Original Research Article

Analysis of the Factors Influencing Choice of Marketing Outlets by Ginger Producers in Kaduna State, Nigeria

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Abstract

The study analyzed the factors that influence the choice of marketing outlets by ginger farmers in Kaduna State, Nigeria. The population of the study was ginger producers in Kaduna State. Multi-stage and random sampling techniques were used to select 555 respondents out of which 369 made valid responses. Data were collected using a structured questionnaire and personal interviews, and analyzed using binomial logit regression model. The study found that the choice of marketing outlets by ginger producers in Kaduna State was influenced by experience, distance to market and output/yield of ginger. The study recommended that; (i) government should rehabilitate existing rural roads and construct new ones to improve access to market by ginger farmers; (ii) farmers should form co-operatives to enable them press for incentives and take advantage of economy of scale; and (iii) research institutions should be encouraged to make available high-yielding varieties of ginger seedlings.

Keywords: Ginger, marketing outlets, binomial logit regression, Kaduna State

Introduction

Ginger has high socio-economic value around the world (Makarau *et al.*, 2013a). It is an important cash crop in Nigeria due to its potential to attract foreign exchange earnings to the country. Locally, there is steady rise in demand for ginger due to its medicinal uses (Mefoh, 2006; Lawal, 2007; Yakubu, 2007; Egbuchua and Enujeke, 2013), the increasing health awareness among Nigerians, its uses for livestock feeds (Verma *et al.*, 2004) and its use as a spice (Asumugha *et al*., 2006; Jakes, 2007; Makarau *et al.*, 2013b). The largest consumers of ginger in Nigeria are Sokoto, Bornu, Kebbi, Kano and Zamfara States in Northern Nigeria. The Nigerian ginger is highly sought after all over the world for its high quality. Its price jn Njgeria ranks third highest in the world after Germany and the United Kingdom (Ewuziem *et al*., 2015).

Ginger (*Zingiber officinale roscoe*) is a slender herbaceous perennial rhizome which is usually grown as an annual crop. It is grown in commercial quantity in Nigeria mainly in Kaduna State (Nmadu and Marcus, 2012; Makarau *et al*., 2013a; Ayodele and Sambo, 2014). It is also grown in the Keffi and Akwanga LGAs of Nassarawa State (Dauda and Waziri, 2006) as well as Buruku LGA of Benue State. In the Southern parts of the country, ginger is found in small orchards in Oyo and Ogun States. Ginger grown in the south usually looks inferior to the bold and richly flavored ginger derivatives from the North (Meadows, 1988).

In Nigeria, ginger cultivation started in 1927 (Asumugha *et al*., 2006). Despite the high demand for Nigerian ginger, the crop is cultivated predominantly by smallholder farmers (Obinatu, 2003). These farmers are faced with limited marketing outlets for their produce. They therefore rely on traditional trading relationships which limit their access to marketing information. This creates inefficiencies and welfare losses (DFID, 2005). According to Barrett (2008), access to market has critical influence on the performance of smallholders. Improving access to market can lead to benefits of higher prices and lower input costs (IFAD, 2001) and therefore greatly enhance economic growth and increase rural incomes. This study examines the factors that influence the choice of marketing outlets by ginger producers in Kaduna State, Nigeria.

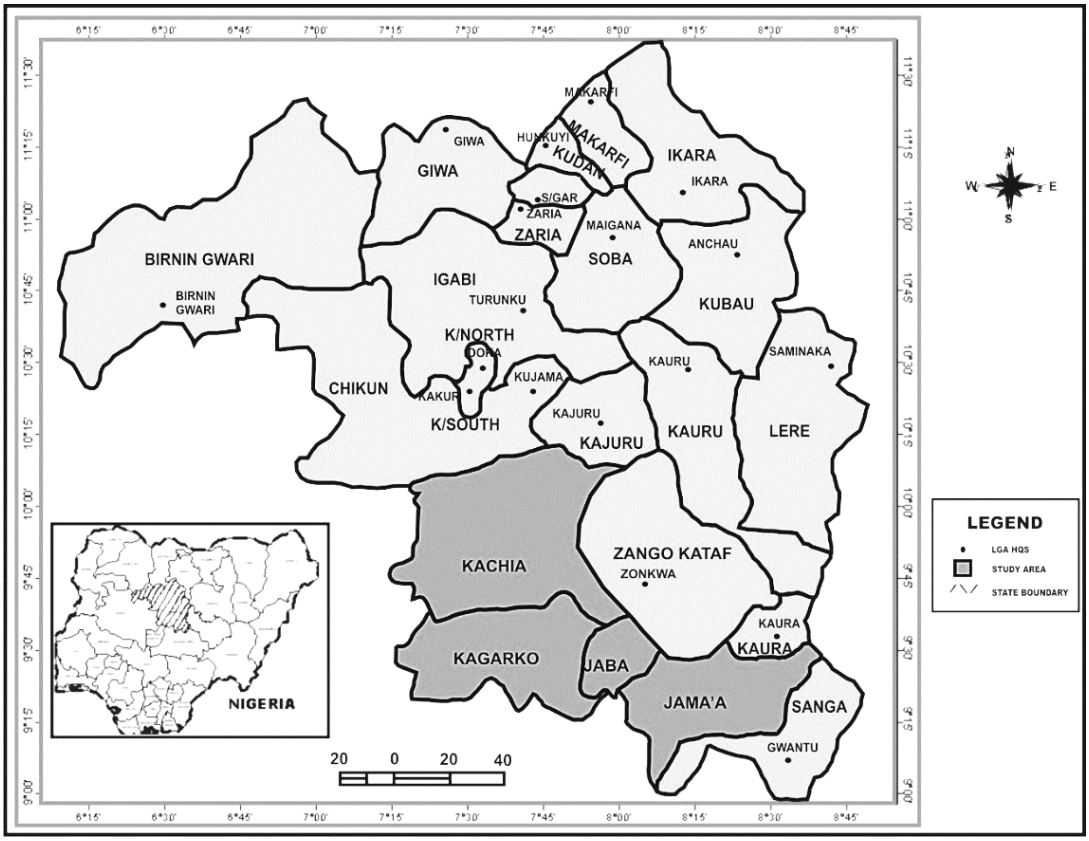
Methodology

Study Area

The study was carried out in Kaduna State, Nigeria. The State is made up of 23 Local Government Areas (LGAs). It is situated between Latitudes $9^0$2' N and $11^0$35' N, and Longitudes $7^0$15' E and $9^0$6' E (Kaduna State Statistical Year Book, 2001). The State has a total population of 26,086,217 million people (projected from NPC, 2006 to 2017). Ginger is cultivated in the Southern part of the State (Ayodele and Sambo, 2014) which also serves as the major source of ginger to other parts of the country (KADP, 2007). Ginger is the major cash crop with annual production of about 1,728.930 metric tons from Kachia, Jaba, Kagarko, Jema'a and Zangon Kataf LGAs of Kaduna State (Kaduna State Perspectives, 2009). Figure 1 is a map of Kaduna State showing the study area.

Population of the Study and Sample Determination

The population of this study comprised of ginger farmers in in Kaduna State. A multi-stage sampling procedure was adopted in selecting the respondents for this study. The first stage was the purposive selection of the Southern region of Kaduna State due to the concentration of ginger producing households in the region (KADP, 2007; Nmadu and Marcus, 2012: Makarau *et al*., 2013b: Folorunso and Adenuga, 2013). The second stage was the purposive selection of the four main LGAs namely; Kachia, Jaba, Kagarko, and Jema'a out of the twelve LGAs of the Southern region. This was based on ginger intensification (KADP, 2004: Kaduna State Ministry of Agriculture, 2007). The third stage was the random selection of 37 villages representing 10 % of



Source: Adapted from Bala (2016)

Figure 1: Map of Kaduna State showing the study area

the villages in each of the four LGAs. This was done in conjunction with the ginger unit of KADP. The fifth stage was the random selection of 15 respondents from the list of ginger-producing households in each of the 37 villages earlier selected. This was achieved with support from the village heads. The number of respondents selected for the study was 555. Table 1 shows the sampling schedule.

Table 1: Sampling Schedule

LGA	No. of Villages in LGA	No. of Villages Selected	No. of Respondents
Kachia	106	11	121
Jaba	61	7	77
Kagarko	64	7	77
Jema'a	120	12	132
Total	351	37	555

Source: Researcher's sample schedule, 2017

Data Collection and Analysis

The data collection instrument for this study was validated by content validity. That was done by passing the research instrument through appropriate scholars. Reliability of the data collection instrument was achieved by pilot testing and by Cronbach's alpha (α) analysis. Primary data were used for this study. The data were obtained with the aid of a structured questionnaire and personal interviews. Data were collected on socio-economic characteristics of respondents, distance to markets, yield/output and choice of marketing outlets. To ensure that respondents provided accurate information, every respondent was assured of his or her confidentiality, and the questionnaire did not require the names of respondents. Furthermore, realizing that smallholder farmers are unlikely to maintain formal records, questions were restricted to the period not exceeding the last farming season. In addition, copies of the questionnaire were administered in the local language of the respondents where necessary. Trained enumerators were used, in addition to the researcher, to administer the questionnaire to the respondents. Out of the 555 copies of questionnaire administered in the study, 440 were returned while 369 responses were clearly stated and correct and were thus used for data analysis. The data were analyzed using binomial logit regression technique.

Model Specification and Description of Variables

In order to determine the factors that influenced the choice of marketing outlet in the study area, a binary response model was specified and estimated by binomial logit regression technique. The binomial logit specification is designed to analyze qualitative data involving a choice between two alternatives (Ogwumike and Akinnibosun, 2013) which in this case were farm gate and market. The logit model was chosen because it has the advantage of simplicity and ease of interpretation over the probit model (Patnaik and Sharma, 2013). Secondly, it was chosen over the least square model because, the response was a choice between market and farm gate and therefore, a binomial process taking the values of 1 for market and 0 for farm gate (non-market) while the Ordinary Least Squares (OLS) assumes a continuous dependent variable and imposes constant parameters over the entire distribution. The OLS also assumes that the producers selling their ginger produce in the market are not fundamentally different from those who do not (ie sell at farm gate). This assumption may not be plausible. The logit method gives parameter estimates that are asymptotically efficient, and consistent (Ogwumike and Akinnibosun, 2013) and is known to produce statistically sound results. The probability of the choice of market is specified as the value of the cumulative distribution function of Z which is specified as a function of the explanatory variables. The equation is of the form:

$$\text{Prob (Market =1)} = F(Z) = ez/(1 + ez) \quad = F(\beta_0 + \beta_1 X_1) \qquad (1)$$

Where:

F (Z) = ez/(1 + ez) is the cumulative logistic distribution, representing the probability of the choice of market among alternatives in the study area.

Z is the market line;

β is the vector of parameters, and

X is the vector of explanatory variables viz; distance to market, size of yield/output, experience, education, age, and gender.

Prob (farm gate = 0) = 1- F (Z) = ez/(1 + e-z) (2)

Therefore, equations 1 and 2 can be written as follows:

$$\frac{F(Z)}{(1-F(Z))} = \frac{(1+ezi)}{(1+e-zi)} \quad (3)$$

Equation 3 is the ratio of the probability that a household will sell ginger in the market to the probability that the household will not (ie. choose to sell at the farm gate). The natural log of equation 3 results in the following equation:

$$Li = Ln\left(\frac{F(Z)}{(1-(F))}\right) = Z_i = \left(0 + (1\ x\ 1 \ldots\ldots k\ x\ k)\right) \quad (4)$$

Equation 4 was used for the estimation of the logit model in this study. Therefore, the model of determinants of factors influencing the choice of marketing outlets in the study area was based on the following empirical logit specification:

$$Li = Ln\left(\frac{(F(Z))}{(1-F(Z))}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \ldots e_i \quad (5)$$

Where

Li is the logit (i.e, natural logarithm of the odd ratio),

F(Z) = 1 for market and 1- F(Z) = 0 for farm gate (ie non-market) as the dependent variable (choice status of household).

(F(Z)/(1- F(Z))) = the odds ratio in favour of the probability of either market or farm gate.

X_1---Xn = independent variables

X_1 =Experience in ginger marketing (years);

X_2 = Educational attainment (years of formal education);

X_3 = Distance to market (Km);

X_4 = Age (years);

X_5 = Output (Kg);

X_6 = Sex (male = 0, female = 1);

β_o = a constant term;

e = error term

The a *priori* expectation is that $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6 > 0$.

The marginal effects of X_i (independent variables) on the dependent variable depends on the values of X_i. This is so because the logit model is not linear (Greene, 1993). Thus, as opposed to the linear regression case, it is not possible to interpret the estimated parameters as the effect of the independent variables upon the choice of marketing outlet in the study area. Therefore, the analysis was based on the marginal effect of each variable on the probability of the effect. This is because logit coefficients do not represent the standard marginal effects represented by linear regression coefficients. However, the marginal effects combine the predicted probability of participation with the estimated logit coefficients.

The marginal effect is derived by taking the partial derivative of equation (2) with respect to an independent variable as follows:

$$\frac{\partial F(Z)}{\partial x_i} = \frac{(ie^{-z})}{[1+ e^{-z}]^2} \quad (6)$$

Where,

$$z = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \ldots + \beta_k x_k \quad (7)$$

β_i is a vector of parameters that associate with the explanatory variable X_i.

The parameters of the logit model were then estimated using the maximum likelihood estimation method. The assumption was that the response variable had a sample of N observations, which were independent.

Results and Discussion

Factors Influencing the Choice of Marketing Outlet by Ginger Producers

A binomial logistic regression analysis was used to determine the factors influencing the choice of marketing outlets by ginger producers. The logit specification was designed to analyze data reflecting a choice between two marketing outlet alternatives namely; farm gate and the market. The results are presented in Table 2. From the results, the Chi Square of 457.413, $p< 0.001$ with df = 6 indicates that the test of the full model against the constant-only model was statistically significant. This means that the predictor variables namely, experience, education, distance to market, age, output, and sex, reliably distinguished between the choice of marketing outlet (farm gate or the market) and created essentially a different model. The Nagelkerke's R^2 of 0.960 indicated a strong relationship of 96.0% between prediction and the choice of marketing outlet. The prediction success overall was 97.5% (98.4% for farm gate and 96.6% for market). The Wald criterion demonstrated that experience (X_1), distance to the

Table 2: Marginal effects from binomial logit regression on the choice of marketing outlets by ginger farmers in Kaduna State

Variables	Coefficients (β)	Wald	p-values	Exp(β)
Constant	-17.643	8.621	0.001	0.000
Experience	-3.603	4.288	0.032	0.840***
Education	0.962	3.613	0.202	1.021
Distance to market	9.553	0.830	0.002	4.681***
Age	-0.792	1.908	0.621	0.890
Output	-4.399	7.325	0.011	0.667***
Sex	0.472	0.682	0.124	1.063
Nagelkerke R^2	0.960			
Cox & Snell R^2	0.711			
Chi Square	457.413***			

Source: Field survey data, 2017
Note: p< 0.001; df = 6; Prediction = 97.5% (Farm gate = 98.4 %; Market = 96.6 %)
***, * implies statistically significant at the 1 % and 10 % level

market (X_3) and output (X_5) made significant contributions to the prediction (for X_1, p = .032; for X_3, p = .002; for X_5, p = 0.011). This is in agreement with Emana *et al*. (2015) and Zuniga-Arias and Ruben (2007) who opined that experience, distance to market and output among others where significant factors influencing farmers' choice of marketing outlet. The Exp(β) values indicated that; when the experience of a ginger producer increased by one year, the odds ratio was 0.84 times lower. Therefore, the ginger producer was 0.84 times more likely to sell his produce at the market. This is so because the producer gains more understanding of the market and therefore becomes more willing to take the risk of transporting his/her produce to the market. This is in consonance with the finding of Tarekegn *et al*. (2017) and Emana *et al*. (2015). According to Montshwe (2006), farm produce is sold at higher prices in the markets than is obtainable at the farm gate. When the distance to market for a ginger producer is raised by one kilometer, the odds ratio was 4.681 times as large. This implies that, the ginger producer is 4.681 times more likely to sell his ginger produce at the farm gate. This is so because of poor rural roads which make transportation of farm produce difficult and expensive. This is in agreement with Tarekegn *et al*. (2017), Emana *et al*. (2015) and Zuniga-Arias and Ruben (2007). Furthermore, when the yield/output of a ginger producer is raised by one kilogram, the odds ratio is 0.667 times lower. Therefore, the ginger producer is 0.667 times more likely to sell his ginger produce at the market. This is because, the larger the quantity of produce, the higher the capacity of the farmer to take advantage of the economy of scale by

negotiating lower fares and higher prices. This is in consonance with the findings of Sigei *et al*. (2015) and Chalwe (2011).

Conclusion and Recommendations

The study concludes that the choice of marketing outlets by ginger producers in Kaduna State was influenced by experience, distance to market and output/yield of ginger. The study therefore recommends that; (i) government should rehabilitate existing rural roads and construct new ones to improve access to market by ginger farmers; (ii) farmers should form co-operatives to enable them press for incentives and take advantage of economy of scale; and (iii) research institutions should be encouraged to make available high-yielding varieties of ginger seedlings.

References

Asumugha, G.N., Anyaegbunam, H.N., Ezulike, T.O. and Nwosu, K.I. (2006). Guide to Ginger Production and Marketing in Nigeria: Extension Guide No. 7. National Root Crop Research Institute (NRCRI), Umudike. Pp 16

Ayodele, T.J. and Sambo, B.E. (2014). Ginger (*Zingiber officinale* Roscoe) Production Efficiency and Constraints among Small Scale Farmers in Southern Kaduna, Nigeria. *Journal of Agricultural Science* 6(8): 141-148.

Bala, F.K. (2016). Analysis of Women Ginger Production as a means for Achieving Farm Household Food Security in Kaduna State, Nigeria. Unpublished M.Sc. Thesis, Ahmadu Bello University, Zaria.

Barrett, C.B. (2008). Smallholder Market Participation: Concepts and Evidence from Eastern and Southern Africa. *Food Policy* 33(4): 299-317

Chalwe, S. (2011). *Factors Influencing Bean Producers' Choice of Marketing Channels in Zambia*. M.Sc. thesis presented to the School of Graduate Studies of the University of Zambia, Lusaka, Zambia.

Dauda, G.K. and Waziri, M.S. (2006). Processing Ginger into Drinks and Spices. *Gidan Waya Journal of Vocational and Technical Educators* 1(6): 211-219

Department for International Development (DFID). (2005). Making Systems Work Better for the Poor. Paper presented at ADB-DFID "learning event" ADB Headquarters. Manilla, Filipinas, February, 2005.

Egbuchua, C.N. and Enujeke, E.C. (2013). Growth and Yield Responses of Ginger (Zingiber officinale) to Three Sources of Organic Manures in a Typical Rainforest Zone, Nigeria. *Journal of Horticulture and Forestry*, 5(7): 109-144.

Emana, B., Ketema, M., Mutimba, J.K. and Yousuf, J. (2015). Factors Affecting Market Outlet Choice of Potato Producers in Eastern Hararghe Zone, Ethiopia. *Journal of Economics and Sustainable Development*. 6(15): 159-172.

Ewuziem, J.E., Onyenobi, V.O., Ironkwe, A.G. and Tokula, M.H. (2015). Nigeria in World Ginger Trade: An Analysis of Performance from 2008 – 2012. *Journal of Agriculture and Food Sciences* 13(2) pp 26-42.

Folorunso, S.T. and Adenuga, K.M. (2013). An Analysis of Technical Efficiency of Ginger Crop Production in Jaba Local Government Area, Kaduna State, Nigeria. Advances in applied Science Research, 4(5): 85-90.

International Fund for Agricultural Development (IFAD) (2001). *The Challenge of Ending Rural Poverty: Rural Poverty Report*. Oxford University Press, Oxford. 12pp.

Jakes, S. (2007). Beverage of Champions. *Journal of Food Chemistry* 101(1): 148-153.

Kaduna State Agricultural Development Project (KADP) (1987). An Exploratory Survey of the farming Systems of Southern Kaduna State. Kaduna State Agricultural Programme, Institute of Agricultural Research, Ahmadu Bello University, Zaria, Nigeria.

Kaduna State Agricultural Development Project (KADP), (2004). *Annual Report*. Kaduna. Pp 90.

Kaduna State Ministry of Agriculture (2007). *A Survey Report on Ginger Production*. Kaduna. Kaduna State Agricultural Development Project. Pp 10.

Kaduna State in Perspective (2009). *Estimated Annual Crop Production in Kaduna State*. Updated: Kaduna. Haro Print Nig. Ltd. Pp 92.

Kaduna State Statistical Year Book (2001). Research Department, Ministry of Economic Planning, Kaduna. Pp 129.

Lawal, A.M. (2007). Marketing Outlets and Strategies for Marketing the Nigerian Ginger: Proceeding of the National Workshop on Ginger Promotion, Processing, Utilization and Marketing in Nigeria.Held on 12th – 17th November at KADP Skill Development Center, Kafanchan, Kaduna State. Pp 11-15.

Makarau, S.B., Damina, A., Daneji, M.I. and Garba, O. (2013a). Social-Economic Factor Influencing the Adoption of Ginger (Zingiber officinale) Farming Technologies in Samaru Zone of the Kaduna State Agicultural Development Project (KADP). *International Journal of Humanities and Social Science Invention* 2(7): 39-44.

Makarau, B.S., Rabiu, M.S., Mohammed, I.D., Anna, O.G., Yakubu, D. and Gadzama, I.U. (2013b). Effect of socio-economic factors on the adoption of ginger (*Zingiber officinale*) production technologies in Southern Kaduna State, Nigeria. *World Journal of Agricultural Sciences* 1 (6): 203-208.

Meadows, A.B. (1988). *Ginger Processing for Food and other Industry*. Federal Industrial Research Organization [FIRO], Oshodi, Lagos, Nigeria.

Mefoh, N.C. (2006). Modern Methods of Ginger Production and Processing for Local Industries and Exports: A Paper Presented at a 3-days National Workshop on Massive Cassava and Ginger Production and Processing for Local Industries and Exports. Pp 1-4

Montshwe, B.D. (2006). *Factors Affecting Participation in Mainstream Cattle Markets by Small-Scale Cattle Farmers in South Africa*. Unpublished MSc. Thesis, University of Free State, Bloemfontein.

National Population Commission (NPC), (2007). The 2006 Population Census Official Gazette (extraordinary). Volume 94, Number 24, May 15, Lagos. 778pp.

Nmadu, J.N. and Marcus, P.L. (2012). Efficiency of ginger production in selected Local Government Areas of Kaduna State, Nigeria. *International Journal of Food and Agricultural Economics* 1(2): 39-52

Obinatu, N. I. D. (2003). The Marketing of Ginger in Kaduna State, Nigeria. University of Nigeria, Nsukka. Unpublished M.Sc Thesis.

Ogwumike, F.O. and Akinnibosun, M.K. (2013). Determinants of poverty among farming households in Nigeria. *Mediterranean Journal of Social Sciences* 4(2): 365-373

Patnaik, D. and Sharma, N.S. (2013). Selection Problems for Application of Probit, Tobit, Logit and Maximum Likelihood estimation: A Methodological Issue. *International Journal of Computational Engineering Research* 3(7): 13-29

Sigei, K.G., Bett, K.H., Kiprop, K.J. and Odipo, O.T. (2015). Factors Influencing the Choice of Marketing Outlets among Small-Scale Pineapple Farmers in Kericho County, Kenya. *International Journal of Regional Development* 2(2):1-11

Tarekegn, K., Haji, J. and Tegegne, B. (2017). Determinants of honey producer market outlet choice in Chena District, Southern Ethiopia: A multivariate probit regression analysis. *Agriculture and Food Economics* 5(20): 1-14

Verma, S.K., Sighn, O., Jain, M. and Borchia, P. (2004). Protective effect of ginger (*Zingiber officinale Rose*). *Journal of Experimental Biology* 4: 736-738.

Yakubu, Y. (2007). Briefs on Ginger Processing: Proceeding of the National Workshop on Ginger Promotion, Processing, Utilization and Marketing in Nigeria Held on 12th – 17th November at KADP Skill Development Center, Kafanchan, Kaduna State. Pp 30-32

Zuniga-Arias, G., and Ruben, R. (2007). Determinants of market outlet choice for mango producers in Costa Rica. In R.M. Van Boekel, A. Van Tilburg & J. Trienekens (Eds.), *Tropical Food Chains: Governance Regimes for Quality Management* (pp. 49-67). Wageningen Academic Publishers.