



Case Report

DETERMINANTS OF COMMERCIAL PRODUCTION OF WHEAT IN NIGERIA: A CASE STUDY OF BAKURA LOCAL GOVERNMENT AREA, ZAMFARA STATE

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ABSTRACT

In Nigeria, wheat is a crop of both household and industrial importance. However, despite its good climatic and edaphic conditions, Nigeria still relies on massive wheat importation. This study therefore examined the factors influencing commercial production of wheat in Bakura Local Government Area (a wheat zone) of Zamfara State, Nigeria. Primary data were obtained from 210 wheat farming households and analyzed with descriptive statistics, household commercialization index (HCI) and tobit regression. The results showed that the average HCI was 54.7%, implying that there is a gap of 45.3% for the farmers to attain full commercialization level. Farm size, fertilizer, credit, access to improved varieties, age of household head, using man-power as the only source of labour for cultivation and non-farm income were found to significantly influence household commercialization of wheat production. The major constraints faced by the household vis-a-vis wheat production were low output price, inadequate land, lack of production inputs, high cost of inputs, transportation problem, inadequate credit facilities and diseases/pests. This study therefore recommends provision of inputs and credit to farmers, encouraging the youth to actively participate in wheat farming, encouraging wheat farmers through price support programmes as well as expanding farmland put to wheat cultivation.

Key words: Wheat importation, Household commercialization index, Factors, Constraints

INTRODUCTION

Globally, wheat (*Triticum aestivum*) is an important industrial and food grain. It ranks second among the most important cereal crops in the world, after rice (1). It is the most important cereals traded on international markets (2). In Nigeria, wheat is consumed in one form or the other in virtually every home, restaurants and hotels throughout the country. Besides, the crop is the main raw material in the Nigeria flour mills. Its flour is used for making bread, confectionaries, biscuits and other snacks. The offal (residue) is used in the feed-mills in compounding livestock feeds (3). Nigeria is the most populous country in Africa. It constitutes about half of West Africa's population and has a population of about 178.5

million people (4). Agriculture is the mainstay of the country contributing about 42% of gross domestic product (GDP) (5), providing employment to about 70% of the labour force (IFAD, 2012), accounting for over 70% of the non-oil exports and perhaps most importantly, providing over 80% of the food needs of the country (3, 6). Nigeria has good ecological and edaphic conditions that can favour wheat production. Notwithstanding, achieving self-sufficiency in wheat production still remains a challenge. Since independence (1960), Nigeria has been depending on wheat importation to meet the domestic consumption. For instance, statistics show that from 1990 to 2013, the average production of wheat in Nigeria was about 81,904 metric tonnes while the average importation of wheat in the country was 2,193,566 metric tonnes within the same period (7).

In an attempt to make Nigeria self-sufficient in wheat production, several measures were put in place by the federal government of Nigeria.

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These measures include launching of several agricultural programmes and establishing several institutes aimed at stimulating interest in local production of wheat. Some of these were the National Cereal Research Institute (NCRI) in 1974, National Seed Service (NSS) in 1975, Operation Feed the Nation (OFN) in 1976, Basin Development Authority (RDBA), Agricultural Development Projects (ADP) (1975), National Grain Production Programmes (NGPP) and Accelerated Wheat Production Programme (AWPP), just to mention but a few. Also, the federal government of Nigeria, at different times, raised the tariff on wheat importation in order to protect local producers against massive imports of wheat. Despite the various interventions, however, there is still a wide gap between domestic demand and supply of wheat in the country. This is partly because wheat production in many parts of the country has remained at subsistence-oriented level despite its comparative advantage of producing in large quantity for commercialization.

Agricultural commercialization may be defined as the proportion of agricultural production that is marketed. It involves the deliberate action on the part of agricultural producer to use factors of production in a way that a greater part of the crops produced is for exchanged or sale (8, 9). Commercialization of agriculture also involves a transition from subsistence-oriented to increasingly market-oriented patterns of production and input use among farming households. The underlying premise is that markets allow households to increase their incomes by producing that which provide the highest returns to land and labour and then use the cash to buy household consumption items, rather than being constrained to produce all the various goods that the household needs to consume (10, 11, 12).

Formulating sound policies on bridging the gap between domestic demand and supply of wheat in Nigeria and making it self-reliant in wheat production requires a deep knowledge about the current commercialization level among wheat farmers and the factors responsible for these levels. This can also be achieved when the challenges confronting household commercialization of the crop are addressed. From the foregoing, this study examines the determinants of household commercialization of wheat production in Bakura Local Government Area of Zamfara State, which is a “wheat zone” in Nigeria. The specific objectives were to

- (i) describe the socio-economic characteristics of wheat farmers in the area;
- (ii) determine the household commercialization level of wheat production in the study area;
- (iii) identify factors affecting household commercialization of wheat production; and
- (iv) identify the constraints to wheat production in the study area.

METHODOLOGY

The study was conducted in Bakura Local Government Area (LGA) of Zamfara State, Nigeria. The choice of the LGA was premised on the fact that it is one of the leading wheat-producing areas (wheat zones) in the country.

The data for the study were mainly obtained from primary sources. The sampling frame was made up of the wheat farming households in the study area. A two-stage sampling technique was used for the study. The first stage involved a random selection of thirteen (13) farming communities from the LGA. Prior information from the LGA revealed that there were 454 wheat farming households across the selected communities. A significant proportion of the population was desired, so, a finite population correction factor was applied. Thus, the minimum sample size to be used was determined using the formula:

$$n = N * X / (X + N - 1) \dots\dots\dots(1)$$

where,

$$X = Z_{\alpha/2}^2 * p * (1-p) / MOE^2 \dots\dots\dots(2)$$

and $Z_{\alpha/2}$ is the critical value of the normal distribution at $\alpha/2$. A confidence level of 95% was used for the study, thus, α is 0.05 and the critical value is 1.96. MOE is the margin of error, p is the sample proportion, and N is the population size (13, 14). This gives a minimum sample size of 209 respondents. Thus, a minimum of 209 respondents were needed for the study.

The second stage was a random selection 210 wheat farming households across the communities using probability proportion to size technique (**Table 1**). The data for this study were collected with the aid of a well-structured questionnaire augmented with personal interview with the farming households.

The data were analysed with descriptive statistics, household commercialization index and tobit regression. Descriptive statistics such as measures of central tendency and percentages were used to examine the socio-economic characteristics of the farmers. It was also used to analyze the barriers to commercial production of wheat by the farmers.

Table 1. Sampling design for the study

Communities	No of wheat farming households	No of households selected	Percentage
Birintudu	207	96	45.7
Ware Dantse	11	5	2.4
Gidan Dikko	15	7	3.3
Maddaci	19	9	4.3
Maitako	37	17	8.1
Rini	22	10	4.8
Talaye	11	5	2.4
Tungar Fadama	28	13	6.2
Tungar Kalgo	13	6	2.9
Tungar Maiburtu	9	4	1.9
Yabawa	11	5	2.4
Yardala	50	23	11
Yarkofoji	22	10	4.8
Total	454	210	100.0

Source: Field Survey, 2015

Household commercialization index was used to determine the extent to which wheat production was market-oriented in the study

area. This was evaluated as the ratio of gross value of farm output to the value sold (9, 12, 15). The model is specified as

$$\text{Household commercialization index} = \frac{\text{Gross value of wheat sold}}{\text{Gross value of wheat produced}} \times 100\% \dots \dots \dots (3)$$

The value ranges from 0 to 100%. The closer the index is to 100 the higher the degree of commercialization. A value of zero is an indication that the farmer is operating under subsistence agriculture. The closer HCI is to 100 the higher the degree of commercialization (12, 15).

Factors influencing household commercialization of wheat production were ascertained with tobit regression model. The tobit regression is a statistical model used to describe the relationship between a non-negative dependent variable y_i and an independent variable (vector) x_i . This explained variable linearly depends on the explanatory variables via a parameter which determines the relationship between the independent variable and the latent variable. The model has a normally distributed error term to capture random influences on the relationship. The observable variable is defined to be equal to the latent variable whenever the latent variable is above zero and zero otherwise. The choice of the model was based on the fact that some of the results of household commercialization indices of the respondents were zeros; the model was censored at zero.

The implicit form of the Tobit regression is given by

$$y_i = \begin{cases} y_i^* = \beta x_i + \mu_i & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases} (4)$$

Where the explicit form of the model is as follows;

$$y_i^* = \beta X_1 + \beta X_2 + \beta X_3 + \beta X_4 + \beta X_5 + \beta X_6 + \beta X_7 + \beta X_8 + \beta X_9 + \beta X_{10} + \beta X_{11} + \beta X_{12} + \beta X_{13} + \beta X_{14} + U \dots (5)$$

Where, Y_i = Household commercialization index of *ith* household; X_1 =Sex of the household head (1 if male, 0 if otherwise); X_2 =Age of household head (Years); X_3 =Household size (Number of household members); X_4 =Educational attainment (Number of successful years spent in school); X_5 =Use of machinery for wheat production (rated as 1 if used, 0 if otherwise); X_6 =Fertilizer (kg); X_7 =Extension services (number of extension contact); X_8 =Access to credit (1 if yes, 0 if otherwise); X_9 =Farm size (hectares); X_{10} =Non-farm income (naira); X_{11} =Farming experience (years); X_{12} =Cooperative membership (1 for membership, 0 if otherwise); X_{13} =Pesticides (litres); β =Coefficient to be estimated; and U =Error term.

RESULTS AND DISCUSSION
SOCIO-ECONOMIC CHARACTERISTICS OF THE FARMING HOUSEHOLDS

Table 2 shows the socio-economic characteristics of the farming households. The

majority of the respondents were male. This indicates the dominance of the male among the farmers. About 70.5% of the respondents were within the age range of 30–50 years. Further analysis revealed that the mean age of the respondents was 42 years. This suggests that the farmers were still in their active age. It is noteworthy, however, that just 10.5% of the

respondents were not older than 30 years, which is the official age limit recognized by the National Youth Service Corps (NYSC) in Nigeria for an individual to be referred to as being a youth. This might be due to the high level of apathy exhibited by the youth to agriculture (16-20).

Table 2. Socio-economic characteristics of the respondents (N = 210)

Variables	Category	Frequency	Percentage
Gender	Male	205	97.6
	Female	5	2.4
Age(years)	≤ 30	22	10.5
	31 - 40	74	35.2
	41 – 50	52	24.8
	51 – 60	54	25.7
	> 60	8	3.8
Marital status	Married	196	87.4
	Single	4	7.9
	Divorced	3	1.4
	Widowed	7	3.3
Household size	≤ 5	12	5.7
	6 – 10	118	56.2
	11 – 15	75	35.7
	> 15	5	2.4
Educational level of household head	No formal education	145	69.1
	Primary education	39	18.6
	Secondary education	23	11.0
	Tertiary education	3	1.4
Primary occupation	Farming	180	85.8
	Non - formal	6	2.9
	Formal	24	11.4
Source of farmland	Inheritance	128	61.0
	Purchase	29	13.8
	Lease	38	18.1
	Government owned	4	1.9
	Communally owned	2	1.0
	Borrowing	9	4.3
Farm size (ha)	≤5.00	157	74.8
	5.01 – 10.0	39	18.6
	10.01 – 15.0	12	5.7
	>15.0	2	1.0
Farming experience (years)	5 – 10	147	70.0
	10 – 15	31	14.8
	15 – 20	16	7.6
	20 – 25	6	2.9
	>25	10	4.8
Farmers association	Yes	89	42.4
	No	121	57.6
Main source of inputs	Own farm	135	64.2
	Open market	42	20.0
	Government agencies	33	15.7
Access to extension	Yes	87	41.4
	No	123	58.6

Source: Field Survey, 2015

Most (87.4%) of the household heads were married. The household size of the respondents ranged from one to seventeen members. The

modal group was 6–10 persons, accounting for 56.2% of the respondents. Further analysis revealed that the mean household size of the respondents was eight persons. These results likely suggest that wheat farming was a means

of catering for the family in the study area. A large proportion (69.1%) of the farmers had no formal education. Only 11% had secondary education while just 1.4% had tertiary education. This scenario might result from the preference for white collar jobs by well-educated individuals, with negligence to agriculture, especially in developing countries like Nigeria (19, 20).

The main occupation of the respondents was farming and most of them obtained their farmland through inheritance and operate on an average of about 4.75 hectares. The mean farming experience of the respondents was about nine years, indicating that wheat production is an age-long venture in the study area. The majority of the respondents sourced

their farm inputs from own farm (previous harvest).

ANALYSIS OF LEVEL OF COMMERCIALIZATION OF WHEAT PRODUCTION BY THE FARMING HOUSEHOLDS

Table 3 shows the summary of the wheat produced, consumed or sold by a typical farming household in the study area. The mean quantity of wheat produced was 9.63 tonnes, out of which 4.36 tonnes was consumed and 5.27 tonnes was sold. It is noteworthy that one tonne of wheat was sold for ₦95,000 in the study area (1 US Dollar=₦315.25). Thus, the values of wheat produced, consumed and sold by the farmers were ₦914,850, ₦414,200 and ₦500,650 respectively (1 US Dollar=₦315.25).

Table 3. Breakdown of wheat produced, consumed and sold by the farming households

Variable	Mean quantity (MT)	Value (₦)
Quantity produced	3.93	931,410
Quantity consumed (as food, gifts, or stored)	1.78	421,860
Quantity sold	2.15	509,550

Note: 1 US Dollar = ₦315.25; **Source:** Field survey, 2015

Table 4 shows the distribution of the respondents according to their HCIs. The HCIs of the respondents ranged from 0–89.7%. Further analysis revealed that those whose HCIs were 0% were 6.2%, implying that such farmers produced for household consumption (as food, gifts or storage) only. The modal group were those whose HCIs indices were between 50–60%. The mean household commercialization index of the farmers was 54.7%. Analysis of the results also revealed that those whose commercialization indices fell below this average were 35.3% while 64.7% of the farmers had their

commercialization indices greater than or equal to this average. The mean household commercialization index (54.7%) obtained in the study area implies that the wheat farmers still have a gap of 45.3% (100–54.7)% to achieve full commercialization in wheat production. The implication of these results is that only almost half (45.3%) of the wheat produced by the farming households is used for household consumption while the remainder (54.7%) is being ‘competed for’ by other members of the public and wheat-based industries.

Table 4. Distribution of the respondents by household commercialization indices

Commercialization indices	No of respondents	Percentage	Minimum	Maximum	Mean
≤ 30.0	53	25.2	0.0	30.0	18.3
30.1 – 40.0	8	3.8	33.3	40.0	36.6
40.1 – 50.0	9	4.3	40.9	49.8	46.4
50.1 – 60.0	77	36.7	52.6	60.0	56.8
60.1 – 70.0	14	6.7	62.5	70.0	66.8
70.1 – 80.0	22	10.5	71.4	78.9	72.7
> 80.0	27	12.9	81.8	89.7	85.2
Sample	210	100	0.0	89.7	54.7

Source: Field survey, 2015

FACTORS INFLUENCING COMMERCIALIZATION OF WHEAT PRODUCTION IN THE STUDY AREA

Table 5 shows that result of the regression analysis on factors affecting household commercialization of wheat production in the

study area. The results of show the age of household head had a negative coefficient and were statistically significant (p<0.05). This implies that the older a household head is, the less the degree of producing wheat at commercial level and vice versa. This could

result from the fact that the more a farmer grows older, the less energetic or innovative he/she is likely to become. Other things being equal, young farmers usually have more physical strength to carry out agricultural production activities than their old counterparts (21-23). Similarly, the youth are more

innovative and can adopt relevant agricultural practices more easily than their older counterparts (12, 21). These could explain the negative relationship that existed between the age of the household heads and their commercialization level.

Table 5. Factors influencing commercialization of wheat production in the study area

Variables	Coefficient	Standard error	t value	p>[t]
Constant	56.64883**	27.81658	2.04	0.043
Sex	14.623	20.70011	0.71	0.481
Age of household head	-2.560821**	1.290677	-1.98	0.049
Household size	-0.0867267	0.352143	-0.25	0.806
Education attainment	0.0209929	0.0194571	1.08	0.282
Use of farm machinery	9.036827*	4.678939	1.93	0.055
Fertilizer	1.0536021**	0.4874104	2.16	0.032
Extension services	-1.578952	2.602031	-0.61	0.545
Access to credit	6.688109***	2.483297	2.69	0.008
Farm size	24.35255***	7.38726	3.30	0.001
Non-farm income	-0.0006034*	0.0003387	-1.78	0.076
Farming experience	-6.770214	4.297533	-1.58	0.117
Membership of farmers' association	3.594723	2.830318	1.27	0.206
Access to improved varieties	7.118932***	1.117372	6.37	0.000
Pesticides	4.391242	4.663003	0.94	0.347
LR chi 2(14) = 64.16				
McFadden's pseudo R ² = 0.3053				
Log likelihood = -877.92576				
Prob > chi2 = 0.0000				

Note:*** significant at 1% ** significant at 5% * significant at 10%; **Source:** Field survey, 2015

The use of machinery in wheat production was positively significant (p<0.10). This implies that farming households that used farm machinery had more wheat for the market than those who did not. This is logical, as the use of machinery has the tendency of improving agricultural productivity thereby increasing the amount of output meant for the market (24-26).

Farm size had a positive coefficient and was statistically significant (p<0.01). This is in line with *a priori* expectation. The implication is that the farmers who had more farmland under cultivation produced more wheat for the market. On the other hand, limited access to land could reduce farmer's ability to engage in commercial agricultural production.

The relationship between access to credit and household commercialization was positive and was also significant at 1%. This result indicates that the more the farmer acquires credit the more the production is oriented towards market. On the other hand, limited access to credit could reduce the ability of farmers to engage in market-oriented production. Also, the use of fertilizer had a positive (significant) influence (p<0.05) on household commercialization of wheat production in the study area. The implication of this that farmers who use more fertilizer produce more and had more wheat for sale than those who do not.

However, non-farm income had a negative but significant coefficient (p<0.1), implying that it has a negative effect on level of commercialization of wheat production by the farmers. One would expect that non-farm income would have a positive effect on household commercialization of the crop. However, this results suggests that households who earn more income from non-farm activities had lower HCIs than those who earned less income from non-farm activities. This may result from the fact that the former group of households could pay less attention to wheat production and this could result in less farm output. Thus, such farmers would have less output for the market, thus decreasing their commercialization level.

CONSTRAINTS TO COMMERCIAL PRODUCTION OF WHEAT BY THE RESPONDENTS

Table 6 is a multiple response table of the perceived barriers to commercial production of wheat by the respondents. The constraints encountered by the farmers in order of importance were: low output price, inadequate credit facilities, lack of production input, high cost of inputs, transportation problem, diseases and pests, and inadequate land.

Table 6. Barriers to commercialization of wheat production by the respondents

Constraints	*Frequency	Percentage	Rank
Transportation problem	114	54.3	5th
Low output price	185	88.1	1st
Inadequate credit facilities	156	74.3	2nd
Inadequate land	109	51.9	7th
Diseases/pests	110	52.4	6th
Lack of production input	142	67.6	3rd
High cost of inputs	127	60.5	4th

Note:* Multiple responses were allowed; **Source:** Field data 2015

CONCLUSION AND RECOMMENDATIONS

It can be inferred from this study that the current level of household commercialization of wheat production (54.7%) is relatively low. The gap of 45.3% obtained in the study suggests that almost half of the wheat produced by the households is used for household consumption, thus making less available to the public and industrial use. This could explain the reason for the current reliance on massive importation of wheat to meet the demand-supply gap in Nigeria. This study has further revealed that the factors that positively influence household commercialization of wheat production in the study area were farm size, fertilizer, use of farm machinery, access to credit and improved wheat varieties, while the age of household head and non-farm income negatively influenced it. The study also showed that the major constraints to market-oriented production of wheat in the country are low output price, inadequate credit facilities, lack of production inputs, high cost of inputs, transportation problem, diseases/pests and inadequate land.

Based on these findings, therefore, there is the need for concerted effort by the government, non-governmental organizations (NGOs), Ministry of Agriculture and other relevant agencies to encourage high production of wheat in the study area. Thus, relevant policies should be put in place. These should include encouraging young individuals to practice wheat production and making wheat-production a worthwhile venture for farmers. This may be achieved through provision of inputs such as improved wheat seeds, fertilizer, pesticides, farm machinery, and so on to farmers at no or subsidized rate. Also, banks and other financial institutions should provide the farmers with credit facilities. This should be done on the basis of little or no interest rate. This will enable the farming households to finance and/or expand their wheat farms. Moreover, measures that will solve transportation problems should be put in place. These should include construction and/or

rehabilitation of rural roads and provision of vehicles for transportation of farm produce to urban centres. This will make conveyance of wheat to urban centres where the farmers could have good prices for their output possible.

Considering the socio-economic characteristics of the households, there is the need to put measures that will improve the human resources in the region. Such measures should include overhauling the educational status of the wheat farming households in the study area. To this end, government and other development agencies should promote and improve literacy programme among the farming households. This will provide the farmers with the skills which are useful in terms of allocation of inputs and increasing their output. This will in turn have an indirect positive effect on their commercialization levels with time. In the same vein, extension activities should be overhauled in the region. This should be done by making sure that the wheat farming household have adequate access to extension services. This could be through employment of more extension workers and provision of enabling environment for them to discharge their duties effectively. In the same vein, extension service providers should train the farmers on sound techniques that will improve the commercialization level of the farmers. Putting all these measures in place will not only improve household commercialization level of wheat production in the country but also reduce the current overdependence of Nigeria on wheat importation.

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