

WELFARE STATUS OF COCOA FARMING HOUSEHOLDS IN ONDO STATE, NIGERIA

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AEE/08/5301

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF MASTER OF
AGRICULTURAL TECHNOLOGY (M. Agric. Tech) DEGREE**

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MARCH, 2012

Abstract

This study was designed to assess the welfare status of cocoa farmers in Ondo State, Nigeria; determine the effects of socio-economic and demographic variables on the households' welfare status and examine the level of welfare inequality among the households.

The primary data used for the study were collected with the aid of structured questionnaire from a representative sample of 60 cocoa farmers in seven Local Government Areas (LGAs) which are known to have preponderance of cocoa farmers in Ondo State. Descriptive statistics were used to describe the socio-economic and demographic variables of households, Gini coefficient and index of dissimilarity were used to assess inequalities in the welfare status, cross tabulation and Chi-square test were used to test for the existence of relationship between welfare index and some socio-economic and farm specific variables while regression analysis was used to assess the effects of some socio-economic variables on cocoa farmers' welfare status.

The result of the analysis revealed that 83.3 percent of the respondents were male. Most of them were old. Their mean age was 59.85 years while the mean household size was 6. About 76.7 percent of the farmers were educated, while 23.3 percent had no formal education. Only 50 percent of them had some field training on cocoa production. Most of the sampled cocoa farmers are small scale producers with about 70 percent of them producing less than 1000 kg of cocoa beans in a cropping season. The mean cocoa output was 877.50 kg. Income from cocoa production was low with an average of ₦ 139,830. The GPS estimate of farm size ranged from 0.01 to 10 hectares with mean of 2.4ha. The majority (60 percent) of the respondents had their farms over 1 km distance from homestead, with a mean distance of 24.02 km. Most of the cocoa farms were old with about 56.7 percent being above 30 years, with a mean of 29.88 years. About 78.3 percent of cocoa farms cultivated by the respondents were previously forest which implies that the lands had not been exhausted before being used to establish the cocoa farms. About 81.7 percent of the respondents had total household income of ₦ 300,000 or less during the survey period. The mean dependency ratio was 1.43. The number of rooms occupied by the respondents' households varied between two and sixteen with mean of 5 rooms. All the respondents in the study area used iron sheets as their roofing material. Majority (70 percent) lived in mud wall and mud brick houses, 51.7 percent lived in houses that needed major repairs. About 60 percent of the households had no electricity supply, 95 percent used wood as source of

fuel for cooking, 70 percent had no access to safe drinking water, 71.7 percent had no toilet facility within their house premises and 70 percent lived in houses with windows that are not protected with wire netting against mosquitoes and other flies. Communication was not a problem in the study area because most of the farmers owned functional mobile phones, radio set as well as television set. The Gini coefficient for the welfare index was 0.2049, and index of dissimilarity was 0.1161, indicating a relatively low degree of inequality in welfare index. This shows that the sampled cocoa farmers were not much better than one another in terms of welfare status. Also the Gini coefficient and index of dissimilarity for income distribution was 0.5249 and 0.3513; respectively, thus, indicating that there was some level of inequality in the distribution of total income of households. The result of bivariate analysis of the relationship between welfare index and socio-economic determinants of welfare revealed that household size, dependency ratio, farmers' training and GPS farm size had significant relationship with welfare index. Also the regression of income per capita on socio-economic and farm specific variables revealed that household size, dependency ratio, GPS farm size and GPS distance to homestead played some roles in determining the welfare status of cocoa farmers in the study area.

The study revealed that most of the cocoa farmers were living in environments which lack the basic amenities required for a decent standard of life. The key variables which affected household welfare in the study area were household size, dependency ratio, distance of farm from homestead and farm size.

Dedication

This work is dedicated to the Almighty God, who in his infinite mercy saw me through and brought the study to completion, and to my parents: Mr. and Chief (Mrs) F.A. Adewumi for their love for me to study for higher degree, understanding, endurance, provision and encouragement which made this work a reality.

Acknowledgement

Foremost, I wish to express my profound gratitude to the Almighty God for giving me grace, enablement, strength, wisdom and understanding to be able to accomplish this work.

My sincere gratitude goes to my project supervisor, Dr. A.E Oguntade for his contribution, assistance, efforts, advice, guidance, patience and supervision towards successful completion of this research work.

My gratitude goes to Prof. P.B. Imoudu, Prof. I. Ajibefun, Dr. Mafimisebi, Prof. S.O. Ewuola, Prof. T.T. Amos, Dr J.O. Oseni, Dr. S.D. Alfred, Mrs Arifalo, Mr. Awolala and the entire staff of the Department of Agricultural Economics and Extension, Federal University of Technology, Akure.

My gratitude goes to my colleagues and friends: Mr Ojo, Fagbule Tola, Mr Osho, Mrs Ogunjobi, Bimpe Balogun, Bimbo Akinduko Mr Aderemi, Miss Mopelola Sodipo, Mr James Abe, Opeyemi and Blessing. I appreciate you all.

I also appreciate Mr and Mrs K. Badejo, Prof. R.O. Abiola and Mrs Y. Muyide for their words of encouragement. My deep sense of appreciation goes to my good friend Stephen Agbugui, thank you for your assistance and support.

I also express my profound gratitude to my Parents Mr and Chief (Mrs) F.A. Adewumi thank you for your support and encouragement. I also appreciate my elder brothers and sisters, my twin brother and the entire Adewumi family for their assistance and encouragement.

Certification

I certify that this Project was carried out by Adewumi Kehinde Josephine of the Department of Agricultural Economics and Extension, School of Agriculture and Agricultural Technology, Federal University of Technology, Akure, Ondo State, Nigeria.

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Table of Content

Abstract	i
Dedication	iii
Acknowledgement	iv
Certification	v
Table of contents	vi
List of tables	x
List of figures	xii
CHAPTER ONE	1
INTRODUCTION	1
1.1 Cocoa Economy	1
1.2 Farm Income and Farmers' Welfare	3
1.3 Problem Statement	4
1.4 Objectives of the Study	4
1.5 Justification of the Study	5
CHAPTER TWO	6
THEORETICAL FRAMEWORK AND LITERATURE REVIEW	6
2.1.1 The Concept of Welfare	6
2.1.2 The Concept of Poverty	6
2.1.3 Cocoa Output and Productivity	7
2.1.4 Farmers' Income and Welfare Status	13
2.1.5 Farmers' Poverty Level and Welfare Status	16
2.1.6 Income Inequality	22
2.1.7 Welfare Indicators	24

CHAPTER THREE	29
Methodology	29
3.1 The Study Area	29
3.2 Sources of and types of Data	31
3.3 Sampling Procedure	31
3.4 Data Analysis	31
CHAPTER FOUR	38
Results and Discussion	38
4.1 Socio Economic and Demographic Characteristics of Respondents	38
4.1.1 Age of Households Heads	38
4.1.2 Household Size of the Respondents	39
4.1.3 Farmers' estimate of farm size	40
4.1.4 Farm size of Respondents measured by GPS	41
4.1.5 Soil Fertility Measure (Previous Land use Prior to Planting)	42
4.1.6 Age of Cocoa farms Cultivated by the Respondents	43
4.1.7 Gender of Household Heads	44
4.1.8 Percentage of Female in Households	45
4.1.9 Marital Status of Respondents	46
4.1.10 Distance of farm from Homestead	46
4.1.11 Cocoa output of the Respondents	47
4.2.0 Income of Cocoa Farming Households	48
4.2.1 Income from Cocoa Production	48
4.2.2 Income from other sources	49
4.2.2.1 Other agricultural incomes	49
4.2.2.2 Non-agricultural incomes (Transfers)	50
4.3.0 Total Income of Respondents	51
4.4.0 Household debt	52
4.5.0 Welfare status of cocoa farming households	53
4.5.1 Dependency ratio of respondents	53
4.6.0 Access to Education	54

4.6.1	Distance to Primary school	54
4.6.2	Number of Children in Primary School	55
4.6.3	Distance to secondary school	56
4.6.4	Number of Children in Secondary School	57
4.7.0	Literacy level	58
4.7.1	Educational level of household head	58
4.7.2	Farmers' Field Training	59
4.8.0	Living standards of cocoa farming households	59
4.8.1	Number of rooms available to household members	60
4.8.2	Roofing materials	61
4.8.3	Exterior Walls of Dwelling	61
4.8.4	Structural condition of dwelling	62
4.8.5	Main Facility for Lightning	62
4.8.6	Cooking-fuel Source	63
4.8.7	Source of Drinking Water	64
4.8.8	Type of Toilet Facility	65
4.8.9	Protection of Houses with Mosquito Nets	65
4.8.10	Means of Transportation Owned	66
4.8.11	Means of Telecommunication Owned	67
4.8.12	Number of Durables Owned	67
4.8.13	Index of Welfare Status	69
4.9.0	Welfare inequality among cocoa Farming Households	69
4.9.1	Effects of Socio-economic and Demographic Variables on Household Welfare	70
4.9.2	Multivariate analysis (Regression Analysis)	72
CHAPTER FIVE		74
SUMMARY, CONCLUSION AND RECOMMENDATIONS		74
5.1	Summary	74
5.2	Conclusion	76

5.3	Recommendations	77
	REFERENCES	78
	APPENDIX	91

List of Tables

Table		Page
1	Annual Production Figure on Cocoa in Nigeria between 1981/82 and 2009/2010	11
2	Cocoa Production in Ondo State as Percentage of Aggregate Production in Nigeria 1976/77 - 2008/2009	12
3	Attributes and Scoring for Housing	33
4	Attributes and Scores for Housing, Means of Transportation and Telecommunication	34
5	Distribution of Household Heads by Age	39
6	Distribution of the Respondents by Household size	40
7	Distribution of Farmers' farm size estimate	41
8	Distribution of GPS Farm Size	42
9	Previous Land use prior to Planting	43
10	Age Distribution of Cocoa farm of the Respondents	44
11	Households Heads' Distribution by Gender	45
12	Percentage distribution of female in the household	45
13	Marital Status of Household head	46
14	Distribution of Farm Distance from Homestead	47
15	Distribution of Cocoa Output in Kilogram of the Respondents	48
16	Distribution of Cocoa Income of the Respondents	49
17	Distribution of Respondents' other Agricultural Incomes	50
18	Distribution of Respondents' Transfer Income	51
19	Distribution of Respondents by Total Income	52
20	Distribution of Respondents by Household debt	53
21	Distribution of Respondents by Dependency ratio	54
22	Distribution of Households Distance to Primary school (Kilometres)	55
23	Distribution of Households by Number of Children in Primary School	56
24	Distribution of Households Distance to Secondary School (Km)	57

Table	Page	
25	Distribution of Households by the Number of Children in Secondary School	57
26	Distribution of Household Head Level of Education	59
27	Distribution of Respondents by Farmers' Field Training	59
28	Distributions of Households by the Number of Rooms Occupied	60
29	Number of persons per Room	61
30	Distribution of Respondents' Exterior Walls of Dwelling	61
31	Distribution of Respondents by Structural Condition of Dwelling	62
32	Distribution of Households by Electricity Supply	63
33	Distribution of Households by Energy for Cooking	63
34	Distribution of Households by Main Source of Drinking Water	64
35	Distribution of Households by type of Toilet Facilities	65
36	Distributions of Respondents by Protection of Houses' with Mosquito Net	66
37	Households Distribution by Means of Transportation Owned	66
38	Distribution of Households by Means of Telecommunication Owned	67
39	Distribution of Respondents by Number of Durables Per Household (Asset)	68
40	Distribution of Respondents by Welfare Index	69
41	Gini coefficient and Index of dissimilarity in the Income and Welfare Index of the Respondents.	70
42	Bivariate Analysis of the relationship between Index of Welfare and Socio-economic determinants of welfare	71
43	Regression coefficient and significance of Income per capita in Relation to Socio economic variables of Cocoa farmers.	73

List of Figures

Figure	Page
1. Map of Ondo State Showing Study Area.	30

CHAPTER ONE

INTRODUCTION

1.1 Cocoa Economy

Cocoa (*Theobroma cacao*) is an international crop. It originated from Latin America and had determined both the economic and political fate of many countries of the world of which Trinidad, Ghana, Nigeria, Cote D'Ivoire, Brazil, Costa Rica and Fernando Po are prominent (Mayhew and Perry, 1988).

Cocoa is a major cash crop of the tropical forest, notably in West Africa where export earnings from its sales form a major part of the economy (Mayhew and Perry, 1988). Cocoa was introduced to Nigeria from the American continent in 1874 and was first planted in Cross River State, but commercial planting began when the crop was introduced into Western Nigeria between 1889 and 1890. Cocoa cultivation gained prominence rapidly in Nigeria in 1965, when Nigeria became the second largest producer of cocoa in the world (Are et al; 1973). Cocoa is an important tree crop in Nigeria and cocoa bean is a major non-oil export commodity and foreign exchange earner (Osuntogun, et. al; 1997, Akinola, 2004; ICCO 2008).

Cocoa production in Nigeria is known to perform the following economic roles: provision of raw materials for cocoa industries, provision of revenue for the government, contributes to the aggregate export earnings and source of income for farmers who engage in cocoa production. Also cocoa farming, processing and marketing provide employment for about 40% of the inhabitants in cocoa producing zones of Nigeria (Oladosu and Sanusi, 2004). The relevance of cocoa to most developing economies cannot be over emphasized as cocoa is produced by more than fifty developing countries across Asia, Africa and Latin America; all of which are in tropical or semi-tropical area. (Olayide and Falusi, 1995, Oyinloye, 1999, Akinbola, 2001).

Nigeria is the fourth largest producer of cocoa in the world, ranking after Ivory Coast, Brazil and Ghana (Titilola, 1997). Global production of cocoa beans in the 2003/2004 and 2004/2005 crop years reached 3.21 million tonnes, about 3% higher than in 2002/2003 (Asare, 2005). Duguma et al; (1998) estimated that there were about 2.5 million cocoa smallholders and if those, for whom cocoa is not the main activity, is included the figure could reach 3 million. These smallholders' yields average 350kg/ha.

Cocoa as a plantation crop was the dominant foreign exchange earner for Nigeria in the early sixties through the early seventies, after which the discovery and exploration of petroleum oil in increasing large quantities gradually led to a shift of the country from its agrarian economic base. Cocoa still remains a major export crop with revenue of 7,459.3 million naira derived from export of dried cocoa beans in 1998; and this constituted 1% of the 2.2 % attributed to total export of major agricultural products. It is also significant in terms of revenue generation and at the farmers'/ traders' level in terms of employment and income earnings. For example, the unexported balance of the estimated 345,000 tonnes produced in 1998 was utilized largely in local manufacturing concerns as cocoa butter, cocoa powder, cocoa cake and cocoa paste; and this yielded revenue of about 640.3 million naira. (Akingbohungbe, 2008). Cocoa exports from Nigeria in 2005, 2006, 2007 and 2008 were 267700, 189500, 174900 and 227303 tonnes, respectively (FAO, 2010).

Cocoa has declined in economic importance at the aggregate national level in Nigeria. It nonetheless remains the economic mainstay of a high percentage of the people of Southwestern Nigeria where its production is much concentrated; and which accounts for 94.4% of the total output in the country. Future prospects of cocoa in Nigeria remain bright with the increasing local processing of the dried beans into cocoa powder, cocoa cake and cocoa butter. The latter in particular commands a premium in the export market and enhanced the foreign exchange generating capacity of cocoa. (Akingbohungbe, 2008).

The age of the tree stock and the incidence of pests and diseases continue to be major constraints to Nigerian cocoa production. A shortage of rural labour is also a major constraint to expansion and the average age of the cocoa farmer is also high. Many farms are over 40 years old and such farms constitute as much as 60% of the cocoa farms in the country (Adegeye, 1997). Other factors that have caused the decline in cocoa production include, the problem of depleted soil fertility, poor control of pests and diseases, use of poor planting materials, poor maintenances of cocoa farms, lack of credit facility to support production practices, defective methods of harvesting and poor handling of post harvest processes, inefficient agricultural extension services (Idowu, 1986, Adenikinju et al; 1989, Fanaye et al; 2003, Asare, 2005,).

The decline in cocoa production can also be attributed to the discovery and exploitation of petroleum. Nigeria has over emphasized the exploitation of crude oil as a main source of

foreign exchange earnings. The country thus neglected cocoa, a versatile renewable and sustainable avenue for generating foreign exchange and employment (Akinwumi, 1995). Between 2002/2003 and 2003/2004 the world price for cocoa dropped by about 48% from some 3000 dollars per tonne to about 1560 dollars in 2003/2004. The largest part of the price is always taken out of prices paid to farmers by the marketing intermediaries (exporters, middlemen and assemblers). This of course had a direct impact on farmers' incomes and food security as low prices have crushed farmers' willingness to invest in fertilizers, pesticide and insecticide to boost and protect their crop (Padi and Owusu 1998).

1.2 Farm Income and Farmers' Welfare

A high level of income inequality exists in many low income countries of Sub-Saharan Africa (SSA) of which Nigeria is one. It is widely believed that majority of the people in Sub-Saharan Africa live in the rural areas. These rural communities are mostly agrarian with majority of them owing just a small piece of land on which they grow crops hardly sufficient to feed themselves let alone to sell in order to generate income. They therefore, live on small and meager income as compared to urban dwellers who earn more than rural dwellers due to their higher literacy level, education and so on (Udo-Aka, 1975).

Studies have shown that Nigerian farmers earn very low incomes. A study of 200 farming households in Ibadan metropolis reveals that all of them were earning less than ₦ 30,000 per month (Yusuf et al; 2008). Babatunde (2008) in a study of farming households in Nigeria also found out that household incomes ranged from ₦11, 661 to ₦142, 165 with a mean of ₦30, 245.

Just as the incomes of the farming households are low their welfare status are also low. Access to basic infrastructure is generally low. Oluwatayo (2008) found out that 55.7% of the rural households studied patronized herbal medicine sources instead of modern health care service. Trekking and bicycle were the main means of transportation for about 50.8% of the households. Babatunde (2008) also found out that many of the rural households studied did not have access to electricity and pipe borne water. These findings are in line with NBS (2006) findings which show that in most parts of rural Nigeria, access to basic infrastructure is low and that there is a significant difference between the level of access to basic infrastructure in the urban and rural areas.

1.3 Problem Statement

Even though Cocoa is the most important agricultural export commodity in Nigeria, the country's cocoa economy needs rejuvenation. Some studies (Adegeye, 1997, Debenham, 1999) have shown that most of the cocoa farmers are old while most of the cocoa farms are also old. There is thus a need to attract young men into cocoa farming who will make new investments in the cocoa economy through replanting of old farms and the establishment of new ones. However, as rational decision makers, the young men will assess the income they could derive from cocoa farming and the welfare status of those currently into cocoa farming to guide their decision. In order to aid policy formulation in addressing factors that may be limiting the income level in the cocoa economy and the causes of low welfare status, it is necessary to provide information on the current level of incomes and welfare of cocoa farmers and those factors that determine the income and welfare status. This study therefore, aims to assess the welfare status of cocoa farmers in Ondo State as well as determine the factors which affect the cocoa farmers' welfare status.

1.4 Objectives of the Study

The broad objective of the study is to assess the welfare status of cocoa farming households in Ondo State, Nigeria. The specific objectives are to

- i. identify the socio-economic characteristics of sampled cocoa farming households in the study area;
- ii. estimate the income of cocoa farming households in the study area;
- iii. determine the welfare status of cocoa farming households in the study area;
- iv. determine the effects of socio-economic and demographic variables on the households welfare status; and
- v. examine the level of welfare inequality among the households.

1.5 Justification of the Study

Cocoa production is important in the economy of Nigeria. The agricultural sector and indeed cocoa production have always been an important component of Nigerian economy. Cocoa serves as source of income to farmers and to many other groups such as LBAs, exporters, processors, transporters and brokers. Without cocoa farmers who are able to earn decent standard of life from cocoa, the crop will soon be abandoned and all the other groups that depend on cocoa for a living will have to look for something else to do. It is the income and welfare status of the current set of cocoa farmers that will determine if young farmers will be willing to replace the aging cocoa farmers. Thus, it is necessary to assess the income and welfare status of cocoa farmers with a view to improve income and welfare status of cocoa farmers. Also is not common to find in literature summary indices that can be used to assess welfare status at household level, which is one of the objectives of this study. Hence, the justification for this study.

CHAPTER TWO

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1.1 The Concept of Welfare

Welfare (a state of well-being), is defined in terms of the level of utility reached by a given individual. This level is a function of goods and services that he or she consumes. This is a 'welfarist approach to well-being, as greater importance is attached to the individual's perception of what is considered useful to him or her. The 'non-welfarist' approach defines well-being independent of individual's from a social point of view, and selective indicators are used to distinguish certain goods considered socially useful. In particular, planners generally favour adequate food, improved access to education, health care, housing, clean water and so on (Ravallion 1992).

Whether or not a household is poor is widely recognized as an important, albeit crude, indicator of the well-being of the household. This is reflected in the central role that the concept of poverty plays in analysis of social protection policy. According to Okorie (1982), the central objective of rural development involves raising incomes and outputs as well as existing assets in order to improve the welfare of rural people in totality.

2.1.2 The Concept of Poverty

Poverty is said to exist when an individual or group of individual fail to attain a level of well-being, usually material well-being, which is deemed to constitute a reasonable minimum by the standard of that society. This means that poverty is an ex post measure of a household's well-being (or lack thereof). It is today defined as a state of long-term deprivation of well-being, a situation considered inadequate for a decent life (Oluwatayo, 2004).

Poverty is a state where an individual is not able to cater adequately for his /her basic needs of food, shelter and clothing in order to maintain minimum standard of living, meet socio-economic obligations, lacks gainful employment, skills, assets and self esteem, and has a limited access to socio-economic infrastructures such as education, health, portable water, and sanitation, and as a result has limited chance of advancing his/her welfare to the limit of his/her capacities (Englama et al (1997).

2.1.3 Cocoa Output and Productivity

Agriculture is the backbone of Nigerian economy and it employs over 75% of the population. This sector has also recorded the growth rate well above 5% compared with the less than 2% growth of early 80's (Falusi, 2008). Agriculture generates about 30% of the gross domestic product (GDP) (World Bank 2006). The sector generates about 90% of the non oil export revenues, employs about one- third of the total labour force and provides a livelihood for the bulk of the rural population (FMARD, 2006).

Cocoa is a valuable tree crop in Nigeria. The high value is due largely to its significant contribution to Nigeria's economic development (Olayemi and Olayide, 1977). Cocoa output in Nigeria which peaked at 305,000 tonnes in 1970 dropped to 155,000 tonnes in 1988/89 and 110,000 tonnes by 1990/91. However, by 1996/97 the production level rose to 135,000 and 177,000 tonnes in 2000/2001 and to 200,000 tonnes in 2004/2005, 230,000 tonnes by 2007/2008 and 260,000 tonnes in 2009/2010 which is an indication that the outputs have been consistent over the years (FAO, 2003, ICCO, 2010).

Cocoa is one of the most widely produced agricultural cash crops in the West African countries. It is a vital source of foreign exchange, investment, and economic growth. The cocoa proportion of the forest agro ecology in Cameroon, Nigeria, Ghana, and Cote d'Ivoire now account for over 2 million tons of cocoa which represents 70% of world supplies. Cocoa production raises over \$2 billion in foreign exchange for the sub region and taxation of the sector generates significant government revenues.

The cocoa industry in Nigeria owed its development in the early days almost exclusively to the initiative and enterprise of the Nigerian peasant farmers. The early growth of cocoa industry in Western Nigeria was phenomenal. From a total of only 183 hectares in 1900, total hectareage of cocoa planted increased to about 4,082 in 1912; 400,000 in 1945; 408,163 in 1958; and 650,000 in 2004 (Olayemi, 1974; Aigbekaen, 2004; Sanusi and Oluyole, 2005). Presently, fourteen out of the thirty-six states in Nigeria produce cocoa and they are grouped into three categories according to their level of production. The groups are: high producer states (Ondo, Cross River and Osun; medium producer states (Edo, Ogun, Oyo, Ekiti, Abia, Delta, and Akwa-Ibom; as well as low producer states (Kwara, Kogi, Taraba and Adamawa) (Hamzat et al; 2006).

Cocoa production in Southwest Nigeria is essentially small scale. The mean cocoa farm was 4.7ha with sample distribution positively skewed (Gockowski and Oduwole, 2001). Farmers with larger cocoa holdings have more land resources of all types than those with small cocoa holdings and devote a higher proportion of their total land resources (72.3%) to cocoa than small scale farmers (55.7%). Conversely, the proportion of land allocated to annual crop and associated fallow fields is more than double among small cocoa farmers (38.9%) than for large farmers (15.6%). The overall importance of cocoa in the livelihoods of rural people in Southwest Nigeria is high, accounting for more than two-thirds of household income. The average producer produces approximately 1700kg annually, which generates mean gross cocoa incomes that have ranged from ₦100,000 to ₦240,000 (equivalent to 833 to US \$ 2000) depending on world price. Interestingly, smaller producers are significantly more dependent on cocoa revenues (70% of total cash revenues) than are large-scale farmers (Gockowski and Oduwole, 2001).

The cocoa survey conducted by the defunct Nigerian Cocoa Marketing Board in the early 1950s produced data, which showed that the area of cocoa held by each farmer was only 0.6ha. Olayemi (1974) however revealed that small holdings of farmers which accounted for about 90 percent of the aggregate hectarage in each state vary from 2 to 5 hectares consisting of three or more scattered plots and this is responsible for over 60 percent of Nigeria's total output (Ojo,2003). Cocoa is grown almost entirely on smallholdings and each farm is usually less than one hectare. Most of the cocoa plantations were established more than four decades ago and very old villagers and tenant farmers are involved in cocoa production (Opeke, 1987 and Adegeye, 2000). Although, the production was so low at the start that by 1914, Nigeria was producing only about 4,000 tonnes per annum or less than two percent of the total world output. Progress became more rapid thereafter and between 1913 and 1930, production increased to about 80,000 tonnes per annum.

Nigeria's cocoa production continued to increase both in absolute quantity and as a proportion of total world productions, that by 1965, Nigeria became the second largest producer in the world with an annual output of about 270,000 tons (Olayemi, 1974; Olatubosun, 1974 and Aigbekaen, 2004). Nigeria's share of total world production also rose from about two percent barely half a century earlier, to about 18 percent. However, the discovery of oil in large

quantities has brought a downward trend in Nigerian production and position in the world market (Ayoola, Badaru and Aikpokpodion, 2000).

Daramola (2004) reported that Nigerian cocoa output has declined from over 300,000 tonnes to 155,000 tonnes with average annual growth rates declining from 8.3% during the 1992-1996 to 1.8% during the 1997-2001 periods, respectively. Also, Sanusi (2005) revealed that average cocoa output was 175,000 tonnes in 2000-2004 periods. Cote d'Ivoire which was placed at a distant third in Africa with 143,000 tonnes behind Nigeria's 196,000 tonnes in 1970 is now the largest producer in the world with 1.3 million tonnes accounting for about 40% of total world's production while Nigeria is ranked the fourth largest producer after Cote d'Ivoire, Ghana and Indonesia (International Cocoa Organization, 2003). Despite the fluctuations in production, Western Nigeria remained the predominant cocoa Zone accounting for about 94 percent of Nigeria's total output (Olayemi, 1974 and Ojo, 2005).

A greater percentage of cocoa trees in Nigeria are above 25 years old, because the aged farmers are reluctant in establishing new plantations while very few young men are going into cocoa cultivation (Debenham, 1999 and Adegeye, 2000). Therefore, young cocoa farms are uncommon in Nigeria's cocoa growing areas. Excessive deforestation and population pressure led to the decimation of cocoa farms as well as degradation of (cocoa) farm lands in Nigeria resulting in cocoa output reduction over the years (Debenham, 1999; Adegeye, 2000 and Ojo, 2003). Furthermore, the land tenure system, which makes the acquisition of (cocoa) farmlands by government and powerful individuals possible, is another serious disincentive to cocoa farmers in Nigeria (Adegboye, 1974; Famoriyo, 1974, Olayemi, 1974; Fabiyi, 1977; Oduwole, 2000; and Ojo, 2000).

The remarkable thing about the development of the cocoa industry in Nigeria is that it took place with no major departure from the traditional peasant method of farming. The success of the peasant cocoa industry in Western Nigeria and other parts of West Africa, has often been explained in terms of the "vent-for-surplus" hypothesis which states in effect, that the opening up of a relatively isolated country to world trade provides a vent for its surplus productive capacity (mainly land and labour) provided that the production of the new crop does not involve a drastic departure from the traditional method of economic organization (Olayemi, 1974).

Myint (1964) stated that the function of international trade in such an economy is to provide the necessary effective demand for the output of hitherto surplus or unused resources. Opeke (2003) reported that the first accurate export figure of dry cocoa beans from Nigeria was in 1910. However, it was revealed that the first exportation of cocoa beans from Nigeria was in 1895 (Sanusi and Oluyole, 2005). The importance of cocoa to Nigerian economy cannot be over emphasized. Cocoa export had been and will continue to be a significant factor in the economic growth of Nigeria. For instance, in 1969 alone, cocoa earned 106 million naira (U.S \$74.2 million), which accounted for 40% of all agricultural exports for the year (Federal Office of Statistics, 1972). Despite negative effects of government policy, cocoa remains the highest foreign exchange earner of all agricultural export crops (Tijani, Farinde and Agboola, 2001).

Although Nigeria is indeed a country endowed with abundant natural and human resources, the country is still grappling with the problems of low agricultural output and productivity. Olayide (1990) attributed this to the low output and productivity characteristic of Nigeria's small holder farmers. Productivity performance in the agricultural sector is critical to improvement in overall economic well being of Nigerians in particular and Sub-Saharan Africa in general, since two-thirds of the labour force is accounted for by agriculture and 40 % of the earnings come from this sector (Fulginiti et al; 2003). Agriculture is the largest non oil export earner and largest employer of labour accounting for 88% of the non oil foreign exchange earnings and 70% of the active labour force of the population. (FGN, 2001). Productivity growth therefore is the main determinant of income growth and poverty reduction. More so, governments view increasing and sustaining agricultural productivity as a means of overall growth, poverty reduction and promotion of food security. In particular it has been shown that agricultural productivity growth is more poverty alleviating than non agricultural led growth (Nomaan, 2004).

Tables 1 and 2 show the annual cocoa production figures in tonnes in Nigeria between 1981/82 and 2009/2010 and Cocoa production in Ondo State as a percentage of aggregate production in Nigeria between 1976/77 and 2008/2009, respectively.

Table 1: Annual Production Figure on Cocoa in Nigeria between 1981/82 and 2009/2010

Year	Annual Production in Nigeria (Tonnes)
1981/82	156,000
1982/83	183,000
1983/84	156,000
1984/85	115,000
1985/86	151,000
1986/87	120,000
1987/88	100,000
1988/89	145,000
1989/90	160,000
1990/91	155,000
1991/92	160,000
1992/93	110,000
1993/94	140,000
1994/95	140,000
1995/96	150,000
1996/97	150,000
1997/98	150,000
1998/99	148,000
1999/2000	153,000
2000/2001	148,000
2001/2002	185,000
2002/2003	165,000
2003/2004	180,000
2004/2005	200,000
2005/2006	200,000
2006/2007	190,000
2007/2008	230,000
2008/2009	250,000
2009/2010	260,000

Source: (i) Quarterly Bulletin of Cocoa Statistics, Vol. XXX Number 1, Cocoa Year 2003/2004.
(ii) ICCO Quarterly Bulletin of Cocoa Statistics, Vol. XXXI Number 4, Cocoa Year 2004/2005.
(iii) ICCO Quarterly Bulletin of Cocoa Statistics, Vol. XXXII. 2005/2006.
(iv) ICCO Quarterly Bulletin of Cocoa Statistics, Vol. XXXIII. 2006/2007.
(v) ICCO Quarterly Bulletin of Cocoa Statistics, Vol. XXXIV No. 3, Cocoa Year 2009/2010.
Published: 26-08-2010

Table 2: Cocoa Production in Ondo State as Percentage of Aggregate Production in Nigeria 1976/77 - 2008/2009*

Year	Aggregate Production in Nigeria (Tonnes)	Quantity of graded Cocoa (metric tonnes)	Contribution % of Ondo State Production to Total Production
1976/77	216,000	66,187	30.6
1977/78	200,000	76,139	36.8
1978/79	135,000	92,800	68.7
1979/80	170,000	74,595	43.9
1980/81	150,000	69,595	46.4
1981/82	156,000	95,193	61.0
1982/83	183,000	91,790	50.2
1983/84	156,000	96,941	62.1
1984/85	115,000	88,748	77.2
1985/86	151,000	68,347	45.3
1986/87	120,000	57,705	48.1
1987/88	100,000	72,584	72.6
1988/89	145,000	110,457	76.2
1989/90	160,000	71,214	44.5
1990/91	155,000	72,173	46.6
1991/92	160,000	81,276	50.8
1992/93	110,000	51,620	46.9
1993/94	140,000	78,649	56.2
1994/95	140,000	69,525	49.7
1995/96	150,000	54,749	36.5
1996/97	150,000	43,898	29.3
1997/98	150,000	41,181	27.5
1998/99	148,000	28,817	19.5
1999/2000	153,000	31,154	20.4
2000/2001	148,000	45,875	31.0
2001/2002	185,000	54,218.5	29.31
2002/2003	165,000	64,906	39.34
2003/2004	180,000	69,822	38.8
2004/2005	200,000	57,076	29.0
2005/2006	200,000	61,835.5	30.1
2006/2007	190,000	45,004.5	23.7
2007/2008	230,000	60,039	26.1
2008/2009	250,000	76,399	30.6

Source: (i) Ministry of Agriculture and Rural Development Ondo State. 2010.

(ii) Quarterly Bulletin of Cocoa Statistics Vol. XXX Number 1 Cocoa year 2003/2004.

(iii) ICCO Quarterly Bulletin of Cocoa Statistics, Vol. XXXI Number 4, Cocoa Year 2004/2005.

(iv) ICCO Quarterly Bulletin of Cocoa Statistics, Vol. XXXII. 2005/2006.

(v) ICCO Quarterly Bulletin of Cocoa Statistics, Vol. XXXIII. 2006/2007.

(vi) ICCO Quarterly Bulletin of Cocoa Statistics, Vol. XXXIV No. 3, Cocoa Year 2009/2010.

Published: 26-08-2010.

* Ekiti State was carved out of the Old Ondo State on 1st October 1996.

2.1.4 Farmers' Income and Welfare Status

Cocoa is the direct source of income for 11 million farmers in West Africa alone (Swift, 1998). Cocoa is a “cash crop”, and has played an important, vibrant role in rural economies worldwide. It provides families with income and raised the standard of living in thousands of communities where it is grown and harvested (The World Cocoa Foundation, 2001). Cocoa is mainly produced at smallholder farms and it is the major source of income for these households, as well as for numerous landless agricultural workers. (Hazell and Reardon, 1998).

Many farmers live in remote, completely rural areas of Nigeria in terms of infrastructure when compare with their counterparts in developed countries and they form a major constituent of the rural nexus. The undeveloped nature of the rural areas poses a lot of constraints to cocoa farmers in Nigeria in virtually all aspects of cocoa economy be it cultivation, harvesting and post-harvest handling, storage, quality assurance, as well as marketing. Investigations have attributed the travails of the Nigerian cocoa industry to the price paid to farmers, old age of farmers and cocoa trees, land degradation, land tenure system, competition with food crops, as well as inadequacy / adulteration of inputs, among others. (Hamzat et al; 2006).

During the regulated trade era, it was generally argued that farmers were being short changed in that a small proportion of the world cocoa market price is paid to them, however trade liberalization resulted in excessive fluctuations in bean prices and consequently farmers still receive quite a fraction of the world market price (Olatunbosun, 1974 and Ojo, 2003). Majority of cocoa farmers are very old with the younger ones not interested in cocoa farming due to opportunity cost in comparison with other sectors of the economy (Adegeye, 1977; Ajobo, 1977; Adegeye, 2000 and Ojo, 2003).

Agricultural commodity production plays a key role in the economies of many low-income countries and households. The United Nations Conference on Trade and Development (UNCTAD 2003) estimated that one billion people depend on agricultural commodities for a substantial portion of their income (South Centre, 2005). Cocoa in the West African countries of Cote d'Ivoire and Ghana provides a perfect example of agricultural commodity dependence: approximately four million and two million people in each country, respectively, depend on cocoa production for a substantial portion of their income (Sarris, 2002 and Talbot, 2002).

The components that make up the acceptable standard of living can be represented as a composite whole by the real income expressed in naira. It therefore can be seen that poverty, can in every sense be linked to the income level of individuals of households since their standard of living is a measure of the income obtained or received by them (Oluwatayo; 2008). The majority of the rural populace in Nigeria either depends entirely on farming and farming related activities for survival and generation of income, or depend on these activities to supplement their main sources of income. The validity of this statement becomes evident when it is realized that over 90% of the country's local food production comes from farms, which are usually not more than 10 hectares in size, with at least 60% of the population earning their living from these small farms (Olawepo; 2010).

The World Bank (1995) described rural farmers in Nigeria as small scale operators, tenant or landless, characterized by low income and high nutritional deficiency. They also have limited assets, large family size, and high dependency rates. Despite their situation, these rural farmers and their farms collectively form an important foundation on which the nation economy revolves (Olawepo; 2010). The significance of rural farming can thus, not be over emphasized as rural areas form the food basket of the nation, and a major source of export materials. The fortunes of poor rural farmers can be determined by a number of factors. The initial distribution of income accruing to the rural farmer stands out as the most accessible determinant of the rural standard of living, since it is most quantifiable factor and the most reliable as majority of the people in the rural areas are predominantly farmers. The determinants of income among the target population therefore serve as social indicators of their standard of living. (Olawepo; 2010). Adebayo, (1985) suggested that the income levels of rural communities may be attributed to certain crucial factors, and understanding these factors may hold the keys to effective rural development policy making.

The inventorization of farmers' income in Nigeria has always been problematic. This is because most of the rural farmers do not keep records and a host of them are not literate. Meanwhile, the federal and state governments have been trying to alleviate farmers' problems through various programmes. Despite all these development efforts, the rural farmers is still regarded as poor (Olawepo; 2010). Cocoa remains, however, significant in terms of internal revenue generation, and at the grower level is important in terms of employment and income

(Ajobo; 1980,). It also remains a major export crop; in 1998 a revenue of 7459.3 million Naira (US \$ 53,280 at 140 per US \$) was derived from dried cocoa beans (i.e. half of the income attributed to the total export of major agricultural products) (CBN; 1998, pp. 8-9).

The cocoa sector is a multi-billion dollar business of global proportions. In 2006, production of beans amounted to 3.6 million tonnes. More than 90% of global cocoa production is grown by an estimated 3.5 million small holders. An additional 14 million rural workers directly depend on cocoa for their livelihood (Tropical commodity coalition 2008). Many of the cocoa growing families in West Africa are poor, often with little or no education and their cocoa crop is the main source of income. Children can be caught in the cycle of poverty pattern which requires that they assist their family to survive and at the same time attempt to use formal education as a means to break out of the cycle. Moreover, cocoa farmers who produce for cash can be vulnerable due to the fact that they are often not growing enough food crops to sustain the family nor are they using sustainable agriculture practices to secure their future livelihood. As cocoa is often grown on remote areas, communities face numerous challenges, such as the lack of educational provision, or a difficult access to services such as quality health centres, (International Cocoa Initiative, 2007).

World cocoa prices fluctuate widely and have been well below production costs in the last decade. Though cocoa prices have shown moderate increases in the past few years, cocoa producers remain steeped in debt accumulated when prices were below production costs. Producers typically also get only half the world price as they must use exploitative middlemen to sell their crop. The effects of insufficient cocoa income have been exacerbated by the deregulation of agriculture in West Africa, which resulted in the abolition of Commodity Boards across the region, leaving small holder farmers at the mercy of the market. This economic crisis forced farmers to cut their labour costs. The outcome was a reduction in the use of hired labour and a surge in reports of labour abuses ranging from farmers pulling children out of school to work on family farms to outright child trafficking and slavery. These small holder farmers and their children remained trapped in a cycle of poverty, without hope for sufficient income or access to basic education or health care (The Global Economy Fair Trade, 2009).

2.1.5 Farmers' Poverty Level and Welfare Status

Poverty has been defined in the past in terms of what a person or household needs to survive, in the physiological sense. It is not just measured by income and consumption of food, clothing and shelter, but also access to education, health services, clean water and good standard of living are central dimension of poverty and welfare (Imoudu, 1998). Poverty has generally been defined as a state of having little or no money and the failure to get necessities of life. The poor is defined as one who lacks basic necessities such as adequate feeding, clothing, good health, education, supply of portable water, electricity and good road among others (Oladunni, 1990). Poverty is substantially a rural phenomenon as is the case in most low income countries like Nigeria. Like an elephant, it is more easily recognized or acknowledged than explained or defined. In the real sense poverty can be recognized as existing when resources of individual or families are insufficient to provide a socially acceptable standard of living (Oluwatayo; 2008).

Poverty in Nigeria is concentrated in rural areas. Based on a relative poverty measure used by the Federal Government of Nigeria (FGN) of the number of people living on less than 2/3 of mean per capita income, 64 percent of people who live in rural areas live below the poverty line, while the figure is only 35.4 percent for urban areas. In 1980, these proportions stood at 28 percent for rural areas and 17 percent for urban areas (FOS, 1999). The higher-order poverty estimates show rural poverty is deep as well as unequal among the poor. Since the majority of the rural poor are primarily dependent on agriculture for their livelihoods, they exhibit agriculture specific poverty characteristics such as land scarcity, poor quality of land resources, shortage of assets and working labour, low educational attainment, low technological change, and living in marginal areas with poor agricultural potential, and constrained (Bigsten et al; 2003).

Nigeria faces serious poverty challenges. Two out of every three Nigerians live below the poverty line of \$1 per day in income. Poverty in Nigeria is concentrated in rural areas, which are home to more than 70 percent of the nation's poor. Development indicators for rural areas lag behind those for urban areas: income are lower, infant mortality rates are higher, life expectancy is shorter, illiteracy is more widespread, malnutrition is more prevalent, and greater proportions of people lack access to clean water and improved sanitation services. (World Bank, 2006). It has

been shown that majority of the poor in Sub-Sahara Africa are small-holder farmers (IFAD, 2001).

Rural people strive to feed themselves while the urban population spends more than 70% of its earnings on food, leaving only 30% for other minimum basic needs such as housing, education, health care, water and livelihood. Hunger, poverty and malnutrition are the main factors interacting to create an enormous setback to socio-economic development, especially in the rural areas of Africa (Roy-Macauley, 2002). Poverty is the inability to adequately meet the basic human necessities of food, clothing and shelter. It is a broad multidimensional, partly subjective phenomenon often viewed as both the cause and symptom of underdevelopment. It is manifested in many ways, including the lack of capability by individuals or groups to function and feel well in the society (Sen, 1981).

Imoudu (1998; 1999), puts it as a condition of having little or no money and not able to get the necessities of life. A situation whereby one is not having a means of sustaining life is a dangerous thing. Such persons cannot contribute to nation's economic growth and development. The natural phenomena that dehumanized people in all ramifications should be detested. Poverty brings hunger, diseases, inadequate shelter, and homelessness. It hinders the education of children and leaves them on the margin of the society.

World Bank (1990), described poverty as inability to attain a minimum standard of living. Lipton (1989), pointed out that in most cases the poor households are those having low assets, low income, and engage in risky activities which have low rates of return. According to Garha (1993), poverty is a socio-economic problem which has implications on the quality of life of the people and as well affects other aspects of life and behaviors including life chances, health, educational attainment, political and deviant behaviors such as crime, destitution, immorality, divorce, alcoholism and delinquency.

Lipton and Maxwell (1992), defined poverty as a state in which there is absence of secured and sustainable livelihood. Balogun (1999), in his study defined poverty in its absolute sense as a situation where a population or a section of the population is able to meet only its bare subsistence essentials of food, clothing and shelter in order to maintain minimum standard of living; and Oladunni (1999), gives a traditional definition of poverty as insufficient income for securing the basic necessities of life such as potable water, food, clothing and shelter. Several evidences have suggested that majority of the world's poor live and work in the rural areas (World Bank 1999, IFAD, 2001).

Globally, about 1.2 billion people are in extreme poverty, living on less than a Dollar per day. Majority of these people are in developing countries, 44% in South Asia, 24% each in Sub-Saharan Africa and East Asia and 6.5% in Latin America and the Caribbean (IFAD, 2001). Many reasons have been advanced for poverty in the less developed countries. Chandhri, (1977), Akinde, (1985), Chambers, (1988), and Fasoranti, (2007) concluded that traditional technology, unchanging farmer's experience, laziness, ignorance, stupidity, urban-biased development, and exploitation of the rural population by the urban elites among others, are the basic causes of poverty.

Eighty percent of all Africans live on a daily income of less than 2 US \$ and nearly half struggle to survive on 1 US \$ a day or less. Poverty is not limited to developing countries as more than 130 million people in the developing countries of the organization for Economic Cooperation and Development (OECD) are considered income-poor (UNDP, 2005). Poverty is a rural phenomenon in most of the developing countries including Nigeria. As reported by Etim (2007), rural poverty accounts for nearly 63% of poverty worldwide, reaching 90% in some countries like Bangladesh and between 65 and 90% in Sub-Saharan Africa. The rural poor make up more than 75% of the poor in many Sub-Saharan African and Asian countries (Pinstrup-Anderson and Pandya Lorch, 2001).

Studies have shown that agriculture is the locus of majority of poverty in Nigeria (World Bank, 1996). FOS and World Bank (1996) in their analysis of the poverty trend in Nigeria noted that poor families are in higher proportion in farming households who are mainly in the rural areas. Regions where agriculture is the major source of employment have the higher incidence of poverty. One of the suggested ways of reducing poverty is "utilizing of the poor factor endowment for improved income earnings and in living standards". In order words enabling the rural poor to increase their income level and thereby their living standards. An obvious way of achieving this is enabling the farming poor to increase their agricultural output so as not only to improve their income but to lift them above the subsistence level (Adeolu and Taiwo, 2004).

An empirical study on Nigeria poverty situation was conducted by Ogwumike (1987). The basic objective of this study was to examine the nature, causes and extent of poverty in Nigeria among the various socio-economic groups by using the basic needs approach. Using data from a sample survey of 980 households in Oyo, Imo and Borno States between October 1984

and January 1985, together with FOS data on prices of selected items, he derived a poverty line of ₦47.44 per head per month for Nigeria. The line derived was based on basic needs items such as food, shelter, clothing, transportation and education. Minimum levels derived for the basic need items are as follows; food (759.5 Kilo cal/week and 2533.3gm/week protein) shelter ₦4.66 a month per person) and education (₦2.09/month/person). The food items constitute about 80 percent of total expenditure. The results from the study suggested that as much as 57.14 percent of the households with their heads engaged in employment among the masses live in poverty in Nigeria.

The World Bank presented a poverty profile for Nigeria using the data from the Federal Office of Statistics (FOS), the demographic household survey and the general household survey. The World Bank (1996) on a controversial study assessed, the poverty trend in Nigeria between 1985 and 1992 using two-thirds of mean household expenditure as poverty line. The bank showed that the proportion of the population in poverty in the country declined from 45 percent (36 million people out of a population of 83million) in 1985 to 34 percent (34.7 million people out of a population of 102 million) in 1992. Also, in the study poverty was more pronounced in rural than urban area and it was concluded that the southern part of the country has less poverty than either the Central or Northern part of the country. There was an indication that the incidence and depth of poverty fell nationally between the two periods, but severity of poverty rose. It was shown that income inequality worsened in 1985-1992 despite the reduction in the number of poor. The top 10 percent had more than 35 percent of income in 1985, rising to 45 percent in 1992. In contrast, the lower 10 percent had only 2 percent of income in 1992.

In 1985, 1.1 billion people were living in poverty all over the world. 16.1 percent of the poor then resided in Sub-Sahara Africa (World Bank, 1990). The number of the poor in 1998 exceeded 1.2 billion in developing countries (United Nations Development Programme, 2000). This is an indication that the menace of poverty though a worldwide problem but is most devastating in Africa (Sub-Saharan Africa). For Sub-Saharan Africa (SSA) and Latin America, the 1980s have been described as a “lost decade” (World Bank, 1990). According to World Bank report (1989), SSA was characterized by low per capital incomes, increasing hunger and environmental degradation. In 1993, 40 percent of the people in SSA lived on less than one U.S dollar a day. (Damery and Squire, 1996). Due to high level of poverty rate in Sub-Saharan

Africa, over 550 million people (75% of the population) have no access to electricity (Okonjo-Iweala, 2008). The population of Nigeria is almost 50 percent of the SSA population. And with increasing level of poverty in the country, this shows that the contribution of Nigeria to the projected high level of poverty in this region is enormous. Nigeria is regarded as a rich country inhabited by poor people-poverty in the midst of plenty; researches have shown that conditions of Nigerians have deteriorated resulting from large scale poverty. Nigeria with over 140 million people which is more than 15 percent of the total Africa population has a land area of about 900,000 sq. Km, a third of which is arable. This country has a GNP per capital of US \$ 260, 45 percent illiteracy rate with about 50 years life expectancy (Okunmadewa, 1997).

In addition, between 1992 and 1993, it was estimated that over 34 percent of Nigerians lived below the poverty line (World Bank, 2001). The 1996 estimate put it at 50 percent. Reports show that there is a large income inequality with the top 10 percent of the income bracket controlling over 90 percent of the country resources. This income bracket also accounted for 60 percent of total consumption of goods and services in the country (Okunmadewa, 1997). According to Soludo (2008), Nigeria's poverty incidence is 54% with some areas as high as 95%. But Adepoju (2008) observed that the majority of Nigerians survive on mere ₦150 (slightly more than U.S \$ 1) a day. It was shown that 71 percent of Nigerian households are poor, out of which 36 percent are classified as Core poor and 35 percent moderately poor (FOS, 1995). Of the 19 states that made up the federation in 1980, less than half of each state population was poor. By 1985, eight states have more than half of the population in poor condition. In 1992 just 3 states remained in this category. But in 1996, only one state was not having more than half of its population in poverty. In Ekiti /Ondo state, incidence of poverty rose from 24.9 percent in 1980 to 71.6 percent in 1996 (Adeyeye, 2000).

Poverty is a serious rural phenomenon and is commonly assessed using income or consumption as criterion. A person is considered poor if his income level is below the defined poverty line, or if consumption fall below a stipulated minimum. When we are talking about poverty income is one of many factors that are considered. Others include a sense of insecurity or vulnerability, health status, literacy, education, political participation and access to assets. Apart from the income/consumption model of poverty, there is a basic needs approach that extends far beyond income to capture the need for basic health and education, clean water and

other services which are required to lift people above the poverty line or prevent them from falling below the poverty line. Additionally, the study of poverty has been extended to cover the more general wellbeing at the household level. This has been assessed in terms of a number of variables which include types of housing, access to school, etc. This is being addressed under a broader term – welfare status. The National Bureau of Statistics (2006) in its study of welfare status of Nigerians used a number of indicators which include: dependency ratio, access to water, safe water source, safe sanitation, improved waste disposal, health access, adult literacy rates, and youth literacy rates.

Development practitioners have used a combination of variables to assess development status at the national level. They came up with a number of composite indices to assess the development status of nations. Typical examples are the Human Development Index (HDI) (UNDP, 1990) and Physical Quality of Life Index (PQLI). This was developed by Morris, (1979).

HDI is people-centered and incorporates three major factors: Longevity (life expectancy, at birth, X_1), income (logarithm of per capital income, X_2) and knowledge (literacy rate, X_3).

That is $F(X_1, X_2, \text{ and } X_3)$.

PQLI is based on three indicators: Life expectancy, Infant mortality and Literacy. That is the indices from the three indicators are added together and an average is calculated.

$$PQLI = \frac{IMI + EI + LITI}{3}$$

Where;

IMI = Infant Mortality Index

EI = Life Expectancy Index

LITI = Literacy Index

However, it is not common to find in literature such summary indices that can be used at household level.

2.1.6 Income Inequality

Income inequality is some measure of the extent of differences in income received by individuals in the population from the lowest to the highest disparity in the levels of income among individuals in the economy (Oluwatayo, 2008). Income distribution is a description of the fractions of population that are at various levels of income; the larger the difference in income, the worse the income distribution, the smaller the better (Oluwatayo, 2008). Income inequality is often studied as part of broader analysis covering poverty and welfare. Inequality is a broader concept than poverty in that it is defined over the whole distribution, not only the censored distribution of individuals or households below a certain poverty line (World Bank, 1999; Cowell, 1999).

According to World Bank 1999, decomposition of income inequality is required for both authentic and analytical reasons as policy analyst and economists may wish to access the contribution to overall inequality within and between Sub-groups of the population. For example, within and between workers in agricultural and industrial sectors, or urban and rural sectors. Decomposition of inequality measures can shed light on both its structure and dynamics. Inequality decomposition is a standard technique for examining the contribution to inequality of particular characteristics and income package influences. These analyses were pioneered by (Bourguignon, 1979, Cowell, 1980 and Shorrocks, 1982a, 1984)

Ipinnaye (2001) found that decomposition analysis of income shows that non-farm income contributes the most to overall income inequality in both the urban and Peri-urban areas of Ibadan. Also in 2000 income inequality was higher in Peri-urban areas than urban areas (Ipinnaye, 2001). Adebayo (2002) found that in the rural areas in Ibadan metropolis, agricultural income contributes most to the overall income inequality accounting for 91% while rental income makes the least contributing to overall rural income inequality accounting for just 0.17%. In the urban areas, non-farm income makes the largest contributing to overall income inequality accounting for 80% while transfer income reduces urban overall income inequality by 0.13%. Elbers et al. (2003), estimated income inequality for Ecuador, Mozambique and Madagascar. Based on a statistical procedure that combines households' survey data with population census data, their analysis showed that the share of within-community inequality in overall inequality is

high. Specifically, Gini-coefficients computed were between 0.320 - 0.518 and 0.320 -0.440 in Madagascar and Mozambique, respectively.

Oyekale (1997) in a micro-survey of some households in Ibadan obtained Gini-coefficient of 0.3716, while Adejare (1999) estimated a Gini coefficient of 0.57. World Bank (2003) shows that in 1996/1997, estimated Gini index was 0.506, 0.477 and 0.407 for Nigeria, Cameroon and Ghana, respectively. Ferreira (1996) in rural Tanzania discovered that during the period of structural adjustment while income inequality increases between 1983 and 1991, there was a reduction in poverty.

The common measures of income inequality are Gini coefficient, Lorenz curve, Variance of the logarithm of individual incomes, coefficient of variation and share in income or consumption accruing to the bottom and top deciles or quartiles. The measures have to do with the distribution of income/expenditure among the population. Two measures that are widely used are, the Lorenz curve and the Gini coefficient (Oluwatusin, 2010).

The Lorenz curve shows the relationship between the cumulative shares of income and the cumulative percentage of the population. When used to measure income distribution, the horizontal axis represents the cumulative percentage of the population while the vertical axis represents the cumulative percentage of the income.

The Gini coefficient is the mathematical expression of the Lorenz curve. It compares the Lorenz curve of a ranked empirical distribution with the line of perfect equality. This line assumes that each element has the same contribution to the total summation of the values of a variable. The Gini coefficient ranges between 0, where there is no concentration (perfect equality), and 1 where there is total concentration (perfect inequality). A measure of 1 indicates perfect inequality. That is one person has all the income and rest have none. A measure of 0 indicates perfect equality i.e. all people have equal shares of income/expenditure. This shows an egalitarian income distribution. Coefficients greater than zero suggest various degrees of income inequality. Gini coefficient is the ratio of the area bounded by the Lorenz curve and the 45 degree line to the total area between the 45 degree reference line and the horizontal axis.

Gini coefficient = Area between the Lorenz curve and the diagonal line

Total area between the diagonal line and the horizontal axis

Where $0 \leq GC \leq 1$ (Oluwatusin, 2010). Mathematically, the Gini coefficient could be presented as:

$$G = 1 - \sum_{i=0}^N (\sigma Y_{i-1} + \sigma Y_i)(\sigma X_{i-1} - \sigma X_i)$$

Where σX and σY are cumulative percentages of Xs and Ys (in fractions) and N is the number of elements (observations)

Index of Dissimilarity (ID) is also used to measure the inequality in a population. It is defined as the summation of vertical deviations between the Lorenz curve and the line of perfect equality and is also known as the summation of Lorenz differences. The closer the ID is to 1 (or 100 if percentages are used instead of fractions), the more dissimilar the distribution is to the line of perfect equality. Mathematically, it could be represented as:

$$ID = 0.5 \sum_{i=1}^N |X_i - Y_i|$$

Where X and Y are percentages (or fractions) of the total number of elements and their respective values (traffic being the most common). N is the number of elements (observations).

2.1.7 Welfare Indicators

International Labour Organization, (1981) identified basic needs as food, water, shelter, work, health services, learning and access to information. Access to these basic needs is often used as indicators of welfare. Access to decent housing, education, potable water and health care services are taken as basic minimum required for a decent and fulfilled life.

The National Bureau of Statistics, (2006), assessed the welfare status of Nigerians using a number of indicators. These indicators include:

Dependency ratio: is the ratio between the number of household members age 15 to 64 and the number of members age 0-14 and over age 64.

Household economic situation compared to one year ago: worse is defined for households that replied much worse now or a little worse now; better is defined for households that replied a little better now or much better now.

Neighborhood crime/security situation compared to one year ago: worse is defined for households that replied much worse now or a little worse now; better is defined for households that replied a little better now or much better now.

Difficulty meeting food needs: is defined for households that reported difficulty meeting food needs often or always.

Difficulty paying school fee: is defined for households that reported difficulty paying school fees often or always.

Difficulty paying house rent: is defined for households that reported difficulty paying house rent often or always.

Difficulty paying utility bills: is defined for households that reported difficulty paying utility bills often or always.

Difficulty paying health care costs: is defined for households that reported difficulty paying health care costs often or always.

Households self classified as poor are households that responded yes to the question do you consider your household to be poor.

Secure housing tenure is defined for households that have any documentation to verify their occupancy status.

Access to water is defined for households with a water source less than 30 minutes away.

Safe water source is defined for households using treated piped water, bore hole/hand pump or protected well.

Year round water source is defined for households with no seasonal interruptions to their water supply.

Safe sanitation is defined for households using a flush toilet, covered pit latrine or ventilated improved pit latrine.

Improved waste disposal is defined for households that have waste collected or use a government bin.

Non-wood used for cooking is defined for households that use kerosene, oil, gas or electricity for cooking.

Activity in the main job is the main economic activity at the person's main job.

Health access is defined for persons living in households with a health facility less than 30 minutes away.

Health need is defined for persons who were sick or injured in the four week period preceding the survey.

Health use is defined for persons who consulted a health practitioner in the four week period preceding the survey. Note that need is not taken into account.

Health satisfaction is defined for persons who consulted a health practitioner in the four week period preceding the survey and who cited no problems.

Consulted traditional healer is defined as the percentage of persons consulting a health practitioner in the four week period preceding the survey who consulted a traditional healer.

Unemployed is defined for youths age 15 to 24 and for all persons 15 and above. It is the percentage of the active population who did not work in the seven day period preceding the survey and who looked for work in the four week period preceding the survey. The active population is all persons working or actively looking for work.

Underemployed is defined for age 15 and above. It is the percentage of the employed population who sought to increase earnings in the seven day period preceding the survey.

Adult literacy rates are defined for persons over age 14.

Youth literacy rates are defined for persons age 15 to 24.

English literacy rates are for persons able to read and write in English. Any language rates are for persons able to read and write in English or any other language.

Primary school:

- Access is defined for children of primary school age (6-11) living in households with a primary school less than 30 minutes away.
- Enrollment (gross) is defined as the number of children of all ages currently in primary school (grades P1 to P6) divided by the number of children of primary school age (6-11).
- Enrollment (net) is defined as the number of children of primary school age (6-11) currently in primary school (grades P1 to P6) divided by the number of children of primary school age (6-11).
- Satisfaction is defined for children of primary school age currently in primary school who cited no problems.

Secondary school:

- Access is defined for children of secondary school age (12-17) living in households with a secondary school less than 30 minutes away.
- Enrollment (gross) is defined as the number of children of all ages currently in secondary school (grades S1 to S6) divided by the number of children of secondary school age (12-17).
- Enrollment (net) is defined as the number of children of secondary school age (12-17) currently in secondary school (grades S1 to S6) divided by the number of children of secondary school age (12-17).
- Satisfaction is defined for all children currently in secondary school who cited no problems.

Kabubo-Mariara et. al 2006 in their work analyzing the determinants of household welfare in Kenya used the following variables:

- Age of household head
- Age of household head squared
- Child less than 5 years old in a household
- Children 6 to 16 years old in a household
- Female head
- Number of adult women in a household
- Number of adult men in a household
- Household head years of schooling.
- Soil quality and topography
- Fine texture
- Coarse soils
- Workability
- Red versus black soils
- Fertility
- Very fertile soils
- Poor soils
- Number of institution present
- Presence of men's groups

- Presence of income generating groups
- Presence of village committees groups
- Population density
- Market access.

These variables were classified into a vector of farm characteristics, a vector of household characteristics and a vector of village / location characteristics. As a proxy for welfare status they used per capita expenditure and per capita income.

CHAPTER THREE

METHODOLOGY

3.1 The Study Area

The study was carried out in Ondo State, Nigeria. The state is situated in Southwestern part of Nigeria. It lies between longitudes 4° 30' and 6° 00' East of the Greenwich Meridian and Latitudes 5° 45' and 8° 15' North of the Equator. Ondo State is made up of 18 Local Government Areas (LGAs) and lies entirely in the tropics. The State has a tropical climate with high temperature all the year round. It has heavy rainfall during the rainy season (March to November). The annual rainfall is between 1000 mm and 1500mm with a high daily temperature of about 30°C .This favorable climate probably accounts for the reason why about 75% of the inhabitants are farmers. They grow both cash and food crops. The main cash crops are cocoa, Kola nut, rubber etc. They also grow food crops like cocoyam, rice, yam, plantain, maize, tomatoes etc. According to Ondo State Ministry of Agriculture and Rural Development (2004), the state alone produced between 45-65% of the total Nigeria cocoa product in any season.

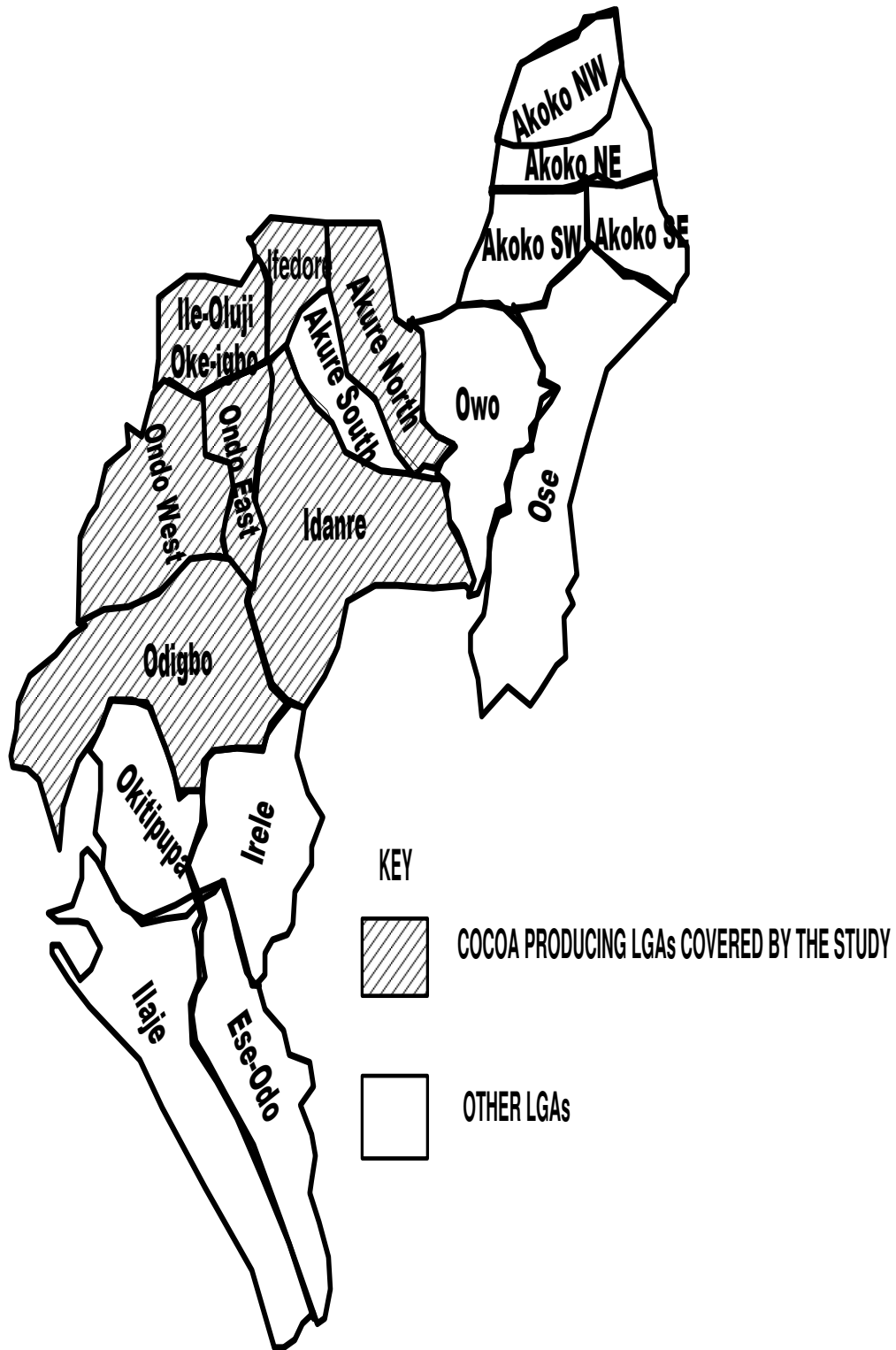


FIG. 1: Map of Ondo State Showing the Eighteen Local Government Areas (LGAs)

3.2 Sources of and types of Data

Primary data was used for this study. Data was collected with the aid of a structured and pre-tested questionnaire. The questionnaire elicited information on a number of variables which include the socio-economic characteristics of the cocoa farmers and information on production operations of their cocoa and non-cocoa enterprises. The information on welfare status that were collected include type of housing, means of transportation owned, family structure, education, income, debts, livestock, electronics and so on.

3.3 Sampling Procedure

Multi-stage sampling technique was used in this study. First seven Local Government Areas (LGAs), which are known to have preponderance of cocoa farmers, were selected for this study. These LGAs are Akure North, Idanre, Ondo East, Ile-Oluji/Oke Igbo, Ifedore, Ondo West, and Odigbo. Specific cocoa growing communities were also selected. Twenty cocoa growing communities were selected in these LGAs while three cocoa farmers were randomly selected from each of the communities. Sixty cocoa farmers were thus selected for the study.

3.4 Data Analysis

The data collected were analyzed through the use of descriptive statistics; mainly frequency distributions, measures of central tendency and measures of dispersion, Gini coefficient, coefficient of dissimilarity, cross tabulation and regression analysis. Descriptive statistics were used to describe the socio-economic attributes of the cocoa farmers. For each of the attributes, the mean, median and mode were estimated while wherever possible, the standard deviation was calculated to indicate the spread of the attribute around the mean. Inequalities in the welfare status were assessed with Gini Coefficient, and Coefficient of Dissimilarity. Cross tabulation and Chi-square test were used to test for the existence of relationship between welfare status and some socio-economic and farm specific variables.

Regression analysis was used to assess which of the socio-economic factors (variables) affect the welfare status of the cocoa farmers and in which directions are the effects.

Welfare Index

A welfare index was constructed based on three key wellbeing indicators; namely: housing, means of transportation and means of telecommunication owned. Each of these wellbeing indicators was scored for a number of attributes. The attributes and the assigned scores are presented in Tables 3 and 4. Table 3 presents detailed information on the attributes of housing and the assigned scores while Table 4 provides an overview of all the attributes and scoring for the three indicators of wellbeing. The maximum score for all the attributes is 63. Thus any respondent that is able to score the maximum for the entire attributes will score 63 points and hence 100 percent.

Based on this scoring scheme, each of the respondent is scored on each of the well being indicator and their attributes. Total score for each respondent was determined as a sum total of all the scores. The percentage score (Welfare index) of each respondents is calculated

as:
$$\frac{\text{Respondent's Score}}{\text{Maximum Score (63)}} \times 100$$

Table 3: Attributes and Scoring for Housing

Attribute	Scoring	Maximum
Number of rooms available to household members	1 to 2 rooms - 1, 3 rooms - 2, 4 rooms - 3, 5 to 7 rooms 4, 8 to 10 rooms - 5, Greater than 10 rooms - 6	6
Roofing material used in the main house	Thatched - 1, Iron sheets - 2, Asbestos sheets - 3, Aluminium sheets - 4	4
Exterior walls of dwelling	Mud walls - 1, Iron sheets - 2, Timber - 3, Mud brick - 4, Cement brick - 5	5
Structural condition of dwelling	Seriously dilapidated-1, Needs major repairs-2, Sound structure-3	3
Electricity supply	No supply- 1, Public supply- 2, Own generator – 3, Public supply plus own generator- 4	4
Cooking-fuel source	Collected wood- 1, Purchased wood- 2, Charcoal - 3, Kerosene- 4 , Gas- 5, Electricity- 6	6
Source of drinking water	Rainwater or river - 1, public well, open – 2, public well, sealed with pump - 3, well in residence yard - 4, piped public water - 5, bore hole in residence – 6	6
Toilet facility	Bush, field, or no facility - 1, shared pit toilet - 2, own pit toilet - 3, flush toilet, own, or shared - 4	4

Table 4: Attributes and Scores for Housing, Means of Transportation and Telecommunication

S/No	Indicators of Wellbeing	Score	Maximum Score	Percent	
1	Housing	Structural Condition of dwelling	3	38	60
		External wall	5		
		Toilet Facility	4		
		Electricity supply	4		
		Cooking-fuel	6		
		Source of water	6		
		Number of rooms	6		
		Roofing Materials used	4		
2	Means of transportation owned	Bicycle	2	15	24
		Wheel barrow	1		
		Motor cycle	3		
		Pickup truck	4		
		Automobile	5		
3	Means of telecommunication owned	Radio	1	10	16
		DVD Player	4		
		Television	3		
		Mobile phone	2		
TOTAL SCORE			63	100	

Total Household Income

Total household income was calculated as the summation of income from cocoa, and other agricultural products from the farm, and non-agricultural incomes. That is

Total Household Income = Cocoa Income + Other Agricultural Incomes + Non-agricultural Incomes.

$$\text{Cocoa Income} = Q \times P_c - \sum x_i p_i$$

Where

Q = Cocoa output

P_c = Price per unit of cocoa

x_i = Input i

p_i = Price of input i ,

The inputs being fungicide, pesticide and labour.

The cocoa farmers did not use fertilizer.

Other agricultural income was defined as the net revenues from other farm products from the farmers' farms. Non-agricultural incomes include transfers such as pension and remittances, as well as wages from paid jobs and other businesses carried out.

Level of Inequality in Welfare Status

The level of inequality in the welfare status of the cocoa farmers was assessed with Gini coefficient and the coefficient of dissimilarity.

The Gini Coefficient (G) and the Index of Dissimilarity (ID)

The Gini Coefficient (G) and the Index of Dissimilarity (ID) are two statistics that are based on the Lorenz curve. They are both linked to the concept of comparing the Lorenz curve with the line of perfect equality. Gini coefficient measures the degree of concentration (inequality) of a variable in a distribution of its elements. It compares the Lorenz curve of a ranked empirical distribution with the line of perfect equality. The Gini coefficient ranges between 0, where there is no concentration (perfect equality), and 1 where there is total concentration (perfect inequality). The extent of inequality in the welfare status of the cocoa farmers was explored with the Gini Coefficient and the Index of Dissimilarity.

The Gini coefficient was calculated as:

$$G = 1 - \sum_{i=0}^N (\sigma Y_{i-1} + \sigma Y_i) (\sigma X_{i-1} - \sigma X_i)$$

Where,

σX is cumulative proportions of the cocoa farmers that was covered in the study;

σY is the distribution of the index or proxy of the welfare status of the cocoa farmers.

The Index of Dissimilarity was calculated as:

$$ID = 0.5 \sum_{i=1}^N |X_i - Y_i|$$

Where,

X is the cumulative proportions of the cocoa farmers that was covered in the study,

Y is the distribution of the index or proxy of the welfare status of the cocoa farmers; and

N is the number of cocoa farmers that was covered by the study (Castillo-Salgado, et. al. 2001, Dixon et. al., 1987, Rodriguez, J-P et. al., 2004, Oguntade, 2005)

Determinants of Welfare Status

Bivariate Analysis

As a first step in assessing which factors affect the welfare status of the cocoa farmers, cross tabulation of welfare status and key socio-economic and farm specific variables was carried out. For each cross tabulation, the Chi-square was computed and was used as the basis for determining if there is association between welfare status and the explanatory variables.

Chi-square was computed as:

$$\sum \frac{(O-E)^2}{E}$$

Where,

O is the observed value in a cell

E is the expected value in the same cell that we would see if there was no association.

Chi-square computed was compared with Chi-square tabulated to determine if association exists or not.

The decision rule is: If the value calculated is greater than the value tabulated, the null hypothesis will be rejected while the alternative will be accepted.

Regression Analysis

The socio-economic and farm-specific factors which affect the welfare status of the cocoa farmers were assessed with the aid of regression analysis. The welfare status was regressed on a number of socio-economic variables. These variables include age of farmer, household size,

household dependency ratio, farm size, marital status, level of education, distance of farm to the homestead, age of cocoa trees etc.

For this regression analysis, the welfare status of the cocoa farmers was proxied by household income (Ravallion, 1996; Brueck, 2004).

For this study, welfare status was defined as a function of a number of explanatory variables following from Brück (2004) and Kabubo-Mariara et.al. (2006). The function was estimated as follows:

$$Y = b_0 + \beta_i X_i + \alpha_i Z_i + \mu \text{ ----- (1)}$$

Where Y = Household welfare status proxied by household income per capita

X_i = A vector of farm characteristics

Z_i = A vector of household characteristics

μ = normally distributed error term which is not correlated with the explanatory variables.

The variables considered in the study include:

- i. Age of household head (yrs)
- ii. Household Size (number)
- iii. Area of land cultivated (ha)
- iv. Previous land use prior to planting (purpose)
- v. Dependency ratio per household (ratio)
- vi. Distance of farm from homestead (km)
- vii. Level of education of household head (yrs of schooling)
- viii. Gender of household head (Male / Female)
- ix. Percentage of female to total number of people per household (%)
- x. Age of Cocoa farm (yrs)
- xi. Income from non-farm activities (₦)
- xii. Cocoa output (kg)
- xiii. Cocoa income (₦)

The linear log and double log functional forms were estimated and a lead equation was chosen based on economic and statistical criteria.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Socio Economic and Demographic Characteristics of Respondents

In this section, a number of socio economic and demographic characteristics expected to affect the welfare of the households in the study area were considered. These include: age structure, marital status, gender, household size, years of formal education, income, size of farm land etc. These socio economic characteristics are expected to be associated with the welfare status of the households.

4.1.1 Age of Households Heads

Table 5 presents the distribution of the respondents by age. The analysis of the age structure of the respondents shows that the modal age group was 61-70 years with 31.7 percent. About 11.7 percent of the respondents were between 30 and 40 years old; 15.0 percent were in the age bracket 41-50 years. About 23.3 percent were in the age group of 51-60 years and 18.3 percent were 70 years and above. The mean age of the household heads sampled in the study area was 59.85 years. This is in line with Adetunji et al (2007) and Gray (2001) who observed that cocoa farmers in West African countries in general have an average age of 50 years and above. Median age was 61 years while the mode was 70 years and standard deviation was 13.71 years. This shows that most of the cocoa farmers in the study area were old.

The result of this analysis suggests that the majority (31.7%) of the cocoa farmers were old and perhaps unable to do arduous farming activity which was the major income source of the households. Old age may influence their productivity and decision making. It is also evident from the table that young people are not many in cocoa production in the study area which may be connected with the problem of rural-urban migration by youths in search of greener pasture. This is in line with Oladele (1998) who reported that many rural areas have been left to the women and the old men lacking in strength since the active population have left in search of greener pasture. Hence, there is a need to attract the young people to cocoa production to avoid the decline of the cocoa economy in the near future.

Table 5: Distribution of Household Heads by Age

Age Group (Years)	Frequency	Percentage
30 - 40	7	11.7
41 - 50	9	15.0
51 - 60	14	23.3
61 - 70	19	31.7
70 and above	11	18.3
Total	60	100

Mean age = 59.85 years, Median = 61 years, Mode = 70 years,

Standard deviation = 13.71

Source: Field Survey, 2010

4.1.2 Household Size of the Respondents

For agricultural commodities like cocoa that are primarily produced by smallholders, the household is the basic unit of production. Most of the times farm family members assist on the farm and this helps to reduce the money spend on labour to work on the farm. Also the amount of farm produce retained for domestic consumption, and the marketable surplus are affected by the size of the farm household.

Table 6 shows the distribution of household size of the sampled farmers in the study area. The household size ranged between one and thirteen. The majority (53.3 percent) had between one and five members. About 45.0 percent had between six and ten members and only 1.7 percent of the respondents had between eleven and thirteen members. The mean household size in the study area was 6. The median was 5.0; and mode was 5.0 while the standard deviation was 2.41.

Table 6: Distribution of the Respondents by Household size

Family Size	Frequency	Percentage
1 – 5	32	53.3
6 – 10	27	45.0
11-13	1	1.7
Total	60	100

Mean = 6, Median =5, Mode = 5, Standard deviation = 2.41

Source: Field Survey, 2010

4.1.3 Farmers' estimate of farm size

Farm size is the total farmland cultivated by the household measured in hectares. The larger the farm size the higher the production level. It is thus expected that households with larger farm size are more likely to be well off than those with small farm size.

Table 7 shows the farmers' estimate of their cocoa farm hectares. The farmers who did not have any idea of their farm sizes were 16.7 percent, those whose estimates were less than or equal to 1ha were 1.7 percent. Farmers with farms size estimates between 1.01 and 2ha were 13.3 percent, while those with estimates between 2.01 and 3ha were 15.0 percent, between 3.01 and 4ha were 10.0 percent, those with farm sizes of between 4.1 and 5ha were 8.3 percent, between 5.01 and 6ha were 3.3 percent, 6.01 and 10ha were 15.0 percent while farmers' with farm sizes of above 10ha were 16.7 percent. The mean farm size was 6.41ha; median was 3.75ha while standard deviation was 7.990.

Table 7: Distribution of Farmers' farm size estimate

Farm size (ha)	Frequency	Percentage
Does not know	10	16.7
Less than or equal to 1	1	1.7
1.01-2.0	8	13.3
2.01-3.0	9	15.0
3.01-4.0	6	10.0
4.01-5.0	5	8.3
5.01-6.0	2	3.3
6.01-10.0	9	15.0
Above 10	10	16.7
Total	60	100

Mean Farmers' farm size = 6.41ha, Median = 3.75 ha, Standard deviation = 7.99 ha

Source: Field Survey 2010

4.1.4 Farm size of Respondents measured by GPS

Farm size in this study refers to the land area that was actually used for cocoa production during the survey year. Nigeria is known to be a nation of small scale farmers who often operate on fragmented farm land because of some practices associated with traditional land tenure systems. According to Olayide et al (1982), farmers could be classified into three categories based on the hectarage of land cultivated, thus we have small scale, that is, those cultivated 0.1 to 5.99 hectares, medium scale those who cultivate 6 to 9.99 hectares and large scale those who cultivate above 10 hectares.

Table 8 shows the cocoa farm hectarages estimated with hand held GPS. Farmers whose farm sizes were less than or equal to 1ha were 15.0 percent, those between 1.01 and 2ha were 36.7 percent. About 26.7 percent had farm sizes between 2.01 and 3ha, those who had farm sizes between 3.01 and 4ha were 10.0 percent. In addition those who had between 4.01 and 5ha were 6.5 percent, those whose farm sizes were between 5.01 and 6ha were 1.7 percent. About 1.7 percent of the sampled cocoa farmers had farm sizes that were between 6.01 and 10ha while

farmers with farm size above 10ha were also 1.7 percent. The majority (36.7 percent) of the respondents had between 1.01 and 2 ha; this shows that most of the respondents were small scale cocoa farmers. This is in line with the result obtained by Ogunlade et al; (2009) which reported that 75.5 % of the cocoa farmers in Nigeria were either small or medium scale farmers. The mean estimate farm size of the respondents in the study area was 2.4ha; the median was 2.0ha while the mode was 1.80ha. The standard deviation was 1.82ha.

Table 8: Distribution of GPS Farm Size

GPS Farm size (ha)	Frequency	Percentage
0.01-1	9	15.0
1.01-2	22	36.7
2.01-3	16	26.7
3.01-4	6	10.0
4.01-5	4	6.5
5.01-6	1	1.7
6.01-10	1	1.7
Above 10	1	1.7
Total	60	100

Mean = 2.4ha, Median = 2.0ha, Mode = 1.80ha, Standard deviation = 1.82ha

Source: Field Survey 2010

The comparison of information in Tables 7 and 8 shows that there are wide differences in farmers' and GPS estimates of cocoa farm sizes.

4.1.5 Previous Land use Prior to Planting

Table 9 shows the previous use to which farm lands cultivated by the respondents had been put before they were used for cocoa production. About 78.3 percent of the lands were previously forest, 1.7 percent was under long bush fallow, also 1.7 percent was used for short fallow food crop rotation, 3.3 percent was replanted old cocoa farms and 1.7 percent was abandoned cocoa

farms while 13.3 percent was used for other purposes. Most of the cocoa farms were forest before they were planted with cocoa.

Specifically about 78.3 percent of the sampled cocoa farms in the study area were previously forest, this shows that most of the farm lands cultivated by the farmers in the study area are very fertile, hence this is used in determining soil fertility measure. It also indicates the tendency for the establishment of new cocoa farms to lead to incursion into virgin forest wherever available.

Table 9: Previous Land use prior to Planting

Land Use	Frequency	Percentage
Forest	47	78.3
Long bush fallow	1	1.7
Short fallow food crop rotation	1	1.7
Replanted old cocoa farm	2	3.3
Abandoned cocoa farm	1	1.7
Other purposes described	8	13.3
Total	60	100

Source: Field Survey 2010

4.1.6 Age of Cocoa farms Cultivated by the Respondents

Oduwole (2004) identified ageing cocoa farms as one of the factors responsible for the decline in cocoa production in South Western Nigeria. He observed that many farms were over 40 years old and such farms constitute as much as 60 % of the cocoa farms in Nigeria.

Table 10 shows the age distribution of cocoa farms cultivated by sampled cocoa farmers in the study area. About 20.0 percent of the respondents had cocoa farms with age between 0 and 10.00 years, 10.0 percent had farms that were between 10.01 and 20.00 years. In addition 13.3 percent had farms that fell between 20.01 and 30.00 years, 23.3 percent had farms that were between 30.01 and 40.00 years. About 30.0 percent of them had farms that fell between 40.01

and 50.00 years; and 1.7 percent had farms that were between 50.01 and 60.00 years while 1.7 percent of the respondents had farms that were above 60.00 years of age.

The fact that about 31.7 percent (majority) of the cocoa farms in the study area were older than 40.0 years suggests that most of the cocoa farms were already old. This could be responsible for low output of cocoa farmers in the study area. This is in agreement with Vos and Krauus (2004) who reported that most cocoa trees in Nigeria are old and abandoned by cocoa farmers. The low output will necessarily result in low income and low welfare status.

Table 10: Age Distribution of Cocoa farm of the Respondents

Age of Farm (years)	Frequency	Percent
0 - 10	12	20.0
10.01 - 20	6	10.0
20.01 - 30	8	13.3
30.01 - 40	14	23.3
40.01 - 50	18	30.0
50.01 - 60	1	1.7
above 60	1	1.7
Total	60	100.0

Mean = 29.88 years, Median = 32.00 years, Mode = 0, Standard deviation = 17.55

Source: Field Survey 2010

4.1.7 Gender of Household Heads

FAO (1998) defines gender as the relation between men and women, both perceptual and material. Gender relations affect household security, family well-being, planning, production and many other aspects of life.

Results in Table 11 shows that the majority (83.33 percent) of the respondents were male while just 16.67 percent were female. This shows that there are more male-headed households than the female headed households cultivating cocoa in the study area. This is likely to be connected with the women involvement in some other businesses especially trading in food

crops. More women are likely to be involved in buying and selling of farm produce than farming itself. This may also be due to tedious nature of cocoa farming activities that are not well suited for females.

Table 11: Households Heads' Distribution by Gender

Sex	Frequency	Percentage
Male	50	83.33
Female	10	16.67
Total	60	100

Source: Field Survey 2010

4.1.8 Percentage of Female in Households

Table 12 shows the percentage of female per household of the sampled cocoa farmers in the study area. About 1.7 percent of the sampled households had no female member. About 60.0 percent of them had between 10.0% and 50.0% of the household members being females while 38.3 percent had between 51.0% and 100.0% of the household members being females. The mean, median and mode were 50.0%. Households that have higher percentage of members as females may be disadvantaged in terms of labour supply for cocoa farm operation.

Table 12: Percentage distribution of female in the household

Percentage of Female	Frequency	Percent
Nil	1	1.7
10 - 50	36	60.0
51 - 100	23	38.3
Total	60	100.0

Mean = 50% Median = 50%, Mode = 50%

Source: Field Survey 2010

4.1.9 Marital Status of Respondents

The significance of marital status on agricultural production can be explained in terms of the supply of agricultural family labour. It is expected that family labour would be more available where the household heads are married.

With regards to household heads marital status, Table 13 shows that 95.0 percent (majority) of the respondents were married, none of the respondents was single, while only 5.0 percent were widow. The high proportion of married respondents shows that more members of farm family are likely going to be available for cocoa production in the study area. Family labour is an important component of labour for small farmers (Awe, 1995).

Table 13: Marital Status of Household head

Marital Status	Frequency	Percentage
Married	57	95.0
Widow	3	5.0
Total	60	100.0

Source: Field Survey 2010

4.1.10 Distance of farm from Homestead

Table 14 shows the distribution of farm distance from homestead of the sampled cocoa farmers in the study area. About 40.0 percent of the respondents lived within the distance of less than or equal to 1km from their farm, 55.0 percent lived within distance of greater than 1 and less than or equal to 3km from farm while 5.0 percent lived within distance of greater than 3km from farm. The mean distance was 24.0km, the median was 1.2km, and modal distance was 0.02km.

Table 14: Distribution of Farm Distance from Homestead

Distance from farm (km)	Frequency	Percentage
Less than or equal to 1	24	40.0
Greater than 1 and less than or equal to 3	33	55.0
Greater than 3	3	5.0
Total	60	100.0

Mean = 24.0km, Median = 1.2km, Mode = 0.02km,

Source: Field Survey 2010

4.1.11 Cocoa output of the Respondents

Table 15 shows the cocoa output in kilogram of the respondents in the study area. About 38.3 percent of the sampled cocoa farmers produced between 50 and 500 kg of cocoa beans, 31.7 percent had output of between 501 and 1000kg. In addition 11.7 percent produced between 1001 and 1500 kg, also 11.7 percent of the farmers had output of between 1501 and 2000kg. About 3.2 percent of them produced between 2001 and 2500kg, and 1.7 percent had output of between 2501 and 3000 kg, while 1.7 percent of the farmers had output of between 3001 and 4000 kg of cocoa.

The mean cocoa production figure was 877.50kg, the median was 716.00kg, and mode was 320.00kg while the standard deviation was 669.94kg. About 70.0 percent of the farmers produced less than or equal to 1000kg of cocoa during the 2008/2009 cropping season. This shows that cocoa farmers in the study area are small scale producers.

Table 15: Distribution of Cocoa Output in Kilogram of the Respondents

Cocoa output (kg)	Frequency	Percentage
50-500	23	38.3
501-1000	19	31.7
1001-1500	7	11.7
1501-2000	7	11.7
2001-2500	2	3.2
2501-3000	1	1.7
3001-4000	1	1.7
Total	60	100

Mean = 877.50kg, Median = 716.00kg, Mode = 320.00kg,

Standard deviation = 669.94kg

Source: Field Survey 2010

4.2.0 Income of Cocoa Farming Households

4.2.1 Income from Cocoa Production

Table 16 shows the distribution of cocoa income of the respondents. About 45.0 percent of the respondents earned less than or equal to ₦100, 000 from their cocoa production, 18.3 percent earned greater than ₦ 100,000 and less than or equal to ₦150, 000. About 16.7 percent earned greater than ₦ 150,000 and less than or equal to ₦250, 000. In addition 6.7 percent earned greater than ₦ 250,000 and less than or equal to ₦300, 000, also 6.7 percent earned greater than ₦ 300,000 and less than or equal to ₦ 350,000 while 6.6 percent of the respondents earned above ₦ 350,000. The mean income was ₦ 139,830, the median was ₦ 105,350 and modal income was ₦ 52,000 and standard deviation was ₦ 152,360. The majority of the respondents (45.0 percent) earned less than or equal to ₦ 100,000 from cocoa, this suggests that most of the cocoa farmers in the study area earned low income from cocoa.

Table 16: Distribution of Cocoa Income of the Respondents

Income (₦)	Frequency	Percent
≤ 100,000	27	45.0
> 100,000 and ≤ 150,000	11	18.3
> 150,000 and ≤ 250,000	10	16.7
> 250,000 and ≤ 300,000	4	6.7
> 300,000 and ≤ 350,000	4	6.7
> 350,000	4	6.6
Total	60	100.0

Mean = ₦ 139, 830, Median = ₦ 105,350, Mode = ₦ 52,000,

Standard deviation = ₦ 152,360

Source: Field Survey 2010

4.2.2 Income from Other Sources

4.2.2.1 Other agricultural incomes

Table 17 shows that 91.6 percent of the respondents earned other agricultural income of between 0 and ₦ 100,000, 5.0 percent earned between ₦ 100,000.01 and ₦200,000. About 1.7 percent earned between ₦ 200,000.01 and ₦ 300,000 while another 1.7 percent earned above ₦ 300,000. The mean was ₦34, 694, the median was ₦ 15,500, and mode was ₦ 10,000 while standard deviation was ₦ 54,332.

Table 17: Distribution of Respondents' other Agricultural Income

Other agricultural Income (₦)	Frequency	Percent
0 – 100,000	55	91.6
100,000.01 – 200,000	3	5.0
200,000.01 – 300,000	1	1.7
above 300,000	1	1.7
Total	60	100.0

Mean = ₦ 34,694, Median = ₦ 15,500, Mode = ₦ 10,000 Standard deviation = ₦ 54,332

Source: Field Survey 2010

4.2.2.2 Non-agricultural incomes (Transfers)

Non-agricultural incomes include transfers such as pension and remittances, as well as wages from paid jobs and other businesses carried out. Table 18 shows that 85.0 percent of the respondents did not have transfer income during the 2008/2009 cropping season. About 3.3 percent earned ₦ 5,000 as transfer income, 1.7 percent earned ₦ 6,000. In addition 3.3 percent of the respondents earned ₦ 10,000 and 1.7 percent earned ₦ 15,000 while 5.0 percent earned ₦ 20,000 as transfer income. The mean transfer income was ₦ 1,850, while the standard deviation was ₦ 5,051.6.

Table 18: Distribution of Respondents' Transfer Income

Transfer Income (₦)	Frequency	Percent
0	51	85.0
5,000	2	3.3
6,000	1	1.7
10,000	2	3.3
15,000	1	1.7
20,000	3	5.0
Total	60	100.0

Mean = ₦ 1,850, Median = 0.00, Mode = 0.00, Standard deviation = ₦ 5,051.6

Source: Field Survey 2010

4.3.0 Total Income of Respondents

Total income is total agricultural income plus total non-agricultural income. Table 19 shows the distribution of the respondents' total income. The analysis of the total income of the households sampled as shown in the table below reveals that 38.3 percent earned less than or equal to ₦100,000 as total household income during the cropping season. About 28.3 percent earned between ₦100,000.01 and ₦200,000; 15.1 percent earned between ₦200,000.01 and ₦300,000. In addition 5.0 percent earned between ₦300,000.01 and ₦400,000, and 5.0 percent earned between ₦400,000.01 and ₦500,000 while 8.3 percent earned between ₦500,000.01 and ₦600,000. The mean total income earned by the sampled households was ₦176,380, the median was ₦130,800, and modal total income was ₦-368,000 while the standard deviation was ₦170,620.

Table 19: Distribution of Respondents by Total Income

Income from all sources (₦)	Frequency	Percent
≤ 100,000	23	38.3
100,000.01 - 200,000	17	28.3
200,000.01 - 300,000	9	15.1
300,000.01 - 400,000	3	5.0
400,000.01 - 500,000	3	5.0
500,000.01 - 600,000	5	8.3
Total	60	100.0

Mean = ₦ 176,380, Median = ₦ 130,800, Mode = ₦ -368,000,

Standard deviation = ₦ 170,620

Source: Field Survey 2010

4.4.0 Household debt

Table 20 presents the distribution of the respondents by household debt. The table shows that 68.3 percent of the respondents did not have any debt. About 13.3 percent had debts of less than or equal to ₦ 50,000, 6.7 percent of them had between ₦ 50,000.01 and ₦100,000 as debt. In addition about 10.0 percent had debt of between ₦ 100,000.01 and ₦200,000 while 1.7 percent of the respondents had between ₦ 200,000.01 and ₦ 250,000 as debt. The mean household debt was ₦ 28,290 and standard deviation was ₦ 58,012. The existence of household debt has negative implication on households' welfare, if debts are significant, the household members could be subjected to psychological pressures which could affect their mental, physical and social wellbeing.

Table 20: Distribution of Respondents by Household debt

Household debt (₦)	Frequency	Percent
Nil	41	68.3
Less than or equal to 50,000	8	13.3
50,000.01- 100,000	4	6.7
100,000.01 – 200,000	6	10.0
200,000.01 -250,000	1	1.7
Total	60	100.0

Mean = ₦ 28,290, Median = 0.0000, Mode =0.00, Standard deviation = ₦ 58,012

Source: Field Survey 2010

4.5.0 Welfare status of cocoa farming households

4.5.1 Dependency ratio of respondents

Dependency ratio is the ratio of dependent people (not of working age) to the number of people of working age (that is, economically active) in the household. A priori, the higher the dependency ratio, the lower the welfare status. Akinseinde (2006) reported that the higher the dependency ratio and ratio of female adults living on the farm, the lower the farming household productivity.

Table 21 shows the distribution of respondents' dependency ratio. About 16.7 percent of the sampled households had zero dependency ratio, which implies that all the members were in the economically active age. About 35.0 percent had dependency ratio of between 0.1 and 1.0. In addition 31.7 percent had dependency ratio of between 1.01 and 2.0. About 6.7 percent had dependency ratio of between 2.01 and 3.0, 5.0 percent of them had between 3.01 and 4.0, and 3.2 percent had dependency ratio of between 4.01 and 5.0 while just 1.7 percent had dependency ratio that is above 5.0. The mean dependency ratio was 1.43, and median was 1.00, while standard deviation was 1.42. A high dependency ratio is an indication that there are fewer people generating the income that is being expended by the family. This put pressure on household resources as well as on the members of the family who are working. This is because members of the family who are not working are either children who are in school, whose education will

require financial resources, and the aged people who may require more medical attention due to their old age. The family's financial resources will be stretch thin, the higher the dependency ratio.

Table 21: Distribution of Respondents by Dependency ratio

Dependency ratio	Frequency	Percent
Nil	10	16.7
0.1 to 1	21	35.0
1.01 to 2	19	31.7
2.01 to 3	4	6.7
3.01 to 4	3	5.0
4.01 to 5	2	3.2
Above 5	1	1.7
Total	60	100.0

Mean = 1.43, Median = 1.00, Mode = 0, Standard deviation = 1.42

Source: Field Survey 2010

4.6.0 Access to Education

In the Nigeria core Welfare Indicator study, access to education is defined for children of primary or secondary school age living in households with a primary or secondary school less than 30 minutes away (NBS 2006). This is probably a reflection of national policy on education and it implies that children of school age are not expected to go long distances from home to obtain education.

4.6.1 Distance to Primary school

Table 22 shows that 33.3 percent of the sampled cocoa farmers' children who are in primary school go to school which are in close proximity to their homes. There are schools that are situated in the same community the children live. About 48.3 percent of the children covered

distance of less than 1km before getting to school on every school day, 8.3 percent covered distance of greater than 1km but less than or equal to 2km. In addition 3.4 percent of children covered distance of greater than 2km but less than or equal to 3km, while 6.7 percent of the respondents' children covered distance greater than 3km before getting to primary school on every school day. The mean distance to primary school was 0.85 km, the median was 0.15 km, and mode was zero, while the standard deviation was 1.63km.

Table 22: Distribution of Households Distance to Primary school (Kilometres)

Distance (Km)	Frequency	Percent
Within community	20	33.3
less than 1	29	48.3
Greater than 1 and less or equal to 2	5	8.3
greater than 2 and less than or equal to 3	2	3.4
greater than 3	4	6.7
Total	60	100.0

Mean = 0.85 km, Median = 0.15 km, Mode = 0, Standard deviation = 1.63 km

Source: Field Survey 2010

4.6.2 Number of Children in Primary School

Table 23 shows that 43.3 percent of the sampled cocoa farmers in the study area had no child in primary school, 21.7 percent of the respondents had 1 child in primary school. About 13.3 percent had 2 children in primary school, and 16.7 percent had 3 children in Primary school while 5.0 percent of the respondents had 4 children in primary school.

Among the sampled households, all the children that were supposed to be in primary school were in school. The mean number of children in primary school was 1.18, median was 1.0, and standard deviation was 1.30

Table 23: Distribution of Households by Number of Children in Primary School

Number of Children	Frequency	Percent
Nil	26	43.3
1	13	21.7
2	8	13.3
3	10	16.7
4	3	5.0
Total	60	100.0

Mean = 1.18, Median = 1.00, Mode = 0, Standard deviation = 1.30

Source: Field Survey 2010

4.6.3 Distance to secondary school

Table 24 shows that 56.67 percent of the respondents' children who are in secondary school covered less than or equal to 1km before getting to school on every school day. About 11.67 percent covered distance of greater than 1km but less than or equal to 2km, and 16.66 percent covered distance of greater than 2km but less than or equal to 3km, while 15.0 percent of the children covered greater than 3km before getting to secondary school on every school day. The mean distance was 1.75 km, the median was 1.0 km, and standard deviation was 2.28 km.

Table 24: Distribution of Households Distance to Secondary School (Km)

Distance (km)	Frequency	Percent
Less than or equal to 1	34	56.67
greater than 1 and less than or equal to 2	7	11.67
greater than 2 and less than or equal to 3	10	16.66
greater than 3	9	15.00
Total	60	100.00

Mean = 1.75 km, Median = 1.0 km, Mode = 0, Standard deviation = 2.28 km

Source: Field Survey 2010

4.6.4 Number of Children in Secondary School

Table 25 shows that 46.7 percent of the respondents had no child in secondary school, 30.0 percent had one child in secondary school. About 15.0 percent of the respondents had two children in secondary school, and 6.6 percent had three children in secondary school while 1.7 percent had four children in secondary school.

Among the sampled households, all the children that were supposed to be in secondary school were in school.

Table 25: Distribution of Households by the Number of Children in Secondary School

Number of children	Frequency	Percent
Nil	28	46.7
1	18	30.0
2	9	15.0
3	4	6.6
4	1	1.7
Total	60	100.0

Source: Field Survey 2010

4.7.0 Literacy level

Literacy level of farmer has to do with the ability of the farmer to read and write. The Nigeria core Welfare Indicator study defined literacy level with respect to the ability to read and write in English Language on the one hand and the ability to read and write in any language on the other hand. In this study, literacy level was defined with respect to the ability to read and write in English language.

4.7.1 Educational level of household head

The importance of education to the general well being of households cannot be over emphasized. Farmers' level of education has implications on how they manage their farms and on their overall productivity hence income. Also the amount of effort put into any economic activity, the risk bearing and the readiness to adopt new farming technology depend on literacy level (Alimi and Awoyomi 1995). This assertion makes education of cocoa farmers an important variable. Also studies have revealed that the level of education (years of schooling) helps farmers to use production information efficiently as a more educated person acquires more information and, to that extent, is a better producer (Hayami 1969, Lockheed et al. 1980 and Phillips 1994).

Table 26 shows that about 23.3 percent of the respondents had no formal education and 30.0 percent had primary education. The majority, 41.7 percent had some form of secondary education while just 5.0 percent were able to obtain tertiary education. The majority (76.7 percent) of the household heads were educated. This shows that the greater share of the sampled household heads was educated, and majority of the cocoa farmers sampled could read and write. The mean number of years of education was 6.35, indicating that a typical cocoa farmer in the study area had about six years (of primary) education.

Table 26: Distribution of Household Head Level of Education

Years of schooling	Frequency	percentage
No formal education	14	23.3
1-6 years of education	18	30.0
7-12 years of education	25	41.7
Above 12 years of education	3	5.0
Total	60	100

Mean = 6.35, Median = 6.00, Mode = 0, Standard deviation = 4.45

Source: Field Survey 2010

4.7.2 Farmers' Field Training

Farmer field school training exposes farmers to the use of modern management practices for cocoa production. It equips farmers with improved knowledge of production and marketing skills that ensure increase in yield and household income.

Table 27 shows the distribution of respondents by field training received. About 50.0 percent of the respondents had farmers' field school training while 50.0 percent had no field training.

Table 27: Distribution of Respondents by Farmers' Field Training

Farmers' training	Frequency	Percent
Trained	30	50.0
Not trained	30	50.0
Total	60	100.0

Source: Field Survey 2010

4.8.0 Living standards of cocoa farming households

A number of social indicators of well-being were considered to examine the welfare status of households and they are as follows: Roof of the building, exterior of the building, structural

condition of building, electricity supply, cooking fuel source, source of drinking water, toilet facility and so on.

4.8.1 Number of rooms available to household members

Table 28 shows the number of rooms used by the households. 1.7 percent of the respondents had 2 rooms, 13.3 percent had 3 rooms. About 55.0 percent had 4 rooms, 6.7 percent had 5 rooms. In addition 13.3 percent had 6 rooms, and 8.3 percent had 8 rooms while 1.7 percent had 16 rooms. The mean was 5.0, the median was 4.0 and mode was also 4.0 while standard deviation was 2.0

Table 28: Distributions of Households by the Number of Rooms Occupied

Number of Room	Frequency	Percent
2	1	1.7
3	8	13.3
4	33	55.0
5	4	6.7
6	8	13.3
8	5	8.3
16	1	1.7
Total	60	100.0

Mean = 5.0, Median = 4.0, Mode = 4.0, Standard deviation = 2.0

Source: Field Survey 2010

With regards to number of persons per room, the minimum value was 1.0, maximum was 4.0, the mean value was 2.0 and the median was 2.0 while the modal value was 1.0.

Table 29: Number of persons per Room

Parameter	Value
Minimum	1
Maximum	4
Mean	2
Median	2
Mode	1

Source: Field Survey 2010

4.8.2 Roofing materials

All the sampled cocoa farmers in the study area used iron sheets for their roofing material. The other alternatives which are available in the study area are asbestos roofing sheet and aluminum long span. These two alternatives appear to be beyond the reach of cocoa farmers.

4.8.3 Exterior Walls of Dwelling

Table 30 shows the distribution of respondent's in respect of the exterior walls of dwelling. About 33.3 percent of the respondents lived in houses with mud wall and 36.7 percent of them lived in mud brick houses while 30.0 percent lived in cement brick houses.

Table 30: Distribution of Respondents' Exterior Walls of Dwelling

Type of wall	Frequency	Percent
Mud wall	20	33.3
Mud brick	22	36.7
Cement brick	18	30.0
Total	60	100.0

Source: Field Survey 2010

4.8.4 Structural condition of dwelling

The housing conditions of a household provide good indicators of welfare measurement. Table 31 shows the distribution of respondents by structural condition of dwelling. About 51.7 percent of the respondents lived in houses that needed major repairs while 48.3 percent of them lived in houses that have sound structure.

Table 31: Distribution of Respondents by Structural Condition of Dwelling

Structural condition of dwelling	Frequency	Percent
Needs major repairs	31	51.7
Sound structure	29	48.3
Total	60	100.0

Source: Field Survey 2010

4.8.5 Main Facility for Lightning

Table 32 shows that about 60.0 percent of the sampled households had no electricity supply, 30.0 percent used public electricity supply, and 3.3 percent used generator while 6.7 percent used both public supply and generator. The result indicates that about 60 percent of the cocoa farmers are living in communities which are not connected to public electricity grid. The cocoa farmers who live in such communities would be handicapped in the use of equipment that depends on electricity. Another 3.3 percent also live in communities which are not connected to public electricity grid but are well-off enough to purchase and operate their own generators.

Table 32: Distribution of Households by Electricity Supply

Electricity supply	Frequency	Percent
No supply	36	60.0
Public supply	18	30.0
Own generator	2	3.3
Public supply plus own generator	4	6.7
Total	60	100.0

Source: Field Survey 2010

4.8.6 Cooking-fuel Source

Table 33 shows that (majority) 95.0 percent of the sampled households collected wood from the surrounding forest for cooking, and 1.7 percent purchased their wood while 3.3 percent used kerosene. Majority (96.7 percent) of the sampled households in the study area used firewood as cooking fuel. Other options which were beyond their means, apart from kerosene, are liquefied natural gas and electricity. The fact that these households depend on firewood has environmental implication. Over time, it may contribute to deforestation especially where communities do not plant trees for fuel wood purposes.

Table 33: Distribution of Households by Energy for Cooking

Source of fuel	Frequency	Percent
Collected wood	57	95.0
Purchased wood	1	1.7
Kerosene	2	3.3
Total	60	100.0

Source: Field Survey 2010

4.8.7 Source of Drinking Water

Table 34 shows the distribution of households by main source of drinking water. The availability of safe water is essential for hygiene. Water is one of the basic necessities of life. Access to good water sources not only refers to water quality but proximity. Water supplies are classified as safe or unsafe. The safe drinking water sources include, pipe borne water, borehole and treated and protected well while the unsaved ones includes rivers, lakes, ponds, unprotected wells and streams.

About 43.3 percent of the sampled households used rain water and river as their main source of drinking water, 26.7 percent used public well (open). About 16.7 percent used public well, sealed with pump, and 5.0 percent used well within their residences while 8.3 percent used piped public water as their main source of drinking water. The majority (70.0 percent) of the sampled households in the study area used either rain water, river or public open well as their main source of drinking water. Thus, greater proportion of the households in the study area were exposed to the risks of contacting water borne diseases.

Table 34: Distribution of Households by Main Source of Drinking Water

Source of drinking water	Frequency	Percent
Rain water, river	26	43.3
Public well, open	16	26.7
Public well, sealed with pump	10	16.7
Well in residence yard	3	5.0
Piped public water	5	8.3
Total	60	100.0

Source: Field Survey 2010

4.8.8 Type of Toilet Facility

Table 35 shows the distribution of households by the type of toilet facility they use. About 71.7 percent (majority) of the respondents had no toilet facility in their homes; they use either the surrounding bushes or bare ground in field. This is an indication of low level of wellbeing of the households and the unhygienic environment in which these people live. About 8.3 percent used shared pit toilet, and 15.0 percent used own pit toilet while 5.0 percent of the sampled households used flush toilet which is owned or shared.

Table 35: Distribution of Households by type of Toilet Facilities

Toilet facility	Frequency	Percent
Bush / field / no facility	43	71.7
Shared pit toilet	5	8.3
Own pit toilet	9	15.0
Flush toilet, own, or shared	3	5.0
Total	60	100.0

Source: Field Survey 2010

4.8.9 Protection of Houses with Mosquito Nets

It is very important to put net material on windows of houses to ensure protection of household members against flies such as mosquitoes, tsetse flies, and house flies. The use of nets on windows should be done in order to reduce the incidence of malaria which is one of the major causes of illness which the MDGs hope to reduce.

Table 36 reveals that only 30.0 percent of the households had protective mosquito nets on their windows. The majority (70.0 percent) of the households were not protected from mosquitoes and other flies.

Table 36: Distributions of Respondents by Protection of Houses' with Mosquito Net

Response	Frequency	Percentage
With Mosquito net	18	30.0
No Mosquito net	42	70.0
Total	60	100

Source: Field Survey 2010

4.8.10 Means of Transportation Owned

Table 37 shows the distribution of the respondents by means of transportation they owned. About 6.67 percent of the respondents had bicycle, 36.67 percent had wheel barrow, 30.0 percent had motor cycle, and 1.67 percent had pickup truck while 5.0 percent had automobile. It appears that the most important means of transportation among the cocoa farmers are wheel barrow which is use for carrying farm products around the homestead and motor cycle for moving from homestead to the farms and vice versa.

Table 37: Households Distribution by Means of Transportation Owned

Means of Transportation	No of Household who own means	Percentage
Bicycle	4	6.67
Wheel barrow	22	36.67
Motor cycle	18	30.0
Pickup truck	1	1.67
Automobile	3	5.0

Source: Field Survey 2010

4.8.11 Means of Telecommunication Owned

Table 38 shows the distribution of the respondents by means of telecommunication they owned. About 91.6 percent of the respondents had radio, 45.0 percent had DVD player, 55.0 percent had television, and 66.67 percent had mobile phones while 16.67 percent had other means of communication. The results show that the cocoa farmers had access to various types of communication facilities, with the radio being the most common. The second most important facility is the mobile phone. The former enabled the farmers to hear the news and be informed while the latter enabled them to communicate with other people.

Table 38: Distribution of Households by Means of Telecommunication Owned

Means of Telecommunication owned	No of Household who own means	Percentage
Radio	55	91.6
DVD Player	27	45.0
Television	33	55.0
Mobile phone	40	66.67
Other means of communication	10	16.67

Source: Field Survey 2010

4.8.12 Number of Durables Owned

Hassan and Babu (1991) have found that the level of asset ownership in a household is an indication of its endowment and provides a good measure of household resilience in times of food crisis, resulting from famine, crop failures, or natural disasters. This is because a household can easily fall back on its assets in times of need by selling or leasing them.

Table 39 shows the distribution of the respondents by number of durables (assets) per household. About 3.3 percent of the respondents had tree pruning saw, 10.0 percent had hand pruning shear, 73.3 percent had ladder, 1.67 percent had chain saw, 5.0 percent had fermenting boxes, 93.3 percent had knapsack sprayer, 5.0 percent had motorized sprayer. In addition 63.3 percent had water drum for pesticide, 3.3 percent had protective goggle, 1.67 percent had

chemical resistance gloves, 41.67 percent had rubber boots and just 8.33 percent of the respondents had overalls.

These durables fall into two categories; work tools and protection tools. Majority of them had the most important work tool for a cocoa farm (knapsack sprayer). The other important tools, water drum for pesticide and ladder, were also owned by many of the farmers. However, most of the farmers do not have the protection tools, namely; protective goggle, chemical resistant gloves, rubber boots and overalls. This means that the farmers will most often be exposed to danger when applying agro-chemicals.

Table 39: Distribution of Respondents by Number of Durables per Household (Asset)

Farm Tools	No of Household who own Tool	Percentage
Tree pruning saw	2	3.3
Hand pruning shears	6	10.0
Ladder	44	73.3
Chain saw	1	1.67
Fermenting boxes	3	5.0
Knapsack sprayer	56	93.3
Motorized sprayer	3	5.0
Water drum for pesticide	38	63.3
Protective goggle	2	3.3
Chemical resistance gloves	1	1.67
Rubber boots	25	41.67
Overalls	5	8.33

Source: Field Survey 2010

4.8.13 Index of Welfare Status

Table 40 shows the distribution of respondents by welfare index. The highest index (score) any household can have based on the construction of the index is 100 (see chapter three). About 38.3 percent of the respondents had welfare index of between 20 and 35; 45.0 percent of the respondents had welfare index of greater than 35 but less than or equal to 50. The welfare index for 11.7 percent of the farmers was greater than 50 but less than or equal to 65 while 5.0 percent had welfare index of greater than 65 but less than or equal to 80. The mean welfare index was 40.79; the median was 40.48 while standard deviation was 12.64

The result of the analysis shows that majority of the cocoa farming households scored less than 50 percent. This is an indication of their status in respect of the welfare indicators, structural condition of dwelling, external wall, toilet facility, electricity supply, cooking-fuel and source of water, which were used to construct the index.

Table 40: Distribution of Respondents by Welfare Index

Welfare Score (percent)	Frequency	Percent
20 to 35	23	38.3
Greater than 35 and less than or equal to 50	27	45.0
Greater than 50 and less than or equal to 65	7	11.7
Greater than 65 and less than or equal to 80	3	5.0
Total	60	100.0

Mean = 40.79, Median = 40.48, Standard deviation = 12.64

Source: Field Survey 2010

4.9.0 Welfare inequality among cocoa Farming Households

The Gini Coefficient (G) and the Index of Dissimilarity (ID) are two statistics that are based on the Lorenz curve. They are both linked to the concept of comparing the Lorenz curve with the line of perfect equality. Gini coefficient measures the degree of concentration (inequality) of a variable in a distribution of its elements. It compares the Lorenz curve of a ranked empirical

distribution with the line of perfect equality. It is a measure of inequality that varies between 0 and 1. Thus, a lower Gini coefficient means less inequality. From the analysis, the Gini coefficient for the Welfare Index was 0.2049 indicating a relatively low degree of inequality in Welfare Index, while the Index of dissimilarity was 0.1161. The meaning of this is that the farmers are not much better than one another in terms of welfare index. On the other hand, the Gini Coefficient for the income distribution was 0.5249, while the index of dissimilarity was 0.3513.

Table 41: Gini coefficient and Index of dissimilarity in the Income and Welfare Index of the Respondents.

	Welfare Index	Income
I.D	0.1161	0.3513
Gini Coefficient	0.2049	0.5249

Source: Author's computation

The Gini Coefficient and Index of dissimilarity of income indicate that there was some level of inequality in the distribution of total income of households. A comparison of the Gini Coefficient and the Index of dissimilarity of the Welfare Index and the income indicates that there was more inequality in the distribution of the income than in the distribution of the Welfare Index. The implication of this is that differences in income did not necessarily imply differences in welfare status.

4.9.1 Effects of Socio-economic and Demographic Variables on Household Welfare

The effects of socio-economic and farm specific variables on household welfare were assessed using two proxies; the Welfare Index and household income per capital. Bivariate analyses (cross tabulation and chi-square) were carried out to establish the existence of association between Welfare index and, socio-economic and demographic variables while

multivariate (regression) analysis was used to assess the effects of the socio-economic and demographic variables on total household income per capita.

Bivariate analysis

The result of the Chi square analysis is presented in Table 42. The results show that the household size and dependency ratio are significant at 5% level of significance. Also farmers training and GPS farm size are significant at 10% level of significance. Household size, dependency ratio, farmers training and GPS farm size hence have significant relationships with the Welfare index. There was therefore association between these variables and Welfare Index.

Table 42: Bivariate Analysis of the relationship between Index of Welfare and Socio -economic determinants of welfare

Cross tabulation of Welfare Index with	Chi square	DF	Significant level
Household size	20.694	6	0.002*
Age of Household head	7.812	12	0.8
Gender of Household head	1.121	3	0.772
Level of Education of Household Head	12.365	9	0.194
Dependency ratio	36.859	15	0.001*
Percentage of Female per Household	4.322	6	0.633
Farmers Training	6.453	3	0.092**
Local Govt. of Household head	23.105	18	0.187
GPS Farm size	30.982	21	0.074**
GPS Distance of farm from homestead	8.584	9	0.477
Age of Cocoa Farm	18.342	18	0.433
Previous land use	8.239	15	0.914

* Significant at 5% level, ** Significant at 10% level

Source: Field Survey 2010

4.9.2 Multivariate analysis (Regression Analysis)

Regression analysis was used to assess the effects of the socio-economic and demographic variables on total income per capita.

Double log statistical regression was chosen as the lead equation for the study based on statistical and econometric criteria. The result shows that household size, dependency ratio, GPS farm size and GPS distance to homestead were significant at 5% level indicating that household size, dependency ratio, GPS farm size and GPS distance to homestead play some role in determining the welfare status of cocoa farmers in the study area. The model R^2 was 0.652 which implies the explanatory variables in the model jointly explained about 65% of the variations in household income per capita.

Table 43: Regression Coefficient and significance of Income per capita in Relation to Socio economic variables of Cocoa farmers.

VARIABLE NAME	REGRESSION COEFFICIENT	STANDARD ERROR	T- VALUE
(Constant)	15.747	3.953	3.984
Log of Household size	-1.369*	0.426	-3.211
Log of Age of farmer	-1.123	0.961	-1.168
Log of farmers' gender	-0.339	1.079	-0.314
Log of level of education	0.006	0.444	0.013
Log of dependency ratio	-0.812*	0.291	-2.789
Log of Proportion of female	0.716	0.504	1.421
Log of GPS Farm size	1.009*	0.282	3.579
Log of GPS Distance to Homestead	-0.418*	0.109	-3.818
Log of Age of farm	0.394	0.259	1.520
Log of Previous land use	0.034	0.161	0.211

$R^2 = 0.652$

Adjusted $R^2 = 0.468$

F- Value = 3.552

*Significant at 5% level of significance.

Source: Field Survey 2010

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The main objective of this study is to examine the welfare status of cocoa farming households in Ondo State, Nigeria. Primary data collected from sampled cocoa farmers were used for this study. Descriptive statistics were used to explain the socio-economic variables, farm specific characteristics, and indicators of well-being of the respondents. Gini coefficient and index of dissimilarity were used to assess inequalities in the welfare status of the respondents. Cross tabulation and Chi-square test were used to test for the existence of relationship between welfare status and; some socio-economic variables and farm specific variables. Regression analysis was used to assess the relationship between welfare status, socio-economic variables, and farm specific variables.

The result of the socio-economic analysis showed that most of the cocoa farmers were old, with an average age of 59.85 years. Household size ranged between 1 and 13 with a mean of 6 members. Majority of the household heads were male and are married. The GPS estimate of farm size ranged between 0.01 and 10 hectares with a mean of 2.4 ha.

Most of the cocoa farms were old with a mean of 29.88 years. Majority of the respondents had their farms over 1 km from homestead, with a mean distance of 24.02 km. Most of the cocoa farmers in the study area were small scale producers, with mean cocoa output and income of 877.50 kg and ₦139, 830 respectively in a cropping season. Just as output was low, income was also low. The mean other agricultural and non-agricultural incomes were ₦ 34,694 and ₦ 1,850 respectively. Also the majority of the respondents earned a total income of ₦ 300,000 or less with a mean of ₦ 176,380 during the survey period. The majority of the sampled households did not incur debt. Most of the sampled households had between 10% and 50% female members and majority had dependency ratio that ranged between 0.1 and 5. The mean dependency ratio was 1.43.

Most of the respondents' children attended both primary and secondary schools within distance of less than or equal to 1km from home. Most of the household heads were literate, with a mean number of years of education of 6.35 and about 50 percent of them had some field training on cocoa production.

With regards to indicators of well-being, the number of rooms occupied by the respondents varied between two and sixteen with a mean of 5 rooms. All the respondents in the study area used iron sheets for their roofing material. Also most of the respondents lived in mud wall and mud brick houses while 30 percent lived in cement brick houses. About 51.7 percent of the respondents lived in houses that needed major repairs while 48.3 percent lived in houses that had sound structure. With regards to electricity, 60 percent of the respondents had no electricity supply in their houses while 40 percent were linked with PHCN and also own a generator. The majority, (95 percent) of the respondents used firewood while just 3.3 percent of the households used kerosene as source of fuel for cooking. About 43.3 percent of the sampled households made use of rain and river water, 48.4 percent used well water while 8.3 percent used public piped water as source of drinking water. The study also revealed that few households (5 percent) had access to water closet toilet, 23.3 percent made use of pit toilet which is either shared or owned while the majority (71.7 percent) had no toilet facility but made use of the bush and field.

About 70 percent of the respondents did not use mosquito net on the windows to protect their houses against mosquitoes and other flies. About 30 percent of the respondents had motorcycles while 6.67 percent had automobile and or pick up van. Majority (91.6 percent) of the respondents owned a functional transistor radio, 55 percent of them owned a functional television set while 45 percent of the respondents owned a DVD Player. The cocoa farmers also benefited from the increasing access to telephone services in Nigeria. About 66.67 percent of the respondents owned a functional mobile phone.

With regards to durables, 73.3 percent of the respondents had at least a ladder, 93.3 percent owned knapsack sprayer, 63.3 percent owned water drum for mixing pesticide, 41.67 percent owned rubber boots while just 10.0 percent of the respondents owned hand pruning shear. In terms of welfare index, 83.3 percent of the respondents had welfare index score of between 1 and 50% and just 16.7 percent of them scored above 50%.

The assessment of the inequality in the welfare index yielded a Gini coefficient for welfare index of 0.2049, and an index of dissimilarity of 0.1161. This means that the cocoa farmers in the study area were not much better than one another in terms of welfare status. The assessment of inequality in income distribution resulted in a Gini coefficient of 0.5249 and an index of dissimilarity of 0.3513, thus indicating that some inequality exists in the income

distribution of cocoa farmers in the study area. The results indicate that there was more inequality in the distribution of the income than in the distribution of welfare index.

The result of bivariate analysis of the relationship between welfare index and socio-economic determinants of welfare revealed that household size and dependency ratio were significant at 5% level of significance. Also farmers' training and GPS farm size were significant at 10% level of significance. This means that household size, dependency ratio, farmers' training and GPS Farm size had significant relationship with welfare index.

The regression of income per capita on household and farm specific variables revealed that household size, dependency ratio, GPS farm size and GPS distance to homestead were significant at 5% level of significance. Indicating that household size, dependency ratio, GPS farm size and GPS distance to homestead played some roles in determining the welfare status of cocoa farmers in the study area. Household size, dependency ratio and GPS distance had negative effects on household income per capita while GPS farm size had positive effects.

5.2 CONCLUSION

The study revealed that the majority of the cocoa farmers interviewed were old and cocoa farms were also old. The mean age of farmer was 59.85 years and average age of cocoa farm was 29.88 years. Also mean household size was 6 members. Majority of the sampled cocoa farmers were educated, small scale producers with average farm size of 2.4ha and mean cocoa output was 877.50 kg per cropping season while average income was ₦139, 830.

Most of the respondents lived in mud wall and mud brick houses with windows that are not protected with wire netting and needed major repairs. Also majority of the sampled households did not have access to electricity supply and safe drinking water and had no toilet facility within their house premises and uses wood as main source of fuel for cooking. Communication was not a problem in the study area because most of the farmers owned functional mobile phones, radio set as well as television set. The findings from the study therefore revealed that most of the cocoa farmers were living in environments which lack the basic amenities required for a decent standard of life. The key variables which affected household welfare in the study area were household size, dependency ratio, distance of farm from homestead and farm size. The Gini Coefficients and the Dissimilarity Indices showed that

there was some level of inequality in the distribution of incomes of the cocoa farmers but low degree of inequality in their welfare status.

5.3 RECOMMENDATIONS

Based on the findings of this study the followings are recommended in order to improve the welfare status of cocoa farming households.

1. Cocoa rehabilitation and especially replanting should be promoted to renew ageing cocoa farms.
2. A package of incentives to attract young people to the farm should be put in place.
3. Infrastructural facilities such as electricity and water should be provided in cocoa farming communities.
4. The cocoa farmers through their farmer organizations and community associations should engage in self-help projects to provide some basic infrastructure such as toilets, potable water (wells) and so on.
5. Government should reformulate its energy policy to ensure that alternatives to wood fuel are affordable and farmers' dependence on firewood is reduced to the barest minimum.

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APPENDIX

WELFARE STATUS OF COCOA FARMING HOUSEHOLDS IN ONDO STATE, NIGERIA SURVEY QUESTIONNAIRE FOR COCOA FARM HOUSEHOLD SURVEY

ID0. Name of Enumerator _____

ID0. Date of Interview _____

ID1. Country _____

ID2. State/Region/County/Province _____

ID3. Division/District _____

ID4. Sub-division/Sub-District/Local Gov't area _____

ID5. Village _____

ID6. Name of household head _____

ID7. Name of spouse of household head _____

ID8. GPS Latitude of compound in village (degree decimals) **N**- _____

ID9. GPS Longitude of compound in village (degree decimals) **E**- _____

ID10. House Number _____

PART A

I. FIELD CHARACTERISTICS

Farm no.	TS1 Farmer's estimate of size (indicate acres or hectares)	TS2.1 Majority of cocoa planted in rows? 1=yes 0=no	TS2.2 Spacing interval between trees if majority planted in rows ___ x ___ ft	TS3. Previous land use prior to planting 1=Forest 2=long bush fallow (A minimum of 7 years) 4=short fallow-food crop rotation 8=replanted old cocoa farm 16=abandoned cocoa farm 32= unknown 64=other describe.	TS4. Was this farm harvested in 2008/2009? 1=yes 0=no	TS5. Source of planting material 1=pods from own farm or neighbor's farm 2=Cocobod seed production unit 3=1 & 2 (both)
1.			___ x ___ ft			
2.			___ x ___ ft			
3.			___ x ___ ft			
4.			___ x ___ ft			
5.			___ x ___ ft			
6.			___ x ___ ft			

Field characteristics (continued)

Farm no.	TS6. Year in which farm was first planted and year in which planting was completed.		LT1. How did you acquire the land for this cocoa farm? 1-Inherited 2-Purchased from stool 4-Purchased from land owner 8-Land grant from stool 16-"Sharecropped" to ownership 32-Leased 64-Other (specify)	LP1.1 Was sharecropper (or caretaker) labor used to produce the 2008/2009 crop from this field? 1=yes 2=no	LP1.2 If yes what was the caretaker's share? 1=1/3 rd 2=1/2 4=2/3 rd 8=other (specify)	LP1.3 If harvest shared with the caretaker how many bags did the caregiver receive for 2008/09 cocoa season?
	Start	Finish				
1.						
2.						
3.						
4.						
5.						
6.						

II. AGROCHEMICAL APPLICATION

Fertilizer use in 2008/2009 and 2007/2008 (if none used check here ___ and skip to *fungicides sub-section*)

Please list all type(s) of fertilizer applied on harvested farms over the last 2 years, the unit measure for each type, the total quantity applied to the farms harvested in 2008/2009 and applied in 2007/2008, and the price per unit in 2008/2009.

FE1. Fertilizer type	FE2. Units	FE3. No. of units applied in 2008/2009	FE4. No. of units applied in 2007/2008	FE5. Unit price in 2008/2009
FE6	How many times were fertilizers applied in the last 12 months? (e.g. 4x)		_____applications	

Fungicide use in 2008/2009 and 2007/2008 (if none was applied by **farmer or CODAPEC** check here ___ and skip to ***insecticide*** sub-section)

Please list all type(s) of fungicide applied on harvested farms over the last 2 years, the unit measure for each type, the total quantity applied to the farms harvested in 2008/2009 and applied in 2007/2008, and the price per unit in 2008/2009.

FU1. Fungicide type	FU2. Units	FU3. No. of units applied in 2008/2009	FU4. No. of units applied in 2007/2008	FU5. Unit price in 2008/2009
FU6.	How many times were fungicides applied in the last 12 months? (e.g. 4x)		_____applications	
FU7.	How many times were fungicides applied by CODAPEC (mass spraying) (e.g. 4x)		No. of CODAPEC applications_____	

Insecticide use in 2008/2009 and 2007/2008 (if none was applied by **farmer or CODAPEC** check here ___ and skip to **herbicides** sub-section)

Please list all type(s) of insecticide applied on harvested farms over the last 2 years, the unit measure for each type, the total quantity applied to the farms harvested in 2008/2009 and applied in 2007/2008, and the price per unit in 2008/2009.

IN1. Insecticide type	IN2. Units	IN3. No. of units applied in 2008/2009	IN4. No. of units applied in 2007/2008	IN5. Unit price in 2008/2009
IN6	How many times were insecticides applied by yourself in the last 12 months? (e.g. 4x)		_____applications	
IN7	How many times were insecticides applied by CODAPEC (mass spraying) (e.g. 4x)		No. of CODAPEC applications _____	

Herbicide use in 2008/2009 and 2007/2008 (if none used check here ___ and skip to ***cultural practices*** sub-section)

Please list all type(s) of insecticide applied on harvested farms over the last 2 years, the unit measure for each type, the total quantity applied to the farms harvested in 2008/2009 and applied in 2007/2008, and the price per unit in 2008/2009.

H1. Herbicide type	H2. Units	H3. No. of units applied in 2008/2009	H4. No. of units applied in 2007/2008	H5. Unit price in 2008/2009
H6	How many times were herbicides applied in the last 12 months? (e.g. 4x)		_____ applications	

. PRODUCTION

Y1	How many total bags (or kg if known) of cocoa did you sell in 2007/2008 from <u>all your farms</u> ? This includes the portion given to sharecroppers and caretakers.	Total bags sold 2007/2008 season _____ Total kg sold 2007/2008 season _____	
Y2	How many total bags (or kg if known) did you sell in 2008/2009 from all your farms?	Total bags sold 2008/2009 season _____ (or) Total kg sold 2008/2009 season _____	

Y3	How much does your bag of cocoa typically weigh?	Weight of a bag of cocoa _____	
Y4	What was the average price received for the cocoa sold in 2007/2008 and 2008/2009?	2008/2009 season Naira _____ per _____ 2007/2008 season Naira _____ per _____	
Y5	Did you receive a bonus payment for cocoa produced in 2007/2008? If yes how much in total did you receive for the produce from all your farms?	Yes 1 No 2 Bonus 2007/2008 Naira _____	
Y6	Did you or any member of your household sell any other non cocoa agricultural product produced <u>on your cocoa farm</u> in the last 12 months?	Yes 1 No 2	If=2, skip to HC1
Y7	If yes, what was the total value of your <u>non-cocoa sales (only those produced on the cocoa farm)?</u>	Non cocoa sales value Naira _____	
Y8	What was the most important non-cocoa commodity sold?	Most important _____	

CAPITAL TOOLS

Go through the list, item by item and get a count of the number of functional capital equipment utilized by the farmer's household at the time of the interview.

	Equipment	Quantity (functional)
	PRODUCTION	
CE1	Tree pruning saw (long handled)	
CE2	Hand pruning shears (secateurs)	

CE3	Ladders	
CE4	Chainsaw	
CE5	Fermenting boxes/baskets	
CE6	Knapsack sprayer	
CE7	Motorized sprayer	
CE8	Water drums for pesticide application (steel or plastic)	
CE9	Protective goggles	
CE10	Chemical resistant gloves (e.g. butyl)	
CE11	Respirator	
CE12	Rubber boots	
CE13	Coveralls	
CE14	OTHER (Describe)	
	TRANSPORTATION	
CE15	Bicycle	
CE16	Wheelbarrow	
CE17	Motorcycle (describe)	
CE18	Pickup truck (describe)	
CE19	Automobile (describe)	
CE20	OTHER (Describe)	
	TELECOMMUNICATIONS	
CE21	Radio	
CE22	DVD player	
CE23	Television	
CE24	Mobile (cellular) phone	
CE25	OTHER (Describe)	

	MISCELLANEOUS	
CE26	Mosquito nets	
CE27	First aid kit	
CE28	Water filter	
CE29	Pit latrine (own)	
CE30	Bush latrine (Short put)	

Welfare status

Instructions: These questions are directed at assessing the socio-economic/welfare status of the respondents. A few of them have been asked above under capital tools from the production perspective. The few repetitions will serve to verify the consistency of the respondent's answers.

WS1 Family structure

	Male:	Female
Number/age of adult (18-55)		:
Number/age of preschooler (0-6)		
Number/age of children (7-17)		
Number/age of old people (>55)		
Female-headed household	Yes/No:	
Number of disabled persons		
Number of women who had first child before age 16 years		

WS2 Education

Number of school-age children in school	Primary School:	Secondary school::
Distance to school	Primary school (km)	Secondary school: (km)
Number of adults that can read	In Yoruba :	In English:
Number of adult that can write	In Yoruba :	In English:
How many adults completed	Primary school only:	Secondary school:
Years of schooling completed by head of household		

WS3 Incomes:

WS3a Please indicate the agricultural incomes in 08/09 in the following table

Crop	Output (kg/mt/Nos, specify)	Revenue (N)	Cash expenses (N)
Cocoa			
Oilpalm			
Plantain			
Citrus			
Other tree crops :			
Other tree crops			
Yams			
Maize			
Cassava			
Other food crops			
Goat			
Sheep			
Chicken			
Other livestock			

WS3b Please indicate the non-agricultural incomes in 08/09 in the following table

Number of adult wage earners	
Monthly wages from all employed adults	₦
Number of adults with non-salaried trade	
Average monthly incomes from non-salaried trade of adults	N
Number of children (7-17 years) working that is receiving income	
Average monthly incomes from children's who are working	₦

WS3c Please indicate the own farm produce in 08/09 consumed by the household in the following table

Crop	Quantity (kg/mt/Nos, specify)	Value (₦)
Palm oil		
Plantain		
Citrus		
Other tree crops produce (1):		
Other tree crops produce (2)		
Yams		
Maize		
Cassava		
Other food crops		
Goat		
Sheep		
Chicken		
Other livestock		

WS4 Transfers: Please indicate incomes received as transfers in 08/09

Remittances from migrant member of family (in Nigeria/In Overseas)	₦
Pensions (old age)	₦

WS5 Debts

Debts with cooperatives and/or financial institutions	₦
Debts with informal moneylenders/shopkeeper	₦
Debts with friends and family	₦

WS6 Housing

Number of rooms available to household members	
Roofing material used in the main house	(1) Thatched (2) iron sheets (3) asbestos (6) aluminium
Exterior walls of dwelling	(1) Mud walls (2) iron sheets (3) timber (4) mud brick (5) cement brick
Structural condition of dwelling	(1) Seriously dilapidated (2) needs major repairs (3) sound structure
Electricity supply	(1) No supply (2) public supply (3) own generator (4) public supply plus own generator
Cooking-fuel source	(1) Collected wood (2) purchased wood (3) charcoal (4) kerosene (5) gas (6) electricity
Source of drinking water	(1) Rainwater or river (2) public well, open (3) public well, sealed with pump (4) well in residence yard (5) piped public water (6) bore hole in residence
Toilet facility	(1) Bush, field, or no facility (2) shared pit toilet (3) own pit toilet (4) flush toilet, own, or shared

WS7 Livestock

Number of cattle	
Number of adult sheep and goats	
Number of adult pigs	
Number of adult poultry	
Number of adult rabbits	

WS8 Transportation

Number of cars	
Number of motorcycles	
Number of bicycles	
Number of lorries	

WS9 Electronics

Number of televisions	
Number of videocassette recorders	
Number of radios	
Number of fans	
Number of refrigerators	

Instructions: Please indicate the time expended on the administration of the questionnaire up to this point: -----

PART B: GPS AND FIELD MEASUREMENTS (To be completed after interview):

Tools: *Garmin Etrex GPS, 100m rollable tape measure, 2.67m stick or palm branch stalk (2 of them) and a home-made calliper for measuring cocoa tree diameter*

- (1) Take a waypoint at the producer's compound in the village and register the lat and long on the first page of the questionnaire in degree decimals.
- (2) From the compound, record a GPS track from the producer's compound to what he considers his principal (i.e. most productive) cocoa farm. On arriving at the farm stop the tracking function and record the track number and the track distance (from the compound to the farm) on the field assessment data collection sheet.
- (3) Record the farm perimeter track by walking with the farmer the entire perimeter of the cocoa farm with the GPS held in proper position (chest height held in a horizontal position away from body). All trees lying within this perimeter should belong to the farmer. Once you have completed walking the perimeter, stop the tracking function and record the track number and area in m² as well as acres on the field assessment data collection sheet.
- (4) From a randomly selected entry point on the perimeter of the farm walk 20 paces into the farm. At this point take a 50 meter tape measure and attach it to a stake driven into the ground, stretch the tape to its full length, in as straight a line as possible. Take a straight measured stick of exactly 2.67 meters in length and hold it perpendicular to the line so that one end is just over the line. Keeping the stick perpendicular and the end over the line, walk the length of the line, counting (1) all cocoa trees and (2) all non cocoa shade trees that come in contact with the stick. Only include shade trees that have more than 50% of their canopy above the cocoa canopy. The cocoa trees should be counted and classified according to three diameter (at waist height) classes: a) <3.5cm, b) 3.5 to 8 cm and c) >8 cm. A wooden gauge or calliper can be made to quickly assess these categories. Upon completing on one side stop and enter the counts for the four categories in the data collection sheet (p.13 of the questionnaire). Now repeat the same procedure on the other side of the string. Move the string to a new randomly chosen location and repeat the exercise. In total six transect walks of 50 meters (or 3 transect walks should the farmer assist in counting from the other side) should be conducted and the string should be placed randomly in 3 different locations in the farm resulting in a total of **800 m²** counted.
- (5) After completing all three transect walks, subjectively assess the cocoa canopy closure for this farm according to the following scale:
 - 1= less than 1/3rd of the farm area is covered by the cocoa canopy.
 - 2= from 1/3rd to 2/3rd of the farm area is covered by the cocoa canopy.

3= more than 2/3rd of the area is covered by the cocoa canopy.

- (6) If farmer has multiple farms start a new track at the perimeter of the first farm and record the track to farm 2. Upon reaching farm 2, stop the track and record the track number and the distance between farm 1 and farm 2 on the data collection sheet. At farm 2 you will now repeat steps 3, 4 and 5 above.

- (7) After measuring all the farmer's fields (including newly established but not yet bearing) and following the interview, fill in the farmer's farm record certificate stating her/his name, the size of each of his farms, the estimated number of cocoa trees in each farm and her/his 2007/2008 yields. Sign and stamp her/his certificate and present it to him upon departure while thanking him or her for their time and effort.

Farm 1.

GPS track number (compound to farm) _____ Distance from compound _____m

GPS track number (perimeter of farm) _____ Field size _____ ha Field size _____Acres

	Transect one			Shade trees	Transect two			Shade trees	Transect three			Cocoa canopy closure
	Cocoa trees				Cocoa trees				Cocoa trees			
	<3.5	3.5-8	>8		<3.5	3.5-8	>8		<3.5	3.5-8	>8	
Side 1												__1
												__2
Side 2												__3

Farm 2.

GPS track number (farm 1 to farm2) _____ Distance farm 1 to farm 2: _____m

GPS track number (perimeter of farm) _____ Field size: _____ ha Field size: _____Acres

	Transect one			Shade trees	Transect two			Shade trees	Transect three			Cocoa canopy closure
	Cocoa trees				Cocoa trees				Cocoa trees			
	<3.5	3.5-8	>8		<3.5	3.5-8	>8		<3.5	3.5-8	>8	
Side 1												__1
												__2
Side 2												__3

Farm 3.

GPS track number (farm 2 to farm 3) _____ Distance farm 2 to farm 3: _____m

GPS track number (perimeter of farm 3) _____ Field size: _____ ha Field size: _____ Acres

	Transect one			Shade trees	Transect two			Shade trees	Transect three			Cocoa canopy closure
	Cocoa trees				Cocoa trees				Cocoa trees			
	<3.5	3.5-8	>8		<3.5	3.5-8	>8		<3.5	3.5-8	>8	
Side 1												__1
												__2
Side 2												__3

Farm 4.

GPS track number (farm 3 to farm 4) _____ Distance farm 3 to farm 4: _____ m

GPS track number (perimeter of farm 4) _____ Field size: _____ ha Field size: _____ Acres

	Transect one			Shade trees	Transect two			Shade trees	Transect three			Cocoa canopy closure
	Cocoa trees				Cocoa trees				Cocoa trees			
	<3.5	3.5-8	>8		<3.5	3.5-8	>8		<3.5	3.5-8	>8	
Side 1												__1
												__2
Side 2												__3

IF FARMER HAS MORE THAN 4 FARMS USE A SECOND QUESTIONNAIRE FORM FOR THE OTHER FARMS AND ATTACH IT TO THIS FORM

Counting sheet I for transect walks

	Category 1 <3.5	Category 2	Category 3 >8 cm	Shade trees
F1				
T1				
F1				
T2				
F1				
T3				

F2				
T1				
F2				
T2				
F2				
T3				

Counting sheet II for transect walks

	Category 1 <3.5	Category 2	Category 3 >8 cm	Shade trees
F3				
T1				
F3				
T2				
F3				
T3				

F4				
T1				
F4				
T2				
F4				
T3				