

## **SOCIO-ECONOMIC DETERMINANTS OF FARM HOUSEHOLDS' PARTICIPATION IN GANDU SYSTEM IN CHARANCHI LOCAL GOVERNMENT AREA OF KATSINA STATE, NIGERIA**

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### **Abstract**

*The study described the socio-economic characteristics of the respondents and analysed the determinants of farm households' participation in gandu system. The data for this study were obtained by the use of structured questionnaire complemented with interview schedule. A total sample size of 140 households was interviewed consisting of 70 gandu and 70 non-gandu participants. Descriptive and inferential statistics were used to analyse the data collected. The result of the study showed that higher percentage of the gandu participants (73%) were within the age range of 41-60 years while 71% of the non-gandu participants were within the age range of 21-40 years. Also 64% of the gandu participants had 11-20 people in their household on the contrary, 77% of the non-gandu participants had 1-10 people in their household. The result further indicated that only 10% of the gandu participants had formal education and 17% of the non-gandu participants had formal education. Over 60% of both gandu and non-gandu participants lack access to extension contact. The logit regression analysis indicated that household size and extension contact significantly influence participation in gandu system at 1% level of probability while age of household head significantly influence participation in gandu system at 5% level of probability and migration was significant at 10% level of probability. In essence, the age of the respondents, household size, migration and extension contact were the variables that determined participation in gandu system. It is recommended that since more of the gandu participants were of older age, the younger members should be encouraged to participate more in agricultural production through government interventions as this will go a long way in increasing their participation in gandu system and could help to sustain the system. Extension contact should be targeted towards the gandu heads that are usually traditionally bound. In order to discourage migration of youth to urban areas, infrastructural facilities and social amenities such as water, electricity, roads, schools and hospitals should be provided by government and other stake holders.*

**Key words:** *Gandu*, participation, socio-economic characteristics, Katsina State.

### **Introduction**

*Gandu* is a Hausa word referring to family farming unit, in other words, it is a household production unit that is understood to be a socio-economic unit in which two or more

married males are ranked in different positions of authority with a view to the allocation of time, energy and scarce resources to derive an income. It is a family farming unit whereby members of a kinship group combine their farming operations under a common leadership and organization, to form the basis for a common unit of domestic economy (Buntjer, 1973).

Diarra and Monimart (2006) defined *gandu* as a collective farm unit that are controlled by the *gandu* head who organizes the agricultural work. *Gandu* as a household organization comprises the head of the family and his son coming together to work on the family farm (*gonar gandu*) and the head of the family is also the head of the family farm (*Baban gandu*). Also Yusuf *et. al.* (2016) in their study in Katsina State defined *gandu* as a system whereby father and sons work together on family farm and feed from the same produce. The *gandu* head provides the seeds and tools used by the units, pays tax, marriage and child-birth expenses of his members. He also feeds the family and provides the male members with personal plots of land (*Gayauna*) on which they are allowed to work at specific times, at least two days in a week and to dispose off the produce as they wish (Becker, 1996; Cooper, 1997; Yusuf *et al.* 2016).

*Gandu* is regarded as family farming because family farming is a means of organizing agricultural production which is managed and operated by a family and utilizes family labour. According to Garner and Campos (2014) family farming is a means of organizing agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labour, both women's and men's. The family and the farm are linked, coevolve and combine economic, environmental, reproductive, social and cultural functions. In addition, Washington (2014) described a family farm as a farm owned by a family, whose operation is passed down to future generations.

Food and Agriculture Organization (FAO) and International Fund for Agricultural Development (IFAD) (2019) indicated that family farms represent over 90 per cent of all farms globally, and produce 80 percent of the world's food in value terms and that they are key drivers of sustainable development, including ending hunger and all forms of malnutrition. Although family farmers produce most of our food they illogically face poverty, especially in developing countries. They face challenges because they lack access to resources and services to support their food production and marketing; because their infrastructure is poor; their voices go unheard in political processes; and because the environmental and climatic conditions on which they rely are under threat (FAO and IFAD, 2019).

In developing countries, 70% of the hungry live in rural areas and depend on farming for their subsistence and income. Family farmers have strong links to the rural economy. They

contribute to rural employment, stimulate local markets and strengthen the value chains. They are the main investors in agriculture and the drivers of community life and solidarity networks in rural areas. Yet, in many regions, their potential remains widely untapped (Ekwall, 2014).

*Gandu* (family farming) has declined as limited numbers of people are currently involved in it. This could be attributed to poverty as many of the family heads can no longer take responsibilities of their son's needs to compensate for their work on farm. This has caused break up of family farming units in Hausa land (Moller, 1998; Iliya, 1999; Toulmin and Guèye, 2003). Based on this background, the study intends to describe the socio-economic characteristics of the farmers and to analyse the determinants **of farm households' participation in *gandu* system in Charanchi Local Government Area of Katsina State.**

### **Research Methodology**

The study was carried out in Charanchi Local Government Area of Katsina State. The Local Government Area comprises of two districts, namely Charanchi and Kuraye districts. Charanchi Local Government Area is bounded by Rimi Local Government to the north, Kankia and Matazu Local Government Areas are found in the southern part of the state, Bindawa Local Government Area from the East and Kurfi and Dutsinma Local Government Areas are found in the west. Charanchi Local Government Area has a population of 137,613 based on 2006 census (National Population Commission, 2006). The projected population in 2020 with growth rate of 3.2% is 215,389 people. Farming is the major occupation of the people and over 90% of the population are Muslims and the predominant ethnic groups are Hausa and Fulani (Charanchi Local Government Headquarters, 2016).

### **Sampling procedure and sample size**

Purposive sampling was used to select three villages each from the two districts of the Local Government Area based on their active participation in *gandu* farming system. The villages were Mazaga, Kereriya and Sake from Charanchi district and Kuki, Yan albasa and Yana from Kuraye district. The study identified a sample frame of 176 households for *gandu* participants and 175 households for non-*gandu* participants. Simple random sampling used to select 140 households which included 70 *gandu* and non-*gandu* households respectively and these represented 40% of the sample frame each for *gandu* and non-*gandu* participants.

**Table 1: Summary of sampling procedure**

Districts	Villages	Sample frame		Sample Size (40% of Sample frame)	
		Gandu	Non-gandu	Gandu	Non-gandu
Charanchi	Mazaga	35	25	14	10
	Kereriya	31	30	12	12
	Sake	25	35	10	14
Kuraye	Kuki	35	25	14	10
	Yan albasa	26	35	10	14
<b>Total</b>		<b>176</b>	<b>175</b>	<b>70</b>	<b>70</b>

Source: Field Survey, 2016

Primary data were used for this study. The data were collected using structured questionnaire complemented with interview schedule. The household head was the sampling unit because he is the head of the *gandu*. Data for this study were analyzed using descriptive statistics. The logit model was used to analyse the determinants farm households' participation in *gandu* system.

The logit regression model is a technique that is used in estimating the probability of an event that can take one or two values. In other words, it is a predictive model that can be used when the target variable is a categorical variable with two categories (binary or dichotomous variable). The logit model is based on the cumulative logistic distribution function as expressed by Gujarati (2004). The model is expressed as follows:

$$P_i = \frac{1}{1 + e^{-z_i}} \dots\dots\dots(1)$$

If  $P_i$  represents the probability of participating in *gandu* and the probability otherwise is  $1 - P_i$

$$1 - P_i = \frac{1}{1 + e^{z_i}} \dots\dots\dots(2)$$

Therefore, equation (2) can be expressed as follows:

$$\frac{P_i}{1 - P_i} = \frac{1 - e^{-z_i}}{e^{-z_i}} \dots\dots\dots(3)$$

The ratio of equations (1) and (2) is the odds ratio in favour of participating in *gandu*. Thus, taking the natural log of equation (3), we have:

$$L_i = \ln \frac{P_i}{1 - P_i} = Z_i \dots \dots \dots (4)$$

Where  $L_i$  = the log odds ratio which is also called the logit.

$$Z = B_1 X_1 + B_2 X_2 + \dots + B_6 X_6 \dots \dots \dots (5)$$

Where  $Z$  is a theoretical or an observable variable in the sense that although,  $X$ 's are generated from the field, the  $B$ 's are not observable. In order to obtain the value of  $Z$ , the likelihood of observing the sample needs to be formed by introducing a dichotomous response variable  $Y$  such that:

$$Y = \hat{a} + \hat{a}_1 X_1 + \hat{a}_2 X_2 + \hat{a}_3 X_3 + \dots + \hat{a}_6 X_6$$

$Y$  is a dependent variable from the equation above and it stands for participation in *gandu*. Since  $Y$  is a dichotomous variable, it takes the value of 0 and 1. Hence,

$Y = 1$  if the respondent is *gandu* participant.

$Y = 0$  if the respondent is non-*gandu* participant

Where:

The variables  $X_1$ - $X_6$  are the socio-economic characteristics of the farmers and they are the independent variables that were generated from the field.

$X_1$  = Age of household heads (in years)

$X_2$  = Household size (number)

$X_3$  = Level of education (Quranic education =1, Primary = 2, Secondary =3 and Tertiary = 4)

$X_4$  = Off-farm employment (number)

$X_5$  = Migration (numbers)

$X_6$  = Extension contact (1 = Yes, 0 = No)

$\hat{a}_1$ -  $\hat{a}_6$  = Coefficients

$\hat{a}$  = Constant

### **Definition and Measurement of Variables**

#### **Independent variables**

The independent variables for this study were the socio-economic characteristics and they are discussed as follows:

- (1) Age: - This is the number of years a person has lived. The age of the person determines his experience, authority or resources. This was measured based on the number of years of the respondents.
- (2) Household Size: - This refers to the total number of people living in a household.

This includes the number of wives, children, relatives and other dependents living in the same household. It was measured by summing up the total number of people in the household.

- (3) Level of Education :- This is the knowledge acquired by the household head through formal or informal means This was categorized into levels of education attained and was measured by scoring each level, such as, Quranic school =1, Primary school = 2, Secondary school,=3 and Tertiary institution = 4.
- (4) Off-farm employment:-This refers to the family members that are not working on farm. This was measured by adding up the number of off-farm employment engaged by the respondents.
- (5) Migration: - This refers to the movement of people from the rural areas to the urban areas. This was measured by adding up the number of individuals that have migrated from each household.
- (6) Extension Contact: - This refers to whether the farmers are being visited by extension agents or not. This was measured as 1 = Yes, 0 = No.

### **Dependent variable**

Participation in *gandu* system was the dependent variable for this study and it refers to the involvement of households in the *gandu* system. Respondents were asked whether they participate in *gandu* or not. This was measured by assigning numbers to those who participate in *gandu* and those who do not. That is, *gandu* participants = 1, Non- *gandu* participants =0.

## **Results and Discussion**

### **Socio-economic characteristics of the respondents**

The socio-economic characteristics described include, age of household head, household size, level of education, off-farm employment, migration and extension contact

### **Age Distribution**

The age distribution of the respondents was classified into youth, middle age and old age. The range from 21-40 years was regarded as youth age, from 41-60 as middle age and 61 years and above as old age. The results of this study showed that among all the participants in *gandu* system, 13% of the household heads were within the youth age, 73% were in their middle age and 14% were in their old age. On the other hand, 71% of the household heads among the non-*gandu* participants were in their youth age, 26% were in their middle age and 3% were in their old age (Table 2). This implies that most of the *gandu* heads were middle aged (41-60 years). At this age, the household head has the ability to exert his authority or control over resources of the family farm. On the other hand, most (71%) of the non-*gandu* participants, fall within the youth age (21-40 years). This indicates that the

*gandu* heads are older while the non-*gandu* heads are younger in age.

### **Household Size**

The findings of this research showed that 64% of the respondents in *gandu* system had 11-20 people in their household, 19% had 21-30 and 16% had 1-10 people in their household. Among the non-*gandu* participants, 76% of the respondents had 1-10 people and 23% had 11-20 people (Table 2). Thus, the result indicated that *gandu* participants had larger household size compared to non-*gandu* participants. The implication is that *gandu* system depends largely on family labour, hence, the larger the household size, the more family labour is utilized.

### **Level of Education**

As shown in Table 2, 90% of *gandu* participants had Qur'anic education, 9% had primary education and 1% had secondary education, while none had tertiary education. With regard to non-*gandu* participants, 83% of the respondents had Qur'anic education, 17% had primary education and none of them had secondary and tertiary education. The result implies that both *gandu* and non *gandu* participants lack higher formal education. This could hinder the adoption of new technologies as it will not be easy for them to comprehend the technologies.

### **Off-Farm Employment**

Findings further indicated that among the *gandu* participants, about 9% of the respondents were engaged in 4 off farm activities, 4% were engaged in 3 off farm activities, about 16% were engaged in 2 off farm activities, 26% were engaged in only one off farm activity while 46% of the respondents were not engaged in off farm activities. Among the non-*gandu* participants, 1% of the respondents engaged in 5 off farm activities, about 9% were involved in 2 off farm activities and 43% were involved in 1 off farm activity while 86% of the respondents were not engaged in off farm activities (Table 2). The result therefore showed that more of the *gandu* participants were engaged in off farm activities. This could help to generate more income for family farming and reduce expenses on family members.

### **Extension contact**

The study showed that 64% of the *gandu* participants had no access to extension contact while 36% had access to extension contact. The results also revealed that 63% of the non-*gandu* participants had no access to extension contact while 37% had access to extension contact (Table 2). It was therefore established by this study that for both *gandu* and non-*gandu* participants, access to extension contact were limited. This constitutes a barrier to adoption of improved agricultural technologies which is expected to help in improving their agricultural production.

**Table 2: Socio-economic characteristics of the farmers**

Variables	Gandu Participant		Non-Gandu Participant	
	Frequency	Percentage (%)	Frequency	Percentage (%)
<b>Age (Years)</b>				
21-40	9	12.8	50	71.4
41-60	51	72.9	18	25.7
>61	10	14.3	2	2.9
<b>Household size</b>				
1-10	11	15.7	53	75.7
11-20	45	64.3	17	24.3
21-30	13	18.6	0	0
31-40	1	1.4	0	0
<b>Level of education</b>				
Quranic education	63	90.0	57	81.4
Primary education	6	8.6	12	17.1
Secondary education	1	1.4	1	1.4
Tertiary education	0	0	0	0
<b>Off-farm employment</b>				
0	32	45.7	60	85.7
1	18	25.7	3	4.3
2	11	15.7	6	8.6
3	3	4.3	0	0
4	6	8.6	0	0
5	0	0	1	1.4
<b>Migration (number of migrants)</b>				
0	59	84.3	64	91.4
1	6	8.6	1	1.4
2	3	4.3	4	5.7
3	2	2.9	1	1.4
<b>Extension contact</b>				
Yes	25	35.7	26	37.1
No	45	64.3	44	62.9

### Migration

The finding of this study reveals that about 3% of the *gandu* participants had 3 of their family members migrated, 4% had 2 members and about 9% had 1 of their family members migrated while 84% of them had none of their members migrated. On the other hand, 1% of the non-*gandu* participants had 3 of their family members migrated, about 6% had 2 members and 1% had 1 of their family members migrated while 91% had none of their family members migrated (Table 2). This indicates that the *gandu* participants had more of their members migrated. This could affect the *gandu* system as family labour will be reduced and may require hired labour which is additional cost to the *gandu* heads.

### **Socio-economic determinants of farm households' participation in *gandu* system**

The result in Table 3 shows the logit estimate of participation in *gandu* with some selected socio-economic variables. The socio-economic variables were age ( $X_1$ ), household size ( $X_2$ ), level of education ( $X_3$ ), Off-farm employment ( $X_4$ ), migration ( $X_5$ ) and extension contact ( $X_6$ ). The result of the logit regression model (Table 1) shows that household size ( $X_2$ ) and extension contact ( $X_6$ ) significantly influence participation in *gandu* system at 1% level of probability while age of household head ( $X_1$ ) significantly influence it at 5% level of probability and migration ( $X_5$ ) was significant at 10% level of probability.

From Table 3, age had positive coefficient (0.1010) and it significantly influences participation in *gandu*. Thus, as the age of the farmer increases, the tendency to participate in *gandu* also increases and vice-versa. This could be because the older farmers are more attached to customs and traditions than the younger farmers. This is in line with the findings of Shuaibu et al. (2018) who indicated in their study that the age of the farmer significantly influences participation in *gandu* at 10% level of probability. Also household size had positive coefficient (0.3529) indicating direct relationship and it significantly influence participation in *gandu*. This also agrees with the study of Shuaibu et al. (2018) that household size significantly influences participation in *gandu* at 10% level of probability. This implies that as household size increases, the likelihood of participating in *gandu* also increases. This may be as a result of demand for family labour in *gandu* system. Thus, the larger the household size, the more family labour is utilized. Extension contact had a negative coefficient (-4.0879) and significantly influence participation in *gandu*, meaning that as extension contact increases, participation in *gandu* is likely to decrease. This is because the system is traditionally bound, therefore, as improved technologies are introduced, less people will be involved in system. This is also related to of Shuaibu et al. (2018). Similarly, migration had negative coefficient (-1.0279) is inversely related to participation in *gandu*, implying that as migration increases, participation in *gandu* is likely to decrease because less number of people will be left to participate in *gandu* system. The result of this study confirms the assertion made by Khan and Janke (2019) that technology and extension services, finance availability, demographic, economic and socio-cultural conditions, and accessibility of specialized education among others are pivotal for a successful development of family farming.

The finding therefore implies that age, household size, migration and extension contact were the significant variables influencing participation in *gandu*. The chi-squared value was 97.5% and it was significant at 1% level of probability. This implies that the model as a whole fits significantly with the data. The percentage of accurate prediction was 50% and the log likelihood function indicated that about 48% of the total variation in participation was explained by selected socio-economic characteristics of the respondents.

**Table 1.** Logit estimate of the determinants of participation in *gandu* system

Variable	Coefficients	Standard error	t-value	P- value
Age (X <sub>1</sub> )	0.1010	0.3162	3.193	0.0014**
Household size (X <sub>2</sub> )	0.3529	0.9484	3.721	0.0002***
Level of education (X <sub>3</sub> )	-0.2590	0.4155	-0.623	0.5332
Off-farm employment (X <sub>4</sub> )	0.1474	0.2457	0.600	0.5485
Migration (X <sub>5</sub> )	-1.0279	0.5318	-1.933	0.0533*
Extension contact (X <sub>6</sub> )	-4.0879	0.7975	-5.126	0.0001***
Sample size		= 140		
Log likelihood function		= -48.281		
Chi-squared value		= 97.5***		
Degrees of freedom		= 7		
Percentage predicted correct		=50		

\* Significant at 10% level of probability. \*\* Significant at 5% level of probability. \*\*\* Significant at 1% level of probability.

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### Conclusion

The results of the study indicated that the age of household head and household size directly and significantly influence participation in *gandu* system, while migration and extension contact inversely but significantly influence participation in *gandu* system. However, the inverse influence of extension contact on participation in *gandu* does not indicate that extension has a negative role but demonstrate that the *gandu* system is traditionally bound. Therefore, as improved technologies are introduced, less people will be involved in the system.

### Recommendations

Based on the findings of this study, the following recommendations were made so as to improve on the system:

- (1) It was discovered in this study that extension contact has a negative influence on participation in *gandu*. Hence, extension contact should be targeted towards the *gandu* heads and extension agents should be properly trained by government and non-governmental organizations such that they would be able to persuade the *gandu* heads who

are usually traditionally bound to adopt improved technologies. This will help to improve their agricultural production and the system as well. This is important because if the *gandu* heads adopt the improved technologies, other members will also adopt the technologies since he has control and authority over family farm matters.

(2) The study showed that the age of the farmer was significant with direct influence on *gandu* participation. It is recommended that youth should be encouraged to engage in agricultural production through government interventions as this will go a long way in increasing their participation in *gandu* system and could help to sustain the system.

(3) The inverse influence of migration on participation in *gandu* as shown by this study indicates that increase in migration leads to decrease in participation in *gandu*. In order to discourage migration of youth to urban areas, infrastructural facilities and social amenities such as water, electricity, roads, schools and hospitals should be provided. This will discourage the youths from migrating to urban areas because they would have been availed with all the facilities that serves as pull factors to urban areas.

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