



**Determining rural farmers' income: A case of mushroom farming in North Central Nigeria**

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**ABSTRACT**

The study appraised the involvement of rural farmers in mushroom farming as a paradigm shift for economic development in North Central, Nigeria. The study used 389 respondents sampled through multi-stage sampling technique from three States and the Federal Capital Territory. Descriptive statistics and t-test were used to analyse the data collected. Results showed that the farming of mushroom in the study area was dominated by males, who were married and were well educated. They were young and active with an average household size of 5 persons. The farmers had high levels of involvement in mushroom production and the average income earned by the farmers before and after adding mushroom to their crops were ₦360,539.58 and ₦426,092.55, respectively. It was found that mushroom farming attracted a reasonable amount of income because about ₦65,552.97 was the difference in the average income earned by the farmers after adding mushroom to their crop production activities. Several coping strategies like formation of cooperative groups and engagement of extension agents in training farmers on input use were very important strategies that could help boost mushroom production and the respondents also acknowledged that income generated from mushroom production can help them to alleviate their poverty levels. The study recommended that farmers that are into mushroom production should be encouraged to form cooperative groups so that they can be able to pool their resources together and build a strong base for information sourcing and dissemination as well as getting financial support for their farming activities.

**Keywords:** Rural farmers; economic empowerment; mushroom farming; coping strategies

**INTRODUCTION**

Mushrooms belong to the fungus family, and they easily appeal to farmers due to their biological make-up and fast-growing rate (Adejo & Ademu, 2018). Adejo and Ademu (2018)

stated further that mushrooms are arable crops that can be cultivated domestically or picked in the wild. The authors stressed further that the crop is edible and source of foreign exchange, hence, its global demand. Okungbowa (2005) noted that some of the mushrooms grow in the soil, others grow out of the soil and that people seems to be skeptical to consuming mushrooms. This skepticism is as a result of their past experience where poisonous mushrooms were mistaken for non-poisonous mushrooms and then consumed by the people. It is this incidence that reduced the consumption of wild mushrooms amongst local people.

Nevertheless, the consumption of mushrooms is gaining popularity as the most important vegetable (Ayodele *et al.*, 2011). Ayodele *et al.* (2011) also stated that mushrooms are healthy and nutritious foods that goes to a large extent to reduce malnutrition and also help a country deliver global commitment of achieving the Millennium Development Goals (MDGs) on health, poverty, and hunger status of her citizens. Aditya and Bhatia (2020) stated that the cultivation of wild edible mushrooms has been found to contribute to the agricultural economy of many developed and developing nations. Aditya and Bhatia (2020) acknowledged that this has been achieved through reduction of rural poverty and improving the economy of the rural communities. Mushroom cultivation has also helped in lifting farmers out of their poverty level, improving their diets and has as well checked the emigration of farmers from their rural communities Aditya and Bhatia (2020). In line with its numerous benefits, mushrooms have been identified as a source of employment to the unemployed, non-animal protein to the people's diet and nutraceuticals to the people's health, and above all, a source of income that can lift the farmers out of poverty (Easin *et al.*, 2017).

In spite of the lofty benefits, mushroom cultivation and production in Nigeria is a neglected area of agriculture which is a lucrative business in most developing and developed countries. It is a step in that direction that prompted that appraisal of the involvement of rural farmers in mushroom farming as a paradigm shift for economic empowerment and poverty alleviation in North Central, Nigeria. The study therefore sought to; examine the socio-demographic characteristics of rural mushroom farmers in North Central Nigeria, examine their levels of involvement in mushroom farming in the study area, determine if mushroom farming has improved the income generating capacities of the farmers, understand the farmers' reasons for engaging in mushroom farming, and identify recommended strategies that can help boost mushroom production.

## METHODOLOGY

### Study Area

**Federal Capital Territory (FCT):** The FCT is the Capital seat of Nigeria and was established in 1976. Its population, according to the Abuja, Nigeria Metro Population Area was projected to about 3,652,000 as at 2022. It lies between Latitude and Longitude  $9.07^{\circ}$  N and  $7.339^{\circ}$  E (FCT, Wikipedia 2016). The FCT is located in the savannah region, covering a land area of approximately 8000 Km<sup>2</sup>. Its temperature ranges between  $37^{\circ}$ C and  $15^{\circ}$ C and the average rainfall is about 1632 mm (provide reference here). These features describe the FCT as a tropical climatic environment that is suitable for the production of crops like maize, yam, millet, sorghum beans, while the common animals reared include goat, sheep, cockerels, guinea fowls (Ishaya *et al.*, 2010).

**Kogi State:** Kogi State has an estimated population (as at 2022 estimation) of about 4,466,800 million (Kogi State Population Statistics). Its coordinates are  $7.7337^{\circ}$  N and

6.6906<sup>0</sup> E. The State measures about 29,833Km<sup>2</sup> in land area and it has important geographical features like several rivers like river Niger and River Benue flowing within and out of the State. Kogi State- Wikipedia stated that, as a result of the rivers around, the State it is predominantly known for its fishing activities; cattle, sheep, goats, poultry and birds are reared by the livestock farmers while the soil grows crops like coffee, oil palm, yams, cocoa and cashew.

**Kwara State:** Kwara State has an estimated land area of 36,825 Km<sup>2</sup> and an projected population size as at 2022 of 3,551,000 (Kwara State Wikipedia). Additional information according to the Kwara State Wikipedia reveals that the geographical coordinates are 8.9669<sup>0</sup> N and 4.3874<sup>0</sup> E, and has a temperature range of 17.8<sup>0</sup>C to 35<sup>0</sup>C. The people of Kwara State are predominantly farmers who grow crops like coffee, kola nut, ground nut, cotton, and cocoa. They as well rear livestock.

**Niger State:** Niger State has a land area of approximately 76,363 Km<sup>2</sup> and it lies between Latitude 8<sup>0</sup>.20'N and 11<sup>0</sup>30'N and Longitude 3<sup>0</sup>30' and 7<sup>0</sup>20'E. The State's population size according to Niger State Population Statistics was about 6,783,300 people in 2022. The predominant occupation of the people is farming as they are known to grow crops like cassava, maize, rice, yam, millet, and cowpea. They also rear animals like cattle, sheep, and goats (Niger State Encyclopedia). The average temperature of the State is between 23<sup>0</sup>C and 37<sup>0</sup>C, while the annual rainfall lies between 1100 and 1600 mm.

### Sampling Techniques

The population of the study comprised farmers who were into mushroom farming in the different communities of the identified north central states. Sampling technique adopted involved a purposive selection of three states, namely Kwara, Kogi, and Niger States and the Federal Capital Territory were randomly selected out of six States that make up the region, (See Table 1).

Table 1: Sample sizes from the states, LGAs and communities used for the study

State	Capital	LGAs	Communities	No. of farmers
Federal Territory	Abaji	Kuje	Kebba	25
			Ebagi	25
			Damwa	25
Kogi	Ankpa	Idah	Agwai	25
			Ankpa	25
			Adde	25
Kwara	Ilorin East	Edu	Akpo	25
			Alade	25
			Ile-Apa	25
Niger	Bida	Mokwa	Zango	25
			Isapa	25
			Obbo	25
Niger	Bida	Mokwa	Umaru	25
			Bariki	25
			Labozhi	25
3 States + FCT	8	16	Bokani	25
				400

The next stage involved a random selection of two Local government areas (LGAs) per State, thus making it six LGAs that were used (efforts were made to ensure that these were areas where mushroom is produced). This then brought the total number of LGAs used for the study to eight. From these LGAs, there was a random selection of two communities per LGA (stage three). This led to making the total number of communities used for the study to 16, Stage four involved the random selection of twenty-five (25) mushroom farmers per community and this added up to four hundred mushroom farmers that were used for the study. The farmers were then administered the questionnaires. Out of those returned, about 389 (97.25%) were considered suitable for the study's analysis.

### **Data Collection**

Primary data sourced from the farmers were used to carry out the study. Questionnaires and interview schedules were used to obtain information from the respondents. The instruments were respectively administered to the farmers. The researcher in conjunction with some trained enumerators administered the questionnaires to the respondents.

The Face content validity method was used to validate the questionnaire. This method involves the use of experts in the field of Agricultural Economics and Extension to assess, criticise and make valuable suggestions on how to improve the instruments vis-à-vis the stated objectives of the study (Erie, 2009).

### **Data Analytical Techniques**

Descriptive statistics (frequency, mean and standard deviation) were used to analyse the objectives one, two and three. Objective four was analysed with the use of a three-point Likert scale. The scale ranged from Strongly agreed, Agreed and Disagreed which was coded 3, 2, 1, respectively. It produces a weight mean of 2.00 (The value was obtained as  $3 + 2 + 1 = 6/3 = 2.00$ ). Factors with means  $\geq 2.00$  indicated that the reasons put up by the farmers affected the production and consumption of mushrooms in a way. Contrarily, values  $< 2.00$  implies otherwise. Objective five was analysed on a 4 – point scale. The scale ranked from major strategy (rank 4), moderate strategy (rank 3), minor strategy (rank 2) and insignificant strategy (rank 4). In the instance where up to 50% of the respondents indicated a factor was a strategy, then such is ranked as a major strategy that can boost mushroom production in the area. Contrarily, where the values were less than 50%, it indicates that the strategies cannot boost mushroom production.

## **RESULTS AND DISCUSSION**

### **Socioeconomic Characteristics of the Respondents**

Results presented in Table 2 showed that most (59.13%) of the respondents were male and were in their early to late thirties (53.47%) with varying educational levels, where most (48.07%) had the post-secondary and 7.46% had no education. In line with gender and educational level of the respondents, the results were in consonance with the findings of Adejo and Ademu (2018) who found most of the households were headed by males, were acclaimed owners of their farmlands, were educated. These characteristics implied that they

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had the potential to be good managers of their farm activities. For example, higher educational attainment has been linked to better management skills/attitude like diligent record keeping which is an important feature of successful farm enterprises. Similar outcome on age of farmers was reported by Ashiegbu *et al.* (2021).

Table 2: Socio-demographic variables of the respondents (N = 389)

Socio-demographic variable	Category	Frequency	Percentage	Mean
Gender	Male	230	59.13	
	Female	159	40.87	
Age groups	< 30	78	20.85	
	30 – 39	208	53.47	
	40 – 49	65	16.71	
	50 – 59	12	3.08	
	> 60	26	6.68	37.37 years
Marital status	Single	98	25.19	
	Married	271	69.67	
	Divorced	16	4.11	
	Widow(er)	4	1.03	
Educational level	No Formal Educ.	29	7.46	
	Primary Educ.	29	7.46	
	Sec. Educ.	144	37.02	
	Post Sec. Educ.	187	48.07	
Household size	1 -3	136	34.96	
	4 -6	176	45.24	
	7 -9	44	11.31	
	10 -12	22	5.66	
	>13	11	2.83	5 persons
Primary occupation	Farming	128	32.90	
	Trading	97	24.94	
	Civil Service	89	22.98	
	Company worker	39	10.03	
	Self Employed	36	9.25	
Major source of income	Farming	319	82.01	
	Others	70	17.99	
Type of farming	Crop farming	372	95.63	
	Poultry	7	1.80	
	Fishing	10	2.57	
Farming status	Full Time	302	77.63	
	Part Time	87	22.37	

Most (66.67%) of the respondents were married, indicating that they were responsible and possibly had dependents. This was expected as it is common for married men to engage in farming business as a way of fulfilling their families' financial needs as supported by Okwuokenye and Abdurrahman (2022). The average household size of the participants was five persons with most (45.24%) participants having between four and six occupants in their households. Similar finding was recorded by Okwuokenye *et al.* (2022). Farming was the

primary occupation for 32.9 % of the farmers with most (82.01%) of them having their major source of income from farming and crop farming is the dominant type of farming engaged by most (95.63%) of the participants. The engagement of majority of the farmers in farming may be connected to the fertile soil in the area coupled with the availability of personal farmlands or affordable rented farmlands.

### Farmers' Levels of Involvement in Mushroom Farming

The level of farmers' involvement in mushroom farming was investigated and the results are presented in Table 3. It showed that most (52.96%) of the farmers indicated a high level of involvement in mushroom farming while 12.60% had low levels of involvement. The result implied that the farmers were involved in mushroom farming to a good extent and such level of involvement may be in line with the perceived benefits like the income being generated either as a primary or supplementary income sources. Buttressing this finding was Aditya and Bhatia (2020) who reported that mushroom cultivation has numerous benefits including poverty alleviation and a source food.

Table 3: Farmers' levels of involvement in mushroom farming

Category	Frequency	Percentage
Very high	31	7.97
High	206	52.96
Average	81	20.82
Low	49	12.60
Very low	22	5.66
Total	389	100.00

### Effect of Mushroom Farming on Income Generating Capacities of the Farmers

The effect of mushroom farming on the income generating capacities of the farmers was evaluated using percentages and means and the results are shown in Table 4. From the result, it was revealed that most (31.63%) of the farmers earned an income of between ₦301,000 – ₦400,000 prior to their involvement in mushroom farming., while over ₦500,000 was earned by 40.62% of the farmers post mushroom farming incorporation. Average income figures pre and post mushroom farming incorporation whereas ₦360,539.58 and ₦426,092.55, respectively.

Table 4: Level of income generated from mushroom farming

Farm Income (₦)	Income before mushroom farming		Income after mushroom farming			
	Freq.	%	Mean	Freq.	%	Mean
≤ 100,000	9	2.31		0	0.00	
100,001 – 200,000	0	0.00		33	8.48	
200,001 – 300,000	111	28.53		47	12.08	
300,001 – 400,000	123	31.62		58	14.91	
400,001 – 500,000	113	29.05		93	23.91	
> 500,000	33	8.48	₦360,539.58	158	40.62	₦426,092.55

About ₦65,552.97 was the difference in the average income earned by the farmers and this was however in favour of the farmers after they incorporated mushroom farming. The result revealed that diversification by including mushroom farming had improved the farmers income generating capacities and ultimately improved their livelihoods.

### Reasons for Engaging in Mushroom Farming

Table 5 shows the reasons the farmers decided to engage in mushroom farming and for consumption. Many reasons were agreed for farmers' involvement in mushroom farming including ease of production (mean = 2.63), sources of food (mean = 2.45), and that mushroom farming has helped solve hunger at home (mean = 2.41). The results are in agreement with the findings of Alfred and Arifalo (2012) and Jannatul *et al.* (2019) who identified mushroom as a high commercial value crop to the farmers and that it stands as a source of nutrients to the people's diet.

Table 5: Reasons for mushroom farming among the respondents.

Reasons for mushroom farming	Mean	Standard Deviation	Rank
- Easy to farm	2.63*	0.57	1 <sup>st</sup>
- Source of food	2.45*	0.66	2 <sup>nd</sup>
- Helped to solve hunger at home	2.41*	0.62	3 <sup>rd</sup>
- Source of medicine	2.13*	0.73	4 <sup>th</sup>
- Source of Nutrients	2.10*	0.77	5 <sup>th</sup>
- Its high Commercial value	2.05*	0.77	6 <sup>th</sup>
- Unemployment	1.51	0.81	7 <sup>th</sup>

\*Agreed  $\geq$  2.00

### Identified Strategies to help Boost Mushroom Farming

The coping strategies that could be adopted by the farmers to ensure a boost in mushroom production is shown in Table 6. The strategies were ranked from highest coping strategy (very important) to the least coping strategy (least important). Farmers' coping strategy that was indicated by at least 50% of the respondents were noted to be very important, while those indicated by less than 50% were not important coping strategies. Amongst the coping strategies, establishment of cooperative groups solely for supporting mushroom farming was identified by 60.15% of the respondents, this was followed by 58.61% of the farmers who believed that development of improved and weather-proof mushroom growing materials, , and 50.39% suggested trainings by extension agents on the use of inputs that can help promote mushroom production. As seen in the table, the suggested strategies that can be adopted to boost mushroom production are many because of varying circumstances of the farmers and so these coping strategies are meant to suit the differing situations. The factors identified above were in line with the limiting factors to mushroom production identified by Jonnatul (2019). It therefore means that addressing the factors will help to boost its production in the study area.

Table 6: Identified strategies for boosting mushroom farming

Coping strategy	Insignificant	Minor	Moderate	Major	Rank
Establishment of cooperative groups with the sole interest of supporting mushroom production	13 (3.34%)	55 (14.14%)	87 (22.37%)	234 (60.15%)	1 <sup>st</sup>
Development of improved and weather-proof mushroom growing materials	32 (8.23%)	48 (12.34%)	81 (20.82%)	228 (58.61%)	2 <sup>nd</sup>
Extension agents training of farmers on the use of inputs to promote mushroom production	27 (6.94%)	65 (16.71%)	101 (25.96%)	196 (50.39%)	3 <sup>rd</sup>
Provision of strong capital base that can help support mushroom farmers	18 (4.63%)	52 (13.38%)	111 (28.54%)	208 (53.47%)	4 <sup>th</sup>
Encourage more farmers to go into mushroom farming through provision of incentives	73 (18.77%)	94 (24.17%)	97 (24.94%)	125 (32.13%)	5 <sup>th</sup>
Develop strategies on how to expand production and market reach of mushrooms	65 (16.71%)	98 (25.19%)	101 (25.96%)	125 (32.13%)	5 <sup>th</sup>
Increase sensitisation on the importance and uses of mushrooms	78 (20.05%)	87 (22.37%)	105 (26.99%)	119 (30.59%)	7 <sup>th</sup>
Research on other uses of mushrooms	94 (24.17%)	159 (40.87%)	77 (19.79%)	59 (15.17%)	8 <sup>th</sup>

### Relationship of Income Generated from Mushroom Farming

The relationship between income generated from mushroom farming and poverty alleviation is shown in Table 7. From the Table, the average income generated pre mushroom farming incorporation was ₦360,539.58 which increased to ₦426,092.55 post mushroom farming incorporation. The difference (₦65,552.97) shows the positive effect of diversification with mushroom farming. A significant difference was confirmed since the calculated t-value (27.324) was greater than the tabulated value (1.645) of the incomes earned pre and post mushroom farming incorporation. Based on this result, the alternative hypothesis was accepted.

Table 7: Effects of adding mushroom to crops produced by respondents (t-test)

Income status of farmers	No.	Income (₦)		t-value	Decision
		Mean	Difference		
- Earnings of farmers after incorporating mushroom farming	389	426,092.55			
- Earnings of farmers before Incorporating mushroom farming	389	360,539.58	65,552.97	27.324*	Significant

\*Significant at the 5% level



Going further, Table 8 investigated whether the production or collection of mushrooms had improved or added to the income generating capacities of the respondents. It showed that about 77% of the respondents agreed that mushroom collection added to their incomes. About 61% revealed that mushroom farming had helped to boost their financial conditions.

Table 8: Extent to which farming/collection of mushrooms has improved farmers income generating capacities

Has mushroom farming/collection increased your farm income?	n (%)
Yes	300 (77.12)
No	24 (6.17)
Undecided	65 (16.71)

## CONCLUSION

The study examined the involvement of rural farmers in mushroom farming as a paradigm shift for economic empowerment in North Central Nigeria. Results showed that the farming of mushrooms in the study area was dominated by males, who were married and were educated. They were young and active with an average household size of 5 persons. The major occupation of most of them was farming with majority engaging in crop farming at full time level as their dominant source of income. The farmers had high levels of involvement in mushroom production for reasons like ease of production, source of food, and because of its high commercial value. Average income earned by the farmers before and after adding mushroom to their crops were ₦360,539.58 and ₦426,092.55 respectively. About ₦65,552.97 was the difference in the average income earned by the farmers and after adding mushroom to their farming ventures This is an indication that the farming of mushroom is an attractive option for the farmers.

Several coping strategies like formation of cooperative groups, engagement of extension agents in training farmers on best practices for mushroom production were suggested by the farmers. Mushroom farming has also increased the income generating capacity of the farmers.

The study thus, recommended that Mushroom farmers should form cooperative groups to serve as a support mechanism for a strong base for sourcing necessary inputs like information, technology, and credit and second, there is need for research to develop improved mushroom growing materials to enable farmers increase their productions.

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