Socioeconomic Analysis of Ginger Value Chain in Kaduna State, Nigeria

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Abstract

Nigeria ranks first with 56.23% of total world ginger cultivation area. However, the nation's contribution to world ginger trade is low. The study analyzed the socioeconomic characteristics of key actors in the ginger value chain in Kaduna State, Nigeria. The study covered four Local Government Areas in Southern Kaduna State namely: Kachia, Jaba, Kagarko and Jema'a. Data were obtained with the aid of structured questionnaire and personal interviews. Multi-stage sampling procedure was used to select 555 respondents out of which 369 responses were analyzed. The data collection instrument was validated by content validity while reliability was achieved by pilot testing and by Cronbach's alpha (α) analysis. Descriptive statistics and OLS multiple regression analysis were used for data analysis. The study found that majority of the actors in the ginger value chain have attained some level of education. The mean household size across key actors in the value chain was 7. The actors in the value chain were male dominated. Majority of the producers were experienced, small-scale farmers with very poor access to extension education and do not membership of any marketing association. The socioeconomic determinants of profit were; experience, education, age, sales income and extension contact for producers; and experience, education, age and sales income for assemblers, wholesalers and retailers. Furthermore, the socioeconomic characteristics of the ginger value chain actors have significant influence on the profitability of ginger enterprises in the study area. The study recommends that government should assist in group formation, strengthening and linkage to finance, employ more extension agents and develop policy to address barriers to women participation and equal benefit in ginger production and marketing.

1. Introduction

Agriculture provides livelihood for majority (90%) of the rural household population in Nigeria [1]. It also contributed immensely to the country's GDP prior to the discovery of oil. Most farmers in the country are small holders who lack the capacity to access adequate market information [2] or perform efficiently [3]. With the current situation in the oil industry, agriculture holds the key to Nigeria's revival from recession. Social analysis is valuable to policy makers for designing and implementing pro-poor interventions in agriculture and rural development [4]. It is instrumental to the selection of appropriate target for intervention and safeguards the interests of weaker populations in the community.

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The Nigerian ginger produce is highly sought after above those of many countries due to its quality [5]. There is a high potential for foreign exchange earnings for the country if the opportunity is adequately harnessed. Besides, ginger production has the potential to reduce spice importation into the country. This is because, there is steady rise in local demand following its use as spice and for medicinal needs. However, ginger production has been declining [6] due to inefficiency [7]. An empirical evaluation of the socioeconomic characteristics of the actors in the value chain will provide useful guidance for inclusive intervention in the ginger value chain to enhance performance. This study was therefore a socioeconomic analysis of the ginger value chain in Kaduna State, Nigeria. The specific objectives were to (i) describe the socioeconomic characteristics of the actors in the value chain; and (ii) identify the socioeconomic determinants of profit among actors in the value chain.

2. Methodology

2.1. Study AREA

The study was carried out in Kaduna State, Nigeria. The State is situated between Latitudes 9°2' N, 11°35' N and Longitudes 7°15' E, 9°6' E [8]. The population of the State is 26,086,217 million people (projected from [9] to 2017). Ginger cultivation is dominated by the Southern Kaduna farmers.

Kaduna State has a cultivable land area of 4.5 million hectares, most of which is in the Guinea Savannah and enjoys mean annual rainfall of about 1525 mm. Other crops grown in the State include; guinea corn, millet, maize, soybean, acha, cocoyam, rice, groundnut, sorghum, beans, cassava, potatoes, beniseed and sugarcane [10]. The major cash crop is ginger with annual production of about 1,728.930 metric tons from Kachia, Jaba, Kagarko, Jema'a and Zangon Kataf LGAs of Kaduna State [11]. The map Kaduna State showing the study area is shown in Figure 1.
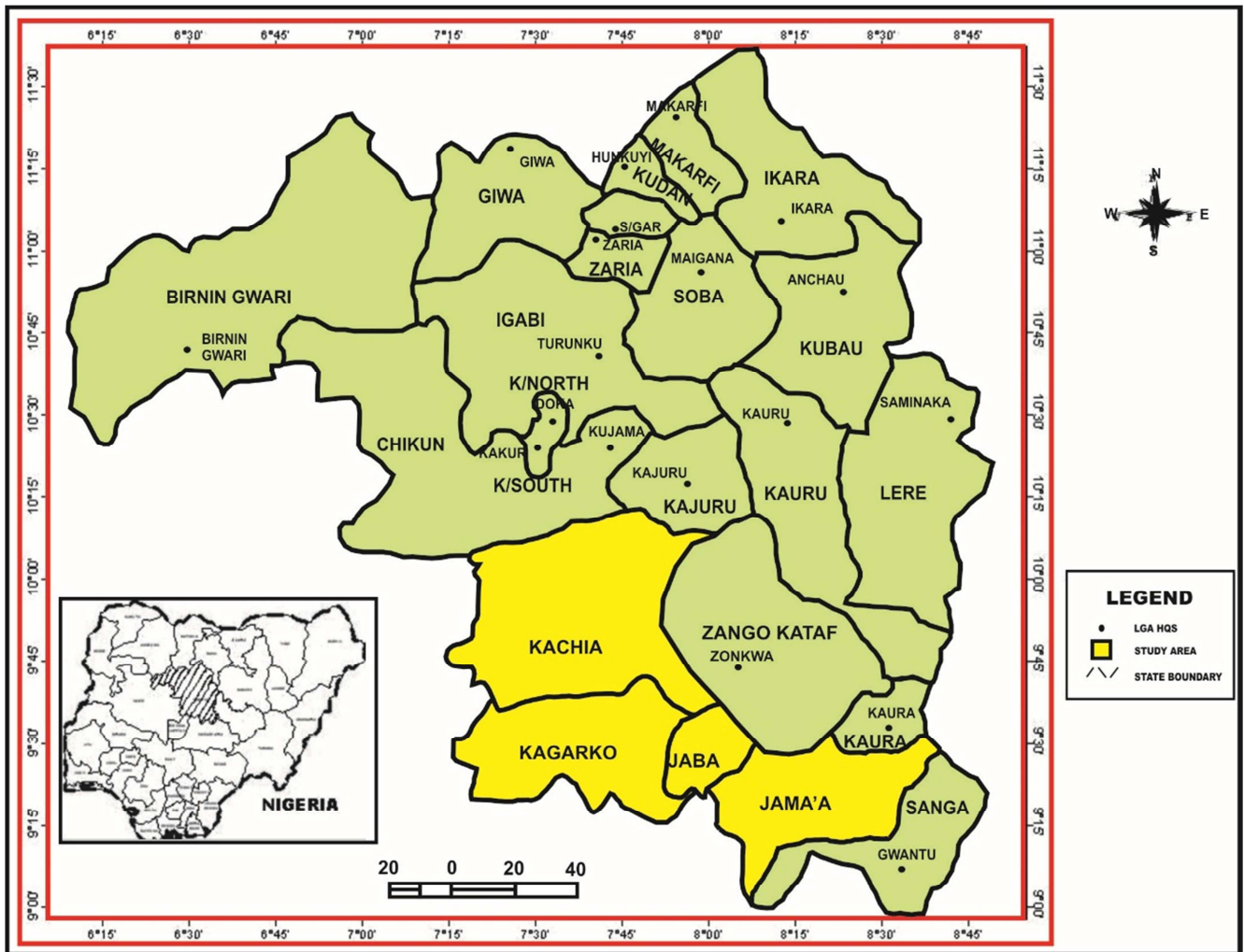

Figure 1. Map of Kaduna State showing the study area.

Source: Adapted from [12]

2.2. Population of the Study

The population of this study is comprised of ginger producing households in Kaduna State. Ginger is mainly produced in the Southern part of the State comprising of twelve LGAs out of which four LGAs are the main ginger producers. The four LGAs namely: Kachia, Jabba, Kagarko, and Jama'a were selected for the study.

2.3. Sampling Technique and Sample Size

A multi-stage sampling procedure was used to select the respondents for the study. The first stage was the purposive selection of the Southern region of Kaduna State due to the concentration of ginger producing households [10, 13, 14]. The second stage was the purposive selection of the four main LGAs (Kachia, Jaba, Kagarko, and Jema'a) out of the twelve LGAs of Southern region of Kaduna State. This was based on ginger intensification [15-16]. The third stage was the random selection of 37 villages representing 10% of the villages in each of the four LGAs. This was done in conjunction with the KADP ginger office. The fourth 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. The sampling schedule is shown in Table 1.

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 sampling schedule, 2017

2.4. Data Collection

Primary data were used for this study. The data were obtained with the aid of structured questionnaire and personal interviews. Data were collected on some demographic and socioeconomic characteristics of respondents. To ensure that respondents provided accurate information, every respondent was assured of their 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, questionnaire was 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 used for data analysis.

2.5. Validity and Reliability of the Research Instrument

The data collection instrument for this study was validated by content validity. That is by passing the research instrument through appropriate scholars. The scholars thoroughly examined the instrument to determine its relevancy and adequacy to the objectives of the study and gave their critical observations. The observations were harmonized, and necessary corrections were affected on the instrument before the field survey was carried out. Reliability of the data collection instrument was achieved by pilot testing and by Cronbach's alpha (α) analysis.

2.6. Data Analysis

The objectives were achieved by descriptive analysis and OLS multiple regression analysis. Hypothesis was tested using the F –statistic from OLS multiple regression analysis. The null hypothesis states that "the socio-economic characteristics of the ginger value chain actors have no significant influence on the profitability of ginger marketers"; Ho: X = 0, and the explanatory variables have no effect ie H_0: $b_1 = b_2 = …. = b_n = 0$ (where b has values between 0 and 1). The alternative hypothesis was that "the socioeconomic characteristics of the ginger value chain actors have significant influence on the profitability of ginger marketers". The null hypothesis is rejected when the calculated test statistic (F-calculated) is greater than the tabulated (F- tabulated) at one, five or ten percent levels.

2.7. Model Specification and Description of Variables

i) Multiple regression model for testing of the hypothesis

The following model was used to test the hypothesis which states that "the socio-economic characteristics of the ginger value chain actors have no significant influence on the profitability of ginger enterprises". The F-statistic from the OLS multiple regression analysis was used to test the hypothesis. The following implicit model was used:

$$P = f (X_1, X_2, X_3, X_4, X_5, X_6, e) \qquad (1)$$

Where,

P = Profit = Gross Margin (GM) – Total Fixed Cost (TFC)

GM = Gross Margin (Naira/ hectare)

TFC = Total Fixed Cost (Naira/ hectare)

X_1 = experience in ginger marketing (years);

X_2 = educational attainment (years of formal education)

X_3 = household size (number of persons)

X_4 = age (years)

X_5 = sales income (Naira)

X_6 = sex (male =0, female =1)

e = Stochastic error term

Four functional forms of the model were tried, and the double log form was selected for the analysis based on the conventional econometric, economic and statistical criteria namely: number of significant variables, the F – ratio, the sign, the Coefficient of multiple Determination (R^2) and the adjusted R^2. The explicit forms of the four functional forms fitted are specified as follows:

Linear function:

$$P = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e \qquad (2)$$

Semi –log function:

$$P = b_0 + b_1logX_1 + b_2logX_2 + b_3logX_3 + b_4logX_4 + b_5logX_5 + b_6logX_6 + e \qquad (3)$$

Exponential:

$$LogP = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e \qquad (4)$$

Double log function:

$$LogP = b_0 + b_1logX_1 + b_2logX_2 + b_3logX_3 + b_4logX_4 + b_5logX_5 + b_6logX_6 + e \qquad (5)$$

3. Results and Discussion

3.1. Socioeconomic Characteristics of the Actors in the Ginger Value Chain

The study examined some of the socioeconomic characteristics of the producers, assemblers, wholesalers and retailers in the ginger value chain. They include educational level, years of experience, household size, age, sex, farm size, extension education and sales income and use of improved varieties.

3.2. Socioeconomic Characteristics of Ginger Producers

The distribution of ginger producers by socioeconomic characteristics is shown in Table A1. The results of the analysis show that majority (90%) of the producers have attained various levels of formal education. This implies that most producers are well placed to source and embrace innovations in ginger production. Education is imperative for adequate understanding and application of agricultural information. It enhances the ability to manage an enterprise and contributes to its overall success and efficiency [17]. This finding agrees with Nmadu et al., Ezra et al., Akpokoje et al. and Umeh et al. who opined that most farmers have attended some formal education and can therefore read and write [13, 18−20].

The distribution of ginger producers by years of experience shows that majority (62%) had over 20 years of experience in ginger production. The mean number of years of experience was 27 years. Experience plays a very important role in the success of any enterprise especially in decision making and forecasting. This result disagrees with the findings of Umeh et al. who reported that majority of farmers have 0 – 15 years of experience [20].

On the distribution of ginger producers by household size, majority (51%) of the producers had household size of 6 - 10. The mean household size distribution of producers was 7. Most ginger farmers depended on family members for farm labour. This is because the farmers were mostly small-scale farmers who lacked the capacity to undertake land development and mechanization of production. The finding agrees with Nmadu et al. and Abah et al. [13, 21].

The distribution of ginger producers by age in the study area shows that about 47% of the ginger producers were 40 years or less. The mean age of the ginger producers in the study area was 41 years. This implies that the respondents were in their mid-ages and strong enough to face the rigorous farm work in ginger production. This result is in consonance with earlier studies by Nmadu et al., Ezra et al., Umeh et al. and Shabu et al. [13, 18, 20, 22].

The distribution of respondents by sex shows that majority (78%) of the ginger producers in the study area were males while 22% were females. This means that there were more male ginger producers in the study area than females. This is

because ginger is a cash crop and favours traditional tendencies for men to seek cash crops than women. In addition, women participate more in crops that can add directly to the food needs of the household. According to FAO, 80% of food crops are produced by women [23]. Furthermore, agricultural labour is mostly provided by women [24] even in men owned farms. However, activities, access to resources and opportunities are often subjected to gender consideration in favour of men. Diksha opined that targeting mainly men for introduction of new crops, improved varieties, training and extension services were responsible for female under representation in cash crop production [25]. This result is in consonance with earlier studies by Nmadu et al., Ezra et al. and Umeh et al. [13, 18, 20].

The analysis of the distribution of ginger producers by farm size shows that 48% of the ginger producers had between 0.1 – 1.9 hectares of farm land. This is less than the mean farm size of 2.4 hectares in the study area. Furthermore, majority (93%) of ginger producers in the study area had farm size of less than 5 hectares of land area indicating that the ginger producers were predominantly small-scale farmers. According to Ojuekaiye, farmers who have farm size of 0.1 hectares – 5.9 hectares are classified as small-scale farmers [26]. This implies that the respondents were small scale farmers and therefore could not achieve economies of large scale. Ginger production is an expensive enterprise.

The distribution of ginger producers by access to extension education shows that majority (85%) of the ginger producers did not have access to extension education in the study area. This indicates that the ginger producers operated based on information passed to them by family members. There were very few extension agents charged with the responsibility of educating farmers on innovations, good agronomic practices (GAP) and farm management practices in the study area. According to the officer in charge of ginger at the KADP, extension services were being provided at a ratio of one extension agent to four thousand farmers due to lack of extension personnel. This is a very low extension agent to farmer ratio. The recommended ratio is one extension agent to eight hundred farmers. This low extension agent to farmer ratio implies that information on farm management and ginger innovations were not being adequately accessed by ginger producers in the study area. Agricultural extension services are a pro-poor public investment with highly beneficial implications for poverty reduction and food security among rural populations. According to Dercon et al., one extension visit reduced poverty by 9.8% and raised consumption level by 7.1% in Ethiopia [27]. Furthermore, Nkonya et al. found that poverty, child stunting and underweight among children below 5 years were reduced by

increasing extension visits in Uganda [28]. This finding therefore points to a negative implication for output in ginger production.

The distribution of producers by sales income shows that 32% earned 3.4 million naira or less. The result indicates that ginger farming has the potential to yield high income under appropriate agronomic practices. Earlier result in this study showed that 32% of producers also had less than 1.0 hectares of farm size. This means that the capital available to these producers is small and cannot be used to carryout high cost investments like land development.

The distribution of producers by use of improved varieties shows that none of the respondents used improved varieties. This is because the seedlings used are either reserved from their harvest or sourced from fellow farmers. This has negative implication for productivity and explains why Nigeria failed to make the highest ginger producing country despite having the largest land area under ginger cultivation in the world. The essence of improved variety is to improve productivity, resistance to pest and disease, nutrition content and adaptability to local environment [29].

On the distribution by membership of unions or market associations, majority of respondents (85%) were not members of any union or market association. This means that they could not take advantage of group influence to press for opportunities, incentives or better prices for their produce. Group effect attracts more market power to small-scale producers and improve their access to marketing information and other opportunities.

3.3. Socioeconomic Characteristics of Ginger Assemblers

The socio-economic characteristics of ginger assemblers in the study area are shown in Table A2. The results of the analysis show that majority (90%) of the assemblers have attained various levels of formal education. Education is very vital in understanding and application of agricultural marketing information. It enhances the ability to manage an enterprise and contributes to its overall success and efficiency [17]. This finding agrees with Obinatu who found that most ginger marketers have attained some level of formal education [30].

The distribution of ginger assemblers by years of experience shows that majority (64%) had over 20 years of experience in ginger marketing. The mean number of years of experience was 28 years. Experience is highly instrumental to the success of every enterprise especially in management decision making, sourcing and application of marketing information and forecasting.

The distribution of ginger assemblers by household size

shows that majority (83%) of the assemblers had household size of 1- 10. The mean household size distribution of producers was 7. This large family size is because of the practice of polygamy in the study area. The finding agrees with Obinatu [30].

The distribution of ginger assemblers by age in the study area shows that about 49% of the ginger assemblers are 40 years or less. The mean age of the ginger assemblers in the study area was 41 years. This implies that the ginger assemblers were still in their mid-ages and had the energy to face the demands of ginger marketing. This result is in consonance with earlier studies by Obinatu [30].

The distribution of ginger assemblers by sex shows that majority (93%) of the ginger assemblers in the study area were males while 7% were females. This is because most farmers sell their ginger at the farmgate thus requiring that the rural assemblers move from one farm to another which is not conducive for most women. In addition, women participate more in marketing activities that allows some time for them to attend to their households. This result is in contradiction with earlier studies by Obinatu who found that all the ginger marketers were males [30].

The distribution of ginger assemblers by sales income shows that the sales income of majority (63%) of assemblers was 5 million or above. This indicates high cash flow among ginger assemblers and under scores the aggregator function of the assemblers.

Furthermore, the distribution of assemblers by membership of marketing association shows that majority (78%) were not members of marketing association. This means that they could not take advantage of group influence to press for incentives.

3.4. Socioeconomic Characteristics of Ginger Wholesalers

The socioeconomic characteristics of ginger wholesalers in the study area are shown in Table A3. The distribution of ginger wholesalers by educational attainment shows that majority (88%) of the ginger wholesalers have attained various levels of formal education. This implies that most wholesalers are well placed to source and embrace marketing information and innovations in ginger marketing. Education is very vital in understanding and application of agricultural marketing information. It enhances the ability to manage an enterprise and contributes to its overall success and efficiency [17]. This finding agrees with Abah et al., Obinatu and Akarue et al. [21, 30, 31].

The distribution of ginger wholesalers by years of experience shows that majority (76%) had over 20 years of experience in ginger marketing. The mean number of years of experience

was 31 years. This indicates that the wholesalers are adequately experienced in the business of ginger marketing. Experience plays a vital role in the success of any enterprise especially in analyzing feedback, management decision making and forecasting.

The distribution of ginger wholesalers by household size shows that majority (69%) of the wholesalers had household size of 1- 10 persons. The mean household size distribution of wholesalers was 7. This is because of polygamy which was highly practiced in the study area. The finding agrees with Obinatu [30].

The distribution of ginger wholesalers by age in the study area shows that 89% of the ginger wholesalers are above 40 years of age. The mean age of the ginger wholesalers in the study area was 47 years. This was because large amount of money is required to carry out ginger wholesale business which was beyond the reach of most interested younger people in the study area. This result is in consonance with earlier studies by Obinatu [30].

The distribution of wholesalers by sex shows that all (100%) of the ginger wholesalers in the study area were males. This was because ginger is a cash crop and favours traditional tendencies for men to seek cash crops than women. In addition, traditionally, men tend to have more access to opportunities and benefits than women. This result is in consonance with earlier studies by Obinatu who found that all ginger wholesalers in the study area were males [30].

The distribution of ginger wholesalers by sales income shows that majority (67%) of wholesalers' sales income was over 50 million naira. This means that large capital is required to carry out wholesale ginger business. This also explains why the wholesalers were few in the study area.

The distribution of wholesalers by membership of marketing association shows that majority of the respondents were members of ginger marketing association. This means that the wholesalers have higher market power and can take advantage of group influence to press for marketing decisions in their favour.

3.5. Socioeconomic Characteristics of Ginger Retailers

The socioeconomic characteristics of ginger retailers in the study area are shown in Table A4. The distribution of ginger wholesalers by educational attainment shows that majority (88%) of the retailers have attained various levels of formal education. The implication is that they are well placed to source marketing information and embrace innovations in ginger marketing. According to Afolabi, education positively enhances the business acumen of entrepreneurs [32]. This finding agrees with the findings of Obinatu who opined that

majority of the ginger marketers have had formal education [30].

The distribution of ginger retailers by years of experience shows that majority (51%) had ≤ 20 years of experience in ginger marketing. The mean number of years of experience was 22 years. Experience has a positive effect on the success of any enterprise especially in decision making and forecasting.

The distribution of ginger retailers by household size in the study area shows that majority (76%) of the retailers had household size of 1-10. The mean household size distribution of retailers was 7. This large household size was because there is high level of polygamy being practiced in the study area. The finding agrees with Obinatu [30].

The distribution of ginger retailers by age in the study area shows that 52% of the ginger retailers are 40 years or less. The mean age of the ginger retailers in the study area was 40 years. This implies that the respondents were strong enough to engage in ginger marketing.

The distribution of retailers by sex shows that majority (67%) of the ginger retailers in the study area were females while 33% were males. This means that there were more female ginger retailers in the study area than males. This is because ginger retailing is done in small units along with other food crops whose retailing are dominated by women. In addition, smaller capital is required to carry out ginger retailing business.

The distribution of retailers by sales income shows that 45% of retailers' sales income was 1 million naira or less. This indicates that a substantial population of retailers realize less than 1 million naira per annum in sales from ginger. Ginger retailing is a small-scale business in the study area.

The distribution of ginger retailers by membership of ginger marketing association shows that majority (77%) of retailers do not belong to any ginger marketing association. This indicates that the retailers have little capacity to influence marketing decisions in the study area.

3.6. Socioeconomic Determinants of Profit

The OLS multiple regression analysis was used to identify the determinants of profit for the key actors in the ginger value chain namely: producers, assemblers, wholesalers and retailers. The results are shown in Tables 2, 3, 4 and 5 respectively. The double log functional form was selected as the lead equation from the four regression equations to which data was fitted for each of the actors (producers, assemblers, wholesalers and retailers).

Table 2. Socioeconomic determinants of profit among ginger producers.

Functional Form	Linear Log	Semi -Log	Exponential	+ Double Log
Constant	100.24 (7.034)***	4.363 (18.154)***	9.121 (27.929)***	24.242 (121.220)***
Experience	1.204 (3.442)***	-0.104 (-0.739)	0.016 (2.595)***	0.176 (5.133)***
Education	1.165 (4.221)***	0.156 (2.762)***	0.064 (0.388)	0.210 (7.192)***
Household size	0.614 (0.208)	0.066 (0.110)	0.024 (0.251)	0.022 (1.032)
Age	-1.641 (-0293)	0.603 (-0.193)	2.712 (1.096)	0.226 (3.054)***
Sales Income	4.108 (0.856)	0.042 (2.622)***	0.027 (3.764)***	0.743 (10.221)***
Sex	0.613 (0.156)	0.122 (1.012)	0.418 (1.006)	-0.140 (-1.172)
Farm size	0.623 (1.032)	0.618 (0.261)	0.912 (2.671)***	0.164 (0.464)
Extension contact	0.208 (2.861)***	0.172 (2.211)**	0.241 (2.303)**	0.421 (4.214)***
R^2	0.676	0.518	0.684	0.876
Adjusted R^2	0.671	0.506	0.672	0.868
F-statistic	98.891***	114.293***	20.982***	218.242***

Values in brackets are t-ratios; values marked with *** are significant at 1% level, ** implies 5% while + implies lead functional form.
Source: Field survey data, 2017

For producers, the results are presented in Table 2. The results show that the Coefficient of multiple Determination (R^2) value was 0.876. This indicates that predictor variables; sex, household size, education, age, sales income, farm size, extension contact, and experience of respondents explained about 88% of variation in profitability of ginger producers in the study area.

The individual results show that the independent variables namely; years of experience, education, age, sales income and extension contact were significant at 0.01 probability

level. The positive (+ve) signs indicate that for any unit increase in experience, education, age, sales income or extension contact of ginger producers, there will be an increase of 0.176%, 0.210%, 0.226%, 0.743% and 0.421% respectively, in the profitability of ginger producers in the study area. This was the *a priori* expectation.

For assemblers, the results are presented in Table 3. The results show that the Coefficient of multiple Determination (R^2) value was 0.863. This indicates that predictor variables; sex, household size, education, age, sales income and experience of respondents explained about 86% of variation in profitability of ginger assemblers in the study area.

The individual results show that the independent variables namely; years of experience, education, age and sales income were significant at 0.01 probability level. The positive (+ve) signs indicate that for any one-year increase in experience, education, age or any one Naira increase in sales income of ginger assemblers, there will be an increase of 0.147%, 0.160%, 0.230%, and 0.256% respectively, in the profitability of ginger assemblers in the study area. This was the *a priori* expectation.

Table 3. Socioeconomic determinants of profit among ginger assemblers.

Functional Form	Linear Log	Semi -Log	Exponential	+ Double Log
Constant	102.521	4.560	7.021	4.218
	(5.637)***	(30.164)***	(91.018)***	(109.002)***
Experience	1.239	-0.10	0.016	0.147
	(2.482)***	(-0.439)	(2.499)***	(7.187)***
Education	1.756	0.17	0.047	0.160
	(4.267)***	(2.963)***	(0.874)	(11.095)***
Household size	0.746	0.082	-2.101	0.026
	(0.208)	(0.012)	(-0.706)	(1.035)
Age	-1.194	0.023	0.002	0.230
	(-0293)	(-0.194)	(0.186)	(7.051)***
Sales Income	4.108	0.225	1.204	0.256
	(2.856)***	(2.636)***	(3.107)***	(11.188)***
Sex	11.663	0.112	0.610	-0.040
	(1.035)	(1.313)	(1.021)	(-1.090)
R^2	0.682	0.664	0.646	0.863
Adjusted R^2	0.678	0.658	0.633	0.861
F-statistic	184.283***	61.192***	69.801***	379.644***

Values in brackets are t-ratios; values marked with *** are significant at 1% level while + implies lead functional form.
Source: Field survey data, 2017

For wholesalers, the results are presented in Table 4. The results show that the Coefficient of multiple Determination (R^2) value was 0.886. This indicates that predictor variables; sex, household size, education, age, sales income and experience of respondents explained about 89% of variation in profitability of ginger wholesalers in the study area.

The individual results show that the independent variables namely; years of experience, education, age and sales income were significant at 0.01 probability level. The positive (+ve) signs indicate that for any one-year increase in experience, education, age or any one Naira increase in sales income of ginger assemblers, there will be an increase of 0.217%, 0.122%, 0.473% and 0.261% respectively, in the profitability of ginger assemblers in the study area. This was the *a priori* expectation.

Table 4. Socioeconomic determinants of profit among ginger wholesalers.

Functional Form	Linear Log	Semi -Log	Exponential	+ Double Log
Constant	92.856	4.263	0.975	4.732
	(7.083)***	(37.101)***	(18.001)***	(116.281)***
Experience	1.239	-0.103	0.007	0.217
	(2.572)***	(-0.233)	(2.815)***	(9.082)***
Education	1.052	0.146	0.178	0.122
	(3.271)***	(2.736)***	(1.082)	(5.031)***
Household size	0.306	0.103	-0.706	0.123
	(0.201)	(0.611)	(-0.913)	(0.037)
Age	-1.194	0.183	0.164	0.473
	(-0238)	(-0.172)	(0.588)	(3.131)***
Sales Income	0.321	0.123	0.187	0.261
	(2.553)***	(2.629)***	(3.101)***	(7.108)***
Sex	0.617	0.102	0.831	-0.124
	(1.033)	(1.013)	(0.521)	(-1.094)
R^2	0.758	0.663	0.573	0.886

Functional Form	Linear Log	Semi -Log	Exponential	+ Double Log
Adjusted R^2	0.738	0.658	0.558	0.880
F-statistic	81.938***	62.129***	47.973***	179.646***

Values in brackets are t-ratios; values marked with *** are significant at 1% level while + implies lead functional form.
Source: Field survey data, 2017

For retailers, the results are presented in Table 5. The results show that the Coefficient of multiple Determination (R^2) value was 0.873. This indicates that predictor variables; sex, household size, education, age, sales income and experience of respondents explained about 87% of variation in profitability of ginger retailers in the study area.

Table 5. Socioeconomic determinants of profit among ginger retailers.

Functional Form	Linear Log	Semi -Log	Exponential	+ Double Log
Constant	112.28 (9.613)***	11.510 (23.120)***	7.303 (51.075)***	5.283 (49.523)***
Experience	1.037 (3.142)***	-0.104 (-0.632)	0.001 (2.612)***	0.514 (4.137)***
Education	1.756 (7.202)***	0.175 (2.623)***	0.817 (0.863)	0.168 (8.105)***
Household size	0.043 (1.008)	0.173 (0.615)	0.172 (0.717)	0.626 (1.005)
Age	-1.194 (-0.073)	0.113 (0.191)	0.841 (2.891)***	0.221 (7.125)***
Sales Income	1.531 (2.815)***	0.128 (2.682)***	0.038 (3.862)***	0.256 (7.135)***
Sex	0.637 (0.127)	0.132 (0.537)	0.177 (0.633)	-0.147 (-1.032)
R^2	0.783	0.582	0.674	0.873
Adjusted R^2	0.728	0.577	0.661	0.867
F-statistic	87.964***	102.013***	115.017***	177.084***

Values in brackets are t-ratios; values marked with *** are significant at 1% level, + implies lead functional form.
Source: Field survey data, 2017

The individual results show that the independent variables namely; years of experience, education, age and sales income were significant at 0.01 probability level. The positive (+ve) signs indicate that for any one-year increase in experience, education, age or any one Naira increase in sales income of ginger assemblers, there will be an increase of 0.514%, 0.168%, 0.221% and 0.256% respectively, in the profitability of ginger retailers in the study area. This was the *a priori* expectation.

Furthermore, the F-statistics of the OLS multiple linear regression analyses were used to test the hypothesis which states that "socioeconomic characteristics of the ginger value chain actors, have no significant influence on the profitability of ginger enterprises." From the analyses, the F-calculated data values for the actors in the ginger value chain are 218.242 for producers, 379.644 for assemblers, 179.646 for wholesalers and 177.084 for retailers. They are all significant and greater than the F-tabulated (3.6689). Therefore, the null hypothesis which states that "the socioeconomic characteristics of the ginger value chain actors have no significant influence on profitability of ginger marketers" was rejected. This implies that the socioeconomic characteristics have a significant effect on the profitability of the enterprises. This result is consistent with earlier findings by Ezre et al., Agwu et al. and Odoemenem et al. who opined

that various socioeconomic variables influenced profitability of different commodities [18, 33, 34].

4. Conclusions and Recommendations

The study concludes that the socioeconomic characteristics of the ginger value chain actors have significant influence on the profitability of ginger enterprises in the study area. The socioeconomic determinants of profit were; experience, education, age, sales income and extension contact for producers; and experience, education, age and sales income for assemblers, wholesalers and retailers. Majority of the actors in the ginger value chain have attained some level of education. The mean household size across key actors in the value chain was 7. The actors in the value chain were dominated by men while most producers were experienced, small holder farmers. Majority of the actors did not hold membership of any marketing association or union. Access to extension education was very poor.

The study makes the following recommendations based on the findings; Government should assist in group formation and strengthening among the actors in the ginger value chain and midwife their linkage to finance and off-takers;

Government should employ additional extension agents to improve access to extension education of ginger farmers; and

Government should develop policy to address barriers to women participation and equal benefit in ginger production.

Appendix

Table A1. Distribution of Ginger Producers by Socioeconomic Characteristics.

LGA										
Variables	**Kachia**		**Jaba**		**Kagarko**		**Jema'a**		**Pooled Data**	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Educational Attainment										
No formal education	11	12	6	7	8	9	12	13	37	10
Primary education	26	28	27	29	30	32	26	29	109	30
Secondary education	38	40	33	36	27	29	31	34	129	35
Tertiary education	10	11	14	15	17	18	12	13	53	14
Adult education	9	9	12	13	11	12	9	10	41	11
Total	94	100	92	100	93	100	90	100	369	100
Years of Experience										
1 - 10	10	11	9	10	10	11	9	10	38	10
11 - 20	26	28	25	27	28	30	26	29	105	28
21 - 30	22	23	23	25	22	24	22	24	89	24
31 - 40	18	19	16	17	15	16	16	18	65	18
41 - 50	9	10	9	10	10	11	8	9	36	10
≥51	9	10	10	11	8	9	9	10	36	10
Total	94	100	92	100	93	100	90	100	369	100
Household Size										
1 - 5	28	30	27	29	26	28	26	29	107	29
6-10	47	50	46	50	48	52	47	52	188	51
11-15	13	14	12	13	11	12	11	12	47	13
≥16	6	6	7	8	8	9	6	7	27	7
Total	94	100	92	100	93	100	90	100	369	100
Years of Age										
≤30	10	11	11	12	9	10	10	11	40	11
31-40	30	32	32	35	34	37	36	40	132	36
41-50	36	38	30	33	29	31	29	32	124	34
≥51	18	19	19	21	21	23	15	17	73	19
Total	94	100	92	100	93	100	90	100	369	100
Sex										
Female	23	24	20	22	19	20	21	23	83	22
Male	71	76	72	78	74	80	69	77	286	78
Total	94	100	92	100	93	100	90	100	369	100
Farm Size										
0.1- 0.9	29	31	30	32	30	32	28	31	117	32
1.0 - 1.9	10	11	16	17	17	18	17	19	60	16
2.0 -2.9	21	22	20	22	18	19	19	21	78	21
3.0 - 3.9	15	16	13	14	14	15	14	16	56	15
4.0 - 4.9	10	11	7	8	8	9	7	8	32	9
≥5	9	9	6	7	6	7	5	5	26	7
Total	94	100	92	100	93	100	90	100	369	100
Access to Extension Education										
Yes	15	16	12	13	13	14	14	16	54	15
No	79	84	80	87	80	86	76	84	315	85
Total	94	100	92	100	93	100	90	100	369	100
Sales Income										
≤3400000	29	30	30	33	30	32	28	31	117	32
3400001 - 6766000	10	11	16	17	17	18	17	19	60	16
6766001 - 10166000	21	22	20	22	18	19	19	21	78	21
10166001 - 13566000	15	16	13	14	14	15	14	16	56	15
13566001 - 16966000	10	11	7	8	8	9	7	8	32	9
≥16966001	9	10	6	7	6	7	5	5	26	7
Total	94	100	92	100	93	100	90	100	369	100
Membership of union/marketing association										
Yes	12		15		11		17		55	15
No	82		77		82		73		314	85
Total	94		92		93		90		369	100

Table A2. Distribution of Ginger Assemblers by Socioeconomic Characteristics.

LGA										
Variables	**Kachia**		**Jaba**		**Kagarko**		**Jema'a**		**Pooled Data**	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Educational Attainment										
No formal education	7	11	5	9	5	9	6	11	23	10
Primary education	20	32	15	27	15	26	17	33	67	30
Secondary education	20	32	19	35	21	36	17	33	77	34
Tertiary education	7	11	11	20	15	26	10	19	43	19
Adult education	8	13	5	9	2	3	2	4	17	7
Total	62	100	55	100	58	100	52	100	227	100
Years of Experience										
1 - 10	5	8	5	9	5	9	4	10	19	8
11 - 20	17	27	15	27	14	24	17	29	63	28
21 - 30	12	19	12	22	14	24	10	24	48	21
31 - 40	13	21	13	24	10	17	11	18	47	21
41 - 50	8	13	5	9	8	14	3	9	24	11
≥51	7	11	5	9	7	12	7	10	26	11
Total	62	100	55	100	58	100	52	100	227	100
Household Size										
1 - 5	31	50	30	55	33	57	29	56	123	54
6-10	19	31	15	27	16	28	17	33	67	29
11-15	9	15	7	13	5	9	3	6	24	11
≥16	3	5	3	5	4	7	3	6	13	6
Total	62	100	55	100	58	100	52	100	227	100
Years of Age										
≤30	7	11	7	13	7	12	6	12	27	12
31-40	22	35	22	40	20	34	20	38	84	37
41-50	24	39	15	27	15	26	17	33	71	31
≥51	9	15	11	20	16	28	9	17	45	20
Total	62	100	55	100	58	100	52	100	227	100
Sex										
Female	5	8	5	22	3	5	3	6	16	7
Male	57	92	50	78	55	95	49	94	211	93
Total	62	100	55	100	58	100	52	100	227	100
Sales Income										
≤5,000,000	20	32	21	38	20	34	22	42	83	37
5,000,001 – 10,000,000	14	23	12	22	14	24	10	19	50	22
10,000,001 – 15,000,000	12	19	10	18	10	17	6	12	38	17
15,000,001 – 20,000,000	9	15	7	13	9	16	8	15	33	15
≥20,000,001	7	11	5	9	5	9	6	12	23	10
Total	62	100	55	100	58	100	52	100	227	100
Membership of union/marketing association										
Yes	12	19	12	22	18	31	7	13	49	22
No	50	81	43	78	40	69	45	87	178	78
Total	62	100	55	100	58	100	52	100	227	100

Table A3. Distribution of Ginger Wholesalers by Socioeconomic Characteristics.

LGA										
Variables	**Kachia**		**Jaba**		**Kagarko**		**Jema'a**		**Pooled Data**	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Educational Attainment										
No formal education	2	18	0	0	1	8	2	25	5	12
Primary education	2	18	4	40	3	23	3	37	12	29
Secondary education	5	46	2	20	5	39	1	13	13	31
Tertiary education	2	18	3	30	2	15	2	25	9	21
Adult education	0	0	1	10	2	15	0	0	3	7
Total	11	100	10	100	13	100	8	100	42	100
Years of Experience										
1 - 10	0	0	0	0	1	8	0	0	1	2
11 - 20	3	27	1	10	2	15	3	38	9	22
21 - 30	4	36	4	40	5	38	0	0	13	31
31 - 40	2	18	2	20	2	15	1	13	7	17
41 - 50	1	9	1	10	2	15	2	25	6	14
≥51	1	9	2	20	1	8	2	25	6	14
Total	11	100	10	100	13	100	8	100	42	100
Household Size										

LGA										
Variables	**Kachia**		**Jaba**		**Kagarko**		**Jema'a**		**Pooled Data**	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
1 - 5	5	45	4	40	4	31	3	38	16	38
6-10	3	27	3	30	4	31	3	38	13	31
11-15	2	18	2	20	3	23	1	13	8	19
≥ 16	1	9	1	10	2	15	1	13	5	12
Total	11	100	10	100	13	100	8	100	42	100
Years of Age										
≤ 30	0	0	0	0	0	0	0	0	0	0
31-40	2	18	1	10	4	31	2	25	9	21
41-50	3	27	6	60	6	46	5	63	20	48
≥ 51	6	55	3	30	3	23	1	13	13	31
Total	11	100	10	100	13	100	8	100	42	100
Sex										
Female	23	24	20	22	19	20	21	23	83	22
Male	71	76	72	78	74	80	69	77	286	78
Total	94	100	92	100	93	100	90	100	369	100
Sales Income										
$\leq 50,000,000$	3	27	4	40	3	23	4	50	14	33
50,000,001 – 100,000,000	3	27	3	30	4	31	1	13	11	26
100,000,001 – 150,000,000	4	36	2	20	4	31	2	25	12	29
$\geq 150,000,001$	1	9	1	10	2	15	1	13	5	12
Total	11	100	10	100	13	100	8	100	42	100
Membership of union/marketing association										
Yes	10	91	7	70	9	69	8	100	34	81
No	1	9	3	30	4	31	0	0	8	19
Total	11	100	10	100	13	100	8	100	42	100

Table A4. Distribution of Ginger Retailers by Socioeconomic Characteristics.

LGA										
Variables	**Kachia**		**Jaba**		**Kagarko**		**Jema'a**		**Pooled Data**	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
Educational Attainment										
No formal education	2	9	1	4	2	9	4	13	9	12
Primary education	4	19	8	30	12	55	6	20	30	30
Secondary education	13	62	12	44	1	5	13	43	39	39
Tertiary education	1	5	0	0	0	0	0	0	1	1
Adult education	1	5	6	22	7	31	7	24	21	21
Total	21	100	27	100	22	100	30	100	100	100
Years of Experience										
1 - 10	5	24	4	15	4	18	5	17	18	18
11 - 20	6	29	9	33	12	55	6	20	33	33
21 - 30	6	29	7	26	3	14	12	40	28	28
31 - 40	3	14	1	4	3	14	4	13	11	11
41 - 50	0	0	3	11	0	0	3	10	6	6
≥ 51	1	5	3	11	0	0	0	0	4	4
Total	21	100	27	100	22	100	30	100	100	100
Household Size										
1 - 5	11	52	12	44	11	50	15	50	49	49
6-10	6	29	9	33	6	27	6	20	27	27
11-15	2	10	3	11	3	14	7	23	15	15
≥ 16	2	10	3	11	2	9	2	7	9	9
Total	21	100	27	100	22	100	30	100	100	100
Years of Age										
≤ 30	3	14	4	15	2	9	4	13	13	13
31-40	6	29	9	33	10	45	14	47	39	39
41-50	9	43	9	33	8	36	7	23	33	33
≥ 51	3	14	5	19	2	9	5	17	15	15
Total	21	100	27	100	22	100	30	100	100	100
Sex										
Female	18	86	15	56	16	73	18	60	67	67
Male	3	14	12	44	6	27	12	40	33	33
Total	21	100	27	100	22	100	30	100	100	100
Sales Income										
$\leq 1,000,000$	9	43	12	44	10	45	14	47	45	45
1,000,001 – 2,000,000	4	19	6	22	6	27	6	20	22	22

Variables	Kachia		Jaba		Kagarko		Jema'a		Pooled Data	
LGA										
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**
2,000,001 – 3,000,000	4	19	5	19	3	14	4	13	16	16
3,000,001 – 4,000,000	3	14	3	11	2	9	4	13	12	12
≥4,000,001	1	5	1	4	0	0	1	3	3	3
Total	21	100	27	100	22	100	30	100	100	100
Membership of union/marketing association										
Yes	5	24	7	26	4	18	7	23	23	23
No	16	76	20	74	18	82	23	77	77	77
Total	21	100	27	100	22	100	30	100	100	100

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