Incidence, Depth and Severity of Poverty in Geidam, Yobe State, Nigeria: Foster, Greer & Thorbecke Analysis

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Abstract
This study assessed the Incidence, Depth, and Severity of Poverty in Geidam, Yobe State, Nigeria. The paper dwelled extensively on the point-in time poverty (current poverty) and the three (3) components that made it; these are: the incidence of poverty (head count ratio), Depth of poverty (poverty gap) and severity of poverty (poverty gap squared). Using a primary data (from a well structured questionnaire); The study employs a multi-stage random sampling techniques to selects 25 respondents from each of the randomly selected four wards of Geidam local government area namely; Asheikiri, Hausari, Kalgeri/Jororo, and Gumsa. Finally a total of one hundred (100) respondents/households' heads was selected for the study. Descriptive statistics of the respondents, and the Foster, Greer and Thorbecke (FGT) index analysis were used to analyze the incidence, Depth and severity of poverty in the study area. The study results reveal that: head count ratio, poverty gap and poverty gap squared in the local government area are high and stand at 63.67*%,* 28.39%, and 12.66% *respectively. The study recommends the provision of comprehensive and integrated safety nets to the study area, in order to build their capacities and increase their incomes for smooth growth and development.*
Keywords: Poverty incidence, Poverty depth, Poverty severity, FGT Index, Geidam, Nigeria.

Introduction

Poverty is a global phenomenon whose impact is multi-dimensional; it touches the economic, social, political, psychological and physical aspects of human endeavors. And it is found in almost all communities of the world, if poverty were to be sighted as a visible object, it would definitely appear horrific, devastating and unpleasant in all ramifications (Sani, 2017).

Poverty in its most general sense is the lack of necessities. Basic food, shelter, medical care, and safety are generally thought necessary based on shared values of human dignity. However, what is a necessity to one person is not uniformly a necessity to others (Bradshaw, 2006). Needs may be relative to what is possible and are based on social definition and past experience (Sen, 1999). Valentine (1968) says that "the essence of poverty is inequality. In slightly different words, the basic meaning of poverty is relative deprivation." A social (relative) definition of poverty allows community flexibility in addressing pressing local concerns, while objective definitions allow tracking progress and comparing one area to another. The most common "objective" definition of poverty is the statistical measure established by the federal government as the annual income needed for a family to survive. The "poverty line" was initially created in 1963 by Mollie Orshansky at the U.S. Department of Agriculture based on three times her estimate of what a family would have to spend for an adequate but far from lavish diet. According to (Darby, 1997) the very definition of poverty was political, aimed to benchmark the progress of poverty programs for the War on Poverty. Adjusted for inflation, the poverty line for a family of four was $17,050 income in 2000 according to the US Census. Most poverty scholars identify many problems with this definition which is related to concepts of family, cash income, treatment of taxes, special work related expenses, or regional differences in the cost of living (Blank, 1997 and Quigley, 2003).

Because of the importance attached to poverty and its devastating effects. One hundred and eighty nine (189) countries ganged up under the auspices of United Nations (UN) Sustainable Development Goals (SDGs) in singly out and targeted the ending of poverty in all its forms everywhere from December 2015 to December 2030. "The ending of poverty" comes first among the seventeen (17) goals of SDGs. (SDGs Booklet, 2017).

The aim of this paper is to dwelled extensively on the point-in time poverty (current poverty) and three (3) components that made it; these are: the incidence of poverty (head count ratio), Depth of poverty (poverty gap) and severity of poverty (poverty gap squared) in Geidam local government area of Yobe state, Nigeria and the paper is restricted to Geidam LGA. $2.00 per day was also chosen as poverty line for this study. The rest of the paper is separated into: Literature review, Methodology, Discussions of results, and Conclusions/policy implications.

The Three Components of FGT poverty index Measures

***Headcount Index*:** By far, the most widely used measure is the headcount index, which simply measures the proportion of the population that is counted as poor, often denoted by P_0. The greatest virtues of the headcount index are that it is simple to construct and easy to understand. These are important qualities. However, the measure has at least three weaknesses: First, the headcount index does not take the intensity of poverty into account. Second, the headcount index does not indicate how poor the poor are, and hence does not change if people below the poverty line become poorer. As a welfare function, the headcount index is unsatisfactory in that it violates the transfer principle (Ravallion, 1996).

***Poverty Gap Index*:** This measures the mean proportionate poverty gap in the population (where the non-poor have zero poverty gap). Some people find it helpful to think of this measure as the minimum cost of eliminating poverty (relative to the poverty line), because it shows how much would have to be transferred to the poor to bring their incomes or expenditures up to the poverty line (as a proportion of the poverty line). The minimum cost of eliminating poverty using targeted transfers is simply the sum of all the poverty gaps in a population; every gap is filled up to the poverty line. However, this interpretation is only reasonable if the transfers could be made perfectly efficiently, for instance, with lump sum transfers, which is implausible. Clearly, this assumes that the policy maker has a lot of information. One should not be surprised; to find that a very "pro-poor" government would need to spend far more than this in the name of poverty reduction (Ravallion, 1996).

Squared Poverty Gap (Poverty Severity) Index: This is simply a weighted sum of poverty gaps (as a proportion of the poverty line), where the weights are the proportionate poverty gaps themselves. The measure implicitly puts more weight on observations that fall well below the poverty line. An important aspect in poverty analysis is the setting of poverty lines below which persons are considered to be poor and above which they are not poor. The food component of the poverty line is divided by some estimate of the budget share devoted to food to obtain the overall poverty line. The non food component is then got by taking the difference between the overall and the food poverty lines. The problem here is that the determination of the budget share devoted to food is likely not to be a transparent process (Ravallion, 1998).

Empirical Review

The empirical literatures are based on the Foster, Greer and Thorbeck **(**FGT) index (1984) class of decomposable poverty indices methodologies of analysis. Some of the studies that used FGT index in Nigeria and elsewhere around the world are: Adepoju and Yusuf (2012), Gowon, Moses and Stephen (2013), Cletus (2014), Sani (2017), Ayehu (2005), and Farah (2016).

Adepoju and Yusuf (2012) assessed Poverty and Vulnerability in Rural South-West Nigeria. The study investigates poverty in rural South-West Nigeria (SWN). Primary data were collected from 582 rural households in a two-wave panel survey employing a multi-stage sampling technique. The data were analyzed using; Foster, Greer and Thorbecke (FGT) poverty measure; the incidence of poverty as 35.0% and 43.6% for the first and second periods. Poverty lines of N3313.57 and N4093.21 were estimated for the two periods, respectively.

Gowon, Moses and Stephen (2013), in their study Determinants of Households' Poverty and Vulnerability in Bayelsa State of Nigeria analyzed household poverty and vulnerability to poverty in Bayelsa state of Nigeria using National Bureau of Statistic 2009-10 NLSS data. A poverty line of N22393.62 was constructed. Results from FGT model showed poverty incidence, gap and severity to be 25, 14.26 and 8.6 percents respectively.

Cletus (2014) studied Poverty and Welfare Status of Households in Easter Senatorial District of Kogi State, Nigeria. The study advances to find out the welfare status and poverty situation of households in Eastern Senatorial District of Kogi State. The analysis of data was done by Foster, Greer, Thorbeck (FGT) poverty analysis. The result shows that the average poverty for instance increases by 23.3% of those above poverty line.

Sani (2017), critically assesses the 'households' degree of vulnerability to poverty in Yobe State, Nigeria. He employs the purposive and multi-stage random sampling techniques to select 300 respondents from the three local government areas of the state namely; Damaturu, Geidam, and Potiskum (100 respondents per local government). A descriptive statistics for socio-economic characteristics of the respondents, and the Foster, Greer and Thorbecke (FGT) index analysis were used to analyse the incidence of poverty in Yobe State. The results revealed that: poverty incidence (head count ratio) in the state is high and stands at 63%. The study need to be further singled out one local government (Geidam) for an in-depth study on all the three (3) components of point in time poverty.

Ayehu (2005) assessed the Rural Poverty Situation and Determinants: The case of Kersa Kondaltity Woreda, South West Shewa, Ethiopia. The food and total poverty lines were found to be Birr 649.87 and 838.65/adult/annum respectively. A foster, Greer and Thorbecke (FGT) index analysis were used to analyse the incidence, depth and severity of food poverty of poverty. The result shows that for total poverty were found to be 45.5, 27.2 and 9.9 percent.

Farah (2016) presents a study Dimensions and Determinants of Poverty in Agro-Pastoral Households of Kabribayah District, Fafan Zone, Somali Regional State, Ethiopia. A FGT index was used. The FGT poverty index revealed that nearly 52% of the sample households live below poverty line with poverty gap and poverty severity index of 0.1456 and 0.0462, respectively.

From the foregoing reviews it is evident that there are few literatures fully containing incidence, depth, and severity of poverty in Nigeria and relatively very few in the study area. While the works reviewed above provide guides, this study will make attempts in filling the gaps on such information in this part of the country (Geidam, Yobe state).

Methodology

The Study Area

Geidam is one of the seventeen (17) Local Government Areas of Yobe State, Nigeria. Its headquarters is in the town of Geidam. Geidam is located in the northwest of the area and the geographical identities are: 12°53′49″N 11° 55′49″E12.89694°N 11.93028°E. With an area of 4,357 km² and a 157,295 population based on the 2006 population and housing census. Geidam is 184KM away from Damaturu, the Yobe state capital and shares common Border with Yunusari and Bursari Local Government Areas in Yobe state, Mobbar Local government area of Borno state and also shared an international border with the Niger Republic. The predominant tribes are: Kanuri, Hausa, Badawi and Fulani. The major occupations of the people are: Farming (both raining and irrigation), animal husbandry/rearing, fishing, trading and merchandized (NBS, 2006).

Sampling Techniques and Sample Size

The study employed a multistage random sampling technique to select the sampled respondents. The first stage was the stratified sampling technique to select two (2) wards each from Geidam town and Geidam village. The second stage was the random selection of two (2) wards each from the two strata in first stage. These produced four (4) wards of; Asheikri, Hausari, Kalgeri/Jororo, and Gumsa out of the eleven (11) wards of Geidam LGA. The third stage employed the random selection of twenty-five (25) household heads as respondents. The process produced an equal number of respondents from each of the 4 wards randomly selected. Then a total of one hundred (100) respondents/households' heads was selected. The data source for the study was aided through the use of a well structured closed-ended questionnaire.

Foster, Greer and Thorbeck (FGT) Index Poverty Analysis

One poverty measure that has been found manageable in presenting information on the poor in an operationally convenient manner is the Foster, Greer and Thorbeck **(**FGT) index measure developed by (Foster, Greer and Thorbeck, 1984). The FGT measure helps quantify three (3) well known elements of poverty, namely; incidence (head count ratio), depth (poverty gap) and severity of poverty (poverty gap squared) (Nelima, 2013). The index is defined as:

$$P_\alpha = \frac{1}{n} \sum_{i=1}^{m} \left(\frac{Z - y_i}{Z} \right)^\alpha , \alpha \geq 0$$

Where;

z =Poverty line

m = Number of households below poverty line

n= Number of households in the reference population/total sampled population

y_i= Per adult equivalent expenditure of i^{th} household in time period t/the average income of poor households per day

α =Poverty aversion parameter

Z- y_i = Poverty gap of the i^{th} household in time period t

$\frac{Z - y_i}{Z}$ = Poverty gap ratio at time period t

α = FGT index and takes the values of 0, 1 or 2.

If Pα is substituted by P_0, P_1 or P_2, then it is used for measuring incidence, depth and severity of poverty in the state respectively.
Here: Pα = Po and Z =$2 per head per day (i.e ₦800 per day) Poverty line (Sani, 2017).
In order to examine the incidence (head count ratio), depth (poverty gap), and severity (poverty gap squared) of poverty in Yobe State of Nigeria; the Foster, Greer and Thorbeck **(**FGT) index (1984) was used. In doing so, the values of: n, m, and yi derived by using FGT index formula

Results Analysis and Discussions

Table 1: Descriptive statistics of the respondents

Variables	Obs.	Mean	SD	Min	Max
Gender	100	0.68	.46725	0	1
Age	100	33.923	10.028	24	51
Household size	100	7.4133	4.6325	3	16
Occupational status	100	2.1067	1.0735	1	5
Dwelling type	100	2.37	1.2774	1	5
Credit facility	100	0.5967	.49138	0	1
Membership of clubs	100	0.4467	.49797	0	1
Monthly food expenses	100	221163.31	13808	10,000	51,000
Monthly income	100	25071.67	16398	10,000	51,000

Source: Field survey, (2017).

Table 1 above depicts a descriptive statistics of some selected socio-economic characteristics of the respondents. It indicates that the average age of the respondents is 34years (active age). The study also revealed that the household size average distribution stand at seven (7). The study further revealed that civil servants are of the average. The average monthly estimated income of the respondents is ₦25,072 and this depicts that are low income earners.

Table 2: Computation of Values for measuring incidence of poverty in Geidam, Yobe State

LGA	n	m	yi (₦)
Geidam	100	62	497.04

Source: Field Survey, (2017).

From the computations on Table 2, it is evident that the adult per day average expenditure of the study area stands at ₦497.04. This indicates that the average income of poor households may be accounted due to slowdown of economic activities resulting from the Boko haram insurgency. Column 3 of Table 2 is translated into Table 3; Table 4; and Table 5 to capture the incidence, depth, and severity of poverty respectively in the Geidam LGA of Yobe State more clearly.

Table 3: Incidence of poverty (%) Geidam, Yobe State

LGA	Poor	Non-poor
Geidam	62	38

Source: Computed from table 2

Table 3 reveals that the incidence of poverty in Geidam stands at 62%. That is 62% of the respondents are poor at on set. The reason for this variance is the fact that Geidam is one of the many LGAs seriously affected by Boko haram insurgency in the north eastern corner of Nigeria. To capture the incidence of poverty in the Geidam, the FGT index is computed as follows:

$$P_\alpha = \frac{1}{n} \sum_{i=1}^{m} \left(\frac{Z - y_i}{Z} \right)^\alpha , \alpha \geq 0$$

Where:
α=0 for incidence (head count ratio) of poverty
m=62 as captured in the responses as those below $2 per day (₦800) poverty line (Sani, 2017).
n=100 as the total number of respondents
yi=₦497.04 which is the average income of poor households of the respondents per day

$$P_0 = \frac{1}{100} \sum_{i=1}^{62} \left(\frac{800 - 497.04}{800} \right)^0$$

$$P_0 = \frac{1}{100} (62)(1)$$

$$P_0 = \frac{62}{100}$$

P_0=0.62× 100%
P_0=62%

From the above computation, Table 3 was extracted.

Table 4: Depth of poverty (%) in Geidam local government Area of Yobe State

LGA	Poor	Non-poor
Geidam	23.48	76.52

Source: Computed from table 2

Table 4 reveals the depth of poverty (poverty gap) in Geidam. The depth stands at 23.48%. The reason for this variance is in tandem with the incidence of poverty.
To capture the depth of poverty (poverty gap) in the state, the FGT index is still computed with the substitution Pα =1 as follows:

$$P_\alpha = \frac{1}{n} \sum_{i=1}^{m} \left(\frac{Z - y_i}{Z} \right)^\alpha , \alpha \geq 0$$

Where:
α=1 for depth (poverty gap) of poverty
m=62 as captured in the responses as those below $2 per day (₦800) poverty line.
n=100 as the total number of respondents
yi=₦497.04 which is the average income of poor households of the respondents per day

$$P_1 = \frac{1}{100} \sum_{i=1}^{62} \left(\frac{800 - 497.04}{800} \right)^1$$

$$P_1 = \frac{1}{100} (62)(0.3787)$$

$$P_1 = \frac{62}{100} (0.3787)$$

P_1=0.62(0.3787)
P_1=0.234784×100%
P_1=23.48%

From the above computation, Table 4 was extracted.

Table 5: Severity of poverty (%) in Geidam local government Area of Yobe State

LGA	Poor	Non-poor
Geidam	8.89	91.11

Source: Computed from table 2

Table 5 reveals that the severity of poverty (poverty gap squared) in Geidam is 8.89%. The reason for this variance is also in consonance with the reasons as at the incidence and depth of poverty respectively.

To capture the severity of poverty in Geidam, the FGT index is still computed as follows:

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{m}\left(\frac{Z-y_i}{Z}\right)^\alpha, \alpha \geq 0$$

Where:
α=2 for severity (poverty gap squared) of poverty
m=62 as captured in the responses as those below $2 per day (₦800) poverty line
n=100 as the total number of respondents
yi=₦497.04 which is the average income of poor households of the respondents

$$P_2 = \frac{1}{100}\sum_{i=1}^{62}\left(\frac{800-497.04}{800}\right)^2$$

$$P_2 = \frac{1}{100}(62)(0.3787)^2$$

$$P_2 = \frac{62}{100}(0.14341369)$$

$$P_2 = 0.62(0.14341369)$$

$$P_2 = 0.088916 \times 100\%$$

$$P_2 = 8.89\%$$

From the above computation, Table 5 was extracted.

Table 6: Incidence, Depth and Severity of poverty (%) in Geidam, Yobe State

LGA	Incidence of poverty FGT α=0 ×100 (Head count ratio)	Depth of poverty FGT α=1×100 (Poverty gap)	Severity of poverty FGT α=2×100 (Poverty gap squared)
Geidam	62	23.48	8.89

Source: Field Survey, (2017).

5 Conclusions

The study examined the Incidence, Depth, and Severity of Poverty in Geidam local government area of Yobe State, Nigeria. Using the FGT Poverty index Approach developed by Foster, Greer and Thorbeck (1984). The paper dwelled extensively on the point-in time poverty (current poverty) and the three (3) components that made it; these are: the incidence of poverty (head count ratio), Depth of poverty (poverty gap) and severity of poverty (poverty gap squared) in the study area. The study further employs a multi-stage random sampling techniques and a primary data from well structured questionnaires to selects 100 respondents from the four wards of Geidam local government areas. However, a descriptive statistics of some selected socio-economic characteristics of the respondents, and the Foster, Greer and Thorbecke (FGT) index analysis were used to analyze the incidence, Depth and severity of poverty in Geidam LGA. The results reveal that: head count ratio, poverty gap and severity of poverty in the LGA is high and stands at 62%, 23.48%, and 8.89% respectively. The result is in conformity with those of: Ayehu (2005),

Adepoju and Yusuf (2012), Farah (2016) and Sani (2017), who found that the incidence of poverty in Nigeria is high. These results suggest that the Incidence, Depth, And Severity of Poverty in Geidam LGA of Yobe State, Nigeria is high and indeed a course for worried and concern.

Recommendations and Policy Implications

The research recommends that a provision of safety nets, such as compulsory and free education, health facilities, better housing (low cost), pipe borne water, sustainable environmental sanitation, free or subsidized farm inputs of (hybrid seeds, fertilizers, herbicides, pesticides, insecticides, and farm tools or implements) to the study area. These will build their capacities; increase their incomes toward raise in aggregate demands and multiplier effects.

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