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MULTI-DIMENSIONAL POVERTY INDEX ANALYSIS OF MILLET FARMERS IN SOME SELECTED LOCAL GOVERNMENTS IN KATSINA STATE

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ABSTRACT

The study analysed the multi-dimensional poverty status of millet farmers in Batagarawa, Daura and Mani Local Government Areas (LGAs) of Katsina State, Nigeria. Poverty status of millet farming households in Katsina State is high inspite of the fact that the state is suitable for millet production. Primary data was collected from 206 millet farmers selected using a multistage sampling using structured questionnaire. Data collected was analysed using descriptive statistics and multi-dimensional poverty index. The results of the descriptive statistics showed that 98.54% of millet farmers were male

Introduction

Poverty has been with mankind since time immemorial. There is a universal outrage against poverty as it is engulfing many people making them to live in absolute poverty (Simpa, 2014). In 2014, the World Bank ranked Nigeria as the third nation among the world's ten countries with highest poor people, Nigeria had 90 million of its citizens living in extreme poverty. Additionally, the National Bureau of

with majority (67.48%) between 43 and 60 years of age who were married (83.01%).The result of the analysis of the millet farmers' multi-dimensional poverty status revealed a high poverty incidence of 98.06%, the intensity of poverty was approximately 58.8% and the overall MPI value is 57.66%,implying that 57.66% of the farmers are living in poverty and are deprived across 98.06% of MPI indicators reflecting a dual challenge of widespread and deeply entrenched poverty among the millet farmers in Katsina State. The study recommends that there is need for increase collaboration between the local and state government to educate millet farmers, increase social investment like provision of basic rural clinics to each rural millet producing village, establishment of an agricultural financial institution as well as provision of improved millet seedling, fertilizers and farming machines to farmers so increase youth participation, increase output of the farmers' and consequently improve their multi-dimensional poverty status.

Keywords: Poverty Status, Millet, Farmers, Multi-Dimensional Poverty Index and Katsina State.

Statistics (NBS, 2017), report revealed that in 2004, the number of citizens in Nigeria living below $1.0 considered as the poverty line stood at 68.7million the number rose to 79.10million in 2010 (a 63.7% rise in poverty incidence),in 2014 it increased to 89 million this number further increased to 112.4million in 2016.In 2024, according to the World Bank Africa report, the number of poor Nigerians rose to a high time record of 129million representing over 56% of the population to be poor.

Ayantoye, Yusuf Omonona & Amao,(2011),opined that in Nigeria, poverty is more intensified in the agricultural sector than on other economic sectors. Majority of the people employed by the agricultural sector in Nigeria are poor thus making productivity and income of these people to be so low that it hinders them from moving out of poverty (Eboh, 2012). According to National Bureau of Statistics, 2012: FAO, 2015,about 88 % of Nigeria's rural population are

classified to be poor people comprising mainly of farmers who have meagre resources, conducting their farming activities averagely using two hectares of land which is mostly usually on sparse ownership accompanied with diminishing productivity, income and thus making them to be unable to break away from the vicious circle of poverty.

FAO,(2015),asserts that one way to reduce poverty is through growing and developing rural agricultural, due to the fact that growth and development that can spring up from the agricultural sector can be faster, precise and effective in reducing high poverty rates - five times more than growth and development emanating from non-agricultural sector of the economy. Thus, Mariyono & Sumarno,(2021),agrees that boosting productivity in the agricultural sector is not only relevant but as well effective in reducing poverty status.

The capability of farmers to have access to qualitative nutrition, education, health and improved standard of living, purchase needed inputs and as well adopt and practice new farming techniques and technologies is highly affected by high poverty rate. The availability of these factors in deficient quantity and quality has a negative impact directly on the productivity of these farmers and agriculture. Consequently, poverty does not only cause but has a negative impact on agricultural productivity especially in terms of farmers output, output per hectare or land size as well as crop output.

Major food crops in Nigeria are tubers, legumes and cereals or grains. One of the cereals cultivated and consumed in Nigeria is millet. States producing millet in Nigeria include; Bauchi, Borno Kebbi,Sokoto Katsina Jigawa, Zamfara and Yobe States (ICRISAT, 2021). Katsina State, located in the North-Western region of Nigeria is the home of millet production. The state produces approximately 1.1million metric tons of millet per annum, thereby having the potential to provide food security to people (Niharika et.al., 2023). Areas predominant in millet production in Katsina State are Daura, Batagarawa and Mani Local Governments. Millet production provides a source of income, employment opportunity as well as foreign exchange earning to Nigerians.

Nigeria is under exploiting the benefits and potentials of millet and this has become a major constraint in boosting its production in large scale a situation which has led its farmers to be in high poverty status. Increasing millet production will address its demand and supply shortage and furthermore improve the income earned by millet farmers and consequently reduce their poverty status. To reduce poverty status of millet farmers in Katsina State, it is important to study their poverty profile and know the type and areas of deprivation among the millet farmers in Katsina State. This research therefore, hopes to fill this knowledge gap with the following specific objectives: to describe the Socio-economic characteristics of millet farmers in the study area; analyze the intensity of poverty among the farmers and incidence of poverty of millet farmers in the study area.

METHODOLOGY

Population and Sample Area.

The study was carried out in Katsina State. It is one of the North-Western states in Nigeria,it lies approximately between Latitudes $12^0$15'00'' and 131^0 25'' N and Longitude 7°30'00" and 7°500"00" E of Greenwich Meridian(National Geo-Spatial Intelligence Agency,2015). The state occupies a total land area of about 24,972.225km^2.Katsina State has an estimated population of 5, 801,584 people as at the 2006 national census (NPC, 2006); with a projected population of 10,868,615 as at 2024 at an annual growth rate of 3.86% this makes it the 3rd most populated state in Nigeria(Worldometers,2024). It shares boundaries with Kano and Jigawa States in the East, Zamfara State to the West, Republic of Niger to the North and Kaduna State to its south. Katsina State is made up of 34 local Governments.

Its climate is tropical wet and dry (tropical continental), with an annual rainfall of about 700mm that usually begins from May and lasts till September ,the peak is usually attained in August (KTARDA, 2023; Nigerian Meteorological Agency, 2023). The soil type in Katsina State is mostly brown and ferruginous tropical red. The vegetation pattern is generally the Sudan semi-arid grasslands, dotted

shrub trees as well as the spare drought resistant trees. It has a varying temperature depending on the season of the year. Usually it ranges from 26° C-32° C with average value of 300C (Anonymous, 2012). The main economic activity in the State is agriculture with minor trading activities, thus majority of the people in the State are farmers. The major crops grown in the state are maize, millet, Sorghum, cowpea, sesame beans, cotton and groundnut (LawaI, 2010).

The study utilized multistage sampling procedure. In the first stage, a purposive sampling technique was used to select 3(three) Local Government Areas in Katsina State which was done based on the predominance and intensity of millet production in the area. The local government areas selected are; Batagarawa, Daura and Mani. There are 30 villages in Batagarawa LGA, 31 in Daura LGA and 29 in Mani LGA. In the second stage, 10% of the villages from each of the selected LGA's were randomly selected in accordance with Kajang and Jatau (2004). A recce survey or examination of the study area undertaken by the researcher and 4 (four) assistants identified 2,065 millet farmers in the study area. In the third stage,10 percent of the population of millet farmers were randomly selected from the chosen area, Kajang and Jatau (2004). This gave a sample size of two hundred and six millet farmers for the study.

Technique Employed

The study used primary data from constructed questionnaire. Data collected were analysed using descriptive statistics and the MPI model. Frequency tables, percentages were the descriptive statistical tools used to analyse the socio economic characteristics of the respondents. The Alkire & Foster (AF,2010), Multi-Dimensional Poverty Index(MPI) model was utilized to estimate the multi-Dimensional poverty Index of the respondents .The MPI was used because it measures deprivations experiences in multiple dimensions of human wellbeing and not only on the income earning of individuals. Furthermore, it views poverty through measuring the type and magnitude of different deprivation at the household level, which can assist in formulating and implementing excellent policies that can assist in reducing acute poverty.

In other to identify people who are multidimensionally poor, the score for each deprivation indicator are summed-up to obtain the household deprivation score.1/3 is used as a cut-off point to differentiate between the poor and nonpoor people (Alkire & Foster,2010). A deprivation score which is ≥1/3shows that the household (including everyone in it) is multidimensionally poor. A person (including every member of his or her household) with a deprivation score of >1/5 but <1/3 are considered to be vulnerable to multidimensional poverty. Individuals with a deprivation score of ≥1/2 are classified to be in severe multidimensional poverty (Alkire & Foster,2010).The MPI is given as:

MPI= H× A.

Where;

(1)H; which is the head count ratio or the incidence of multi- dimensional poverty, is the proportion of people who are multi- dimensionally poor in the population, it is given as,

$$H = \frac{q}{n} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where,

H= is the head count

q= number of multi-dimensionally poor people.

n=total population.

(2) A= The intensity of poverty which is a reflection of the average proportion of the weighted component indicators in which people are deprived multi-dimensionally. It is obtained as;

$$A = \frac{\sum S_i}{q} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . (2)$$

Where

A=intensity of poverty

S_i=deprivation score which the ith multi-dimensionaly poor individual experiences. Or sum of the weights connected to each indicator in which the ith person is deprived.

q= number of multi-dimensionally poor people.

Result and Discussion

Table 1: Socio Economic Characteristics Of Millet Farmers

Factor	Freq	Percentage
Gender		
Male	203	98.54
Female	3	1.46
Level Of Education		
No. Formal Education	99	48.06
Pri.Edu	68	33.01
Secondary	45	15.00
Tertiary	11	5.39
Age		
18-30	9	4.37
31-42	58	28.16
43-60	139	67.48
Mean	42.11533	
Standard Deviation	9.317885	
Land Size(Hectare)		
Small(1-5)	205	99.51
Medium(6-10)	0	00.00
Large(11-15)	0	00.00
Extra Large (>15)	1	0.49
Output(100kg bag)		
1-10	2	0.97
11-20	34	16.50
21-30	38	18.45
31&Above	20	9.71
Minimum	1.2	
Maximum	50.5	
Mean	27.51	
Total	**206**	**100.00**

Source:Researcher's Field Survey,2024.

Table 1 shows a significant disparity in the gender of the millet farmers, with majority 203 (98.54%) of the farmers as male, while only 3 (1.46%) are female.

This indicates that millet farming in Katsina State is male-dominated, this in agreement with the findings of Dawud et.al (2017).The minimal participation of women in millet farming could be attributed to various cultural, social, and economic factors. In many rural communities in northern Nigeria, traditional gender roles and cultural norms often restrict women's involvement in labor-intensive agricultural activities. Additionally, women may face limited access to essential resources such as land, farming inputs, and capital, further hindering their participation in millet farming. Household responsibilities and societal expectations may also contribute to the low female representation in this sector. This gender disparity highlights the need for gender-sensitive agricultural interventions that can promote inclusivity and equity. Empowering women through improved access to resources, training programs, and supportive policies could encourage their active participation in millet farming and enhance their contribution to agricultural development in the region, Dawud et.al (2017).

The table also reveals that a significant proportion of the respondents **99 (48.06%)** have no formal education, This suggests that almost half of the millet farmers lack basic literacy and numeracy skills, which may limit their ability to adopt to modern farming techniques, access agricultural information, or participate effectively in capacity-building programs. Supporting this, Coker, Ibrahim & Ibeziako (2018) posits that level of education influences accepting and adopting of new innovations and decision on agriculture.

A substantial percentage, **68 farmers (33.01%),** have attained primary education, representing the second-largest group. This indicates that about one-third of the farmers have basic literacy skills, which might enable them to engage with some farming innovations or training, though they may still face limitations in accessing more advanced agricultural knowledge.

Farmers with secondary education constitute **28 (13.59%)** of the total respondents. This group is better positioned to understand and adopt improved farming practices, access extension services, and utilize technology compared to those with lower educational levels. Meanwhile, only **11 farmers (5.34%)** have tertiary education, reflecting the smallest group. This minority likely has the most

potential for engaging with advanced agricultural innovations, record-keeping, and business practices in farming. Addressing this gap through adult education programs, farmer-focused training, and accessible agricultural extension services could significantly improve their capacity to adopt modern farming methods and enhance their livelihoods.

Furthermore the table reveals that the majority of the millet farmers, (67.48%) fall within the 43-60 years category, suggesting that older individuals dominate farming activities. The 31-42 years age group constitutes 28.16% of the farmers, representing a considerable portion of middle-aged participants actively engaged in farming. Meanwhile, only 4.37% of farmers are within the 18-30 years category, highlighting low participation among younger individuals. The mean age of farmers is 42.12 years, with a standard deviation of 9.32, reflecting moderate age variability within the farming population. The dominance of older individuals in farming raises concerns about the sustainability of agricultural activities, emphasizing the need for policies that encourage youth involvement through mechanization, financial support, and modern agricultural training programs.

Additionally, table 1 equally showed that, **205 (99.51%) of the 206 respondents** operate on small landholdings ranging between 1 to 5 hectares, thus demonstrating a skew toward small-scale farming in the study area which may be a result of limited access to land, traditional inheritance practices, or the fragmentation of farmland over generations (Sood et al.2019).Interestingly, there are no farmers in the **medium (6–10 hectares)** or **large (11–15 hectares)** land size categories, indicating a complete absence of moderate or large-scale millet farming operations in the sample. These small sizes of farms could be due to the fact that majority of the millet farmers acquired their farm lands through inheritance (Sood et al.2019).

This lack of middle-scale farming highlights a potential gap in the sector that could be explored through policies encouraging land consolidation or cooperative farming practices.

Only **1 farmer (0.49%)** falls into the **extra-large landholding (>15 units)** category. This outlier represents an exceptional case and underscores the disparity in land ownership among millet farmers in the region. Farmers with access to larger landholdings may have greater opportunities to scale production, adopt advanced farming technologies, and achieve economies of scale compared to their small-scale counterparts.

The dominance of small landholdings suggests that millet farming in the region is characterized by subsistence farming practices, with limited capacity for commercialization or large-scale production. This poses challenges for productivity and income generation. To address these issues, interventions such as improved access to credit, inputs, and modern agricultural practices tailored to smallholders could enhance productivity. Furthermore, programs promoting land consolidation or cooperative farming could help bridge the gap and foster a transition toward more efficient farming systems.

Lastly, from table 1, farmers producing within the **21-30 output** range constitute the largest group, accounting for **38 farmers (18.45%),34 farmers (16.50%)** fall into the **11-2** output group, suggesting that nearly one-third of the respondents produce at a lower moderate level. Combined, these two groups make up over 34% of the sample, representing the majority of millet farmers. **Only 2 farmers (0.97%)** produce between **1-10 100kg bags of millet**, highlighting a small group of farmers with minimal output. These farmers may face significant challenges such as poor access to inputs, limited land size, or inadequate farming practices, which hinder their productivity.

Conversely, farmers producing **41 bags and above** make up **20 farmers (9.71%).** This group represents the higher-performing farmers, who likely benefit from better resources, farming techniques, or larger land sizes. However, their smaller representation indicates that only a minority of millet farmers achieve high levels of productivity. This analysis shows considerable variation in output levels, with the total respondents producing between **1.2 and 50.5100kg bags,** and an average output of **27.51 100kg bags**

The wide range of outputs underscores disparities in productivity among millet farmers in Katsina State. Factors such as land size, access to inputs, farming

methods, and climatic conditions may contribute to these differences. Interventions to enhance productivity could include the provision of improved seeds, fertilizers, extension services, and training programs. Additionally, addressing challenges faced by low-output farmers could help reduce disparities and increase the overall productivity of millet farming in the region.

Table 2: Millet Farmers MPI Deprivation Indices

Indices	Frequency	Percentage
Deprivation in Mortality		
Deprived(1)	168	81.55
Not Deprived(0)	38	18.45
Deprivation in Nutrition		
Deprived(1)	113	54.85
Not Deprived(0)	93	45.15
Deprivation in Schooling		
Deprived(1)	34	16.50
Not Deprived(0)	172	83.50
Deprivation in Years of Schooling		
Deprived(1)	62	30.10
Not Deprived(0)	144	69.90
Deprivation on Living Standard		
Sanitation		
Deprived(1)	203	98.54
Not Deprived(0)	3	1.46
Cooking Fuel		
Deprived(1)	202	98.06
Not Deprived(0)	4	1.94
Deprivation in Housing		
Deprived(1)	160	53.33
Not Deprived(0)	140	46.67
Water		
Deprived(1)	198	96.12
Not Deprived(0)	8	3.88
Electricity		
Deprived(1)	128	62.14
Not Deprived(0)	78	37.86
Housing		
Deprived(1)	102	49.51
Not Deprived(0)	104	50.49
Assets		
Deprived(1)	192	93.20
Not Deprived(0)	14	6.80
TOTAL	**206**	**100**

Source: Researcher;s Field Survey,2024.Note*1=deprived,0=not deprived (Alkire &J ahan, 2018).

From the above table, about 81.55% of the millet farmers have lost children under five years of age in the previous years therefore being deprived in that indices, about 113 millet farmers are deprived nutritionally meaning that such families can't afford three basic meals per day which can be linked to the high mortality rate and deprivation for the millet farmers.

172 millet farmers enrolled their children to schools while only 34 farmers children are not enrolled, equally about 144 millet farmers have completed six years of schooling this makes them not be deprived in the schooling indicator. Although many of the farmers did not continue their education after the primary school which is likely to affect their decisions in embracing new techniques and as well allow their wards to continue their educational pursuit.

However in the standard of living indicators, the deprivations experienced by the millet farmers is disturbing, as many as 203(98.54%) of millet farmers lack access to proper sanitation or toilet facilities as they mostly use open defecation or pit latrine only 3(1.46%) farmers use safe and hygienic toilet this makes them to be prone to many sicknesses and diseases. Only 4(1.94%) farmers use clean energy (cooking gas) to cook while 202(98.06) farmers use firewood as their cooking fuel making them to be seriously deprived in these indicators.

Furthermore, about 198(96.12%) of the millet farmers lack access to safe, hygienic water for using only 8(3.88%0 of the farmers have access to safe water making them to waste a lot of time in search of water whose safety and hygienic status is not ascertained. Equally, 128(62.14%0 of the farmers maintained that they have no access to electricity in their homes, only 78(37.86%) have access to electricity in their homes. Housing indicator revealed that 102(49.51%) of the millet farmers are living in mud or clay houses while 104(50.49%) are living in block houses, only 14(6.80%) of the farmers have more than one handset while 192(93.20%) of the respondents are deprived in this indicator, thus showing a high rate of deprivation in the standard of living indicators. This aligns with national and regional poverty profiles, where rural communities that are heavily reliant on agriculture often exhibit high poverty rates due to limited access to resources, infrastructure, and markets (World Bank, 2022).

Table 3: Distribution of Farmers MPI

Variable	Obs.	Mean	Std. Dev	Min	Max
MPI (Poverty Status)	206	0.9806	0.1383	0	1
Incidence of Poverty (H)	-	0.9806	-	-	-
Deprivation Score (if MPI = 1)	206	0.5880	0.1469	0.3333	1
Intensity of Poverty (A)	-	0.5880	-	-	-
MPI Value (H * A)	-	**0.5766**	-	-	-

Source: Reseacher's output using Stata 2021 Version, 2024.

The data presented in the table reflect various aspects of poverty, including its incidence, intensity, and severity. The mean MPI value for the sampled farmers is 0.9806, indicating that most millet farmers are significantly affected by multidimensional poverty. This reflects the prevalence of extreme poverty among the farming population in the study area.This clearly shows that majority of millet farmers in the study area are severely affected by poverty and experiencing deprivations in many aspects of their lives.

Furthermore, the incidence of poverty for the farmers from the above table is 0.9806, which implies that 98.06% of the millet farmers in the study area are multi-dimensionally poor. This figure is in conformity MPI 2023 report which showed Katsina state having a poverty rate of 72.70%. This figure is alarming and it underscores the pervasive nature of poverty in this agricultural community. This high incidence of poverty reflects systemic challenges faced by the respondents which include deprivation to basic services, agricultural inputs and market constraints which traps most of the farmers in poverty.

The deprivation score, which applies to farmers identified as multidimensionally poor (MPI = 1), the average score of 0.5880 indicates that poor farmers are deprived in approximately 58.8% of the indicators used to compute the MPI. The standard deviation of 0.1469 shows some variability in deprivation levels, which may be influenced by differences in access to education, healthcare, clean water, or agricultural resources among farmers. The minimum score of 0.3333 signifies moderate levels of deprivation, while the maximum of 1 reveals that some

farmers experience deprivations across all measured indicators, reflecting a state of extreme poverty.

The intensity of poverty, represented as A, captures the average proportion of deprivations among the poor. With a value of 0.5880, this statistic aligns with the deprivation score, confirming that the poor farmers experience severe and widespread deprivations. This intensity indicates that there is need to take measures to reduce poverty in this study area, addressing poverty in this community requires comprehensive interventions that tackle multiple deprivations simultaneously. Factors such as poor infrastructure, lack of education, inadequate healthcare, and limited income-generating opportunities contribute to the high intensity of poverty.

From the table, the overall MPI calculated value is 0.5766. This composite measure combines the extent and severity of poverty, providing a holistic view of the multidimensional poverty faced by millet farmers in Katsina State. This value is in conformity with findings from (Alkire and Johan, 2018; Oyekale, 2013). The high MPI value reflects a dual challenge: not only is poverty widespread among the farmers, but it is also deeply entrenched, with individuals suffering from a significant share of deprivations.

Implications of the Analysis

From the analysis of this study, it implies that more males participate in millet farming than their female counterparts in the study area, these male farmers are producing millet on small pieces of farmlands and this further goes to affect the output they produce as it is small. This situation is justified as most of the farmers and their families are experiencing nutritional challenges.

It is an established fact that people with nutritional challenges are most likely to experience health challenges. Many of these farmers lack access to health facilities, electricity, clean water and asset. This situation makes their living standard to be very low.

The widespread incidence of poverty shows that there are systemic barriers that limit millet farmers' ability to escape poverty in the study area. Furthermore, the

high deprivation scores and intensity of poverty indicate that multidimensional poverty is pervasive across several dimensions and classes of people
Addressing these barriers requires large-scale, structural interventions in areas such as access to education, healthcare, and infrastructure.

Conclusion

The MPI analysis underscores the urgent need for multifaceted and sustained efforts to combat poverty among millet farmers in Katsina State. With nearly all farmers experiencing multidimensional poverty and facing severe deprivations, it is imperative for policymakers, development organizations, and other stakeholders to implement comprehensive poverty reduction strategies. Addressing the high incidence and intensity of poverty will not only improve the livelihoods of these farmers but also contribute to broader socio-economic development in the region.

Recommendations

Based on the findings of this study, the following are recommended;
There should be a comprehensive collaboration package between State and Local Government Areas in Katsina in the form of agricultural package that specifically targets millet production through rural agricultural agents that;

1. Educate and provide agricultural advice to millet farmers to encourage and increase the participation of youths in millet production to boost millet production in the study area.
2. The local government in collaboration with Katsina State government should embark on capacity building of the millet farmers to boost production through agricultural agents
3. Synergize and improve on the provision of basic health care clinics, sanitation and other social facilities to millet producing areas and rural farming communities as this will enhance living standard and consequently boost their productivity and reduce poverty.
4. There is need to increase women participation in millet farming in the study area, this can be done by collaboration between Local and the state

government encouraging women through awareness programmes,as well as forming agricultural groups for women like Katsina Intergrated Women Farmers And Processors Association(KIWFPA).

5. 5.Local Government through Katsina State Government (through ministry of agriculture) can provide reasonable size of land for farmers to be producing millet and pay a negligible amount as land rent for millet farming.
6. In order to increase youth participation and output, the Local Governments in collaboration with the state government (through extension workers) should provide improved millet seedlings, fertilizer and modern farming machines to the farmers in the study area.

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