	11.00	5	7.00
50-59	1	1.00	0	0.00
60-69	2	3.00	0	0.00
TOTAL	75	100.00	75	100.00
Average Farming Experience:		21.84		15.66
Standard Deviation		13.91		10.83

Source: Field Survey Data, 1991/92

4.1.5 Household Size

From Table 4.5, it is observed that there were more females in an average household than males. The difference is statistically significant at 5 percent level. But there were no significant differences between males and females in respect of the number of dependent male relatives and dependent female relatives. The pattern of household composition suggests that many households might experience family labour supply problems since a higher proportion of their members were females who usually got married at their most productive age. More females are found in most rural households because relatively more males tend to migrate to the urban centres in search of non-farming occupations.

TABLE 4.5

Average Size Of Household Member

Category	Mean Value	Standard Deviation	Coefficient of Variation
NOH	1.00	0.00	0.00
NOMC	2.54	0.52	0.20
NODMR	0.64	0.10	0.15
HM	4.18	2.80	0.67
NOW	1.28	0.21	0.16
NOFC	3.54	0.91	0.26
NODFR	0.97	0.19	0.19
HF	5.80	3.74	0.65

Source: Field Survey Data 1991/92.

NOH = Number of husband(s)

NOMC = Number of Male Children

NODMR = Number of Dependent Male Relatives

HM = Size of all Male Members of the Household

NOW = Number of Wives

NOFC = Number of Female Children

NODFR = Number of Dependent Female Relatives

HF = Size of all Female Members of the Household.

4.1.6 Farmers' Farm Sizes

Analysis of farm size presented in Table 4.6 shows that 80 percent of the women had less than two hectares of farm as against about 70 percent of men farmers who had less than two hectares of farm under cultivation. From the table, it could also be observed that about 30 percent of the male farmers cultivated two hectares or more, while only 20 percent of the female farmers cultivated two hectares or more.

Specifically, only one percent of the female farmers cultivated 6 to 6.99 hectares, while about 14 percent of the male farmers cultivated 6 hectares or more. In fact, no female cultivated up to 7 hectares of farm, but about 7 percent of the male farmers cultivated 7 hectares or more. On the average, male farmers cultivated larger

hectarages than female farmers. This is because male farmers cultivated an average of 2.12 hectares while female farmers cultivated an average of 1.11 hectares and an average of 1.61 hectares was for joint farm. Observations made during this study show that the males tended to produce more for the market while the female farmers tended to produce relatively more for household food consumption than for the market.

TABLE 4.6

Distribution of Farm Sizes by Gender

Farm size Interval (hectares)	Number of Males	Relative Frequency Males (%)	Number of Females	Rel. Freq. Females (%)
0 - 0.99	41	55.00	39	52.00
1 - 1.99	12	16.00	21	28.00
2 - 2.99	4	5.00	11	15.00
3 - 3.99	5	7.00	3	4.00
4 - 4.99	2	3.00	0	0.00
5 - 5.99	1	1.00	0	0.00
6 - 6.99	5	7.00	1	3.00
7 - 7.99	2	3.00	0	0.00
8 - above	3	4.00	0	0.00
Total	75	100.00	75	100.00
Average farm size		2.115		1.112
Standard Deviation		3.469		1.107
Average farm size for joint farm				1.609

Source: Field Survey data, 1991/92.

4.1.7 Farmers' Non-Farm Income

As shown in Table 4.7, 32 percent of male farmers earned non-farm income exceeding =N=2,850.00 per annum in 1992 as against only 5 percent of female farmers. In fact, about 31 percent of the male farmers earned non-farm income exceeding =N=3050.00 in 1992 while only one percent of the female farmers earned non-farm income exceeding =N=3,050.00 in the same year. This is expected because more of the women were full-time farmers and would be expected to derive relatively less of their income from non-farm sources.

On the other hand, the male farmers appeared to meet more of their household expenses from their non-farm incomes while their wives appeared to meet more of their household expenses from the incomes generated from their farming activities. However, a majority of both male and female farmers appeared to earn non-farm incomes that were less than =N=1500.00 per annum. In all, at least 54 percent of the male farmers and 75

percent of the female farmers earned between =N=50.00 and =N=1449.00 per annum from non-farm sources. Thus male farmers earned more non-farm income than female farmers. It would appear therefore that male farmers would meet more of their household expenditure through non-farm income than female farmers do.

TABLE 4.7

Distribution of Non–Farm Income by Gender

N	MALES Number	MALES Relative Frequency %	MALES % Cummulative Relative Frequency	FEMALES Number	FEMALES Relative Frequency %	FEMALES % Cummulative Relative Frequency
	3	4.00	4.00	6	8.00	8.00
	6	8.00	12.00	12	16.00	24.00
	7	9.00	21.00	10	13.30	37.30
	8	11.00	32.00	6	8.00	45.30
9	6	8.00	40.00	10	13.30	58.60
49	5	7.00	47.00	10	13.30	71.90
49	5	7.00	54.00	3	4.00	75.90
49	2	3.00	57.00	2	3.00	78.90
49	4	5.00	62.00	4	5.00	83.90
49	1	1.00	63.00	4	5.00	88.90
49	0	0.00	63.00	2	3.00	91.90
49	3	4.00	67.00	1	1.30	93.20
49	0	0.00	67.00	1	1.30	94.50
49	1	1.00	68.00	0	0.00	94.50
49	1	1.00	69.00	3	4.00	98.50
ove	23	31.00	100.00	1	1.30	99.80
	75	100.0	100.00	75	99.8	99.8
n–farm income		3914.4			1055.9	
eviation		679.78			100.18	

Source: Field Survey data 1991/92

4.1.8 **Farmer's Farm Income**

The frequency distribution of farmers' farm income by gender is shown on table 4.8. The Table shows that 73.4 percent of male farmers earned less than =N=3,000.00 from their farming activities while 64 percent of women farmers earned less than the said =N=3,000.00 from their farming activities. However, very few (4%) male farmers earned more than =N=8,000.00 from their farming activities while no woman farmer earned up to =N=8,000.00 from farming activities. On the average, male farmers earned =N=8,873.35 from farming activities while women farmers earned =N=5,842.58 from farming activities. Also and on the average, men earned a total income of =N=12,878.75 from farm and non-farm activities while females earned a total income of =N=6,997.58 from both farm and non-farm activities. It follows therefore that males earn more farm income than females.

Thus, Tables 4.7 and 4.8 together suggest that more of the incomes of rural farming

house holds were derived from the sale of farm produce than from non-farming activities. It also further indicates that the rural households studied were predominantly farmers. Furthermore, men earned more income than females from both farm and non-farm activities. When the means were separated and tested for statistical significance, it was observed that the differences in male and female farm and non-farm incomes were statistically significant at 5 percent.

TABLE 4.8

Distribution of Farm Income by Gender

N	MALES Number	Relative Frequency %	% Cummulative Relative Frequency	FEMALES Number	Relative Frequency %	% Cummulative Relative Frequency
	20	26.70	26.70	13	17.00	17.00
999	18	24.00	50.70	17	23.00	40.00
999	17	22.70	73.40	18	24.00	64.00
999	7	9.30	82.70	12	16.00	80.00
999	5	6.70	89.40	5	7.00	87.00
999	1	1.30	90.70	4	5.00	92.00
999	2	2.70	93.40	4	5.00	97.00
999	2	2.70	96.10	1	1.00	98.00
999	1	1.30	97.40	0	0.00	98.00
bove	2	2.70	100.00	0	0.00	98.00
	75	100.00	100.00	75	98.00	98.00

arm Income 8873.35 5842.58

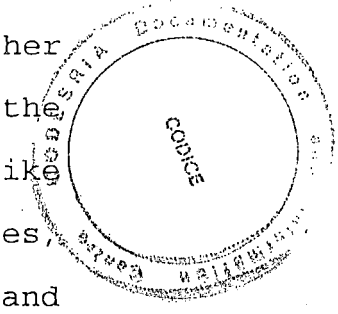
Deviation 1250.76 1249.71

ield survey data, 1991/92

4.2 Gender Responsibility in Agriculture and Resource Use pattern

4.2.1 Gender Distribution in Agricultural Activities

The distribution of the farmer's responses on the various farm activities participated in is shown in Table 4.9. The activities reported here were the major farm activities engaged in by the respondents. From the table, it could be observed that relatively more men were engaged in commercial crops like rice, citrus, cashew, plantain, groundnut and yam than women. On the other hand, more women were involved in the production of largely subsistence crops like okro, tomatoes, cocoyam, beans, vegetables, melon, pepper, sweet potatoes, soyabeans and cassava than men. The types of crops predominantly planted by the male farmers probably explains their cultivation of larger hectarages than the female farmers. It is



known that the male-oriented crops identified in this study usually require larger farm area than women-oriented crops. The result in Table 4.9 indicates that the male farmers produce more commercial-oriented crops. In fact, the men produced most of the cash crops listed in Table 4.9 while female farmers produced more food crops. Hence, it would appear that households with more female farmers tend to be relatively self-sufficient in food production, since they engaged in the production of crops that tend to supply the basic household food requirements, other things remaining equal. On the other hand, male-dominated households would need to supplement their food requirements from outside their own farm production, since most of them engaged in the production of commercial foods mainly for the market. It also appears that male-headed households would reserve greater proportion of their farm produce for sale than for

household consumption. When the proportions of male and female engaged in various crop enterprises were separated and tested for statistical significance, it was observed that there was a statistically significant difference in the proportions.

TABLE 4.9

Distribution of Farmers' Activities by Crop and Gender

Type of crops	No. of Males	Relative Frequency of males (%)	No. of Females	Relative Frequency of females (%)
Cassava	32	5.40	43	5.20
Cocoyam	7	1.20	68	8.20
Yam	53	8.90	22	2.60
Rice	66	11.10	9	1.10
Melon	12	2.00	63	7.50
Tomatoes	8	1.40	67	8.10
Okro	5	0.80	70	8.40
Vegetable	10	1.70	65	7.80
Groundnut	55	9.20	20	2.40
Sorghum	59	9.90	16	1.90
Maize	27	4.50	48	5.80
Soyabeans	25	4.20	50	6.00
Beans	9	1.50	66	7.90
Pepper	13	2.20	63	7.60
S/potatoes	19	3.20	56	6.70
Citrus	66	11.10	9	1.10
Plantain	56	9.40	19	2.30
Cashew	60	10.10	15	1.80
Oil palm	13	2.20	63	7.60
Total	595	100.00	832	100.00

Source: Field survey data, 1991/92

This indicates that agricultural enterprises are gender-specific in the area of study.

4.2.2 Gender Distribution in Cultural Practices

The analysis of agronomic operation by gender shows that a greater proportion of the male farmers' relative to female farmers undertook activities of land preparation, prunning, bird scaring, pesticide application, drying of produce, transport of farm produce to home and store (see Table 4.10). On the other hand, a greater proportion of the female farmers carried out the activities of crop planting and transplanting, fertilizer application, yam staking, weeding and produce bagging and packaging.

When the average number of male and female farmers involved in carrying out the activities of land clearing, crop harvesting,

threshing and winnowing were tested for statistical significance, it was observed that there was no significant difference in the proportion of males and females that carried these agronomic operations. Generally, no gender would be excluded from the execution of any farm operations. The result further shows that land clearing and preparations, planting, weeding and harvesting consumed a larger proportion of total farm labour than the other operations.

TABLE 4.10

Distribution of Farmers by Cultural Practices and Gender

Farm Operation	No. of Males (Mandays)	No. of Females (Mandays)	Total	% Male	% Female
Land clearing	63.32	62.14	125.46	50.47	49.53
Land preparation	99.04	40.18	139.22	71.14	28.80
Crop Planting	43.38	57.83	101.21	42.86	57.14
Crop Transplanting	9.63	13.66	23.29	41.35	58.65
Fertilizer Application	17.87	40.55	58.42	30.59	69.41
Weeding	85.43	121.80	207.23	41.22	58.78
Staking	15.04	34.00	49.04	30.67	69.33
Pesticide Application	28.79	11.33	40.12	71.76	28.24
Bird scaring	34.50	12.25	46.75	73.80	26.20
Harvesting	48.46	53.79	102.25	47.39	52.61
Threshing & Winnowing	41.97	47.30	89.27	47.02	52.98
Prunning	1.00	0.00	1.0	100.00	0.00
Drying	42.13	23.44	65.57	64.26	35.74
Bagging & Packaging	19.36	29.58	48.94	40.00	60.00
Transport of Produce	35.39	30.31	65.70	53.87	46.13

Source: Field survey data 1991/92

4.2.3 Land Resource Acquisition Pattern

The major methods of land acquisition in the study area by the male farmers is through land inheritance and outright land purchase. Women do not inherit land in the area and as such depended more on land allocated to them by their husband and those acquired through outright land purchase as well as through lease agreement (see table 4.11)

TABLE 4.11

Distribution of Farm Sizes Acquired Under Different Tenurial Arrangement by Gender (ha)

Tenure system	Male	Female
Inheritance	4.21	-
Purchase	3.38	1.56
Crop lease	1.07	0.61
Cash lease	1.84	0.85
Husband	-	1.45
Average	2.12	1.12

Source: Computed from field survey data 1991/92

Land inheritance here refers to land transfered to somebody through lineage or descendant. Land purchase refers to a situation whereby the land is bought. Two types of lease agreement were identified. They include cash and crop lease agreement.

Land transaction by lease or purchase by a woman could only take place if she could produce a man who could negotiate on her behalf. Land inheritance is patrilineal and the decision as to who gets farmland or whether farmland should be sold is taken by the household head in the case of the family and by the community leaders in the case of communal land. This impression was revealed by about 80 percent of the sampled farmers and also shown in Table 4.11.

Further analysis of Table 4.11 showed that even though land acquired through lease appeared to be small in respect of both male and female farmers, male farmers had larger hectarages under lease arrangement than women

farmers. An explanation for this could be found in the fact that culture forbids women from engaging in land transactions directly without the involvement of their male partners or close male relations. This suggests that the women in this culture were put in a position whereby the quantity of land they got from others, apart from their husbands, would depend on the good relations that existed between them and their lessors on the one hand, and between the husbands and the lessors on the other hand. This, to a large extent, reduced the quantity of land women could acquire through lease agreement. It was also discovered that title to land was mainly through inheritance as many people were often unwilling to alienate land.

4.2.4 Farm Credit Acquisition and Use Pattern

The analysis of sources of credit acquisition by male and female farmers is shown in Table 4.12. The Table revealed that

men obtained an average of =N=2766, representing 64 percent while women obtained an average of =N=1560, representing 36 percent of their farm credit from both formal and informal credit institutions. Further analysis showed that male farmers obtained at least 74 percent of their credit need from the formal sources while women obtained between 45 percent and 65 percent from the informal sources. Thus male farmers had more access to credit in the formal credit institution while female farmers appeared to have easier access to credit in the informal credit institution.

The result is consistent with an earlier finding by Odii (1987) in a study of the Supervised Agricultural Credit and the Special Emergency Agricultural Loan Schemes in Imo State where it was reported that greater proportion of the loans went to the male farmers. In that study, loan repayment by women loan beneficiaries was as low as 30 percent, while male farmers repaid up to

70 percent of the farm credit extended to them. Thus, male farmers appear to have benefited more from the formal credit institution probably because they have shown high degree of loan repayment capability. Also, it may also be found in the fact that most male farmers would be able to fulfil the collateral requirements of formal credit institutions than most women would do.

TABLE 4.12

Average Amount of Credit Received by Gender and Source in 1991 - 92 Cropping Season

Source	Men =N=	Women =N=	Total Per Household =N=	% Received by Men	% Received by Women
Co-operative Society	2937	803	3740	78.53	21.47
Development Bank	2501	871	3372	74.17	25.83
Commercial Bank	3126	1034	4160	75.14	24.86
Money Lender	763	1446	2208	34.56	65.44
Relative	3446	2647	6903	41.51	58.49
Personal Savings	1297	1065	2362	54.91	45.09
Others	5290	3054	8344	63.40	36.60
Average	2765.71	1559.86	4325.57	63.94	36.06

Source: Field Survey data 1991/92.

4.2.5 Trade-off in Gender Time Allocation in Household Agricultural Production

Household members are believed to allocate their time according to their comparative advantage in the production of market and home-consumed goods. In order to investigate this proposition, the time allocated by each gender in the production of crop was analysed as shown in Table 4.13.

From the survey it was found that Abia men spent an average of 6.16 hours of their time per day while Abia women spent an average of 8.24 hours of their time per day in farming practices. On the other hand, Imo men spent an average of 5.06 hours per day while their women spent about 9.31 hours per day in farming practices.

TABLE 4.13

Analysis of Intra-Household Gender Time Allocation in Family Farm Production (hours/day/person).

Activity	Men	Women
Clearing and tilling	5.83	5.49
Planting	0.37	1.53
Water Collection	0.17	1.82
Weeding	1.78	2.30
Produce Processing (sorting and grading)	0.38	1.67
Transport of Produce	0.65	4.15
Harvesting	2.04	0.59

Source: Field survey data 1991/92

In general, men devoted about 5.83 hours per day and 2.04 hours per day in land preparation and harvesting respectively. Women spent about 5.49 hours per day, 4.15 hours and 2.30 hours per day in land preparation, transport of produce home and weeding respectively. On the average, women devote 73.13 percent of their total time

to agricultural activities while men devote 46.75 percent of their total time to agricultural activities. Though the activities listed in table 4.13 are not exhaustive women devoted a larger proportion of their time in performing agricultural tasks than men.

CHAPTER FIVE

GENDER-RELATED DETERMINANTS OF HOUSEHOLD FOOD CONSUMPTION AND PRODUCTION

5.1 Allocation of Farm Output and Income to Meet Household Food Requirements.

The relative contribution of male and female farmers to household food requirements is shown in Table 5.1.

TABLE 5.1

Contribution to Household Food Requirements by Gender (000,000 kcal)

Parameter	Male	Female	Total
Mean Kcal of output produced (a)	15.53	13.10	28.63
Standard deviation	0.03	1.65	-
Mean Kcal of output consumed (b)	4.68	3.59	8.27
Standard deviation	1.25	1.26	-
Percentage of Produce consumed=b/a	30.16	27.43	57.59
Household food requirement per annum (HFR) = (c)	-	-	5.04
Percentage of HFR derived from own production =(b/c)	92.88	71.26	-

- Not applicable

Source: Computed from field survey data 1991/92

The table indicates that male farmers contributed 4,682,000 kcal out of 5,041,000 kcal of food required per household per annum. This represents about 92.88 percent. The female farmers contributed a total of 3,592,000 kcal out of the total household food requirement per annum. This represents about 71.26 percent. This suggests that, even though neither male nor female farmers can solely satisfy food demand, the male farmers contributed more than the female farmers in meeting household food demand from own production.

The analysis of recurrent expenditure pattern of household by gender is shown in Table 5.2. From the table it was observed that apart from maintenance of machines and equipment where women contributed about 60 percent, men contributed higher percent ages to all other recurrent items examined in the study. The result shows that issues relating to clothing, house renovation, health care,

payment of school fees, entertainment and provision of food were the primary responsibility of the male household heads. This is evident from the fact that the male household heads, on the aggregate, contributed about 61.32 percent while the females contributed about 38.68 percent of these household recurrent expenditures.

With respect to household capital expenditure, the male household head contributed higher proportions to the purchase of fan, bicycle, radio, furniture, television, land and motor cycle. Specifically, the women members of the household contributed nothing in respect of expenditures on land, fan and television. On the aggregate, only 17.52 percent of household capital expenditure was borne by women (see Table 5.3). Thus men contributed more than women in both recurrent and capital expenditure in the household. The findings is

consistent with that of Huffman (1987) when he studied farmers in Panama and concluded that male farmers contributed more to household expenditure than females.

TABLE 5.2
Recurrent Expenditure Pattern Of Households By Gender

S/N	ITEMS	Average Amount Spent by men	Standard Deviation	Coefficient Of Variation	Average Amount Spent by Women	Standard Deviation	Coefficient Of Variation	Total Amount Spent By Both Men & Women	Percentage Contributed by Men	Percentage Contributed by Women
1	Clothing	1139.18	501.23	0.44	415.9	166.36	0.4	1555.08	73.26	26.74
2	House renovation	2332.14	816.25	0.35	1500	1350	0.9	3832.14	60.85	39.15
3	Health care	316.49	85.45	0.27	199.16	23.9	0.12	515.65	61.38	38.62
4	School fees	1017.34	600.23	0.59	357.5	71.5	0.2	1374.84	73.99	26.00
5	Entertain– ment	470.54	221.15	0.47	167.59	48.6	0.29	638.13	73.74	26.26
6	Maintenance of machines	125.00	35.00	0.28	150	52.5	0.35	310.86	40.21	59.79
7	Food items	3257.76	716.7	0.22	2671.2	641	0.24	5928.96	54.95	45.05
	TOTAL	8658.45			5461.35			14155.66	61.32	38.68

Source : Field Survey Data 1991/92

TABLE 5.3
Capital Expenditure Pattern Of Households By Gender

S/N	ITEMS	Average Amount Spent by men	Standard Deviation	Coefficient of Variation	Average Amount Spent by women	Standard Deviation	Coefficient of Variation	Total Amount Spent by both men and	Percentage Contributed by Men	Percentage Contributed by Women
1	Purchase of fan	464.40	51.08	0.11	0.00	0.00	0.00	464.40	100.00	0.00
2	Purchase of bicycle	322.68	369.21	1.11	90.25	37.00	0.41	422.93	78.66	21.35
3	Purchase of Radio	405.79	409.85	1.01	58.75	59.34	0.01	464.54	87.35	12.65
4	Purchase of furniture	951.14	285.34	0.30	117.86	55.39	0.47	1069.00	88.97	11.03
5	Purchase of Television	610.00	122.00	0.20	0.00	0.00	0.00	610.00	100.00	0.00
6	Land Purchase	1200.00	17.50	0.02	0.00	0.00	0.00	1200.00	100.00	0.00
7	Purchase of motor cycle	1339.20	1102.68	0.82	857.65	403.10	0.47	2196.94	60.96	39.04
	TOTAL	5293.21			1124.51			6417.77	82.48	17.52

Source : Field Survey Data 1991/92.

5.2 Gender-Related Determinants of Household Food Consumption

The results of the multiple regression analysis of gender-oriented factors that affect household food consumption are shown in Table 5.4. From the table, the double log form of the regression results produced the lead equation. Thus further analysis of the determinants of household food consumption was based on the lead equation form.

From the double log form, it could be observed that output and incomes derived from both male and female are positive determinants of household food consumption. This suggests that increases in the quantities of male and female farm produce as well as their incomes would lead to increases in household food consumption and vice versa, given other factors.

In addition, the coefficient for male and female output are significant at one percent. This implies that male and female farm output

are statistically significant determinant of household food consumption. It therefore follows that policies geared towards increasing the level of farm output in the household would raise the level of household food consumption. The coefficient for male and female incomes are statistically significant at one percent and 5 percent respectively. The higher statistical significance of male income with respect to household food consumption is expected in view of the fact that male household heads appear to devote an increasing proportion of their incomes to household food consumption as their incomes increase. Further more, the increased production of commercial crops by male farmers increases their farm incomes and, hence, their aggregate household income.

The coefficient for the size of male and female household members are all negatively related to household food consumption. This indicates that increases in the values of

these variables would reduce household food consumption and vice versa given that other factors remain constant.

TABLE 5.4

Multiple Regression Results On Gender Determinants
Of Household Food Consumption By Functional Forms

Functional Form	Constant	ln Qmj	ln Qwj	ln Ymj	ln Ywj	ln Hmj	ln Hwj	R^2	S.E	F−ratio
Linear	1.3839	0.0284	0.2973	0.1154	0.0367	0.0344	−0.4051	0.5167	1.0483	4.978
		(0.212)	(1.638)*	(1.523)	(−0.533)	(0.153)	(−1.850)*			
Semi log	6.5214	0.1152	−0.1030	−0.0114	1.8615	−1.6459	−1.6763	0.4614	1.3166	4.301
		(0.526)	(−0.305)	(−0.143)	(1.665)*	−1.596)	(−3.634)***			
Double log	14.9660	0.4602	1.0659	0.6813	0.3834	−0.2245	−0.1495	0.7598	0.6613	14.956***
		(3.231)***	(3.805)***	(3.360)**	(2.319)**	(−3.270)***	(−4.950)***			
Exponential	7.6766	0.5088	0.1126	−0.0444	−0.2179	−0.0215	−0.3031	0.2734	4.0725	5.223
		(1.885)*	(0.260)	(−0.443)	(−0.790)	(0.156)	(−3.312)***			

ln = natural logarithm
* = significant at 10 percent
** = significant at 5 percent
*** = significant at 1 percent
Figures in parentheses are the t−ratios.

The coefficients for the size of male and female member of the household are significant at one percent. This indicates that household size is a statistically significant determinant of household food consumption.

However, a combined effect of the gender factors studied explained about 75.98 percent of the total variation in the level of household food consumption. This is revealed by the adjusted coefficient of multiple determination (R^2). On the aggregate, the included variables are all highly statistically significant determinants of household food consumption as revealed by the value of the F-statitic. Thus gender issues are generally important in discussing household food consumption.

5.3 Household Food Consumption Elasticities by Gender

The household food consumption elasticities were examined so as to ascertain the degree to which household food consumption respond to changes in gender factors. That is the rate at which household food consumption level change with gender factors. Thus, this section examined household food consumption elasticities with respect to:

(i) male farm output (Q_{mj})

(ii) female farm output (Q_{wj})

(iii) male income (Y_{mj})

(iv) female income (Y_{wj})

(v) male household size (H_{mj})

(vi) female household size (H_{wj})

Estimates of these elasticities were computed from the lead equation. Since the lead equation is of the Cobb Douglas form (double log form), the regression coefficient for the respective exogeneous variables are

themselves elasticities (see Olayide and Heady 1982). The estimates of the elasticity coefficients are as shown in Table 5.5.

TABLE 5.5

Estimates of Household Food Consumption Elastici ties by Gender Variables

Gender Variables	Elasticity Formula	Elasticity Coefficient
Male farm output (Q_{mj})	$\frac{\delta \ln C_j}{\delta \ln Q_{mj}}$	0.4602
Female farm output (Q_{wj})	$\frac{\delta \ln C_j}{\delta \ln Q_{wj}}$	1.0659
Male income (Y_{mj})	$\frac{\delta \ln C_j}{\delta \ln Y_{mj}}$	0.6813
Female income (Y_{wj})	$\frac{\delta \ln C_j}{\delta \ln Y_{wj}}$	0.3834
Male household size (H_{mj})	$\frac{\delta \ln C_j}{\delta \ln H_{mj}}$	0.2245
Female household size (H_{wj})	$\frac{\delta \ln C_j}{\delta \ln H_{wj}}$	0.1495

Source: Computed from the double-log form of the regression result in Table 5.4.

From Table 5.5, the male farm output elasticity of household food consumption is 0.4602, indicating a fairly elastic response. The value of the elasticity coefficient implies that if male farm output is increased by 100 percent, household food consumption will increase by about 46.02 percent. The female farm output elasticity of household food consumption is 1.0659, indicating a highly elastic response. The value of the elasticity coefficient shows that if female farm output is increased by 100 percent, household food consumption will increase by 106.59 percent. Thus equiv alent percentage increase in gender farm output will add disproportionately to increases in household food consumption level. This suggests that policies that emphasize increases in the level of household food consumption should be targetted on increasing the level of female farm output rather than those of the male farm output at the household level.

The male income elasticity of household food consumption is 0.6813, indicating a high elastic response. The coefficient of male income elasticity means that if male income is increased by 100 percent, household food consumption will change by 68.13 percent. The coefficient of elasticity for female income is 0.3834, indicating a low elastic response. This is because the value means that 100 percent increase of female income would only increase household food consumption by 38.34 percent. Thus, equivalent percentage increase in male and female income would add disproportionately to household food consumption. Thus,policies geared towards increased household food consumption would have quicker positive effect if they are targetted at increasing male income at the household level. The absolute value for the coefficient for male household size elasticity of food consumption is 0.2245, indicating low elastic response. This means that if the number of male members

of the household is increased by 100 percent it would result in only about 22.45 percentage increase in food consumption. The absolute value for the coefficient for female household size of food consumption is 0.1495, indicating a rather lower elastic response. This implies that if the number of female members of the household is increased by 100 percent, it would increase household food consumption by only 14.95 percent. However, the lower the value of the coefficient of elasticity for household size the better. This is because household with lower elastic response would be more food secured than those with high elastic response. The explanation to this is that a high elastic response of household size would result in high level of food consumption which may not correspond with household food supply. This may create food gap at the household level. This means that household with greater number

of males than females would have higher consumption level as shown from the elasticity coefficient.

Thus, the rate with which household food consumption change (marginal propensity to consume) appear to be more with respect to changes in female farm output, male income and male household size than for male farm output, female income and female household size.

5.4 Sensitivity Analysis on Household Food Consumption Function

In order to ascertain the nature and magnitude of the changes in both the slope and the intercept of the household food consumption curve, a sensitivity analysis was performed on the lead equation form. This was done by introducing a 10 percent change in the respective gender factors under investigation. The results are as shown in Table 5.6.

The first case investigated a 10 percent positive change in gender output only. The result shows that an increase in male and female farm output by 10 percent would on the average result in a shift in the intercept from 14.966 Kcal to 26.065 Kcal. This means an increase of 11.099 Kcal, suggesting a positive shift in the minimum household food consumption level. This represents about 74.16 percent increase in household food consumption level. Also, the magnitude of the coefficients for the male and female output increased. Thus, policies that increase the level of gender farm output would help in increasing food consumption at the household level given other factors.

The second case investigated a 10 percent positive change in incomes only. The result shows that an increase in male and female incomes would on the average result in 13.38 percent increase in household food consumption level. This is because the 10 percent increase in the gender incomes

resulted in a change of the minimum consumption level from 14.966 Kcal to 16.968 Kcal. Also there would be increases of 26.68 percent and 52.40 percent in marginal propensities to consume with respect to male and female incomes respectively, given other factors.

TABLE 5.6

Multiple Regression Results of Sensitivity Analysis on Gender Variables

Cases	Parameters Estimates									
	Constant	lnQmj	lnQwj	lnYmj	lnYwj	lnHmj	lnHwj	R^2	S.E	F−ratio
(1) 10 percent positive change in output	26.065	0.9096 (2.654)***	2.1695 (4.078)***	0.6813 (2.350)**	0.3834 (2.319)**	−0.2245 (−3.270)	−0.1495 (−4.950)***	0.8388	0.7892	14.659***
(2) 10 percent positive change in income	16.9680	0.4602 (3.2341)**	1.0659 (3.805)***	0.8631 (2.035)**	0.5843 (2.091)**	−0.2245 (−3.270)***	−0.1495 (−4.950)***	0.7956	0.5689	13.681***
(3) 10 percent positive change in Household size	9.8640	0.4602 (3.234)***	1.0659 (3.805)***	0.6813 (2.3350)*	−0.3834 (2.319)**	−0.2865 (−4.238)***	0.8124 (−5.022)***	0.9856	13.986***	

** = Significant at 5 percent
*** = Significant at 1 percent
ln = natural logarithm
Figures in parentheses are the t−ratios

Thus, a positive change in female incomes would translate into higher household food purchases than a similar change in male incomes.

The third case analysed a 10 percent positive change in household size. The result shows that an increase in the number of household dependants by 10 percent would result in a decrease in the minimum consumption level by about 34.09 percent in an average size household. This could be seen from the change in the intercept of 14.966 to about 9.864. Also the marginal propensity to consume decreased by 62.54 percent and 91.64 percent with respect to male and female household size respectively. Thus, increasing the number of mouths to be fed in a household would further aggravate the existing problem of inadequate food consumption particularly for household that are predominantly male.

5.5 Gender - Related Determinants of Household Crop Production Efficiency

Whole - farm normalized profit functions were fitted for male, female and joint farms using the ordinary least square regression method. The regression results are as shown in Table 5.7.

TABLE 5.7

Multiple Regression Results on Gender - Related Determinants of Household Crop Production

Parameter	Male farmers	Female farmers	Joint farm
Constant (A*)	10.5926	4.3356	16.6599
Inq_{1j}	-1.4890	-0.4879	-1.1785
	(-1.877)*	(-1.097)	(-1.670)*
Inq_{2j}	-1.5652	-0.0669	-1.5335
	(-2.557)**	(-0.178)	(-5.021)***
Inq_{3j}	-0.3011	-0.2221	-1.3573
	(-0.727)	(-0.541)	(-4.872)***
Inq_{4j}	-0.9230	-0.7939	-1.3097
	(-1.957)*	(-1.812)*	(-2.887)**
Inz_{1j}	0.4231	0.0680	0.0076
	(1.678)*	(0.457)	(2.176)**
Inz_{2j}	0.6969	0.1473	0.3030
	(1.453)	(0.186)	(3.629)**
Inz_{3j}	0.2155	-0.2401	0.1539
	(1.251)	(-0.515)	(1.789)*
Inz_{4j}	-1.7705	0.0829	0.5036
	(-2.680)**	(0.109)	(5.143)***
R^2	0.6384	0.5185	0.8382
SE	2.1634	1.9335	0.3829
F-ratio	5.100**	2.808**	4.969**

In = natural Logarithm
* = significant at 10 percent
** = significant at 5 percent
*** = significant at 1 percent
Figures in parentheses are the t-ratios

Source: Computed from 1991/92 survey data

5.5.1 Male Farmers Cobb Douglas Normalized Profit Function

With respect to male farmers Cobb Douglas normalized profit function, the coefficient of the normalized price of male hired labour is negative and statistically significant. This indicates that payment of higher wage to male labour would reduce male farmers profit and vice versa. The coefficient of the normalized price of female hired labour is also negative and highly statistically significant. This implies that higher wage rate for female labour would reduce farmers profit and vice versa. The elasticity coefficients for both male and female hired labour show that if the wage rates of both male and female labour were increased in the same proportion, the increased use of female labour would reduce farm profit more than the increased use of male hired labour, and vice versa. This suggests that farmers used male hired labour more efficiently than female hired labour.

The coefficient of the normalized price

of fertilizer is negative, though not statistically significant. This indicates that an increase in the price of fertilizer would reduce male farmers' profit and vice versa. The non-statistical significance of this variable could be due to the adoption of alternative soil amendment strategies especially with the recent increase in the unit price of fertilizer.

The coefficient of the normalized price of tractor hire is negative and statistically significant. This implies that an increase in the price of tractor hire would reduce male farmers' profit and vice versa, given other factors.

The coefficient of the male family labour is positive and statistically significant. This indicates that male family labour significantly affects the farmers profit. The coefficient of female family labour is also positive but not statistically significant. The non-statistical significance of female

family labour means that its effect on farmers' profit is negligible.

The coefficient of farm size cultivated by the male farmer is positive but not statistically significant. This means that larger hectarages could increase farm profit by increasing farm output, ceteris paribus. The coefficient of the value of farm implements used is negative. This indicates that there is excessive use of farm implements. Its high level of statistical significance indicates that it is an important determinant of farm profit.

All the included variables explained about 63.84 percent of the total variation in household crop production with respect to the male farmers. The included variables together showed higher statistical significant determinant of household crop production as revealed by the value of the F - statistic. However, specific factors such as male hired labour, female hired labour, tractor hire, male family labour, and farm implements such

as hoes and cutlasses are vary important factors influencing the level of farm profit generated by male farmers. These factors should therefore, be emphasized if male farmers have profit maximization as their objective.

5.5.2 Female Farmers Cobb Douglas Normalized Profit Function

In the case of the female farmers, the coefficients of the normalized prices of male hired labour, female hired labour, fertilizer, tractor hire are consistently negative as in the male farmers profit function. This indicates that increase in any of these variables would reduce female farmers profit and vice versa. However, only the coefficient of the normalized price of tractor hire is statistically significant. Thus, though higher prices of these inputs may reduce farm profit and vice versa, their influence on profit level is not statistically significant among female farmers.

The coefficients of all the fixed resource included in the model are positive except that of farm size. Also all the fixed factors are not statistically significant, indicating that these factors have no significant influence on profit determination among female farmers. The non-statistical significance of most of the coefficients in the normalized profit function for female farmers could be due to the fact that female farmers aim primarily at meeting the basic household subsistence food requirements rather than achieving the objective of profit maximization.

However, all the factors together accounted for about 51.85 percent of the variations in farm profit among female farmers. This percentage was found to be statistically significant at 5 percent level, as revealed by the value of the F - ratio. This means that all the factors combined, significantly influence farm profit of female farmers. But the combined effect of these

factors have greater influence on farm profit generated by male farmers than that of female farmers as revealed by the adjusted coefficient of multiple determination and the value of the F-ratio (see Table 5.7).

5.5.3 Joint Farm Cobb Douglas Normalized Profit Function

The sign of the coefficient of the normalized prices of male hired labour, female hired labour, fertilizer and tractor hire were all negative and statistically significant. This indicates that there is inverse relation between the prices of these variables and the level of household farm profit. It means that household farm profit could be increased by reducing the prices of these inputs. The explanation that could be adduced for this is that lower prices of this inputs would reduce the overall cost of production and therefore would increase net farm returns. Conversely if prices of these inputs increase, cost of production would be high and then net return

would be very low or even negative, indicating low profit or loss respectively.

The coefficient of male and female family labour, area of land cultivated and quantity of farm implements used were all positive and statistically significant determinants of household farm profit. This means that increasing the quantities of these variables would increase household farm profit.

All the included variables together accounted for about 83.82 percent of the variations in the household farm profit. Also, a combined influence of all of them showed high level of statistical significance. The high level of explanatory power as well as the significance of the included exogenous variables as revealed by the adjusted coefficient of multiple determination, the t and F statistics, suggest the need for gender consideration in farm profit at the household level. Thus higher profit levels could be attained by emphasizing these variables that showed significant influence in household farm

profit.

5.6 The Chow Test for Equality in The Normalized Profit Functions by Gender

The Chow test is applied to ascertain whether the structure of the normalized profit functions differ between male and female farmers. More specifically, the analysis attempts to answer the question: Are the regression coefficients derived from the male farmers profit function statistically different from those derived from the female profit function?

In doing this, the following procedure was adopted.

1. The null hypotheses are stated as

(i) $A^{*m} = A^{*w}$

(ii) $\alpha_{ij}^{*m} = \alpha_{ij}^{*w}$

(iii) $\beta_{ij}^{m} = \beta_{ij}^{w}$

That is, there are no significant differences in the corresponding coefficients obtained from the two gender normalized profit functions. The alternative hypotheses are that there are significant differences in the coefficients obtained from the two gender normalized profit function.

2. Pooled data from all the 150 male and female farmers were used to estimate an aggregate normalized profit function.

3. The sum of squares of residuals from the male farmers regression equation is calculated as $\Sigma e_m^2 = 216340$

4. Similarly, the sum of squares of error in respect of the female farmers regression equation is calculated as

$$\Sigma e_w^2 = 193350$$

5. The sum of squares of error in respect of the pooled sample (male and female) regression equation is calculated as $\Sigma e_p^2 = 538290$

6. Finally the F - ratio according to Chow is given as

$$F = \frac{Q_3/K}{Q_2/(n_1+n_2-2k)}$$

where

n_1 = number of observations used in the male regression equation

n_2 = number of observations used in the female regression equation.

K = number of parameters being estimated

Q_1 = sum of squares of error from the pooled regression equation.

Q_2 = the addition of the respective sums of squares of error from male and female regression equations.

$Q_3 = Q_1 - Q_2$ = the difference between the sum of squares of error from the pooled regression and the addition of the respective sums of squares of error from male and female regressions.

7. The computed values are

Q_1 = 538,290

Q_2 = 216340 + 193350

$= 409,690$

$Q_3 = 538290 - 409690$

$= 128\ ,600$

$n_1 = 75$

$n_2 = 75$

$K = 9$

$$F^* = \frac{128600/9}{409690/(75 + 75 - 2(9))}$$

$$F^* = \frac{128600/9}{409690/132}$$

$= 4.6038$

F - tabulated $= 1.88$

8. The result shows that $F^* > F_{0.05}$ and hence the null hypothesis that the coefficient in the male and female farmers' profit functions are the same is rejected. That is the two profit functions differ significantly.

5.7 Gender Input Demand Equations

The variable factor demand functions were estimated by directly differentiating the normalized profit functions with respect to the normalized prices of the various factors and by invoking shepherd's Uzama Lemma which

states that the negative of the first derivative of the normalized unit profit function with respect to the normalized input price is the optimal variable input quantity or the factor demand function. The estimates of the input demand coefficients by gender are given in Table 5.8.

TABLE 5.8

Estimates of Input Demand Equations by Gender

Type of Input Demand	Male Farmers			Female Farmers		
	Constant	In π^*	In q^*	Constant	In π^*	In q^*
Male labour	0.3981	0.4231	-1.4890	-0.7177	0.0680	-0.4879
Female labour	0.4480	0.6969	-1.5652	-2.7046	0.1473	-0.0669
Fertilizer	-1.2003	0.2155	-0.3011	-1.5046	0.2401	-0.2221
Tractor hire	-0.0801	1.7705	-0.9230	-0.2308	0.0829	-0.7939

Source : Computed from table 5.7

5.7.1 Male Farmers' Input Demand Equations

Results of the male farmers input demand equations shows that input is an increasing function of profit and a decreasing function of input prices of all the variable whose demand equations were estimated. This is as revealed by the sign of the coefficients of all types of the input demand equations among male farmers (see Table 5.8). The intercept for male and female hired labour are positive, indicating increasing returns. The intercept for fertilizer use and tractor hire by male farmers are negative, indicating decreasing returns.

The profit and price elasticities with respect to female labour demand are consistently higher than the profit and price elasticities with respect to male labour demand among male farmers. Thus demand for female hired labour respond more to profit and price than the demand for male hired labour. The profit and price elasticities of

fertilizer input are low, indicating inelastic response among male farmers. This implies that male farmers' use of fertilizer is not commensurate with either the profit they derive or the unit price of fertilizer. The profit and price elasticities of tractor hire are high, indicating a rather elastic response. Thus tractor hire among male farmers respond to changes in the profit derived and the tractor hiring charge per hectare.

5.7.2 Female Farmers' Input Demand Equations

The results of the female input demand equations in Table 5.8 shows that input demand is an increasing function of profit and a decreasing function of input prices. This is revealed by the sign of the coefficients of profit and input prices in all the input demand equations estimated for the female farmers.

The intercept of the input demand functions for the female farmers are

consistently negative. This indicates that female farmers may be using inputs up to the point of decreasing negative returns.

The profit elasticities with respect to all the inputs demanded by the female farmers are very low, indicating a rather inelastic response of input demand to profit generated therefrom. Thus female farmers appear to be demanding inputs irrespective of the amount of profit derived from its respective use. This means that profit appear not to be the main motive for the demand for male and female hired labour, fertilizer and tractor hire by the female farmer. The price elasticity with respect to male hired labour is significantly greater than unity statistically. This indicates a high elastic response. Thus, the demand for male hired labour by female farmers respond quickly to changes in the wage rates. The input price elasticity of tractor hire is not significantly different from unity, indicating a one to one correspondence between tractor hiring charge per hectare and the

demand for tractor services by the female farmers.

The demand for female labour and fertilizer by female farmers showed very low elastic response with respect to their respective unit prices. Thus female farmers demand for female labour and fertilizer input appear inelastic. This probably explains why female farmers over used these inputs to the point of negative returns as revealed by the intercept.

5.8 Relative Efficiency in Gender Use of Resources

Relative efficiency in gender use of farm inputs was determined by estimating input demand parameters directly and production function parameters indirectly as well as scale coefficients from the normalized profit function fitted separately for male and female farmers. The results are as shown in Table 5.9.

A farmer is adjudged to be allocatively

efficient in input use and, hence in profit maximization if there is no significant negative divergence between the optimal level of inputs (X_i^*) and the actual quantity of inputs (X_i) used. That is, if the deviation ($X_i^* - X_i$) is small and non negative (Lan and Yutopoulos, 1972). Also, a farmer is considered to be allocatively efficient if marginal cost (MC) of inputs is equal to the marginal revenue (MR) (Henderson and Quandt, 1958).

Table 5.9 shows that men derived an average gross profit of =N=1008 per hectare while women derived an average of =N=250 per hectare. Thus male farmers made higher gross profit than female farmers.

There is a significant and positive divergence between the optimal quantity of male hired labour (60.0 mandays) and the actual quantity (24.76 mandays) of male hired labour used by male farmers. This indicates that male farmers were using less than optimal level of male hired labour to produce.

However, there was a significant negative divergence between the optimal quantity of male hired labour (8.06 mandays) and the actual quantity (15.13 mandays) of male hired labour used by female farmers. This implies that female farmers were using larger than the optimal quantity of male hired labour to produce. Thus, both male and female farmers were not efficient in the use of male hired labour.

There is a significant positive divergence between the optimal quantity of female hired (83.86 mandays) and the actual quantity (18.81 mandays) of female hired labour used by the male farmers. Thus, male farmers were using less than optimal level of female hired labour to produce. On the other hand, there was a significant but negative divergence between the optimal and actual quantity of female hired labour used by the female farmers. This indicates that female farmers were over-using female hired labour.

Thus, male farmers were under-utilizing both male and female hired labour while female farmers were over-utilizing male and female hired labour. It follows therefore that both male and female farmers were inefficient in the use of hired labour.

There were also significant negative divergence between the optimal and actual quantities of fertilizer and tractor hire services by both male and female farmers. This means that both male and female farmers were inefficient in their use of fertilizer and tractor hire service.

With regard to the returns to scale, the function coefficient in respect of the male farmers was 0.7281, indicating decreasing returns to scale while the function coefficient for the female farmers was 0.6337, indicating that female farmers are also operating at decreasing returns to scale. But if all the inputs were increased in the same proportion, the proportionate addition to output would be greater for male farmers than

female farmers. However, this difference is not statistically significant.

In summary, although there was significant difference between male and female farmers in the allocation of male and female hired labour, there was no significant difference in the efficiency of both male and female farmers in the aggregate use of inputs.

This is consistent with the earlier finding of Moock in 1976 when he evaluated the efficiency of male and female farm managers in Kenya.

TABLE 5.9

Direct Estimates of Input Demand Coefficient and Indirect Estimates of Production Parameters

Variable	Estimates for male farmers						Estimates for female farmers					
	Mean	αi^*	Xi^*	αi	βi^*	βi	Mean	αi^*	Xi^*	αi	βi^*	βi
Profit n*	1008.000	–	–	–	–	–	250.0000	–	–	–	–	–
Hired Male Labour	24.760	−1.4890	60.61	0.2821	–	–	15.1330	−0.4879	8.0600	0.1898	–	–
Hired Female Labour	18.813	−1.5652	83.86	0.2965	–	–	17.7870	−0.0669	0.9400	0.0260	–	–
Fertilizer Expenses	67.680	−0.3011	4.49	0.0570	–	–	34.1800	−0.2221	1.6250	0.0864	–	–
Tractor Hiring	111.070	−0.9230	8.37	0.1749	–	–	76.2300	−0.7939	2.6040	0.3088	–	–
Male Family Labour	54.640	–	–	–	0.4231	0.0802	40.2400	–	–	–	0.0680	0.0265
Female Family Labour	56.653	–	–	–	0.6969	0.1320	76.3200	–	–	–	0.1473	0.0573
Area of Land Cultivated	2.115	–	–	–	0.2155	0.0408	1.1120	–	–	–	−0.2401	−0.0934
Value of Farm Implement	489.011	–	–	–	−1.7705	−0.3354	334.0810	–	–	–	0.0829	0.0323

Source: Computed from Table 5.7
– = not available

$Xi^* = \ln\alpha i^* + \ln n^* - \ln qi^*$
n^* = mean profit (normalized)
qi^* = mean unit input price (normalized)

5.9 Test of Hypotheses of Relative Efficiencies

Five statistical hypotheses were tested as presented in Table 5.10

TABLE 5.10

Tests of Relative Efficiency in Gender use of Resources

	Ho	Computed F	Critical $F_{0.05}$ (9,66)
i.	$A^{*m}=A^{*w}$	4.94	2.00
ii.	$\alpha_{ij}^{*m}=\alpha_{ij}^{*w}$		
	$A^{*m}=A^{*w}$	2.92	2.00
iii.	$\alpha_{ij}^{*m}=\alpha_{ij}^{*w}$	4.39	2.00
iv.	$\alpha_{ij}^{*w}=\alpha_{ij}^{*a}$	2.96	2.00
v.	$\alpha_{ij}^{*m}=\alpha_{ij}^{*a}$	0.19	2.00

Source : Computed from Table 5.7

α_{ij}^{*a}= price coefficient from the

aggregate normalized profit function.

H_o = null hypothesis

The first hypothesis is that of equal relative economic efficiency. That is,

H_o : A^{*m} = A^{*w}

The alternative is that the economic efficiency of male and female farmer differ significantly. The null hypothesis of equal relative economic efficiency was rejected at 5 percent significance level. Hence, we concluded that male farmers were relatively more economic-efficient than female farmers.

The second hypothesis is that of equal relative price efficiency. That is

H_o: $\alpha_{ij}^{*m}=\alpha_{ij}^{*w}$

The alternative is that male and female farmers have different price efficiency parameters. The null hypothesis was rejected

at 5 percent level of significance and we concluded that male and female farmers did have different price efficiency parameters. That is, they both did not succeed to the same degree in maximizing profits.

The third hypothesis is that of equal relative technical and price efficiency. That is

$$Ho: A^{*m}=0$$

$$\alpha_{ij}^{*m}=\alpha_{ij}^{*w}$$

The alternative hypothesis is that male and female farmers do not have the same level of technical and price efficiency. The null hypothesis was rejected at 5 percent level of statistical significance, indicating that male and female farmers neither achieved the same degree of technical efficiency nor succeeded to the same degree in their profit maximization.

The fourth hypothesis is that of absolute

price efficiency of women farmers, that is,

$$Ho: \alpha_{ij}^{*w} = \alpha_{ij}^{*a}$$

The alternative hypothesis is that women farmers do not have profit maximization as their objective. The null hypothesis was also rejected at 5 percent level of significance. This implies that women farmers did not maximize profit.

The fifth hypothesis is that of absolute price efficiency of male farmers. That is,

$$Ho: \alpha_{ij}^{*m} = \alpha_{ij}^{*a}$$

The alternative hypothesis is that male farmers did not maximize profit. The null hypothesis was not rejected at 5 percent level of statistical significance. That is the null hypothesis was accepted at 5 percent level of significance. This indicates that male farmers did maximize profit. Also, since the profits generated by male farmers were on the

average greater than the profits generated by the female farmers as shown in Table 5.9, the male farmers are considered relatively more efficient within a given range of price (see Lau and Yotopoulos 1971).

5.10 Problems of Input Acquisition in Farming Households

The respondents were asked to indicate problems they faced in input acquisition. Their responses were analyzed as presented in Table 5.11.

From Table 5.11, it is evident that male farmers identified high cost of farm inputs, corruption among government officials, frequent changes in government policies on input, scarcity of farm inputs and lack of funds to purchase these inputs as major constraints they faced in input acquisition for household farming activities. On the other hand, the female farmers identified cultural factors, high cost of inputs,

corruption among officials, scarcity of farm inputs, lack of funds to purchase farm inputs and changes in government policies on inputs as impediments to the quantity of farm inputs they acquired for their farming activities. With the exception of cultural impediments which are peculiar to women, both male and female farmers appeared to encounter the same set of problems, although not to the same degree in input acquisition for household agriculture.

Although other problems such as those of land dispute, excessive land fragmentation, transportation, inadequate storage facilities, poor feeder roads, distance of farm from input acquisition centres, widowhood practices and population pressure were also mentioned by farmers during the survey, these problems appeared to be very insignificant as revealed by the relatively small percentage of response in Table 5.11.

TABLE 5.11

Distribution of Responses on Problems of Input Acquisition by Gender

PROBLEMS	MALES No. of Resps.	MALES %	FEMALES No. of Resps	FEMALES %	% of Total.
High Cost	62	82.67	68	90.67	6.67*
Scarcity of unavailability	50	66.67	51	68.00	67.33*
Land Dispute	5	6.67	2	2.67	4.67
Excessive land Fragmentation	5	6.67	5	6.67	6.67
Changes in govt. policies	56	74.67	41	54.67	64.66*
Transportation	20	26.67	25	33.33	30.00
Inadequate storage facilities	13	17.33	11	14.67	16.00
Poor feeder roads	25	33.30	14	18.67	26.00
Corruption among govt. agents & officials	58	77.33	64	85.33	81.33*
Cultural practices	12	16.00	71	94.67	55.33*
Distance from the farm to input acquis-ition centre	24	32.00	16	21.33	26.67
Widowhood practices	1	1.33	10	13.33	7.33
Population pressure on land	10	13.33	3	4.00	8.67

Source: Field Survey data 1991/92.

Therefore, only the more critical problems are discussed in the following subsections of this chapter.

5.10.1 High Cost of Farm Inputs

About 82.67 percent and 90.67 percent of male and female farmers respectively mentioned high cost of farm inputs as a major constraint to input demand. High cost of input tends to reduce the amount of inputs acquired by farming households and this leads to a reduction in farm size, farm output, farm profit and household food security. A higher majority of female farmers appeared to have this problem than male farmers. When farmers were asked to indicate what they thought would solve the problem, a high percentage (89.33%) of them suggested that input prices to farmers should be reduced through the use of Price Control Boards and Task Forces by government (see Table 5.12). This would enable them to monitor and regulate the role of middlemen in

the determination of input prices.

5.10.2 Scarcity of Farm Inputs

The reluctance of many families to sell household farm inputs such as land creates artificial land scarcity, while the population pressure on land creates natural land scarcity in most farming communities. About 67 percent and 69 percent of male and female farmers respectively reported this as a problem. When a basic farm resource such as land is scarce, farm sizes would be generally small and food insecurity among farming households would be higher. This is because scarcity of farm land would mean small scale of farm operation which would result in low farm output and income, ceteris paribus. Majority (89.33%) of the women advocated for the use of the Land Use Decree to solve this problem (see Table 5.12).

5.10.3 Lack of Funds for Purchased Inputs

Many male and female farmers reported that lack of funds hindered them from

purchasing other required inputs apart from land. This stems from the fact that very few of the farmers had access to farm credit. They, therefore, depended more on their own incomes for acquiring other capital inputs. The women appeared to be more affected by the problem of inadequate farm credit. Most of the farmers (60%) were of the view that adequate loans at liberalized interest rates and at low acquisition cost and at the proper time would reduce this problem to the barest minimum (see Table 5.12).

5.10.4 Government Policies on Inputs

One of the greatest problems reported particularly by the male farmers was that of incessant changes in government policies on input procurement and distribution. About 75 percent and 55 percent of male and female farmers respectively identified this problem. This complaint by farmers was supported by the incident of government introduction and subsequent partial withdrawal of subsidies on a number of farm inputs. There were also

instances of erratic banning and unbanning of input importation.

5.10.5 Corruption Among Government Officials

About 73 percent and 85 percent of the male and female farmers respectively identified corruption among government agents as one of their major constraints to input acquisition. This corruption was said to manifest in the form of diversion of inputs from one location to the other, sale of inputs to middlemen who, in turn, resold them to farmers at higher prices as well as input hoarding. All these created a disincentive to farmers.

TABLE 5.12

Distribution of Responses on Solutions to Problem of Input Acquisition by Gender

Solution	MALES No. of Respo-nses	%	FEMALES No. of Respo-nses	%	% of Aggreg Farmers
Interest rate liberalization	66	88.00	24	32.00	60.00
Use of subsidy	58	77.33	54	72.00	74.67
Use of cooper-atives	55	73.33	18	24.00	48.67
Increase in input quantities	62	82.67	55	73.30	78.00
Application of land use decree	7	9.33	67	89.33	49.33
Use of task force	63	84.00	1	1.33	42.67
Appropriate technologies	48	64.00	45	60.00	62.00
Reduction of input prices	65	86.67	69	92.00	89.33

Source: Field Survey Data 1991/92.

About 43 percent of the farmers in the survey reported that the use of Task Forces to monitor input distribution and sale of inputs

direct to the farmers could reduce the problem of corrupt practices by government officials in input sale and distribution.

CHAPTER SIX

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

6.1 SUMMARY OF MAJOR FINDINGS AND CONCLUSIONS

6.1.1 Background of the Study

The study analyzed gender issues in relation to farm and intra-household resource allocation, food consumption, crop production and profit optimization behaviour of rural farming households in south-eastern Nigeria. The study stems from the fact that the problem of inadequate food at the household level has been partly associated with difficulty in input acquisition and inefficiency in resource allocation, particularly among women farmers.

The twin problems of input acquisition and allocative efficiency could be solved by engaging in the analysis of gender oriented household crop production activities that would ensure adequate food security and at

the same time, allow farm operators to make profits which can sustain their non-food consumption at the household level.

Both primary and secondary data were collected from male and female farmers as well as government institutions in six Local Government Areas located in six agricultural zones of Imo and Abia States, using structured questionnaires (see appendix A).

A sample of 150 farmers made up of 75 farming house holds were selected, studied and analyzed from an original sample of 204 farmers made up of 102 farming households selected for the study. Those not included in the analysis were dropped as a result of incomplete and/or unreliable information supplied. The data were analyzed using a combination of descriptive and inferential statistics, econometrics as well as the use of Cobb Douglas normalized profit function.

6.1.2 Household Socioeconomic Characteristics by Gender

The results revealed that the average age of the male farmers was 51.28 years while that of the female farmers was 39.33 years. However, most of the farmers (both male and female) fell within the age bracket of 36 and 65 years.

About 13 percent and 14 percent of the male and female farmers respectively did not have formal education. When this proportion was tested for statistical significance, it was observed that there is no significant difference statistically in the literacy rate of male and female farmers in the household.

The average number of male members of the household was 4.18 (approximately 5 persons) while the average number of female members was 5.80 (approximately 6 persons). Thus, there were more females than males in an average household.

The average number of wives was 1.28

(approximately 2 wives) per household. Most of the households were, however, monogamous as revealed by about 63.38 percent of the male respondents who had only one wife.

Only about 36 percent and 51 percent of male and female farmers respectively had farming as their primary occupation. Most full-time farmers were female while most of the part-time farmers were male.

The average length of male farming experience was 21.84 years while that of the female farmers was 15.66 years. The male farmers were, therefore, more experienced than female farmers in farming.

The average farm income of a male farmer was =N=8873.35 while the average farm income of female farmers was about =N=5842.58 per farmer per farming season. The average non-farm income of male farmers was =N=3,914.40 while the average non-farm income of the female farmers was =N=1055.90 per person per annum. Thus, the male farmers

generated more farm and non-farm income than the female farmers.

6.1.3 Agricultural Activities and Cultural Practices by Gender

Agricultural activities such as rice, citrus, cashew, plantain, groundnut and yam were identified as predominantly male enterprises while crops like okra, tomatoes, cocoyam, beans, vegetables, melon, pepper, oil palm, sweet potatoes, soyabeans, maize and cassava were identified as predominantly women crops. The males produce a majority of the cash crops while females produce a majority of food crops. Thus agricultural activities are gender specific.

In terms of cultural practices, more male labour was used in the performance of certain farm operations such as land preparation, pesticide application, pruning, bird scaring, drying of farm produce and transportation of farm produce to house and stores. However, more female labour was utilized in planting,

transplanting, weeding, fertilizer application, staking, bagging and packaging. There were no significant differences in the number of mandays of male and female labour used for harvesting, threshing and winnowing. On the whole, there is no significant difference in the number of mandays of male and female labour used in carrying out the cultural practices in the respective enterprises studied. Thus, cultural practices are hardly gender specific and hence there is little or no division of labour in agricultural production.

6.1.4 Farm Resource Acquisition and Use Pattern by Gender

The average, size of male farmers' farms was 2.12 hectares while the average farm size for the female farmers was 1.11 hectares. On the whole the average farm size for the joint farm (family farm) was 1.61 hectares. Male farmers, therefore, cultivated larger hectares than female farmers. Joint farms were,

transplanting, weeding, fertilizer application, staking, bagging and packaging. There were no significant differences in the number of mandays of male and female labour used for harvesting, threshing and winnowing. On the whole, there is no significant difference in the number of mandays of male and female labour used in carrying out the cultural practices in the respective enterprises studied. Thus, cultural practices are hardly gender specific and hence there is little or no division of labour in agricultural production.

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however, larger than female farms but smaller than the male farms. When these means were tested for statistical significance, it was observed that there were significant differences statistically in the sizes of these three categories of farms. The larger farm size of the male farmers probably enabled them to produce for both household food consumption and the market while the smaller female and joint farms were predominantly meant to provide food for household consumption with little marketable surplus.

While most males acquired their land through inheritance, purchase and lease, a majority of female farmers acquired their farmlands from their husbands and through lease agreement. Negligible amount of land was acquired through gift, borrowing and exchange. Women were not allowed to engage in land transactions except in their husbands' or male-relative presence.

Although male farmers made use of greater proportion of both male and female family labour in performing agronomic operations in their farm than was the case for either female or the joint farm, there was no significant difference on the average in the use of male and female family labour in the household agriculture.

In terms of hired labour, more female labour was hired per household but the male farmers utilized larger proportion of hired labour (male and female) than the female farmers. This may be due do the fact that male farmers cultivated larger hectares than the female farmers. However, it was observed that there was no significant difference statistically in the quantity of male and female labour (family and hired) used in the household agriculture. But greater proportion of the aggregate household labour was derived from the family labour source. This is probably due to the large composition of

the average household in the study area.

In general, there is no significant difference in the role of men and women with regards to the performance of agricultural tasks. This further suggest that the degree of gender specialization or division oflabour in agriculture in the study of area appear to be minimal.

Generally, male labourer spent 5.61 hours per day in the farm while female labourer spent 8.78 hours per day in the farm. Thus, women devoted a larger proportion of their time in performing agricultural tasks than men. Farmers also tended to employ members of the opposite sex as hired labour.

With regard to farm credit, male farmers, unlike the female farmers acquired a significant proportion of their farm credit from formal credit institutions. This is probably because they have been found to repay more or that they could offer the collateral security requirements more easily

than female farmers. However, the female farmers obtained greater proportion of their farm credit through the informal credit institutions such as money lenders, relations and accumulated savings.

6.1.5 Gender-Related Determinants of Household Food Consumption

Men contributed significantly more than women in the purchases of both recurrent and capital items in the household. In isolating the determinants of household food consumption, the coefficients of male farm output, female farm output, male incomes and female incomes were positive, indicating that increasing the quantities of these variables would increase household food consumption levels and vice versa, given other factors.

On the other hand, the coefficients of number of male and female members in the household are negative, showing that increasing the number of people in the

household would reduce the per capita income and hence the level of food consumption in the households and vice versa, given other factors.

Also the included gender factors showed statistical significance, indicating that gender issues are important in analysing food consumption at the household level. The marginal propensity to consume appear to be more related to changes in female farm output, male income and male household size than to changes in male farm output, female income and female household size.

The results of the sensitivity analysis shows that household food consumption would not only be stable but would also be sustained by initiating policies that would increase farm output of both male and female farmers. This is because the minimum quantity (amount) of household food consumption not only increased, but the magnitude of the explanatory variables also

became higher when gender output was increased by only 10 per cent. The changes introduced by equivalent percentage increase in income and household size were lower than the changes that occurred when farm output was increased. Household consumed lesser amount of dietary energy per person per unit time when their number is increased by even 10 percent.

The explanatory variables in all, accounted for 75.98 per cent of the variability in food consumption at the household level as shown by the adjusted coefficient of multiple determination (R^2). The combined effects of all the regressors showed very high level of statistical significance as revealed by the magnitude of the F-statistic. This implies that gender variables are important determinants of household food consumption behaviour.

6.1.6 Gender - Related Determinants of Farm Profit and Relative Efficiency in Household Agriculture.

In terms of factors that determine the farmers' profit, the coefficients of all the variable inputs were consistently negative. This indicates that at higher input prices, household profit levels would diminish and vice versa. The coefficients of all the fixed factors were also consistently positive in the aggregate profit function. This indicates that increase in the quantities of these factors would increase the level of farm profit. The coefficients of both the fixed and variable factors were statistically significant, indicating that gender factors are important determinants of household profit behaviour. The gender factors showed high statistical level of significance in male profit function than the female profit function. The Chow test revealed that the coefficients obtained from the male farmers

normalized profit function were statistically different from the coefficients obtained from the female farmers normalized profit function.

The direct estimates of input demand parameters and the indirect estimate of the production function parameters showed that male farmers were relatively more efficient in the allocation of male and female hired labour as well as the use of tractor hiring services than female farmers. This is because there were no significant divergencies between the optimal quantity and the actual quantity of male and female hired labour as well as the tractor hire services used by the male farmers. However, there were significant divergencies between the optimal quantity and the actual quantity of male and female hired labour as well as tractor hire services used by the female farmers. Both male and female farmers were relatively inefficient in the use of fertilizer because

they appeared to have used greater quantities of fertilizer input than the optimal in their farm production. Thus, there was no gender difference in the relative efficiency of fertilizer use.

Male labourers spent an average of one hour to perform a task that take female labourers 1.57 hours and therefore produced higher level of output per unit time.Male labourers were therefore relatively more technically efficient than female labourers in time allocation.

There were also gender differences in price efficiency parameters, indicating that male and females farmers did not succeed in the same degree in profit maximization. In fact the test of absolute price efficiency showed that male farmers maximized profit while female farmers did not maximize profit. On the whole, male farmers were more technically and price efficient and hence more economic efficient in the use of farm

inputs than female farmers.

6.1.7 Problems Associated with Input Acquisition by Gender

Problems such as cultural impediments, high cost of farm inputs, scarcity of farm inputs, inadequate funds for the purchase of farm inputs, frequent changes in government policies, corruption among government officials were identified as major obstacles in input acquisition by the male and female farmers in the household.

However, interest rate liberalization, introduction of subsidies, use of cooperatives, application of Land Use Decree, use of Task Forces, development of appropriate technologies and overall reduction in input prices amcng others were suggested as measures that would alleviate the problem of inadequate farm input acquisition at the household level.

6.2 POLICY IMPLICATIONS

The age bracket of male and female farmers show that women farmers constitute a larger proportion of the active work force in agriculture than the male farmers. Agricultural labour derive more from female than male members of the household.

Estimates of farm and non-farm incomes reveal that male members of households earned higher incomes than female members and that male and female farming activities yielded smaller incomes relative to their non-farming activities such as trading. The high proportion of females in household may cause labour problems in agriculture particularly in South - eastern Nigeria where agricultural labour is predominantly supplied from the family labour source. This is because the females are migratory in nature due to marriage. The strong impact of gender factors on household food consumption suggests that policies geared towards increasing the level

of female farm output at the household level would raise the level of household subsistence food supply while those that would raise male output would contribute little to household subsistence food supply but would greatly enhance crop production for the market.

Furthermore, policies that redistribute income in favour of women would reduce the negative impact of the male non-farm income on household food consumption. In order to ensure adequate food consumption, households should emphasize those factors that are significant in explaining household consumption behaviour. The current methods of land acquisition and allocation between gender in households suggests the need for effective land policy. This would improve farmers' farm sizes, enhance their farm output and incomes as well as ensure that greater food is available for the household.

However, granting loans and other farm inputs on the basis of efficiency would

increase farm profits but decrease subsistence and hence food consumption in the household. Based on the finding that male farmers are relatively more technically and economically efficient in input allocation than female farmers, it would appear uneconomical to redistribute these scarce farm production inputs in favour of women, particularly if households aim at profit maximization. The degree of responsiveness of farmers to changes in input and output prices shows that government policies on input prices should be handled more carefully than output prices. This is because farmers could easily reduce their inputs if the prices are increased but would find it difficult to adjust planned production because of their past experience. Interest rate liberalization, use of subsidies, use of cooperative societies, application of Land Use Decree, Use of Task Forces, development of appropriate technologies are some of the strategies that

could reduce the problem of input acquisition by farmers.

In summary the study points out that an integrated gender oriented resource allocation model is a more efficient strategy for the development of household agriculture and food economies. This is revealed by the effectiveness of the relevant statistics in the joint profit function and the holistic gender oriented household food consumption models as against the isolated discussion on women role in agriculture that has predominated the literature.

6.3 AREAS FOR FURTHER RESEARCH

Three areas for further research on gender issues in agriculture have been identified. They include, first, the impact of labour saving technologies on gender role in farming activities with a view to channelling saved household labour resources to alternative areas. Second, is the study

of the relative resource allocative efficiency by male and female farmers under alternative land tenurial arrangements and farming systems with a view to designing appropriate land tenure reform policies and determining enterprise mix that will optimize gender farm output and profit. Third, is the study of gender related factors in food security and nutrition under alternative farm enterprise combinations with a view to determining appropriate agricultural enterprise mixes that will enhance food security and nutrition at household, state and national levels.

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APPENDIX A

HOUSEHOLD INTERVIEW SCHEDULE ON GENDER CONSIDERATION IN FARM RESOURCE ALLOCATION, FOOD CONSUMPTION AND PROFIT OPTIMIZATION BEHAVIOUR.

(1) Household Number..... (2) L.G.A.....

(3) Town..... (4) Village .....

(5) Farmer's Age..... . (6) Sex.....

(7) Number of Wives/Husband.....

(8) Number of male Children.....

(9) Number of female of Children.....

(10) Number of dependent male relatives.....

(11) Number of dependent female relatives.....

(12) How many years did you spend in school.....

(13) Which of these occupation do you do (tick /)

(a) Farming (b) Fishing (c) Trading

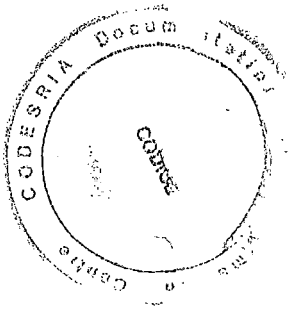
(d) Teaching (e) Tailoring (f) Driving

(g) Hair dressing (h) Civil Service

(i) Wine tapping

(j) Weaving (k) Blacksmitting

(l) Catering (m) Others specify.



(14) Which of the occupation in (13) is your major occupation.....(15) How long have you been in your major occupation.....

(16) Do you have your own personal farm apart from your husband's/wife's farm.
Yes..... No.....

(17) If yes, list the crops you produced this year:

(1)..... (2).....

(3).....

(4).....

(5).....(6).....

(17b) Which of the crops 1–6 in 17a above is your major crop.....

(18) If 16 is no, where do you spend your farm labour time

(a) Wife's own farm (b) Husband's own farm
(c) Family farm (d) Other farms outside the household (e) Do not work in the farm at all.

LAND ACQUISITION AND USE

(19) Indicate the number of plots, size and crop planted in each plot under the following access category this year

Category	Source	No. of Plots Cultivated	Size of a Plot	Total Plot Size	Main Crop Planted
Inheritance					
Pledge					
Cash lease (Rent)					
Crop lease (kind)					
Exchange					
Borrowed					
Gift					
Purchase					
Land Use Act					
Others					

(20) If land is rented, what did you pay for a plot .....

(21) If farmland was not rented, what quantity of your produce do you give in return.....

FAMILY LABOUR ACQUISITION AND USE

22 Mention the number of adult men, women and children from your family that worked o farm this year

Farm Operations	No. of adult males employed	No. of hours worked	No. of days worked	No. of adult females	No of hours worked	No. of days worked	No. of male children	No. of hours worked	No. of days worked	No. of female Children	No. of hours worked	No of days worked
Land Clearing												
Land preparation (hoeing)												
Sowing/planting												
Fertilization												
Weeding												
Transplanting												
Prunning												
Insecticide application												
Herbicide application												
Bird scaring												
Harvesting												
Threshing and Winnowing												
Drying												
Bagging												
Transport home												
Staking												
Others												

23. How many adult men and women as well as male and female children did you hire to perform the following operations

Farm Operations	No. of adult male employed	No. of hours worked	No. of days worked	No. of female employed	No. of hours worked	No. of days worked	No. of male children	No. of hours worked	No. of days worked	No. of female Children	No. of hours worked	No. of days worked	Total Amount Spent
Land Clearing													
Land Preparation													
Sowing													
Fertilization													
Weeding													
Transplanting													
Pruning													
Insecticide application													
Herbicide application													
Bird scaring													
Harvesting													
Threshing and winnowing													
Drying													
Bagging													
Transport home													
Staking													
Cutting of logs													
Others													

(24a) How much did you pay a male labourer in a day.....

(24b) How much did you pay a female labourer in a day.....

CREDIT ACQUISITION AND USE

(25) How much money did you get and what interest rate did you pay from each of these Credit Sources

Farm Credit Source	Amount Received	Interest Paid	Amount used in agriculture	Amount used in home consumption
Friends				
Family relatives				
Money lender				
N A C B				
Supervised agric scheme				
Emergency agric scheme				
Imo ADP				
Imo ADC				
Imo River Basin				
Commercial banks				
Thrift societies				
Others				

PRODUCTION CONSUMPTION AND MARKETING OF FARM PRODUCE

(26) Indicate the unit of measurement, quantity produced and unit prices of your farm produce this year.

Types of Crops	Unit of measurement	Quantity produced	Unit price	Value
Cocoa				
Palm oil				
Palm kernel				
Palm wine				
Rubber				
Cola				
Citrus				
Plantains				
Cassava				
Cocoyam				
Yam				
Rice				
Melon				
Tomatoes				
Okro				
Pumpkin				
Water leaf				
Pineapple				
Groundnut				
Sorghum				
Wheat				
Others				

(27) What quantities of these crops did you consume; sell and store since this year.

Types of Crops	Quantities consumed	Quantities sold	Quantities Stored
Cocoa			
Palm oil			
Palm kernel			
Palm wine			
Rubber			
Ground nut			
Cola			
Citrus (orange)			
Plantain			
Cassava			
Cocoyam			
Yam			
Rice			
Maize			
Melon			
Tomatoes			
Okro			
Pumpkin			
Water leaf			
Pineapple			
Sorghum			
Wheat			
Others			

HOUSEHOLD NON-FARM INCOME AND CONSUMPTION EXPENDITURE

(28) How much do you get from

Non farm activity	Amount realised per day	Amount realised per week	Amount realised per month	Amount realised per annum
Trading				
Teaching				
Tailoring				
Driving				
Hair dressing				
Civil Service				
Fashion design				
Watch night				
Dry cleaning				
Watch repairing				
Bicycle repairing				
Cook				
Contractor				
Others				

(29) How much of your non-farm income sources do you use for family consumption per week.....

(30) Indicate the amount spent on the following household items since this year.

Item	Amount Spent	Item	Amount Spent
Clothings		Furniture	
House renovation		Television	
Fan		Sewing Machine	
Bicycle		Land Acquisition	
Radio		Motor Cycle	
Health Care (Medical Check-up)		Maintenance	
School Fees		House rent	
Househelp Wages		Entertainment	

(31) How much do you spend buying food items in a day

for the family.....

(32) List the major food items you usually buy in a week

1. ..... 5. .....

2. ..... 6. .....

3. ..... 7. .....

4. ..... 8. .....

GENERAL

(33) In your family, who is in charge of sharing farm inputs?

Men / / Women / / (tick)

(34) List other inputs you got and used on your farm.

Farm Inputs	Source	Quantity Purchased	Cost Per Unit	Total Cost
Fertilizer				
Herbicide				
Insecticide				
Tractor hiring				
Irrigation water				
Others (specify)				

(35) Do you belong to a cooperative society? Yes No.

(36) If yes, name the society: .....

.....

(37) Has extension agents visited you? Yes No.

(38) If yes, how many times did a male extension agent

visit you .....;

How many times did a female extension agent visit you? .....

PROBLEMS OF INPUT ACQUISITION

(40) Tick the Problem(s) which you encounter in getting farm inputs;

a. High Cost
b. Scarcity or unavailability
c. Land dispute
d. Excessive land fragmentation
e. Lack of funds to purchase the inputs
f. Changes in government policies
g. Transportation
h. Inadequate storage facilities
i. Poor feeder roads
j. Corruption among government agents
k. Cultural practices
l. Distance from the farm to the input acquisition centre.
m. Widowhood practices
n. Population pressure on land.

(41) What ways do you think these problems would be solved? (tick)
*Enumerators to ask them and wail for response before ticking.

(a) Interest rate liberalization
(b) Introduction of subsidy on inputs
(c) Effective distribution channels through co-operatives in the rural areas.
(d) Increase in the quantity of farm inputs
(e) Use of decree to enforce some land reforms
(f) Abolition of cultural ties that forbide particular sex from acquiring property.
(g) Family planning
(h) Development of appropriate technologies that are less capital intensive.

Others:.....

APPENDIX B

DERIVATION OF THE INDIRECT ESTIMATES OF THE PRODUCTION FUNCTION' PARAMETERS FROM THE ESTIMATES OF THE NORMALIZED RESTRICTED PROFIT FUNCTION.

Indirect estimates of the production functions parameters are related to the estimates from the normalized profit function through the following identities:

$$\alpha^*_i = -\alpha i\,(1-\mu)^{-1},\quad i = 1, \ldots m \qquad \ldots 1a$$

or

$$\beta^*_i = \beta i\,(1-\mu)^{-1},\quad i = 1, \ldots n \qquad \ldots 1b$$

Where α^*_i , β^*_i are the estimates from the profit function αi, βi are the indirect estimates of the production function and

$$\mu = \sum_{i=1}^{m} \alpha i$$

Summing the first identity across the variable inputs, one obtains

$$\sum_{i=1}^{m} \alpha^*_i = -\mu(1-\mu)^{-1} \qquad \ldots\ldots 2$$

Let $\mu^* = \sum_{i=1}^{m} \alpha^*_i$

then $\mu^* = -\mu(1 - \mu)^{-1}$ 3

which leads to $(1 - \mu)\,\mu^* = -\mu$ or

$$\mu^* - \mu\mu^* = -\mu$$

$$\mu^* = -\mu + \mu\mu^*$$

$$\mu^* = -\mu(1 - \mu^*)$$

$$\frac{\mu^*}{1 - \mu^*} = -\mu$$

$$\mu^*(1 - \mu^*)^{-1} = \mu$$

Dividing by μ^*

$$(1 - \mu^*)^{-1} = -\frac{\mu}{\mu^*}$$

But $\mu^* = -\mu(1 - \mu)^{-1}$

therefore

$$(1 - \mu^*)^{-1} = \frac{-\mu}{-\mu(1 - \mu)^{-1}}$$

Dividing both sides of the equation by $-\mu$

$$-\mu(1 - \mu^*)^{-1} = -\mu(1 - \mu)$$

Hence $(1 - \mu^*)^{-1} = (1 - \mu)$ 4a

or

From Equation 3; $\mu^* = -\mu(1 - \mu)^{-1}$

Dividing both sides by $(1 - \mu)^{-1}$ we obtain

$$\frac{\mu^*}{(1 - \mu)^{-1}} = \frac{-\mu(1 - \mu)^{-1}}{(1 - \mu)^{-1}}$$

$$= \mu^*(1 - \mu) = -\mu$$

$$- \mu^*(1 - \mu) = \mu$$

$$- \mu^* + \mu\mu^* = \mu$$

$$- \mu^* = \mu - \mu\mu^*$$

$$- \mu^* = \mu (1 - \mu^*)$$

$$- \frac{\mu^*}{1 - \mu^*} = \mu$$

$$\mu = - \mu^* (1 - \mu^*)^{-1} \quad \text{..... 4b}$$

Thus $\alpha_i = -\alpha^*_i (1 - \mu^*)^{-1}$, $i = 1,\ldots m$

$\beta i = \beta^*_i (1 - \mu^*)^{-1}$, $i = 1,\ldots n$

APPENDIX C

CORRELATION RESULTS OF THE LINEAR FORM OF THE DETERMINANTS OF HOUSEHOLD FOOD CONSUMPTION

	Cj	Qmj	Qwj	Ymj	Ywj	Hmj	Hwj
Cj	1.0000						
Qmj	.1769	1.0000					
Qwj	.5987	.1385	1.0000				
Ymj	.1080	.4232	.1935	1.0000			
Ywj	−.1643	−.4654	−.2666	−.0757	1.0000		
Hmj	−.2541	−.5894	−.2937	−.3179	.6896	1.0000	
Hwj	.1806	−.0993	−.0372	−.0762	.4193	.2213	1.0000

APPENDIX D

CORRELATION RESULTS OF THE SEMI–LOG FORM OF THE DETERMINANTS OF HOUSEHOLD FOOD CONSUMPTION

	Cj	Qmj	Qwj	Ymj	Ywj	Hmj	Hwj
Cj	1.0000						
Qmj	–.1912	1.0000					
Qwj	.0951	–.1238	1.0000				
Ymj	–.3278	.4236	–.0133	1.0000			
Ywj	–.1968	.1283	.3770	.0584	1.0000		
Hmj	–.1694	–.0192	–.0118	.2578	.0147	1.0000	
Hwj	.9702	–.2165	.0865	–.3113	.2401	–.1265	1.0000

APPENDIX E

CORRELATION RESULTS OF THE DOUBLE – LOG FORM OF THE DETERMINANTS OF HOUSEHOLD FOOD CONSUMPTION

	Cj	Qmj	Qwj	Ymj	Ywj	Hmj	Hwj
Cj	1.0000						
Qmj	–.1226	1.0000					
Qwj	.0951	–.0996	1.0000				
Ymj	–.3278	.3506	–.0113	1.0000			
Ywj	–.1968	.1149	.3770	.0584	1.0000		
Hmj	–.1694	.0614	–.0118	.2578	.0147	1.0000	
Hwj	.4323	–.1421	.0297	–.1598	–.1881	.0109	1.0000

APPENDIX F

CORRELATION RESULTS OF THE EXPONENTIAL FORM OF DETERMINANTS OF HOUSEHOLD FOOD CONSUMPTION.

	Cj	Qmj	Qwj	Ymj	Ywj	Hmj	Hwj
Cj	1.0000						
Qmj	−.0778	1.0000					
Qwj	.1070	−.2530	1.0000				
Ymj	.0318	.0099	.1023	1.0000			
Ywj	−.1491	.3929	−.3218	−.1155	1.0000		
Hmj	−.2014	.0659	−.1537	−.0018	.0997	1.0000	
Hwj	−.0391	−.2363	.0895	.1187	−.0400	−.0153	1.0000

APPENDIX G

CALORIC OUTPUT OF FOOD COMMODITIES

1Kcal = 4.19 KJ

1g of carbohydrate provides 16 KJ (3.75 Kcal)

1g of fat provides 38 KJ (9 Kcal)

1g of protein provides 17 KJ (4 Kcal)

Proximate analysis of conventional foods (per 100g)

Food Item	Cal	Prot (g)	Fat (g)	Carb (g)	Water (g)
Okra	36	2.4	3	7.6	88.9
Soyabean	403	34.1	17.7	33.5	10.0
Potato	76	2.1	0.1	17.1	79.8
Sweet Potato	114	1.7	0.4	26.3	70.6
Taro					
(Cocoyam)	98	1.9	0.2	23.7	73.0
Yam	101	2.1	0.2	23.7	73.0
Rice	360	7.5	1.9	77.4	12.0
Cowpea	363	22.8	1.5	61.7	10.5
Pop Corn	362	11.9	4.7	72.1	9.8
Maize	360	10.8	4.5	70.2	8.5
Cassava	101	2.1	0.2	23.2	73.5

Source: Gaman P.M. and K.B. Sherrington, "The Science of Food".

pp. 179 – 181, 1977

APPENDIX H

GRAIN EQUIVALENT OF FOOD COMMODITIES

Food Item	Quantity Required for 1 Cal (g)	Quantity Required for 1 Cal (kg)	Amount of Cal Supplied per kg (Cal)
Okra	2.8	.0028	357.14
Soyabean	0.25	.00025	4000
Potato	1.3	.0013	769.14
Sweet Potato	0.9	.0009	1111.11
Taro (Cocoyam)	1.0	.001	1000
Yam	0.99	.00099	1010.10
Rice	0.3	.0003	3333.33
Pop Corn	0.28	.00028	3571.43
Maize	0.3	.0003	3333.33
Cassava	0.99	.00099	1010.10

Source: Gaman P.M. and K.B. Sherrington, "The Science of food". pp. 179 – 181. 1977