

Income Poverty and Inequalities in Northern Region of Ghana

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Abstract: The standard of living in any country is largely determined by means of Poverty and inequality indicators. This study relied on poverty and inequality indicators to assess living standards of people in Northern Region of Ghana using the Ghana Living Standards Survey Round 7 data. The study showed that the standards of living in the Northern Region is below the national average, comparing the ARPT of GHC1,779.48 to the national ARPT value of GHC2,429.11 and RMPG of 65% while the national RMPG is 72%. The ARPR of 37% is just below the national ARPR of 38%, which shows an improvement in reduction of the percentage of poor people in Northern Region. The Gini coefficient for Northern Region (0.6746) is slightly low compared to the national Gini coefficient of 0.7038 indicating an improvement in the distribution of income in the Region. The Tamale Metropolis which is the administrative capital of Northern Region with a value of GHC4,582.08, has the most At-Risk-of-Poverty Threshold, while the West Gonja District has the smallest value of GHC618.54. Poverty was high in Karaga and Savelugu-Nanton districts, with ARPRs of 43% and 42%, respectively. The Saboba and Chereponi Districts have the lowest poverty rates in the Northern Region with ARPR of 16% and 27% respectively. The East Mamprusi District has the highest Gini coefficient value of 0.72 and the Bole District has the lowest rate of disparities in the Northern Region with a 0.41 Gini coefficient. Therefore, in order to improve the livelihood and standards of living in the Northern Region, there is the need to improve education and capacity building for all people in the Region.

Keywords: Poverty, Poverty Indicators, Inequality Indicators, Northern Region, Income

1 Introduction

Poverty means lacking enough resources to provide the fundamental needs for survival including nutrition, shelter, beverages, clothes, the absence of education, transportation and so on [1].

The basic poverty level is used to determine what constitutes absolute poverty. An individual is considered to be in poverty if his/her income is less than the national poverty level. It comprises the inability to provide for physical and social wellness of a person in terms of access to amenities like sanitization, education, medical treatment, information, as well as the fundamental needs for existence such as foods, beverages, clothes, and housing [2, 3].

Relative Poverty is the situation in which an individual does not have the minimum quantity of income necessary to sustain their level of life in their community. The people who are unable to sustain the expected standard of living in society are regarded as being impoverished because they are much less fortunate than the other members of the society [2].

Most of the time, individuals desire to flee poverty. Consequently, it performs the function of a catalyst for the rich and those in need to take action to alter the circumstance so that others can have access to nutrition, a place to live, health care, education, and a say in local affairs. Poverty has many causes, and each one of those causes and its effects are unique. Depending on the circumstances, poverty varies greatly. Living in poverty in Ghana or the UK is not the same as in the United States. Within a nation, the disparities between the rich and the poor can likewise be substantial [4].

Inequality refers to unequal distribution of necessities of life like money, resources, education, well-being, food, geography, politics, and cultural identity. The monetary and material aspects of inequality are the main topics of concern for economists, but there is also inequality in abilities, academic achievement, life-years, welfare, and assets to the list of non-income inequality characteristics [5].

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Ghana is acknowledged as a stable, well-run developing nation with reasonably advanced institutional capabilities that promote human rights. After averaging more than 7% annual economic growth since 2005, Ghana attained lower-middle income nation status in 2010, 2011 saw the beginning of the flow of revenue from offshore oil reserves uncovered in 2007, double-digit economic growth was recorded. This occasioned a sharp drop in financial poverty, which went from 51.70% of the population in 1992 to 24.20% of the population by 2013. Whilst Ghana achieved the MDG goal 1, inequality worsened with a change in Gini index from 37.00 in 1992 to 42.30 in 2013 as growth has sped up [6].

In comparison to other Sub-Saharan nations, Ghana cannot yet be classified to have a significant degree of inequality. The wealthiest 20% of the population controlled nearly half of Ghana's revenue by 2006, while the lowest 20% saw their proportion income of the country fell from 6.9% to 5.2% [7]. The disparity between the north and the south of the nation appeared to have gotten worse. For instance, between 1999 and 2006, rural areas in the north contributed more to the poverty levels of the nation than urban areas (from 37% to 49%), and those residing in the Upper West, the poorest region, experienced an increase in poverty between the 1990s and 2006 [3].

Analysis of household living conditions from 2006 showed that these heightened inequality levels had a negative influence on efforts to reduce poverty and impoverished people saw slow rates of growth. Since then, the slow but steady growth of the economy of Ghana has been an expansion of oil production, quick urbanization, and a number of economic crises, such as the global financial crisis, increases in food prices, and, more recently, increases in utility and fuel prices as a result of the removal of government subsidies. There is a lot of conjecture that the distance between the rich and the poor has expanded and also the pace of eradicating hardship has dramatically slowed in recent years. The fact that some groups have profited disproportionately more from Ghana's growth while other groups have received smaller benefits in big pockets in frequently rural, northern areas raises additional concerns [8].

Data on non-financial indices also point to a widening of inequality. For instance, between 2006 and 2011, the disparity between affluent and poor countries' child mortality rates doubled [9, 10]. Children in wealthy groups are two times more likely to survive today than those in poorer groups. More and more evidence point to the possibility that rising inequality can have a variety of detrimental effects on development of a nation, particularly on economic growth, political and social stability, and social cohesion [9, 6].

Economic growth is linked to a decline in poverty, according to a study of six African nations, namely Côte d'Ivoire, Ethiopia, Ghana, Kenya, Nigeria, and Tanzania. Except Côte d'Ivoire, all the countries saw a decrease in the prevalence of poverty. One important finding is that poverty changes brought on by inequality and economic growth have the opposite signs. Accordingly, economic expansion decreased poverty while increasing inequality across all nations [11].

Urban localities have mean annual household incomes that are consistently greater than the national average whilst the rural localities are far lower than the national average. This study seeks to assess the poverty and inequality situation in the Northern Region of Ghana using the Ghana Living Standards Survey round seven (GLSS7) data.

2 Methodology

2.1 Poverty indicators

2.1.1 Quantile

According to [12], The definition of a quantile is;

$$Q_{\alpha} = y_k - 1 + (y_k - y_{k-1})[\alpha N - (k - 1)] \quad (1)$$

Where $\alpha N < k \leq \alpha N + 1$. The quantile's sample estimate is expressed as;

$$\hat{Q}_{\alpha} = y_{k-1} + (y_k - y_{k-1}) \left(\frac{\alpha \hat{N} - \hat{N}_{k-1}}{w_k} \right) \quad (2)$$

An α -order quantile's linearized variable is provided by

$$\hat{z}_k^{Q_{\alpha}} = -\frac{1}{f(\hat{Q}_{\alpha})} \frac{1}{\hat{N}} \left[\mathbf{1}_{[y_k \leq \hat{Q}_{\alpha}]} - \alpha \right] \quad (3)$$

In order to estimate the poverty indicators, the quantile estimates (2) and (3) were utilized.

2.1.2 Median Income and At-Risk-of-Poverty Threshold

Assume that the projected median income for the sample is $\hat{m} = \hat{Q}_{0.5}$, at 60% of the median income, the At-Risk-of-Poverty Threshold (ARPT) is given by

$$ARPT = 0.6F^{-1}(0.5) \quad (4)$$

Estimated by

$\widehat{ARPR} = 0.6\widehat{Q}_{0.5} = 0.6\widehat{m}$. This is a totally scale-dependent metric. The linearized variable of ARPT is inversely related with the median income given by

$$\begin{aligned} \hat{z}_k^{ARPT} &= I(ARPT)_k \\ &= 0.6I(MED)_k \\ &= -\frac{0.6}{f(\widehat{m})} \frac{1}{N} [1_{[y_k \leq \widehat{m}]} - 0.5] \end{aligned} \quad (5)$$

2.1.3 At-Risk-of-Poverty Rate

This is the number of persons with an income less or equal to the ARPT, where $ARPR \in [0, 1]$ defines the share of the population with an income below the ARPT: $ARPR = F(ARPT)$. It is also scale-dependent. The sample estimate is given by

$$\widehat{ARPR} = \frac{\sum_{y_k \leq \widehat{ARPT}} w_k}{N} \quad (6)$$

[13] defined the linearized variable of the $ARPR$ as

$$\begin{aligned} \hat{z}_k^{ARPR} &= \frac{1}{N} (1_{[y_k \leq \widehat{ARPT}]} - \widehat{ARPR}) - \frac{f(\widehat{ARPT})}{f(\widehat{m})} \frac{0.6}{N} (1_{[y_k \leq \widehat{m}]} - 0.5) \\ &= \frac{1}{N} (1_{[y_k \leq \widehat{ARPT}]} - \widehat{ARPR}) + f(\widehat{ARPT}) \hat{z}_k^{ARPT} \end{aligned} \quad (7)$$

2.1.4 Median Income of People below the ARPT

The average revenue of those living in poverty is $m_p = F^{-1}(1/2F(ARPT))$. Despite being calculated in the same manner as any other quantile, the precise meaning could vary [14]. [13] specified the m_p linearized variable as follows in terms of the ARPR:

$$\hat{z}_k^{m_p} = \frac{1}{f(\widehat{m}_p)} \frac{\hat{z}_k^{ARPR}}{2} - \frac{1}{N} (1_{[y_k \leq \widehat{m}_p]} - F(\widehat{m}_p)) \quad (8)$$

2.1.5 Relative Median Poverty Gap

The difference between the ARPT and the median income of those who live below it is known as the relative median poverty gap (RMPG). The income of all "poor" people is equal to the ARPT if $RMPG = 0$, and $RMPG = 1$ if the income of all "poor" people is zero. It evaluates the level of poverty among those classified as "poor"; $RMPG = \frac{ARPT - m_p}{ARPT}$ (9)

[3].

The RMPG's linearized variable is defined as;

$$\hat{z}_k^{RMPG} = \frac{\widehat{m}_p \hat{z}_k^{ARPT} - ARPT \hat{z}_k^{m_p}}{ARPT^2} \quad (10)$$

[13].

2.2 Inequality indicators

According to [15], inequality indicators can be used to assess inequality both within and between groups. [16] found that data on inequality is limited due to survey coverage and unequal data collection across countries. Dispersion of deciles are the easiest way to assess inequality through ratios, which rank the population from poorest to richest and display the percentage of spending (or income) due to each fifth (quintile) or tenth (decile) of the population. These indicators are important for understanding inequality and policy implications. The following are the definitions of the inequality indices considered in this study.

2.2.1 The Lorenz Curve

The Lorenz curve symbolizes complete income equality in society. It describes the distribution of income in a given

society. In other words, the income inequality decreases when the Lorenz curve approaches the diagonal. Contrarily, the higher the growth in income disparity, the further the Lorenz curve deviates from the diagonal. The diagram in figure 1 below is an illustration of a Lorenz curve graph.

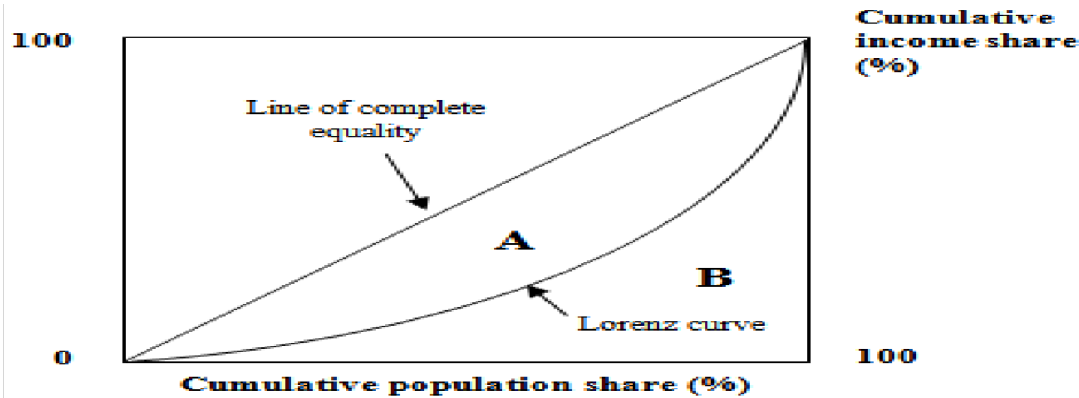


Fig. 1: Lorenz Curve

2.2.2 The Gini Coefficient

The Gini index is computed by dividing Area A, which is between the Lorenz curve and the line of total equality, by the sum of Areas A and B. If everyone earned the same amount of money (full equality), the Lorenz curve and the line representing it would merge, and the Gini coefficient would be 0. But in the case of complete inequality, the Lorenz curve would pass through the points (0, 0), (100, 0), and (100, 100), and the surfaces A and B would be equivalent, leading to a Gini coefficient of one.

3 Results and Discussion

3.1 Estimates of Poverty Indicators

The ARPT of Ghana is 0.38 with a standard error of 0.28198. Details of the results are contained in Table 1 below.

Table 1: Estimated poverty indicators of Ghana

Poverty indicator	Estimates (GHC)	Standard Error
ARPT	2,429.11	0.26432
ARPR	0.38	0.28198
RM PG	71.64	1.28635
MEDP	688.90	0.31078

The ARPT is GH2, 429.11, the median income of all impoverished Ghanaians deviates from it by 28.36%. With a median income of GH688.90, 38% of the population is considered to be living below the ARPT.

Table 2: Estimates of poverty indicators for Northern Region

Poverty indicator	Estimate (GHC)	Standard Error
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ARPT	1779.48	0.07178
ARPR	0.37	0.00044
RMPG	64.84	0.00430
MEDP	625.73	0.08452

As seen in Table 2, the Northern Region has ARPT of GH¢1,779.48 (0.07178), ARPR of 37% (0.00044), RMPG of about 65% (0.00430) and MEDP of GH¢625.73 (0.08452).

Table 3: District estimates of poverty indicators for Northern Region

District	Poverty Indicator				
	ARPT	ARPR	RMPG	MEDP	
Bole		894.49	0.2938	93.09	61.82
Sawla/Tuna/Kalba		1479.06	0.3076	102.57	-38.00
West Gonja		618.54	0.3146	93.72	38.84
Central Gonja		1972.34	0.3684	76.28	467.91
East Gonja		1074.29	0.3672	62.99	397.64
Kpandai		1167.28	0.3271	108.22	-95.78
Nanumba South		2290.78	0.3914	45.64	1245.16
Nanumba North		2478.77	0.4026	44.8	1368.35
Zabzugu Tatale		1549.24	0.335	69.68	469.78
Yendi		1457.17	0.3352	60.95	568.97
Tamale		4582.08	0.4059	79.07	958.82
Tolon Kumbungu		3449.45	0.345	63.27	1266.83
Savelugu Nantong		2118.11	0.4204	45.58	1152.62
Karaga		1195.78	0.432	39.9	718.71
Gushiegu		722.4	0.3663	71.99	202.37
Saboba		1260.75	0.162	46.39	675.86
Chereponi		832.5	0.2672	96.5	29.26
Bunkpurugu Yonyo		1144.68	0.312	77.49	257.65
East Mamprusi		1097.21	0.37	61.77	419.42
West Mamprusi		1483.88	0.3197	63.98	534.48

From Table 3, West Gonja district has the least ARPT of GH¢618.54 followed by the Gushiegu district with a value of GH¢722.40 whilst Tamale metropolis has the highest ARPT of GH¢4,582.08 followed by the Tolon-Kumbungu district with a value of GH¢3,449.45. These two districts also have high RMPG values, with Tamale Metropolis having 79% RMPG and Tolon-Kumbungu district with 63% RMPG. The Saboba and Chereponi districts have the lowest poverty rate in the Northern Region, with the Saboba district having the smallest ARPR of 16% followed by the Chereponi district with a value of 27%. Whilst the Kpandai and Sawla/Tuna/Kalba districts have high ARPT of GH¢1167.28 and GH¢1479.06 respectively, the median income of all poor people in the Kpandai district differ from the ARPT by 9% and the median income of all poor people in the Sawla/Tuna/Kalba district differ from the ARPT by 7%. Also, The Karaga district has the highest ARPR of 43% followed by the Savelugu-Nantong district with 42%. The Karaga and Savelugu-Nantong districts also have high ARPT of GH¢1195.78 and GH¢2118.11 respectively.

The Gini coefficient estimate and the Lorenz curve graph below shows the distribution of income in Ghana.

3.2 Estimates of Inequality Indicators

Table 4: Gini coefficient estimate for Ghana

Inequality indicator	Estimate	Standard Error

Gini coefficient	0.7038	0.00635
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From Table 4, The Gini coefficient estimate for Ghana is 0.7038 with a standard error of 0.00635.

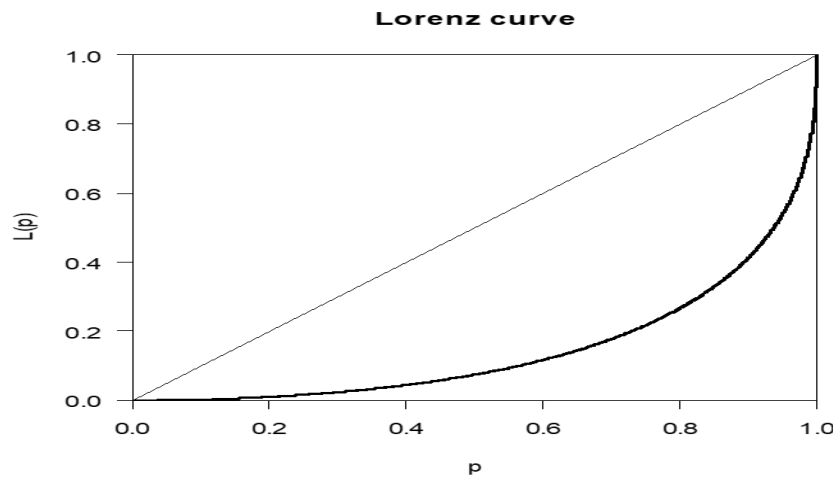


Fig. 2: Lorenz Curve for Ghana

Figure 2 presents the Lorenz curve for Ghana. It describes how the distribution of income actually is in a given society. In other words, the income inequality decreases as the Lorenz curve gets closer to the diagonal. In contrast, the farther the Lorenz curve deviates from the diagonal, the larger the growth in income disparity. The Lorenz curve in Figure 2 moves far away from the diagonal.

Estimates of inequality indicators for Northern Region

The Gini coefficient estimate and the Lorenz curve graph below shows the distribution of income in Northern Region.

Table 5: Gini coefficient estimate for Northern Region

Inequality indicator	Estimate	Standard Error
Gini coefficient	0.6746	0.01720

From Table 5, the Gini coefficient estimate for Northern Region is 0.6746 with a standard error of 0.01720.

Figure 3: Lorenz Curve for Northern Region

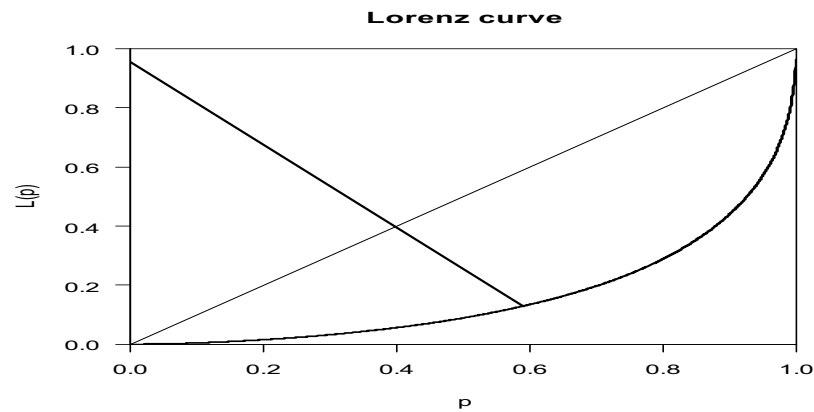


Figure 3 gives a graphical representation of the distribution of income in the Northern Region with a Gini coefficient value of 0.6746.

Estimates of inequality indicators for Districts in Northern Region

The Gini coefficient estimates below shows the distribution of income in the districts of the Northern Region

Table 6: Gini coefficient estimates for the Districts in Northern Region

District	Gini coefficient	Standard Error
Bole	0.40755	0.04293
Sawla/Tuna/Kalba	0.5672	0.07568
West Gonja	0.60647	0.08609
Central Gonja	0.66829	0.05845
East Gonja	0.50624	0.02813
Kpandai	0.51681	0.04673
Nanumba South	0.67185	0.06184
Nanumba North	0.55831	0.03612
Zabzugu/Tatale	0.52443	0.04910
Yendi	0.62784	0.03102
Tamale	0.67054	0.03935
Tolon/Kumbungu	0.64206	0.08412
Savelugu/Nantong	0.71337	0.04602
Karaga	0.43269	0.03842
Gushiegu	0.52509	0.02838
Saboba	0.52194	0.06601
Chereponi	0.62529	0.06355
Bunkpurugu/Yunyoo	0.64887	0.08229
East Mamprusi	0.71699	0.04077
West Mamprusi	0.65689	0.03907

As can be seen from Table 6, in terms of inequality at the district level, the East Mamprusi district has the highest Gini coefficient estimate of 0.72 followed by the Savelugu-Nantong district with an estimate of 0.71. The Tamale Metropolis being the Regional Capital and the most populated city in the Northern Region has a Gini coefficient value of 0.67054.

The Bole district has the lowest rate of inequality in the Northern Region with Gini index of 0.41 followed by the Karaga district with a Gini coefficient of 0.43.

3.3 Discussion

The study sought to evaluate the income poverty in Northern Region using poverty and inequality indicators for Northern Region of Ghana. Consequently, the poverty and inequality indicators for the districts in the Northern Region were computed. Data for this study were obtained from the Ghana Living Standards Survey Round 7 with a sample size of 16,772 used for computing the national indicators whilst a sample size of 1,702 was used for computing indicators for Northern Region.

With only a slight increase in income disparity, Ghana saw a major drop in poverty, cutting the rate by half to meet the first Millennium Development Goal. In 1991, the poverty rate in Ghana was 47.40% at \$1.90 in Purchasing Power Parity (PPP) per person per day. At \$1.90, the poverty rate in Ghana decreased to 13.3% in 2016, which was lower than both the region's average and that of middle-income countries. Ghana saw the largest decrease in poverty between 1991 and 1998. Since then, both the rate of poverty reduction and the elasticity of poverty to growth have dramatically decreased [17].

Poverty started to become more and more of a northern occurrence in 2005. The three northern regions made up only 18% of the country's population in 2018, despite housing 25% of the nation's poor people between 1991 and 1998. Due to the dramatic decline in poverty in southern and central Ghana in 2005, the northern region of the country had a 44% increase in the percentage of the poor, or nearly one in every two poor people living there. However, only 17% of the population was residing there at the time. Due to the northern regions' strong performance in 2012, the percentage of the poor reduced to 40% [18].

In the early 2000s, the Volta region and the three northern regions (Northern, Upper East, and Upper West), experienced increased spatial inequality and poverty and vulnerability concentration. The percentage of severe poverty in Greater Accra declined from 5.20% to an insignificant proportion between 2005 and 2016, whereas it decreased in the Upper West region, from 76% to just 45.2%. The discrepancies in service delivery and ecological circumstances are also reflected in the spatial inequalities [17].

The study shows that, while the ARPT is GH2,429.11, the median income of all impoverished Ghanaians deviates from it by 28.36%. With a median income of GH688.90, 38% of the population is considered to be living below the ARPT. This is not ideal and would have negative effects on the possibilities for national development and living standards. The estimates paint a troubling picture of the situation in Ghana since the components depict households, whereas all the victims, whether in real terms or as a percentage, may be significantly greater, accompanying the consequent effects on potentials for national growth and living conditions [3].

At the regional level, the Northern Region has ARPT of GHC1,779.48 with ARPR of 37.00%, RMPG of 65.00% and MEDP of GHC625.73. Comparing the ARPT of GHC1,779.48 to the national ARPT value of GHC2,429.11 and RMPG of 65% while the national RMPG is 72% shows that the living standards in the Northern Region is below the national average. It is also evident that the median income for all people in poverty in the Northern Region differ from the ARPT by 35.00%. These estimates show that the Northern Region is indeed among the poorest Regions in Ghana since ARPR indicates that about 37% of the people are poor. However, the ARPR of 37% is just a value below the national ARPR of 38%, which shows an improvement in reduction of the percentage of poor people in the Region

The West Gonja district has the least ARPT of GHC618.54 followed by the Gushiegu district with a value of GHC722.40 indicating a low standard of living in these two districts whilst Tamale metropolis has the highest ARPT of GHC4,582.08 followed by the Tolon-Kumbungu district with a value of GHC3,449.45. These two districts also have high RMPG values, with Tamale Metropolis having 79% RMPG and Tolon-Kumbungu district with 63.00% RMPG. These estimates show that the standard of living is high in the Tamale Metropolis followed by Tolon-Kumbungu district. The Saboba and Chereponi districts have the lowest poverty rate in the Northern Region, with the Saboba district having the smallest ARPR of 16% followed by the Chereponi district with a value of 27.00%. Whilst the Kpandai and Sawla/Tuna/Kalba districts have high ARPT of GHC1167.28 and GHC1479.06 respectively, the median income of all poor people in the Kpandai district differ from the ARPT by 9% and the median income of all poor people in the Sawla/Tuna/Kalba district differ from the ARPT by 7%. Also, The Karaga district has the highest ARPR of 43% followed by the Savelugu-Nantong district with 42% indicating that they are the two districts with the highest rate of poverty in the Region, the Karaga and Savelugu-Nantong districts also have high ARPT of GHC1,195.78 and GHC2,118.11 respectively

The Gini coefficient for Ghana is 0.7038. A rule of thumb state that, "The interval between 0:1 is used for the values of the Gini coefficient. When the coefficient value is close to 0, it means that the distribution of income is completely

equal. Also, if the Gini index is equal to 1, then the income distribution is completely unequal.”. Since the coefficient value is 0.7038, it can then be concluded that there is a high inequality in income distribution in the country.

The Gini coefficient for Northern Region of 0.6746 means that there is a high disparity in income distribution in the Northern Region. The Gini coefficient for Northern Region (0.6746) is slightly low as compared to the national Gini coefficient of 0.7038 indicating an improvement in the distribution of income in the region. The East Mamprusi District has the highest Gini coefficient of 0.72 followed by the Savelugu-Nantong district with a value of 0.71, indicating that, the income distribution in these two districts is the most unequal in the Northern Region.

The Tamale Metropolis being the Regional Capital and the most populated city in the Northern Region has a Gini coefficient value of 0.67054, which is approximately equal compared to the regional coefficient of 0.67458. The Bole district has the lowest rate of inequality in the Northern Region with Gini index of 0.41 followed by the Karaga District with a Gini index of 0.43. Consequently, the distribution of income in these two districts is estimated to be the least unequal in the Northern Region.

Conclusion

The study revealed that the standards of living in the Northern Region is below the national average, but the Gini index showed an improvement in the distribution of income in the Region.

The Saboba and Chereponi districts have the lowest poverty rates in the Northern Region whilst the Karaga district has the highest ARPR followed by the Savelugu-Nantong district indicating that they are the two districts with the highest rate of poverty in the Region. The East Mamprusi district has the highest income disparity whilst the Bole district has the lowest rate of income inequality in the Northern Region. Therefore, in order to increase production and raise standards of living of the youth while lowering poverty and inequality in the Northern Region, there is a need to improve education about capacity building in all undertakings.

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