

Analysis of Market Participation and Rural Poverty among Farmers in Northern Part of Taraba State, Nigeria

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ABSTRACT Market access plays a remarkable role in ensuring better income and welfare for smallholder farmers through diverse channels. By raising income, markets increase purchasing power, which, in turn, creates demand for consumer goods, *ipso facto* enhancing farmer welfare. The study examined market participation and poverty in rural Nigeria with a focus on selected rural communities in northern Taraba State. Multi-stage stratified random and purposive random sampling techniques were used to select respondents. On 120 rural farmers, 120 questionnaires were administered, retrieved and analyzed. About 110 out of the 120 sampled farmers were market participants operating at various levels of market participation as revealed by the total market participation index (TMPI); 10 farmers, 15 farmers, 25 farmers and 60 farmers participated in the market at levels 1, 2, 3 and 4 respectively. About 70.83 percent, 7.5 percent and 21.67 percent of the respondents were very poor, poor and non-poor respectively. Data were fitted to logit and tobit models. The results revealed concordant R^2 of 0.89, 0.20 and 0.43 and the fits of the data and log likelihoods were statistically significant at 0.01 percent for probability of market participation, factors influencing poverty and level of sales of produce respectively. Seven covariates (X1=market information, X3=distance, X4=output size, X5=extension visit, X6=cooperative membership, X8=family size and X9=education) out of nine covariates, eight covariates (X1=age, X2=farming experience, X3=distance, X4=infrastructure, X6=transport cost, X7=dependency ratio, X10=farm size and X11=market participation) out of eleven covariates and five covariates (X2=output size, X3=distance, X5=cooperative membership, X7=extension visit and X8=family size) out of nine covariates used carried appropriate signs in consonance with *a priori* expectation for probability of market participation, factors affecting poverty and factors influencing level of sale of produce respectively. Socio-economic variables such as distance, cooperative membership, family size, high output commercialization ratio and education and institutional variables such as supportive infrastructure and institutions have been found to be important variables affecting market participation while high transportation costs, poor infrastructure, high dependency ratio, age and poor market participation were found to have positive correlation with poverty in the study area. Governmental intervention is recommended to better the lots of these farmers.

INTRODUCTION

Nigeria is the most populous country in West Africa with a population of about 130 million people (Agbaje et al. 2005). Agriculture plays a central role in its economic development. In spite of its vast agricultural potentials, its rural dwellers, that constitute a larger proportion of its population and produce about 90% of its food supply, are poor. Considering the prominent role agriculture plays in the livelihood of these people, strategies aimed at reducing poverty and hunger centered on rapid growth in this sector becomes imperative so as to sustain increased agricultural output and raise their income.

To this end, increased integration of these smallholder farmers into markets at local, regional and national levels becomes an issue of paramount significance. Many policy makers and development economists have emphasized the significance of marketing in agricultural and economic development. Agricultural/food marketing is the principal determinant of agricultural growth and contributes to overall development (Dittoh 1994; Timma 1996; Balint

et al. 1998; Timma 1997). Increasing agricultural output in most developing countries is improving the productivity of farmers, which is not achievable devoid of markets that effectively bind the increasingly specialized activities of widely dispersed producers into an integrated national economy. Consequently, an efficient and responsive marketing system for agricultural products is a *sine qua non* for development process (Abbot 1993). The income and economic welfare of the farmers are determined by agricultural prices, which in turn influences their farm investment and production decision (Benfica 2006). Renkow and Hallstrom (2002) said food crop marketing system is often considered inefficient in most African countries. As a result, farmers find it difficult to dispose of their produce at attractive prices and places of their choice due to perceived weaknesses in food crop marketing system. This development dampens their morale to raise production and supply which often steps up food prices to consumers hence restriction of increase in farm income (Rosegrant et al. 2005). There is, therefore, the need to create escape from food insecurity and

poverty by improving farm income through market participation, generating employment for farm workers, reducing food prices and fuelling economic growth (IFAD 2003). Smallholder farming and effective market participation are a sure pathway of pulling rural people out of poverty hence improving their income and food security (Rosegrant et al. 2005).

However, the performance of the Nigerian economy as documented by NBS (2005) showed that national GDP growth rate rose sharply from 3.49% in 2002 to 10.23% in 2003. Likewise, poverty reduced by 65.5% in 1996 to 54.4% in 2004 (NBS 2005). Meanwhile, inequality of income distribution as measured by the Gini coefficient remained high. For example, Oyekale et al. (2006) using per capita and per capita adult equivalent income documented Gini coefficient of 0.5925 and 0.5927 respectively in 2004 while DFID (2003) points out that inequality close to 0.5 is high. The implication is that growth achieved during the period under reference might not have trickled down adequately and as such creating areas of high poverty incidence. Poverty contributes to poor agricultural productivity, as many farmers cannot afford to purchase necessary farm inputs such as fertilizer, pesticides and improved seeds, which would bring about increased productivity.

Accordingly, this study answered the following questions: What role do socio-economic characteristics play on market participation and rural poverty? What are the impediments/constraints to market participation and improved farmer income? What is the level of market participation among rural farmers? What are the levels of poverty among rural farmers? What factors influence market participation? What factors influence poverty? The objectives of the study were:

- To determine the socio-economic characteristics of farmers in the study area.

- To identify the constraints to market participation and improved farmer income.

- To determine the level of market participation in the study area.

- To determine the level of rural poverty in the study area.

- To determine factors influencing market participation.

- To determine factors influencing poverty.

Research work on market participation are scanty; more especially in developing countries

where important functions make this question paramount (Bellemare and Barrett 2006). The factors, drawing from literature on the determinants of market participation and sales, include transaction costs (distance to roads, markets and towns, transport availability, labour and population density), human capital (age, education, gender, extension training), physical capital (number of livestock producing stock, farmland) and financial capital (crop income, non-farm income, credit). Agricultural market participation is, therefore, the integration of subsistence farmers into the input and output markets of agricultural products with a view to increasing their income level hence reduce poverty (Ehui and Holloway 2002).

In a study conducted in Ethiopia (Holloway et al. 2000) on livestock farmers, it was found out that farmers with lower transaction cost participated in markets and sold more because they were likely to recover their production and marketing costs. In this way, farmers living closer to roads, markets or towns with means of transportation or more labour were found to participate and sell more livestock products. Farmers in more densely populated areas faced greater demand for their farm produce hence had lower search cost, hence population density positively affected market participation and sales (Holloway and Simeon 2002; Balint and Wobst 2005).

Other authors who are of the view that poor infrastructure often increases the transaction costs of smallholder market participation are Bellemare and Bareth (2006), and Lapar et al. (2003). The descriptive analysis influence of institutional factors on market participants (Holloway et al. 2000; Mukhura 2001; Mukhura 2001; Renkow et al. 2002; Lapar et al. 2003; Balint 2006), show that high transaction cost which is the major institutional factor, emerges as a result of inadequate restructuring of the input and output markets, reinforced by low production factor endowment, which hinder sales.

Lapar and Lucila (2002) reported that better access to roads, markets or towns might increase the opportunity cost of labour and capital in agricultural production and marketing (especially where alternative opportunities exist and the return to labour and capital are higher) and might in turn reduce (hence negative effects) participation and sales.

Several authors (Lapar et al. 2003; Holloway et al. 2005) studied market participation based

on the assumption that market participation and volume choices are made sequentially or simultaneously; farmers initially decide whether or not to participate in the market, then decide on the volume purchased or sold, conditional on having chosen market participation; farmers make market participation decision simultaneously with the decision as to volume purchased or sold.

Market access would be improved with an increase in the flow of market information to the farmer, to broaden the information base of the farmer and reduce dependence on traders for price information. Without an institutional framework that facilitates information flow, access to information is dependent on social capital, that is, neighbors' friends and relations (IFAD 2001; Stifel and Sahn 2003).

Oduro et al. (2004) reported that age and gender have negative and positive effects on market participation respectively. Older people tend to have more dependents and more subsistence activities hence low market participation while female-headed households and households with more female members, especially with respect to dairy products tend to be primarily involved in these production activities hence positively affect market participation. Infrastructure and services are important defining parameters of market proximity and therefore effective market participation (Holloway et al. 2000).

MATERIALS AND METHOD

Multi-stage stratified random and purposive sampling techniques were used to select respondents from six local government areas, which make up the northern part of the state. These Local Government Areas are Jalingo, Ardo-Kola, Yorro, Zing, Lau and Karim Lamido. The second stage involved the collection of list of wards from each Local Government headquarters. The third stage involved random selection of two

wards. The fourth stage involved random selection of two villages from each ward. In all, six Local Government Areas were selected involving 12 wards and 24 villages from where 120 farmers were randomly selected in a ratio proportional to the size of their population. The data collected were on market participation, age of respondents, their educational attainment, farming experience, income, production inputs, outputs, inputs and output prices for 2006 and 2007 cropping seasons.

Indexing, tobit and logit models were used to determine the level of market participation, probability of market participation and factors of poverty respectively.

Indexing was used to measure the level of market participation among respondents in the study area. Table 1 depicts the index used in computing the total market participation index (TMPI). Additionally, various levels of market participation by farmers in the study area were determined using the formula below.

$$\frac{RTMPI}{NMPWC} \times \frac{100}{1} \quad (1)$$

Where:

RTMPI = Replication/frequency of total market participation indices.

NMPWC = Number/size of market participants within a given category.

The logit model was used to determine the probability of market participation.

$$\ln \left(\frac{P_i}{1-P_i} \right) = Z_i = \beta_0 + \beta_1 X_i + e \quad (2)$$

It is based on the cumulative logistic regression model estimated thus:

$$L_i = L_n \left(\frac{P_i}{1-P_i} \right) = Z_i = \beta_0 + \beta_1 X_i + \dots + \beta_n X_n + e \quad (3)$$

Where n=1..... 11

Z_i	=	Logit or log of odds.
P_i	=	Participation in market by the ith farmer (I)
$1-P_i$	=	Non-participation by the ith farmer (0)

Table 1: Market participation index box

Qty sold (kg.)	Home stead (1)	Farm gate (2)	Village market (3)	Town market (4)	City market (5)	On sea-son (1)	Off-sea-son (2)	Consu-mer (1)	Trader (2)
0	-	-	-	-	-	-	-	-	-
< 450 (1)	X1	X2	X3	X4	X5	X1	X2	X1	X2
451 - 1000 (2)	X2	X4	X6	X8	X10	X2	X4	X2	X4
1001-1450 (3)	X3	X6	X9	X12	X15	X3	X6	X3	X6
>1450 (4)	X4	X8	X12	X16	X20	X4	X8	X4	X8

Source: Field data 2008

Minimum= X1+X1+X1=X3 Maximum= X4+X8+X12+X16+X20+X4+X8+X4+X8=X84

X_1	=	Market information (1= received market information, 0 = otherwise)
X_2	=	Training (1=received market information, 0 = otherwise)
X_3	=	Distance (km)
X_4	=	Size of output (kg)
X_5	=	Extension visit (1 = visited, 0 = otherwise)
X_6	=	Cooperative membership. (1 = member, 0 = non-members)
X_7	=	Farming experience (years)
X_8	=	Family size (No of household)
X_9	=	Education (number of years in school)
X_{10}	=	Age (years)
X_{11}	=	Gender (1 = male, 0 = female)
B_0	=	a constant term
e	=	error term.

The tobit model was used to determine factors influencing poverty and level of market participation in the study area. In this analysis, the tobit regression was run twice. The first run was to determine the factors influencing poverty using a set of independent variables. In the re-run, certain variables were dropped in order to determine the level of market participation.

The tobit regression model is as specified below

$$Y_i^* = X_i \beta + U_i \quad (4)$$

$U_i = N(0, \sigma^2)$ where

Y_i^* = latent variable representing levels of market participation and poverty respectively.

X_i = a vector of farmers' characteristics relevant in explaining the levels of market participation and poverty (dummy).

β = a corresponding vector of parameters to be estimated

U_i = a homoscedastic, normally distributed error term.

The dependent variables for the tobit model were the percentage of produce sold and level of poverty respectively.

Both dependent variables were dummies (high = 1, otherwise = 0)

The independent variables used in determining factors influencing poverty were as specified below.

X_1	=	age
X_2	=	Farming experience
X_3	=	Distance
X_4	=	Access to infrastructure (Accessible = 1, otherwise = 0)
X_5	=	Farm size

X_6	=	High transportation cost (high = 1, otherwise = 0)
X_7	=	dependency ratio (high = 1, otherwise = 0)
X_8	=	use of fertilizer (yes = 1, otherwise = 0)
X_9	=	Revenue from produce sale (high = 1, otherwise = 0)
X_{10}	=	Household size
X_{11}	=	Market participation (participated = 1, otherwise = 0)
In the same vein the independent variables used in determining the level of market participation were as specified below		
X_1	=	Training
X_2	=	Output
X_3	=	Distance
X_4	=	Gender (male = 1, female = 0)
X_5	=	cooperative membership (Member = 1, otherwise = 0)
X_6	=	major occupation
X_7	=	Extension visit (yes = 1, otherwise = 0)
X_8	=	Family size
X_9	=	Education

RESULTS AND DISCUSSION

Out of the 120 respondents captured in the study, 90 (75 percent) were married out of which 88 (97.78) were market participants while the remaining 2 married respondents (2.22 percent) were not. It was found out that 75 and 45 respondents representing 62.5 percent and 37.5 percent were males and females respectively while the mean age of respondents, mean distance from the respondents' residences to the nearest market and the mean household size were 51 years, 13.5km and 9 persons respectively. Extension agents visited only 2.5 percent of the respondents in the last two years while 97.5 percent of the respondents belonged to farmers' group and 75 percent belongs to cooperative societies. Over 98 percent of the respondents owned, hence cultivated, their own land while over 58 percent of them had no formal education, about 25 percent, 4.17 percent and 2.5 percent had primary education, secondary and post-secondary education respectively. Only 2.83 percent of the respondents had access to credit facilities while 100 percent of them complained of lack of adequate storage facilities. The bulk of labor supply came from the family accounting for 91.67 percent while only 8.33 percent hired labour. Distribution of respondents based on the constraints they faced revealed poor infrastructural facilities (92.5 percent of roads

were bad), poor storage facilities hence high percentages of loss of farm produce. Also, the distribution of farmers by farming characteristics revealed the mean farming experience of farmers to be 45 years, mean farm size owned to be 9.4ha and mean size of farm cultivated during the last two cropping seasons to be 2.18ha. Distribution of farmers based on sources and proportion of farm and non-farm income revealed that 89.89 percent and 10.11 percent were agricultural and non-agricultural sources of revenue in the area of study respectively. The study revealed that of the average total quantity of produce sold 2833.83kg, 1652.92kg, 236.2kg and 472.31kg representing 70 percent, 10 percent and 20 percent were sold to traders on-farm, at home and in the market respectively while 118.9kg, 118.01kg and 235.49kg representing 25.17 percent, 24.98 percent and 49.85 percent were sold to consumers on the farm, at home and in the market respectively. 66.67 percent and 33.33 percent of the quantities sold were on-season and off-season respectively. About 46.16 percent, 38.84 percent, 3.56 percent and 11.44 percent of the total output in the study area were consumed, sold (110 market participants), giving out as gifts and reserved against the succeeding cropping season respectively.

More than half of the respondents in the study area (76.66 percent) had total annual income of less N90, 000 with over 50 percent earning below N60, 000 and 2.51 percent earning above N150, 000. About 70.83 percent, 7.5 percent and 21.67 percent of the respondents were very poor, poor and non-poor respectively

Analysis of Market Participation

An analysis of market participation of respondents was made using Table 2. The analysis showed that out of a total of 120 respondents only 10 farmers did not participate in output market. Market participation in the study area as detailed in the market participation index box was categorized into four levels. The Total Market Participation Index (TMPI) symbolizes what each respondent scored and the score determines the level in which a sampled farmer participated in the market. When the scores between the quantities of produce sold and other indices in the matrix (market location, period of produce sale and buyers) were computed, the minimum score was 3 implying the least participant, while the maximum score was 84 meaning the highest participant.

The four levels of market participation (MP) depict that although 110 sampled farmers participated in the market, they had different levels of participation. It is worthy of note that 10 did not score up 3 hence were tagged market non-participants. The various levels of market participation and their scores are as presented in Figures 1 to 4. Ten (10) respondents (8.33%), 15 respondents (12.5%), 25 respondents (20.83%) and 60 respondents (50%) of sampled farmers participated in levels 1, 2, 3, and 4 respectively.

The result of the logit regression model is presented in Table 3. The fit of the data was statistically significant at ($p < 0.01$) while the concordant $R^2 = 0.89$. The result indicated that the specified regressors were 89% able to explain market participation in the study area.

The result revealed that with the exception of training (X_2) and farming experience (X_7) all other explanatory variables in the model had positive influences on market participation of farmers as expected. The explanatory variable for distance (X_3) carried a negative sign in consonance with the *a priori* expectation. The decision by households to participate in market in the study area was significantly influenced by the following household socio economic variables: market information (X_1) ($P < 0.01$), distance (X_3) ($P < 0.05$), size of output (X_4) ($P < 0.01$), extension visit (X_5) ($P < 0.05$), cooperative membership (X_6) ($P < 0.01$), family size (X_8) ($P < 0.01$) and education (X_9) ($P < 0.1$). Conversely, training (X_2) and farming experience (X_7) had no significant influence on farmers' market participation.

The result showed a negative sign for the explanatory variable on farming experience, which is in dissonance with a *priori* expectation. It might be that more mouths were being fed. More so, this variable reflected insignificance.

The result of the logit model showed that market information was positively and significantly related to the probability of farmers to participate in market. In other words, it means receivers of market information are more likely to take market participation more seriously than non-receivers. Besides, the odds ratio [Exp (B)] for market information was 2:01; meaning farmers who were receivers of market information were 2 times more likely to participate in market than non-receivers.

The result also revealed that distance to the preferred marketing channel (X_3) was negatively

Table 2: Analysis of the market participation index

S. No.	Farmer I.D.	Quantity sold (Kg.)	Market location					Period of sale		Buyers (options)		T.M. P.I.
		(<450Kg) (1)	Home stead (1)	Farm gate (2)	Village market (3)	Town market (4)	City market (5)	On- sea- son (1)	Off- season (2)	Consu- mer (1)	Tra- der (2)	
1	39			2				1		1		4
2	45		1					1			2	4
3	61		1					1		1		3
4	98				3			1		1		5
5	46					4		1		1		6
6	97		1					1			2	4
7	44			2				1			2	5
8	67					4		1	2	1		8
9	96			2				1			2	5
10	62				3				2	1		6
11	49	451 - 100 (2)			6			2			4	12
12	85					8			4	2		14
13	99				6			2			4	12
14	48				6			2			4	12
15	93				6			2			4	12
16	58				6			2			4	12
17	100				6		10		4	2		12
18	88							2			4	16
19	57					8		2			4	14
20	72				6			2			4	12
21	86				6			2			4	12
22	50				6			2			4	12
23	60				6			2			4	12
24	95				6			2			4	12
25	64					8			4	2		14
26	59					8			4	2		14
27	51				6			2			4	12
28	89				6			2			4	12
29	47				6			2			4	12
30	91				6			2			4	12
31	40				6			2			4	12
32	13				6			2			4	12
33	24				6			2			4	12
34	21				6			2			4	12
35	14				6			2			4	12
36	34	1001 - 1450 (3)			9			3			6	18
37	32				9			6			6	21
38	71				9			3			6	18
39	33				9			3			6	18
40	15				9			3			6	18
41	31				9			3			6	18
42	19				9			6			6	21
43	79				9			3			6	18
44	16				9			3			6	18
45	28				9			3			6	18
46	80				9			3			6	18
47	17				9			3			6	18
48	26				9			3			6	18
49	29				9			3			6	18
50	1				9			6			6	21
51	74	>1450 (4)				16		4	8		8	36
52	23				12			4			8	24
53	30				12			4			8	24
54	27				12			4			8	24

Table 2: Contd.....

S. No.	Farmer I.D.	Quantity sold (Kg.)	Market location					Period of sale		Buyers (options)		T.M. P.I.
		(<450Kg) (1)	Home stead (1)	Farm gate (2)	Village market (3)	Town market (4)	City market (5)	On-season (1)	Off-season (2)	Consumer (1)	Trader (2)	
55	4				12			4			8	24
56	73				12			4			8	24
57	20					16		4	8		8	36
58	18					16		4	8		8	36
59	25			8				4			8	20
60	22				12			4			8	24
61	2					16		4	8		8	36
62	3					16		4	8		8	36
63	11					16	20	4	8		8	56
64	36					16	20	4	8		8	56
65	70					16	20	4	8		8	56
66	82		4		12			4		4	8	32
67	110		4		12			4		4	8	32
68	76					16	20		8		8	56
69	102					16	20		8		8	56
70	104					16		4	8		8	36
71	12					16		4	8		8	36
72	109					16	20	4	8		8	56
73	68					16	20	4	8		8	56
74	75			8		16		4	8		8	44
75	106			8		16		4	8		8	44
76	38			8		16		4	8		8	44
77	81			8		16		4	8		8	44
78	84			8		16		4	8		8	44
79	107					16	20	4	8		8	56
80	83		4	8		16		4	8		8	48
81	101		4	8		16		4	8		8	48
82	105		4	8		16		4	8		8	48
83	103					16		4	8		8	36
84	35		4	8		16		4	8		8	48
85	108		4	8		16		4	8		8	48
86	5					16	20	4	8		8	56
87	77					16	20	4	8		8	56
88	6					16	20	4	8		8	56
89	69		4	8		16		4	8		8	48
90	78		4	8	12	16	20	4	8	4	8	84
91	7			8		16		4	8		8	44
92	8				12	16	20	4			8	60
93	37				12	16	20	4			8	60
94	9				12	16	20	4	8		8	68
95	10				12	16		4	8		8	48
96	43				12	16		4	8		8	32
97	94				12	16		4	8		8	32
98	53		4	8	12	16	20	4	8	4	8	84
99	66				12	16	20	4	8		8	48
100	92				12	16		4	8		8	52
101	67				12	16	20	4	8		8	28
102	54			8				4	8		8	32
103	87		4	8				4	8		8	48
104	55				12	16		4	8		8	48
105	65				12	16		4	8		8	28
106	42			8				4	8		8	32
107	90					16		4	8		8	32
108	52					16		4	8		8	32
109	56					16		4	8		8	32
110	41					16		4	8		8	32

Source: Field data, 2008

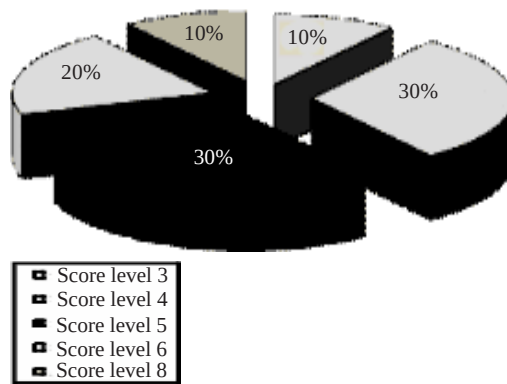


Fig. 1. Market participation level 1

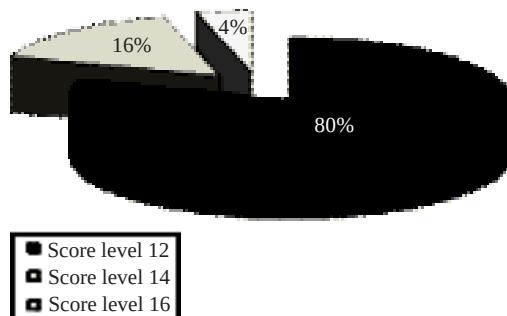


Fig. 2. Market participation level 2

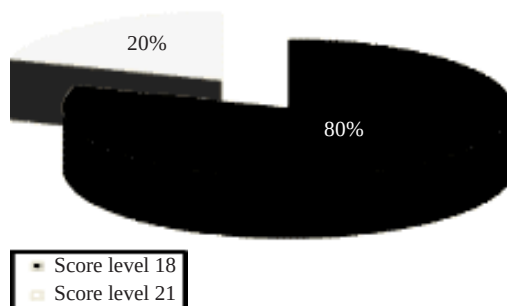


Fig. 3. Market participation level 3

and significantly related to the probability of farmers to participate in market and marketing. The negative size means that with a unit increase (say 1km) in distance, the probability to sell or participate in market will reduce. Conversely, it means with a unit decrease (1km) in distance, households closer to market outlets were more likely to participate in marketing activities than households living further away.

The result also showed the size of output to be positively and significantly related to the pro-

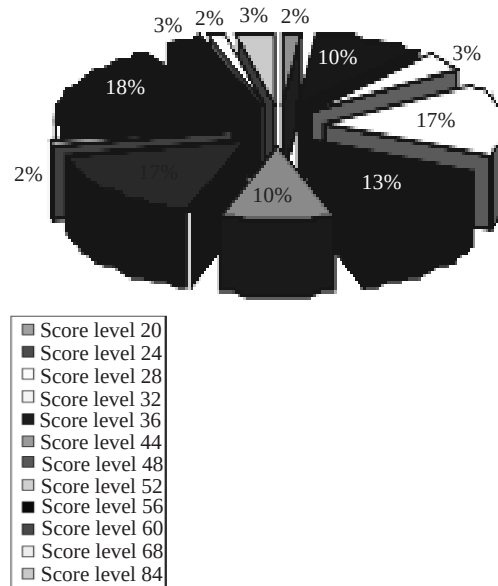


Fig. 4. Market participation level 4

bability to participate in marketing activities. A natural increase in the size of gross output implies an increase in the output commercialization ratio that is the ratio of quantity consumed to that sold.

Accordingly, a unit increase in the size of this ratio will also increase the probability to sell output hence increase in market participation.

Extension visit (X_5) was found to be positive and significantly related to the probability of rural farmers in the study area to participate in marketing activities. This is attested to by the odds ratio [Exp (B)] of 3.41 meaning farmers who were visited by extension agents/officers were more than 3 times likely to take market participation more seriously than those who were not visited.

The variable for cooperative membership (X_6) revealed a positive and significant relationship with the probability of market participation by farmers. It means market participation would be motivated by belonging to a cooperative society. This is because cooperative membership popularizes market participation by making farmers cross fertilize ideas, experiences and affords access to sources of information regarding credit facilities, knowledge and skills, hitherto not known, with a view to improving their livelihood thereby stamping out poverty (Conway 2005).

Table 3: Logit model result for factors influencing probability to sell farm produce

Variable	Notations	Coefficients	S.Error	Z-value	P-values	Exp (B)
Constant	β_0	3.23941**	1.34405	2.41	0.16	-
Market infor.	X_1	0.70132***	0.0246077	2.85	0.004	2.01
Training	X_2	-0.667732 ^{ns}	0.601560	-1.11	0.265	0.51
Distance	X_3	-0.666760**	0.0263517	-2.53	0.011	0.94
Size of output	X_4	0.0108675***	0.0039627	2.74	0.003	1.01
Extension visit	X_5	1.22853**	0.5849958	2.10	0.036	3.41
Coop.M/ship	X_6	0.626479*	0.319547	1.96	0.025	1.87
Farming exp.	X_7	-0.0247440 ^{ns}	0.0242870	-1.02	0.308	0.98
Family size	X_8	0.149009*	0.0811815	1.84	0.066	1.16
Education	X_9	0.0640931*	0.0367866	1.74	0.040	1.06

$\chi^2 = 148.522$ ($P < 0.01$); Log likelihood = -68.351 ($P < 0.01$)

Concordant $R^2 = 0.89$ *** $P < 0.01$, ** $P < 0.05$, * $P < 0.10$, ns = not significant

The family size variable (X_8) revealed a positive and significant relationship with the probability of market participation by the farmers meaning an increase in the size of the family would increase the probability for market participation by farmers. The large family size of farmers is to cash in on family labour, which is in keeping with the findings of Williams (1985) and Akunbile (1999) that local farmers keep large family sizes for agricultural purposes.

The education variable (X_9) revealed a positive and significant relationship with the probability of market participation by farmers. The findings showed that the probability of market participation increased with the level of education. A unit increase in the level of education increases the probability to participate in market.

In estimating the determinants of poverty, Tobit Model consisting of eleven independent variables was used as presented in Table 4. The table reveals a chi-square of 52.08 percent at 1 percent level of significance implying that the model has a good fit to the data. The log likelihood was -104.86 and 1 percent level of significance. The R^2 is 0.2 meaning 20 percent variability in the dependent variable was accounted for by the independent variables. Eight out of the eleven regressors were significant at various levels of significance. Age (x_1), which was significant at 1 percent level negatively, explains the probability to be poor. In other words, increase in age reduces poverty implying increase in the income of farmers. This means as a farmer ages on, he or she will have more experience hence plans and organizes their farm in an efficient way in order to boost yield hence improvement in income. Distance (x_3) which was significant at 5 percent level had an appropriate negative sign, meaning a decrease in distance from the farmers' village to the nearest market

would increase chances of market participation hence increase in income. Access to infrastructure (x_4) (dummy), which was significant at 10 percent level negatively, affected poverty, meaning increase in income. It means availability of incentive infrastructure such as good road, available and adequate storage facilities, pipe borne water, health care facilities, banking, postal services and electricity will go a long way in encouraging farmers to wage war against poverty. Farm size (x_5) which was significant at 1 percent level carried a positive sign which was out of accord with *a priori* expectation hence did not reduce poverty. Transport cost x_6 (dummy) which was significant at 10 percent level had a positive sign hence an appropriate sign that increases poverty. It implies that with one unit increase in transport cost, poverty soars by 24 percent. Dependency ratio x_7 (dummy), which was significant at 10 percent level, had a positive effect on poverty meaning increasing the dependency ratio by 1 unit will increase poverty by 28 percent. Household size (x_{10}), which was significant at 10 percent level, had a negative sign, meaning increase in house hold size reduces poverty. Although household size was significant at 10 percent, it had a negative sign. It implies that increase in the size of the household entailed more seriousness in farming to feed more mouths. Also increase in output means increase in marketable surplus (hence output commercialization ratio) and increase in the tempo of market participation. Market participation X_{11} (dummy) that was significant at 5 percent had a negative sign meaning a negative effect on poverty. A unit increase in market participation will lead to a 40 percent decrease in poverty. This is because when market participation is increased, there is going to be a decrease in poverty, as more money will be generated through active market participation.

Table 4: Tobit regression model result for factors influencing poverty in the study

Variable	Notations	Coefficient	S. Error	t-ratios	P>/t/	[95% conf. interval]	
Age	X ₁	-.0352363***	0.112207	-3.14	0.002	-.0574731	-.0129996
Farming exp.	X ₂	-.0022876 ^{ns}	.0111277	-0.21	0.837	-.0243401	-.0197648
Distance	X ₃	-.1227149**	.0488341	-2.51	0.013	-.2194927	-.0259372
Access to infra-structure	X ₄ (dummy)	-.2429561*	.1448378	-1.68	0.096	-.5299906	.0440784
Farm size	X ₅	.4329964***	.1126238	3.84	0.000	.2098024	.6561904
High trans. Cost	X ₆ (dummy)	.2369448*	.1358506	1.74	0.084	-.0322792	.5061688
Dependency ratio	X ₇ (dummy)	.2840643*	.1539497	1.85	0.068	-.0210279	.5891565
Use of fert.	X ₈ (dummy)	.1661609 ^{ns}	.2021295	0.82	0.413	-.2344123	.05667341
Rev. from sale	X ₉ (dummy)	.1545687 ^{ns}	.1324093	1.17	0.246	-.1078354	.4169729
Household size	X ₁₀ (dummy)	-.026247*	.0168435	-1.56	0.122	-.0596268	.0071328
Market location	X ₁₁	-.4031899 ^{ns}	.0809816	-2.04	0.069	-.1636764	.1572965
Constant	$\hat{\alpha}_0$	1.366324***	.3829747	3.57	0.001	.6073584	2.125291

$\chi^2 = 52.08$ (P<0.01); Log likelihood = -104.86 (P<0.01)

R² = 0.20 *** P<0.01, **P<0.05, *P<0.10, ns = not significant

Farming experience (X₂) had a negative sign meaning a unit increase in farming experience will reduce poverty negligibly since it is significant. Use of fertilizer (X₈) and revenue from produce sale (X₉) were not significant in affecting poverty in the study area

In estimating the determinants of level of market participation, tobit model was used involving nine regressors as presented on table 5. The table shows a log likelihood of -36.30 and a chi-square of 53.94 percent both at 1 percent level of significance implying that the model had a good fit to the data. It had an R² = 0.43 meaning that 43 percent variability in the level of market participation was accounted for by the independent variables. Output (X₂), which had a positive sign, was significant at 1 percent level but with zero effect on the level of market participation. This might be due to incorrect data

provided by the respondents on the effect of output on level of market participation.

Distance (X₃) which had a negative sign (appropriate sign) was significant at 10 percent level meaning a decrease in distance by 1km will increase the level of market participation by 2 percent.

Cooperative membership (X₅), which had a positive sign, was significant at 1 percent level. A unit increase in the level of cooperative membership will increase the level of market participation by 1.23 percent. Extension visit (X₇), which had a negative sign, was significant at 5 percent level. Frequency of extension visit should increase and not decrease the level of market participation. The reverse is the case in this scenario; this might be ascribable to provision of incorrect data on this variable by respondents.

Family size (X₈), which had a negative sign,

Table 5: Tobit model results for factors affecting level of market participation

Variable	Notations	Coefficient	Std. error	t	P>/t/	[95% conf. Interval]	
Training	X ₁	.0581876 ^{ns}	.0639581	0.91	0.365	-.0685371	.1849124
Output	X ₂	.0000788***	.0000267	2.95	0.004	.000026	.0001317
Distance to market	X ₃	-.0198233*	.0105674	-1.88	0.063	-.0407613	.0011147
Gender	X ₄	-.0658879**	.0589341	-1.12	0.266	-.1826583	.0508825
Cooperative membership	X ₅	.012308***	.0027876	4.42	0.000	.0067848	.0178312
Major occupation	X ₆	.0350951 ^{ns}	.0599283	0.59	0.559	-.0836451	.1538353
Extension visit	X ₇	-.1505325**	.0661072	-2.28	0.025	-.2815154	-.0195496
Family size	X ₈	-.0299545 ***	.0077045	-3.89	0.000	-.0452201	-.0146889
Education	X ₉	.0024247 ^{ns}	.0049036	0.49	0.622	-.0072912	.0121406
Cons	$\hat{\alpha}_0$	.9455215***	.1357749	6.96	0.000	.6765008	1.214542

$\chi^2 = 53.94$ (P<0.01); Log likelihood = -36.30 (P<0.01)

R² = 0.43

*** P<0.01, **P<0.05, *P<0.10, ns = not significant.

was significant at 1 percent level. It means increase in the family size can lead to decrease in market participation level by 3 percent. This is because an increase in family size means a corresponding increase in the number of mouths to be fed hence a decrease in the level of market participation.

Three variables affected the level of market participation positively but were insignificant. They included training, major occupation and education. Another factor that affected the level of market participation negatively and was insignificant was gender of respondents.

Measuring Poverty

The welfare of the people was measured using non-money metric indicators. This approach gathered information on household assets ownership on the basis of which drew up a table on assets ownership. Table 6 shows the various proportions in which household assets were owned in the study area. The low proportion of household assets ownership is an index of poverty, the high proportion of livestock ownership by some respondents notwithstanding. However, the study demonstrates the fact that although there is increase economic growth in Nigeria generally, poverty deepens implying that growth is out proportion with poverty reduction measures. For clarity and simplicity of analysis observation were ranked into three equal groups containing

78 observations each using the factor score generated by the procedure. The bottom third was categorized as “very poor”, the middle third as “poor” and the top third as “non-poor”. Deriving from this ranking a poverty profile was developed for the study area.

The Poverty Profile

- **Poverty and Location:** Rural communities in Karim Lamido L.G.A. were the poorest of all the six rural communities in the six Local Government Areas of study. 64.29 percent of the rural communities in Karim Lamido L.G.A. were very poor, 29.16 percent of rural communities in Lau, which is a riverine area, were non-poor. Table 7 shows the highest percentage of non-poor to be in Lau community compared to the remaining five rural communities in the other L.G.A.s.
- **Poverty and Household Demographics:** Table 7 shows that the poorest (very poor) household had the highest mean household size and the highest ratio of children to adults compared to the other category of households in the area of study.
- **Poverty and Education:** The proportion of children aged between 6-12 years attending school averaged 57 percent, 71 percent and 88 percent in very poor, poor and non-poor household respectively. The table shows that children within the age group of 13-15 years

Table 6: Distribution of assets among the communities

S. No.	% of HHs that have the following assets	Jalingo L.G.A (4 villages)	Ardo-Kola L.G.A (4 villages)	Yorro L.G.A (4 villages)	Zing L.G.A (4 villages)	Lau L.G.A (4 villages)	Karim Lamido L.G.A (4 villages)	Overall
1	Car	2.38	1.45	0.00	1.45	0.00	1.35	1.11
2	Motor cycle	1.5	0.00	2.32	5.68	3.50	2.50	2.58
3	Bicycle	30.45	25.44	20.35	40.33	45.40	50.60	35.43
4	Television	2.25	2.15	1.13	2.33	1.40	1.00	1.71
5	Generator set	1.3	0.00	1.30	2.11	0.00	1.25	0.09
6	Radio cassette	40.5	32.50	30.20	40.12	50.30	48.9	4.04
7	Cooking Store	2.33	3.5	2.50	8.44	9.33	5.65	5.29
8	Refrigerator	0.00	0.00	1.45	0.00	0.00	1.20	1.33
9	Watch/clock	50.62	45.56	48.75	50.25	60.00	70.33	54.25
10	Hurricane lamp	83.45	79.30	90.45	92.25	88.46	90.25	87.36
11	Tractor	0.00	0.00	1.25	1.08	0.00	0.00	1.79
12	Ox-drawn	3.35	2.32	4.50	6.50	4.25	2.10	3.82
13	Plough	2.00	3.52	3.13	4.30	2.50	1.40	2.81
14	Cattle	40.21	45.20	30.60	35.65	40.45	50.45	40.43
15	Sheep	50.2	40.20	69.30	70.25	80.25	78.45	64.78
16	Chicken	30.2	0.00	2.20	10.65	5.20	4.25	8.75
17	Pigs	2.35	1.25	0.00	3.25	2.25	1.50	1.77
18	Donkey	40.55	39.50	45.60	50.60	60.30	77.25	52.31
19	Goats Duck/drake	55.62	63.30	60.60	65.60	50.30	60.40	59.30

Source: Field data 2008

Table 7: A poverty profile of villages in the area of study

Percentage	VP	P	N
In Jalingo L.G.A.	48.0	32.0	20.0
In Ardo-Kola L.G.A.	45.45	40.91	20.0
In Yorro L.G.A.	53.3	26.67	20.0
In Zing L.G.A.	50.0	25.0	25.0
In Lau L.G.A.	54.17	16.67	29.16
In Karim Lamido L.G.A.	64.2	14.29	21.42
<i>H Demographics</i>			
No. in HH (mean)	11.0	9.0	5.5
Ratio of children to adult (mean)	0.58	0.47	0.35
<i>% of Children Attending School</i>			
Girls:			
6 – 12 years	50.45	69.8	80.5
13 – 15 years	30.30	50.6	100.0
Boys:			
6 – 12 years	63.25	71.30	95.0
13 – 15 years	60.11	82.5	79.80
<i>Type of Employment of HH Members in Main Job (Mean %)</i>			
Self-employed	95.1	86.7	72.97
Wage employed	2.7	6.5	27.03
Unemployed	2.2	6.8	0.00
<i>Occupation of HH Members in Main Job (Mean %)</i>			
Farming	89.1	72.	40.5
Tailoring	2.0	3.0	21.5
Logging	2.0	4.0	10.6
Artisan	1.0	2.0	3.5
Clerical	0.2	1.2	2.7
<i>Number of Additional Jobs of Members Of HH</i>			
% with no other job	68.25	52.75	50.35
% with one other job	13.5	30.75	40.25
% with one other job	0.7	3.5	4.12
with three other job	0.0	0.0	1.95
<i>Social Networks: Membership of</i>			
Cooperative: % of respondent	23.56	29.11	47.33
Social groups: % of respondents	24.19	26.31	49.5
<i>Most Important Source of Financing</i>			
Own savings	50.73	42.33	80.38
Family and friend	20.75	13.90	18.78
Rural bank	0.00	0.00	0.00
<i>Membership of Informal Groups</i>			
No. of respondents ever been members	8	22	25
No. that are still members	3	18	20
<i>HH Receives Remittances</i>			
% that receives remittances	20.34	32.42	48.33
<i>Coping Strategies</i>			
% HH that have cut down on meals	73.39	69.75	20.84
% HH that have withdrawn wards from sch.	15.00	8.18	2.02
% HH that can't pay for health care	63.25	55.67	29.09
Share of output that is sold (mean %)	62	85	99

Source: Field data 2008

attending school were less in number than the former while the proportion of boys going to school outweighed that of girls.

This gender disparity seemed pronounced in all the three categories of household. This development might not be unconnected with the early giving of hands in marriage of the female gender and poverty as was found to characterize most of the households in the area of study.

- **Poverty and Source of Employment:** Farming is the primary source of employment in all the rural communities hence most of the respondents were self-employed. Although 89.1 percent of the workforce in the very poor household practice farming in their main job, the proportion diminishes to 72 percent and 40.5 percent for the poor and non-poor household respectively.
- **Poverty and Credit:** Generally, very poor households were less likely to have applied for and gotten loan elsewhere vis- a- vis the poor and the non-poor households. The predominant source of finance for farming was own savings for all the three categories of households. Other sources included friends and families.
- **Members of Informal Savings Group are Low:** past membership of such groups by very poor households was lowest compared to the other two categories of households. Even current membership was also lowest in the very poor households; the reason being lack of security of own contribution and disagreement of the *modus operandi* of disbursement among others.
- **Poverty and Market Participation:** Table 9 shows mean commercialization ratios for all households in the study area. Output commercialization ratio is the ratio of quantity of output consumed to the quantity of output sold. Individuals in very poor households tended to have lower output commercialization ratios compared to non-poor households.
- **Poverty and Social Networks:** Producer cooperative societies were in existence in the study area. However, membership was not very encouraging among respondents. Participation in social group was not encouraging either even though members claimed to have been members for quite some time. They were not benefiting much from being members. Non-challancy by the leadership towards the welfare of the followership was a principal reason advanced for low membership.

Table 8: L.G.A.s, selected villages and major crops grown

<i>Sampled villages Jalingo L.G.A.</i>	<i>Population of farmers</i>	<i>No. of Respondents</i>	<i>Crops grown</i>	<i>Livestock</i>
1. Abbare Makita	150	7	Maize, Sorghum, melon, bemi seeds,	Chicken, sheep,
2. Garin Jalo	110	5	rice, cassava, millet, beans, G/nut,	goat, cattle, pigs,
3. Jasa	125	6	sweet potato, cocoyam, vegetables,	duck, turkey.
4. Bashin	135	7	cotton, onion, tomato, garden eggs,	
Total	520	25	banana, oranges, mangoes.	
<i>Ardokola</i>				
1. Wuro Baka	120	6	Maize, Sorghum, melon, bemi seeds,	Chicken, sheep,
2. Lanko	116	6	rice, cassava, millet, beans, G/nut,	goat, cattle, pigs,
3. Wuro Ardo	114	5	sweet potato, cocoyam, vegetables,	duck, turkey
4. Mayo Renewo	113	5	cotton, onion, tomato, garden eggs,	
Total	413	22	banana, oranges, mangoes.	
<i>Lau L.G.A.</i>				
Boi	80	4	Maize, Sorghum, melon, bemi seeds,	Chicken, sheep,
Didango	80	4	rice, cassava, millet, beans, G/nut,	goat, cattle, pigs,
Donadda	75	4	sweet potato, cocoyam, vegetables,	duck, turkey
Bamga	70	3	cotton, onion, tomato, garden eggs,	
Total	305	15	banana, oranges, mangoes.	
<i>Karim Lamido</i>				
Karim Maundi	105	5	Maize, Sorghum, melon, bemi seeds,	Chicken, sheep,
Kodei	125	6	rice, cassava, millet, beans, G/nut,	goat, cattle, pigs,
Kwanchi	110	5	sweet potato, cocoyam, vegetables,	duck, turkey
Ameche	80	4	cotton, onion, tomato, garden eggs,	
Total	420	20	banana, oranges, mangoes.	
<i>Zing L.G.A.</i>				
Yali	130	6	Maize, Sorghum, melon, rice,	Chicken, sheep,
Manzaran	125	6	cassava, millet, beans, G/nut, sweet	goat, cattle, pigs,
Yukwa	118	6	potato, vegetables, onion, tomato,	duck, turkey
Monkin	137	6	garden eggs, banana, oranges,	
Total	510	24	mangoes.	
<i>Yorro L.G.A.</i>				
Kassa	75	4	Maize, Sorghum, melon, rice,	Chicken, sheep,
Kokin	70	3	cassava, millet, beans, G/nut, sweet	goat, cattle, pigs,
Lavo	69	3	potato, vegetables, onion, tomato,	duck, turkey
Dinya	74	4	garden eggs, banana, oranges,	
Total	288	14	mangoes.	

- **Poverty and Coping Strategies:** In spite of the fact that in all the communities' bulk of the harvest was consumed, respondents particularly the very poor assented to the fact that there were times (lean or off-season) when they had had to forgo some meals compared to non-poor households. Additionally very poor and poor households tended to have difficulties in paying their children's school fees and health care fees. The number of withdrawn wards/children from school was rampant among the very poor compared to the non-poor.
- Additionally, table 8 shows the Local Government Areas covered in the study with selected villages and major crops grown. A quick look at the table reveals the predominance of the production of staples such as sorghum, rice, maize, melon, groundnuts and other common cereals and legumes.

CONCLUSION

Easy market access in the study area is found to be hamstrung by a number of household socioeconomic variables hence the poor status of farmers. Rural links with the outside world in terms of market participation is a function of the quantity and quantum of human capital, skill, physical infrastructure, basic services and utilities and the institutions and norms that influence socio economic interaction. However, the rural economy, as found out by this study, is not adequately endowed with these socio-economic and institutional variables (due to Govt. neglect and high incidence of poverty) to effectively participate in the market in order to generate income to combat poverty. From the study, household socioeconomic factors such as distance, cooperative membership, family size, output size (output commercialization ratio, that is,

Table 9: Output commercialization ratios by crop

S. No.	Crop	No. of respondents	Mean output commercialization ratio	Minimum	Maximum
1	Maize	6	0.92	0.83	1.00
2	Sorghum	4	0.98	0.61	0.95
3	Paddy rice	7	0.87	0.51	0.85
4	Millet	4	0.50	0.75	0.95
5	Yam	11	0.84	0.55	1.00
6	Cassava	12	0.77	0.41	0.99
7	S/potato	9	0.70	0.70	0.95
8	Beans	5	0.98	0.19	0.98
9	Unshelled G/nut	6	0.77	0.66	1.10
10	Cocoyam	2	0.78	0.80	1.00
11	Bambara nut	3	0.88	0.60	0.99
12	Yam/maize	13	0.87	0.18	0.98
13	G/nut/maize	8	0.72	0.75	0.95
14	Maize/beans	5	0.72	0.94	1.00
15	Yam/beans	9	0.99	0.00	0.99
16	Yam/sorghum/beans	6	0.82	0.52	0.85

Source: Field data 2008

Qty consumed/Qty sold) and education and institutional variables such as lack of supportive infrastructure and institutions have been found to be important variables affecting effective market participation while high transportation costs, poor infrastructure, high dependency ratio, age and decreased market participation were found to have positive correlation with poverty in the study area.

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