Spatial inequality and household poverty in Ghana

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Abstract

The study analyses district-level consumption inequality in Ghana, explores the relative contribution of within- and between-district inequalities to national inequality and examines the relationship between household poverty and inequality. The last three rounds of the Ghana Living Standard Survey are used. We observe that the contribution of within-district inequality to national inequality is higher than inequality between districts. Also, district-level consumption inequality shows a significant effect on household poverty, but with varying signs. We surmise that the variation in signs is as a result of the state of economic activity and factors that affect both poverty and inequality.

Keywords: Spatial, Inequality, Poverty, District, Household and Ghana

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Introduction

Over time, the proposition that development and poverty reduction are growth dependent – that is, as countries experience increased growth, their productive capacities expand, leading to poverty reduction and overall development – has been questioned. Based on data from transition economies, Gruen and Klasen (2012) provide evidence to support the negative relationship between growth and subjective well-being and a positive relationship between growth and income inequality. Also, the volatile growth that has characterised the global economy in recent times has threatened the ability of poor countries to achieve the first target of the Millennium Development Goals (MDGs) (halving poverty by 2015). Among the inhibiting factors for volatile growth and poverty reduction is inequality (Fosu, 2011; Imai et al., 2010). Recent trends and patterns of global and country-specific inequality are alarming and vary widely. Milanovic (2011) reveals that global inequality has reached 70 Gini points and, further to this, there has been a shift from inequality within a country to inequality between countries. The latter suggests that the income (poverty) gap between nations has widened. Although there has been a drift towards inequalities between countries, within countries inequality has been identified, with several adverse consequences, including poverty (Neckerman and Torche, 2007). However, on the effect of inequality on poverty, Araar and Duclos (2011), using evidence from Nigeria, find that the relationship is complex, as it is (1) context specific, (2) dependent on the measure of inequality, and (3) reliant on type of inequality changes.

Although Ghana's economy is currently experiencing high levels of economic growth – about 14 per cent per annum and a significant reduction in the incidence of poverty – inequality is on the ascendancy. Previous studies (Aryeetey et al., 2009) that have examined regional inequalities reveal significant variation across the ten administrative regions of the country. The gap in the literature, however, is in knowledge of the magnitude of inequality across the administrative districts in Ghana. This study is premised on the argument that estimating the magnitude of inequality at the district level will provide a deeper understanding of the contribution of district-level inequality to regional and national inequality and how it relates to household poverty. This study therefore addresses the following three objectives: (1) to decompose inequality using administrative districts as the unit of analysis and explore the relative contribution of within- and between-district inequalities to national inequality; (2) to examine trends of inequality in one of the regions (Eastern) in Ghana; and (3) to investigate the relationship between district-level inequality and household poverty.

In the context of poverty reduction, its nature, multi-dimensionality and correlates have generated renewed interest and constant reflection. Inequality is closely related to the definition and conceptualisation of poverty. The close link between poverty and inequality is partly supported by the fact that the latter has been defined or measured in the context of the former (Sen, 1976; Foster et al., 1984). In practice, the association

between the two developmental issues has moved in varied directions in different countries, suggesting an intriguing relationship (Bourguignon, 2004). More interesting to this discourse is the characterisation of the two concepts: that is, degree of aggregation (unit of analysis) and whether what is being considered for measurement (income, consumption, wealth, etc.) is the same or varies between poverty and inequality. While inequality deals with the entire distribution, poverty either reflects the proportion below the poverty line (absolute poverty) or is measured based on the characteristics of other units in the sample (relative poverty). The variations in characterisation of both poverty and inequality have partially accounted for the depth of discussion that is taking place on these developmental issues. In sum, the conceptual difference between poverty and inequality is nuance.

Also, the discourse on poverty and inequality has deepened in recent times, based on outcomes of empirical studies that seek to evaluate the ability of the developing countries to achieve the MDG1 target of halving poverty by 2015. Just to cite a couple of findings that indicate the need for individual country studies on poverty and its correlates, such as inequality and growth, Imai et al. (2010) assert that while globally the goal of halving poverty is on course, many individual countries and regions are struggling to achieve this goal. Also, Fosu (2011) argues that even if all countries grow at a desired rate (such as the purported seven per cent growth rate) necessary for achieving MDG1, this criterion will not be sufficient for all developing countries, given their idiosyncratic factors such as inequality.

On the nature of inequality, one dimension currently being explored in the literature is spatial disparity. This is because there is a growing sense across much of the developing world and other transitional economies that spatial and regional inequality of income, consumption, economic activities and other social indicators is on the increase (Kanbur and Venables, 2003; McKay and Aryeetey, 2007; World Bank, 2009). More importantly, the trend towards increased regional inequalities comes within the context of positive economic growth in several parts of the developing world in recent times, especially in previously poorly performing regions, such as sub-Saharan Africa (Aryeetey et al., 2009). For example, Ghana's economy has been noted to be growing at an impressive rate, albeit with increasing consumption inequality at the national level. Thus, although some analysts and economists have conferred a middle-income status on the country, the question remains as to whether the increasing inequality makes the growth volatile or otherwise. This pattern of well-being underscores the relevance of some recent studies that have explored the patterns, trends and relationships between economic growth, poverty and inequality in Ghana (Coulombe and Wodon, 2007; Aryeetey et al., 2009). Though inequality within and between districts (and regions) has long been a focus of study by geographers and planners, mostly using qualitative indicators, the current study calculates district-level inequality and examines the component of national inequality that can be attributed to within-district disparities and

the component that can be attributed to between-district inequalities. These patterns are compared to patterns of poverty and inequality in other geographical areas – administrative regions (10 regions), residence (rural-urban) and ecological zones (Accra, Urban Coastal, Urban Forest, Urban Savannah, Rural Coastal, Rural Forest, Rural Savannah). The rationale for this exercise is to identify the components of inequality that are contributing to the observed increasing trends of national inequality. This, in our opinion, provides a policy tool for targeting inequality interventions.

In addition to the above objective, we explore the trend of inequality in the Eastern Region of Ghana and investigate the effect of district-level inequality on poverty, both in the Eastern Region and for Ghana as a whole. The choice of the Eastern Region is motivated by the fact that it is the only region that experienced a reduction in inequality (by 0.08 percentage points) over the period 1991 to 2006, in contrast to the national and other regional trends.

The rest of the paper is presented as follows. The next section reviews the theoretical and empirical discourse on poverty and inequality. This is followed by an outline of the macroeconomic, poverty and inequality situation in Ghana. The methods of study and discussion of the results are presented in the fourth and fifth sections. To conclude the paper, the final section highlights the main findings and policy recommendations.

Poverty and inequality

The issue of inequality is central to the focus of this study. The conceptualisation of inequality has yielded varied interpretations. Several reasons account for the varied interpretations. One reason is that the space (income, land, consumption and so on) within which inequality is conceptualised remains a source of divergence on the discourse. That said, we focus on consumption inequality[1] in view of the data limitations on other variables such as income. A second reason is that inequality can either be viewed as exogenous to a given outcome or endogenous, depending on the orientation of a particular study. In this study, we consider inequality as exogenous as we do not intend to establish causality. In this section, we provide a review of the discourse between poverty and consumption inequality.

Undoubtedly, both issues of poverty and inequality have increasingly become multi-disciplinary, given their multi-dimensionality and dynamism. For instance, economists have explored the growth–poverty nexus based on the role of inequality (Fosu, 2011; Bourguignon, 2004; Ravallion, 1997), while sociologists, among other theories, have argued that poverty and inequality are outcomes of social categorisation and identity that self-perpetuate themselves within a society (Mosse, 2010). Another twist to this discourse is the relationship between poverty and inequality – that is, whether they are

[1] For this reason, use of inequality in the paper refers to consumption inequality.

dependent or independent, or whether they both mutually cause the occurrence of other outcomes. Barber (2008) suggests that the relationship between poverty and inequality is either pragmatic, that is, inequality exacerbates poverty, or moral, that is, inequality is a form of poverty. Also, the nature, effects and consequences of inequality on society (Neckerman and Torche, 2007) have attracted enormous concern. The foregoing suggests the wide scoping nature of the poverty–inequality literature. However, for the sake of brevity the following two sub-sections briefly discuss the nature of inequality outcomes, and the argument of economists regarding the relationship between poverty, inequality and development.

In the context of the nature of the effects of inequality, Evans et al. (2004) identify four possible dimensions. First, the mechanical effect suggests that if two outcomes are related, then inequality in one phenomenon will lead to inequality in the other. That is, given that income relates to consumption, then income inequality will lead to consumption inequality. Second, relational effect is premised on the cause of inequality rather than the consequence. Relational effect suggests that as the relationship between two variables gets stronger it breeds inequality, even when economic inequality remains constant. For instance, if over time the effect of parental income on the quality of child health increases, then this will lead to disparities in child health outcomes, even when economic inequality remains unchanged. Third, the functional perspective explains the non-linear relationship between economic inequality and a given outcome. For instance, an increase in the income of poor people is related to a significant improvement in the health of poor people, thereby reducing inequality associated with health. Inequality brings about economic segregation, thereby reducing the health status of the poor, but with an increase in their income health inequality reduces. The final effect is the externality effect, whereby inequality has a contextual effect and therefore is not related to any outcome. Those living in the context of absolute poverty and, for that matter, high inequality may believe or feel themselves to be deprived of their essential needs and therefore engage in criminal activities to survive.

Central to the economists' viewpoint is the Kuznets' assertion that poor countries at the onset of growth will experience higher inequality, which will later decline as the economy sustains its growth and develops. Kuznets (1955) argues that at the early stages of economic development, inequality worsens with an increase in income (growth). According to Todaro and Smith (2009), this could be related to the Lewis model, where, in the early stages of growth, development is clustered in the modern industrial sector with limited employment opportunities due to a lack of skilled labour, while wages and productivity are high for a few individuals. Due to this disparity, income is found in the hands of a few individuals, with the majority are left in poverty. Using time series data based on the US economy, Andre (2011) has recently confirmed Kuznets' conjecture of a negative relationship between the structure of the economy and income inequality.

The second relationship that is explored is that poverty causes inequality. With a majority of individuals being poor, saving out of their limited income may be at a very low level and they may also not qualify for the credit and loans that might improve their economic situation. This therefore deepens the income inequality situation among those who are already poor.

Finally, an increase in the income of the poor may reduce the level of inequality and also lead to the development of the economy. Further, following the Kuznets curve, this increase in inequality reaches a particular point and then tends to reduce with an increase in development or income. At this later stage of development, the supply of skilled labour increases more than the supply of unskilled labour. This implies that most people are now in employment and there is a redistribution of income from the rich to the poor, therefore reducing the level of inequality and raising the income of the majority.

In conclusion, we assert that while the association between poverty and inequality is well established in the theoretical and conceptual literature, empirical discourse on the direction of causality remains under-researched. This is partly explained by the attendant bi-causal relationship that has been established at the conceptual level. Though we do not deal with the issue of bi-causality in this paper, estimation of the determinants of household poverty, with a district-level inequality variable, considerably reduces the plausibility of endogeneity engendered by bi-causality.

Ghana's macroeconomic, poverty and inequality situation

Ghana's 2008 gross national income of just US$14.7 billion and a 2005 Gini index coefficient of 40.2 (World Development Indicators, 2010) justify the lasting search for an 'appropriate' country context development plan that can contribute significantly to poverty reduction and, for that matter, inequality. The structure of the economy between 2006 and 2008 signalled potential shifts, as both industry and service sectors grew relatively more than the agricultural sector. However, provisional figures in 2009 show that this was short-lived, as in that year the latter contributed relatively more to the 4.5 per cent GDP growth (Bank of Ghana, 2010). With the economy still depending on its agricultural sector, mainly raw outputs, the need to decompose poverty at the district level and identify an approach capable of simultaneously reducing poverty and inequality, and to restructure the composition of the economy, remains vital.

Indeed, poverty in Ghana has many different dimensions. Poor communities are characterised by low income, malnutrition, ill health, illiteracy and insecurity. There is also a sense of powerless and isolation. These different aspects interact and keep households and communities in persistent poverty (Bhasin and Annim, 2005). In Ghana, disparities in social and economic well-being are evident between various spatial units

across the country, particularly southern Ghana and northern Ghana. According to Aryeetey et al. (2009), such regional or spatial disparities can also be viewed in terms of urban and rural differentials. Presently, in almost all socio-economic indices, rural Ghana does not compare favourably with urban Ghana. In all, differentials in socio-economic development between rural and urban areas are far wider in the regions of northern Ghana compared to southern Ghana (Aryeetey et al., 2009). The spatial disparities prevail despite sustained economic growth and poverty reduction efforts over the last decade.

Different reasons have been suggested as the cause of Ghana's regional inequality in development, including a combination of colonial and post-colonial legacies (Aryeetey et al., 2009). Thus, regional inequalities in Ghana are largely attributed to the structure of the Ghanaian economy, which has changed very little from that inherited from the colonial era. The continuation in the post-colonial era of the colonial policy of investing in regions with exportable products, and providing a supporting infrastructure in such regions, has resulted in between-regional inequalities among regions in Ghana (Aryeetey et al., 2009). This situation has led to substantially high levels of deprivation in some parts of the country, particularly in the three northern regions of Ghana, namely Upper West, Upper East and Northern Regions, which have received less developmental attention since the colonial days.

In spite of these variations, empirical evidence suggests that poverty incidence in Ghana has generally declined since 1991. According to Coulombe and Wodon (2007), Ghana has achieved substantial poverty reduction over the last 15 years and is on track to reduce its poverty rate by half, compared to the 1990 level, well before the MDGs' target date of 2015. For example, estimates from the Ghana Living Standards Survey (GLSS) dataset suggest that consumption poverty in Ghana (the share of the population living in poverty) has fallen from 51.7 per cent in 1991 (GLSS 3) to 28.5 per cent in 2006 (GLSS 5). Thus, every year on average, the share of the population living in poverty has been reduced by about 1.5 percentage points. This impressive poverty reduction has been associated with good labour market outcomes in terms of job growth. This achievement was, however, not as widespread as one might have hoped. Indeed, according to Coulombe and Wodon (2007), the national pattern masked a sharp disparity in performance between geographic areas. Poverty reduction over the period 1991/92 to 2005/06 varied across Accra (annual reduction of 0.05 per cent[2]) and the other ecological zones. In the Savannah area, for instance, the share of the population in poverty rose in urban areas, and other measures of poverty which take into account the distance separating the poor from the poverty line also rose in rural areas (Coulombe and Wodon, 2007).

[2] Although poverty rose by 7 per cent between 1998/99 and 2005/06 in Greater Accra, annual reduction over the 15-year period (1991/92 to 2005/06) was 0.05 per cent– [{(11/23) exp(1/15)}-1].

In terms of performance in reducing poverty and inequality, evidence suggests that while some regions have remained relatively stable regarding regional ranking, others have made impressive progress within the last three rounds of the GLSS (see Appendices 1 and 2). In particular, Eastern Region was the only region to experience a consistent drop in inequality over the 15-year period (1991/1992–2005/2006). However, it is not certain whether all the districts in the region experienced a drop in inequality within the period under review. Therefore, this paper, as one of its specific objectives, explores inequality within and between districts in the Eastern Region of Ghana.

Methods of study

Data

The data for this study were obtained from the Ghana Living Standard Survey (GLSS), which is a nationwide survey carried out by the Ghana Statistical Service (GSS). The first round of the GLSS was conducted in 1987–88, and as at 2006 five rounds had been conducted, with the second, third, fourth and fifth rounds conducted in 1988–99, 1991–92, 1998–99 and 2005–06 respectively. The two overarching goals of the GLSS are to track the well-being of Ghanaians and to serve as a source of information for Ghana's national accounts. In so doing, it focuses on the household as the socio-economic unit, but collects information on individuals within the household and on the communities in which the households are identified. Among the thematic issues on which the GLSS captures information are demographic characteristics, education, health, economic activity, migration and tourism.

This study focuses on the last three rounds of the GLSS (3, 4 and 5). They involve sample sizes of 4,523 households for the third round, 5,998 households for the fourth round and 8,687 households for the fifth round. For this study, the unit of analysis for the poverty analysis is the household, and for the inequality analysis, the distribution unit is the district. Through creation and re-designation, the number of districts in Ghana has changed significantly in the past decade. For the purpose of comparability across the last two rounds of the surveys (the district analysis is restricted to the last two rounds of the GLSS, as the third round does not provide information on districts), we use the number of districts covered in the fourth round as the benchmark. Therefore 102 districts of the then 110 districts were used.

Poverty and inequality measures

The literature on poverty measurement has been dynamic in the past couple of decades, primarily due to its encompassing nature, different facets and traditional debate on theory, conceptualisation and measurement. The extensive literature on poverty measures mainly focuses on scope (which spans from uni-dimensional to multi-dimensional poverty), contextualisation (subjective and objective, absolute and relative,

and temporary and chronic) and choice of indicators (income, consumption, nutrition, social, and process indicators). While these have led to several approaches to measuring poverty, the GLSS uses the Foster, Greer and Thorbecke (FGT) class of poverty measures. This approach facilitates the measurement of poverty from three perspectives: incidence (headcount); depth (poverty gap); and severity (square of poverty gap). In this paper, we use the headcount ratio for the sake of brevity.

Measurement of inequality has also evolved in a similar fashion to include approaches such as the decile dispersion ratio, Gini coefficient (Lorenz curve) of inequality, generalised entropy (GE) measure, standard deviation, variance, and Atkinson's inequality measures. This study uses one of the GE measures of inequality (Theil index) because of its advantage of decomposing inequality into subgroups of the population, such as regions and districts in a country. In addition to this, the GE satisfies the following criteria: a good inequality measure; mean and population size independence, anonymity or symmetry; Pigou-Dalton transfer sensitivity; and statistical testability (Haughton and Khandker, 2009).

The GE has the general formula:

$$GE(\alpha) = \frac{1}{\alpha^2 - \alpha}\left[\frac{1}{n}\sum_{i=1}^{n}\left(\frac{y_i}{\bar{y}}\right)^{\alpha} - 1\right] \qquad 1$$

where n is the sample size, y_i captures the individual $i's$ income, where $i = \epsilon\ (1,2,\dots,n)$, and $\bar{y} = (\frac{1}{n})\sum y_i$ represents the arithmetic mean of income. The value of the GE ranges from 0 (showing an equal distribution of income) to ∞ (showing increasing levels of income inequality). GE class measures are sensitive to changing values of α which capture the differences of income at various parts of the income distribution. The values mainly used for α are 0, 1 and 2, though they take on other real values. A lower value of 0 makes GE highly sensitive to changes in the lower tail of the income distribution, while a higher value like 2 makes GE sensitive at the upper tail of the income distribution. But α value of 1, also known as the Theil index, implies equal weight over the income distribution. The Distributive Analysis Stata Package 2.1 (DASP) was used in generating the inequality scores and associated graphs.

Econometric estimation

The hypothesis of the study – district-level inequality influences household poverty – is examined with a least squares regression. The least squares estimation of the hypothesised function relationship between poverty and inequality is specified in Equation 2 below. In addition to district-level inequality (main explanatory variable of interest), we identify other explanatory variables based on the poverty literature. For comparability with previous studies in Ghana, we make the specification akin to the model in Coulombe and Wodon (2007). For easy interpretation and normalisation, we take the logarithm of consumption per equivalent adult and regress it on our explanatory variables.

$$\begin{aligned} lnconsp = {} & \beta_0 + \beta_1 gini + \beta_2 agehead + \beta_3 ageheadsq + \beta_4 sex_{malehead} \\ & + \beta_5 hh_{infants} + \beta_6 employment_{sector} + \beta_7 education + \beta_8 region \\ & + \beta_9 ownland_{hhmem} + \beta_{10} Urban \\ & + U_i \end{aligned} \qquad 2$$

where $lnconsp$ is the log of consumption per equivalent adult and the right hand side variables are, respectively: Gini coefficient; age of household head and its square to absorb the non-linearity observed from the bi-variate exploration of the data; sex of household head (male dummy); number of infants in the household; sector in which the household head is employed; educational level attained by the household head; regional dummies; size of land owned by the household, and residence (urban dummy).

Results and discussion

As a recall, the first objective of this paper is to examine the trend of within inequality (component of disparities that can be associated with differences within areas) and between inequality (part of differences attributable to between areas) for different geographical classifications. As mentioned earlier, the contribution of this paper in this context is the district decomposition of inequality. However, we examine decomposition for other geographical classifications for the purposes of comparison. The study decomposes the GE index of inequality for four spatial zones – the rural/urban, the ecological, the regions, and the districts in Ghana. Table 1 presents the results for the Theil's T (using a sensitivity parameter value of 1). We precede the discussion with two statements on broad first expectations. First, Haughton and Khandker (2009:112) hint that within inequality should constitute 69.1 per cent of the total inequality. From Table 1, the share of between inequality (columns 4, 7 and 10) across the different geographical areas supports this claim, as the share of between inequality is less than 30 per cent, with the exception of the share of between inequality for 1998. Second, the Theil's index possesses an additive property, where the sum of between and within inequality equals

the national inequality. This was also confirmed in each of the rounds and across the different geographical locations.

In view of the above, the rationale for decomposing inequality is to identify which component is contributing to the increasing inequality in Ghana. In support of earlier evidence from McKay and Perge (2009), we find that spatial inequality in the context of regions increased significantly in the 1990s before reducing to its current level of 4.6 in 2005. However, comparing across different geographical areas, varying trends were observed. For instance, in contrast to the regional trends, inequality between rural–urban residences showed a fall in the 1990s and an increase in the 2000s. Also, from the perspective of between ecological zones inequality, we observed an increasing trend over the entire period. That is, from Table 1, between ecological zones inequality increased from 4.5 per cent in 1991–92 to 5.5 per cent in 1998–99 and further to 6.9 per cent in 2005–06, while between rural/urban and region inequality showed a fluctuating pattern. In view of the above, we surmise that between inequalities for regions and ecological zones contributed to the 1 per cent increase in national inequality in the 1990s, while the 4 per cent increase in the 2000s can be partly explained by between inequalities for rural–urban residences and ecological zones. In the context of our contribution to the discourse of inequality in Ghana, between-district inequalities reduced in the 2000s.

The variations in the trends of spatial inequality, given the choice of geographical area, lead us to probe the level of endowment (natural or otherwise) and management of resources in a geographical area. In the context of the geographical locations used in the paper, two of the four (regions and districts) are purely administratively determined, while the third (ecological) is based on the natural characteristics (signifying level of natural endowment) and the fourth (rural–urban residence) hinges between two types. Analysing the outcomes of the trends for between geographical inequalities from this perspective, it is unsurprising to find a continuous increasing trend for between ecological zones inequalities, and varying outcomes for regions and rural–urban residences. Policy variation might account for these observations.

Table 1: Decomposition of inequality in Ghana – patterns and trends

Patterns	Trends								
	1991–92			1998–99			2005–06		
	Between	Within	Share [a]	Between	Within	Share [a]	Between	Within	Share [a]
Rural/urban	3.7	21.2	14.8	3.5	22.4	13.5	5.3	24.8	17.6
Zones [b]	4.5	20.4	18.0	5.5	20.4	21.3	6.9	23.2	22.9
Region	2.8	22.1	11.2	6.1	19.8	23.6	4.6	25.5	15.3
District	-	-	-	9.8	16.1	37.9	8.0	22.0	26.7
Ghana	24.9			25.9			30.1		

[a] Share of between inequality across the different patterns in the given year.
[b] These represent the ecological zones of Ghana.

The inequalities within districts for the period 1998 to 2006 showed an increase for all the geographical areas. This contrasts with the observation of varying trends of inequalities between geographical areas for the same period. A plausible reason for this contrasting evidence can be associated with the nature of decentralisation policies and their implementation in Ghana. In the context of the nature of the policies, it could be a possible reason for the overall increase at the national level and within each of the geographical areas, while differences in implementation account for the varying trends observed for between geographical area inequalities. In the case of ecological zones, though the classification has less administrative importance, the stronger policy effects for the other administrative classifications can affect ecological zones between and within inequalities. This finding provides a platform for detailed analysis of the effects (both short- and long-term) of alternative policy interventions at different levels of geographical classifications.

Another component that explains the respective 1 per cent and 4 per cent increases in national inequality observed in the 1990s and the 2000s is the within geographical area inequalities. In contrast to the observed decrease in between-district inequality, inequality within districts increased over the period 1998 to 2006. The increase of almost 6 per cent is the highest across the geographical areas and this context contributed relatively more to the five per cent increase in national inequality.

In response to the objective of examining trends of inequality in the only region of Ghana (Eastern) that experienced a reduction in inequality over the period 1991–2006, Table 2 presents ranks of consumption poverty and inequality and mean welfare and Gini coefficients for districts in the Eastern Region of Ghana. In addition to the consistent reduction in inequality over the period 1991 to 2006, the poverty position of the Eastern Region of Ghana has varied widely over the same period. In terms of poverty, the Eastern Region moved from sixth in 1998 to second in 2005 in the regional ranking of poverty, and from second in 1998 to first in 2005 in the regional ranking of inequality. Therefore, we found it necessary to examine which districts contributed to this improvement and in what proportions. As can be seen from the table, while some districts performed better in terms of their national ranking in poverty and inequality, there are a host of others whose performance declined within the last two rounds.

However, all the districts within the region experienced an improvement in mean welfare, with Akwapim South and Suhum-Kraboa-Coaltar Districts experiencing the highest percentage changes: 175.55 per cent and 139.72 per cent respectively. It is worth noting that even though Birim North District experienced the lowest percentage change in mean welfare (28.35 per cent), as against Akwapim South with the highest percentage change of 175.55 per cent, in terms of ranking of inequality it performed much better than Akwapim South, moving from forty-second position in 1998 to third in 2005. However, what propelled Akwapim South to a much better mean welfare was its ability to move

from sixty-third position to being one of the first in terms of districts with the lowest number of people below the national poverty line. This is in line with Coulombe and Wodon's (2007) assertion that any change in poverty can be formally explained by changes in the mean consumption per equivalent adult of household on the one hand, and by changes in inequality or in the distribution of consumption between households on the other hand.

Worth mentioning in this regard is the very impressive performance of Suhum-Kraboa-Coaltar and Manya Krobo Districts, moving from sixty-sixth position and fifty-first position respectively to being among the first. A plausible reason is that, according to Coulombe and Wodon (2007), poverty measures are affected only by changes in consumption for those households below the poverty line (or crossing the line). Therefore, the poverty gap (defined as the mean distance separating the population from the poverty line) in a region or district will determine how much effort is needed to reduce the poverty headcount (defined as the share of the population which is poor). Thus, the wider the poverty gap, the greater the efforts needed to reduce poverty. For example, if there were more households below the poverty line (but very close to the line) in the districts, a little improvement in the consumption of such households would enable them to cross the poverty line, thereby leading to a substantial leap in the national or even regional ranking of poverty.

In terms of consumption inequality, the Eastern Region managed a marginal improvement of 4.93 per cent, while within the region, Birim North District recorded the highest drop (29.12 per cent) followed by the districts of New Juaben (19.83 per cent), Afram Plains (18.77 per cent), Kwahu South (12.54 per cent) and Suhum-Kraboa-Coaltar (11.15 per cent). Some other districts, however, experienced a widening gap in consumption inequality, with Yilo Krobo, Asuogyaman and Fanteakwa Districts recording the highest percentage change (45.85 per cent, 33.97 per cent and 31.99 per cent respectively).

TABLE 2: Poverty and inequality within the Eastern Region

Districts	Rank of poverty		Rank of inequality		Mean welfare			Consumption inequality		
	1998	2005	1998	2005	1998	2005	Per cent change	1998	2005	per cent change
Afram Plains	79	69	83	13	106.70	153.30	43.67	0.325	0.264	-18.77
Akwapim North	29	35	77	63	207.80	299.00	43.89	0.316	0.342	8.23
Akwapim South	63	1	61	50	145.60	401.20	175.55	0.301	0.327	8.64
Asuogyaman	46	43	25	71	138.00	235.00	70.29	0.262	0.351	33.97
Birim North	32	15	42	3	137.90	177.00	28.35	0.285	0.202	-29.12
Birim South	74	21	57	19	124.20	220.90	77.86	0.298	0.277	-7.05
East Akim	34	46	13	20	128.00	187.70	46.64	0.237	0.278	17.30
Fanteakwa	21	36	32	75	168.80	233.50	38.33	0.272	0.359	31.99
Kwaebibirem	27	58	28	57	148.70	229.60	54.40	0.269	0.334	24.16
Kwahu South	71	42	87	27	129.00	201.30	56.05	0.335	0.293	-12.54
Manya Krobo	51	1	74	31	160.50	221.70	38.13	0.315	0.298	-5.40
New Juaben	25	1	89	21	214.30	314.90	46.94	0.348	0.279	-19.83
Suhum-Kraboa-Coaltar	66	1	54	12	126.90	304.20	139.72	0.296	0.263	-11.15
West Akim	38	59	53	82	141.00	218.90	55.25	0.295	0.373	26.44
Yilo krobo	15	41	8	59	157.00	237.40	51.21	0.229	0.334	45.85
Eastern Region	**6**	**2**	**2**	**1**	**148.40**	**232.30**	**56.54**	**0.304**	**0.319**	**4.93**

The third objective is underpinned by the hypothesis that district-level inequality affects household-level poverty. The discussion of the econometric analysis is preceded by a bi-variate graphical examination of the relationship between consumption inequality and poverty. Figures 1 and 2 respectively examine the relationship for the fourth round (1998) and fifth round (2005) of the GLSS. In each case, the vertical line in the graph represents the national poverty incidence and the horizontal line shows the national inequality for the period. Demarcating the graph with these national lines creates quadrants for each period with the following interpretations. The first quadrant, that is, top left, represents districts with low poverty but high inequality. The second quadrant (top right) identifies districts with high poverty and high inequality. The third and fourth quadrants respectively symbolise low poverty and low inequality, and high poverty and low inequality. A careful examination reveals that some districts moved significantly across the quadrants. For instance, Bole which had the highest inequality in 1998 and was in the top left quadrant, moved to the fourth quadrant (high poverty low inequality) in 2005. The fitted line for the relationship between poverty and inequality in both periods failed to reveal any discernible pattern. The *lowess* curve in the fourth quadrant, however, suggests a downward sloping relationship, which is an indication that among the districts with low inequality and high poverty, a negative association prevails. In addition to Figures 1 and 2, we have provided in Appendices 6 and 7 the bi-variate relationship between mean per capita expenditure and inequality.

Figure 1: Poverty and Inequality in Ghana - District Perspective

1998

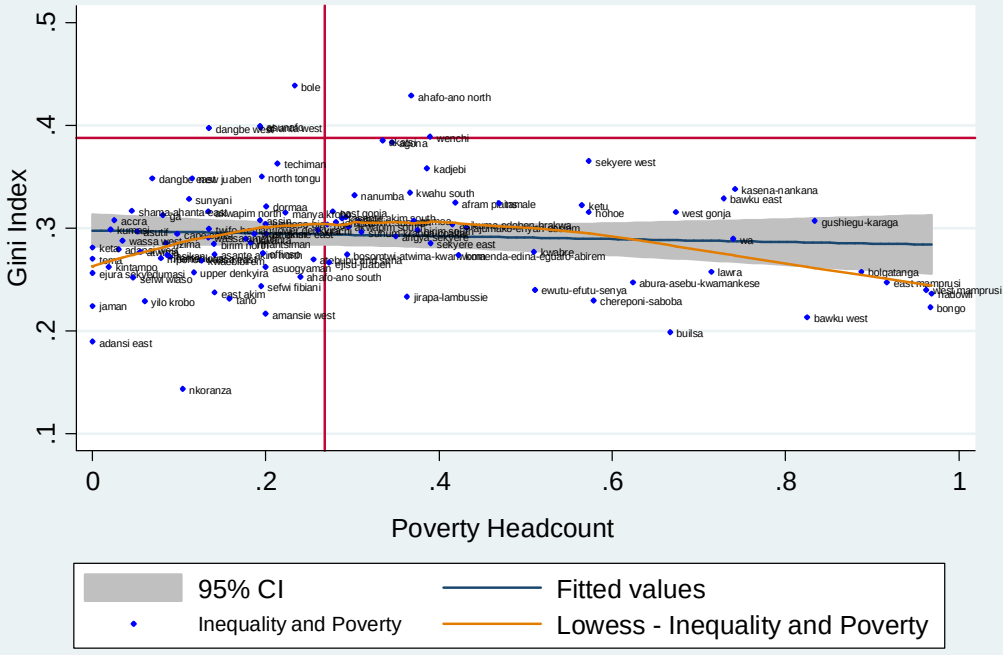
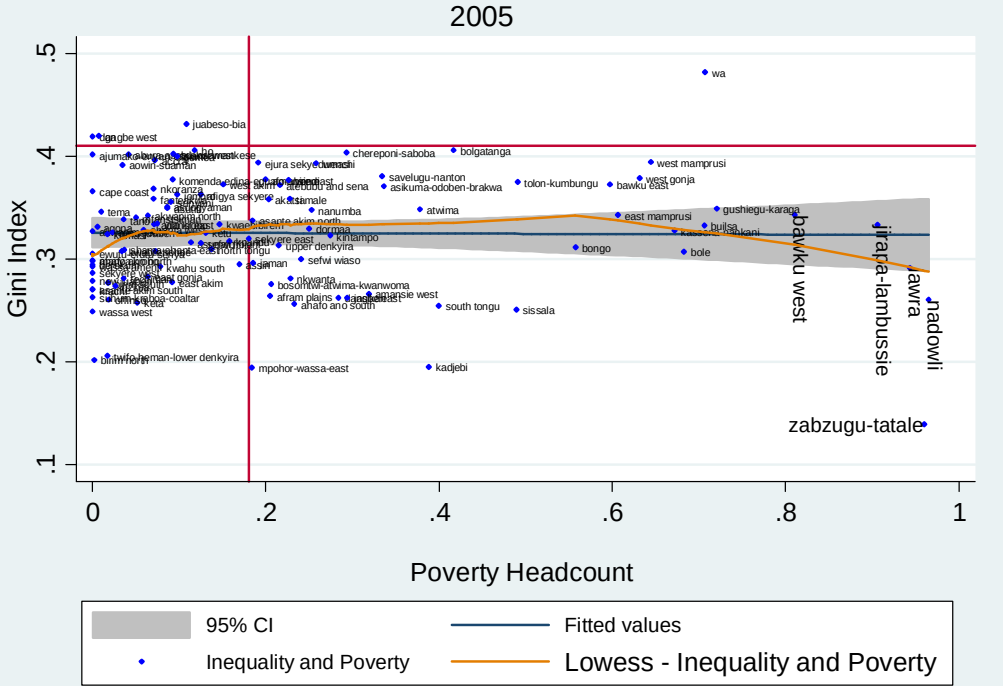


Figure 2: Poverty and Inequality in Ghana - District Perspective

2005



In discussing the econometric results, we are cautious, as it was indicated earlier that the relationship between poverty and inequality is not straightforward and varying results have been found in different countries (Araar and Duclos, 2011; Bourguignon, 2004). In this regard, we provide results which suggest a relationship but not causality. To enhance a better understanding of the econometric results, especially the coefficient of our main variable of interest (district-level inequality), we have provided in Appendices 3 and 4 the summary statistics and correlation matrix. Also provided in Appendix 5 is a set of results with different model specifications in terms of inclusion and exclusion of variables (education, land size and regional dummies) that are likely to be related to both poverty and inequality. Since this implies that such variables violate the strict exogeneity assumption underpinning least squares estimation, we do not attach much importance to the exact magnitude of the coefficients, given the potential of either a downward or upward bias.

Using the logarithm of consumption per equivalent adult as the dependent variable, we observe from Table 3 that in six out of the eight models, estimated district-level inequality tends to be statistically significant but with varying signs. The signs, however, follow a defined pattern, which encourages deeper examination. From Table 3, in the parsimonious case, district-level inequality is negative and significant, indicating that higher inequality is associated with lower levels of consumption. This suggests that in the full model, where other variables are included and the sign of district-level is positive, other factors jointly affect inequality and poverty. From our model specification, a typical variable that affects both consumption and inequality is the area of land owned by households.

Other variables in the model showed expected signs and were mostly statistically significant. For instance, heads of household with education higher than secondary level have greater consumption per equivalent adult than their counterparts without education. Also consistent with results from the GSS (2007) and Coulombe and Wodon (2007), female-headed households have greater consumption per equivalent adult (an indication of being less poor) than their male counterparts.

The econometric results were verified using usual post-estimation techniques, such as reporting robust coefficients which corrects for heteroskedasticity, checking for omitted variables using the Ramsey's specification test, dealing with non-normality of residuals, and inspecting the presence and effect of multi-collinearity. In the context of endogeneity, this is not econometrically dealt with in this paper. This in our opinion does not undermine the policy implication of the observed statistical significance of inequality. As noted earlier, the variation in signs is attributed to model specification and restriction of the geographical area (rural–urban residences and national) for the analysis. In the sense of restricting the analysis for different geographical areas, the econometric results and outcomes of the first objective corroborate each other.

Table 3: Effect of inequality on poverty
Dependent variable: logarithm of consumption per equivalent adult

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Urban – Ghana		Rural – Ghana		Ghana		Eastern Region	
Explanatory variables	Parsi-monious	Full	Parsi-monious	Full	Pars-imonious	Full	Parsi-monious	Full
District-level inequality	0.30	2.73	-0.64	0.79	-0.39	1.41	0.71	2.37
	[1.22]	[3.32]**	[-3.63]**	[2.78]**	[-2.67]**	[5.21]**	[1.51]	[2.00]*
Age of household head	-0.03	-0.06	-0.03	-0.04	-0.03	-0.05	-0.02	-0.02
	[-5.91]**	[-4.53]**	[-8.19]**	[-4.75]**	[-10.22]**	[-6.17]**	[-2.26]*	[-1.14]
Square of age of household head	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	[4.21]**	[4.16]**	[6.49]**	[4.51]**	[7.82]**	[5.75]**	[1.71]+	[1.00]
Sex of household head (male)	-0.11	-0.04	-0.27	-0.11	-0.20	-0.09	-0.13	-0.00
	[-4.31]**	[-0.51]	[-11.59]**	[-2.35]*	[-11.85]**	[-2.27]*	[-3.05]**	[-0.02]
Number of infants in the household	-0.28	-0.10	-0.25	-0.18	-0.27	-0.17	-0.29	-0.28
	[-9.45]**	[-1.51]	[-12.84]**	[-5.48]**	[-16.12]**	[-5.92]**	[-6.98]**	[-3.27]**
Household Head is a[1] private sector worker	-0.25	0.06	-0.10	-0.02	-0.21	0.01	-0.27	0.04
	[-6.33]**	[0.68]	[-1.61]	[-0.20]	[-6.18]**	[0.16]	[-2.98]**	[0.19]
Household Head is self-employed	-0.35	-0.07	-0.53	-0.09	-0.44	-0.09	-0.49	-0.10
	[-9.52]**	[-1.00]	[-9.68]**	[-1.12]	[-14.77]**	[-1.59]	[-7.24]**	[-0.66]
Household Head is unemployed	-0.34	0.16	-0.28	-0.01	-0.34	0.15	-0.40	-
	[-6.36]**	[1.11]	[-3.50]**	[-0.05]	[-7.71]**	[1.22]	[-2.71]**	-
Household Head attained primary[2]	-	-0.34	-	0.12	-	0.05	-	-0.35
	-	[-3.14]**	-	[1.29]	-	[0.56]	-	[-2.16]*
Household Head attained JSS/MSLC	-	-0.18	-	0.19	-	0.14	-	-0.32
	-	[-2.24]*	-	[2.15]*	-	[1.70]+	-	[-2.25]*
Household Head attained SSS/equivalent	-	0.00	-	0.49	-	0.39	-	-0.04
	-	[.]	-	[4.76]**	-	[4.26]**	-	[-0.16]
Household Head attained higher than SSS	-	0.17	-	0.56	-	0.51	-	-
	-	[1.89]+	-	[4.65]**	-	[5.46]**	-	-
Central Region[3]	-	0.11	-	-0.02	-	0.03	-	-
	-	[0.93]	-	[-0.30]	-	[0.62]	-	-
Greater Accra Region	-	-0.21	-	0.20	-	-0.10	-	-
	-	[-1.61]	-	[1.77]+	-	[-1.32]	-	-
Volta Region	-	-0.09	-	-0.09	-	-0.08	-	-
	-	[-0.91]	-	[-1.33]	-	[-1.50]	-	-
Eastern Region	-	0.10	-	0.08	-	0.08	-	-
	-	[0.99]	-	[1.26]	-	[1.43]	-	-
Ashanti Region	-	0.15	-	-0.12	-	-0.04	-	-
	-	[1.51]	-	[-2.28]*	-	[-0.91]	-	-
Brong Ahafo Region	-	-0.06	-	-0.16	-	-0.13	-	-
	-	[-0.65]	-	[-2.47]*	-	[-2.49]*	-	-
Northern Region	-	-0.47	-	-0.42	-	-0.43	-	-
	-	[-3.52]**	-	[-4.53]**	-	[-5.52]**	-	-
Upper East Region	-	-0.81	-	-0.81	-	-0.80	-	-
	-	[-5.68]**	-	[-10.27]**	-	[-11.81]**	-	-
Upper West Region	-	-0.10	-	-1.02	-	-0.70	-	-
	-	[-0.46]	-	[-10.33]**	-	[-6.30]**	-	-
Area of land owned by household	-	0.00	-	0.00	-	0.00	-	-0.02
	-	[6.38]**	-	[3.34]**	-	[2.70]**	-	[-3.51]**
Urban dummy	-	-	-	-	0.59	0.45	-	-
	-	-	-	-	[35.29]**	[13.35]**	-	-
Constant	15.73	15.54	15.69	15.04	15.49	14.93	15.24	14.83
	[108.52]**	[34.07]**	[131.99]**	[54.90]**	[173.03]**	[65.84]**	[64.71]**	[22.82]**
Observations	3618	559	5069	1316	8687	1875	914	206
Adj. R^2	0.071	0.227	0.111	0.220	0.268	0.329	0.102	0.105
F-statistic	38.25	14.01	86.81	20.12	362.81	40.44	16.29	3.35
Log-likelihood	-3726.17	-497.25	-5526.76	-1173.82	-9302.33	-1704.53	-826.20	-175.49

t statistics in brackets – + p<.10, * p<.05, ** p<.01 – [1] Reference group is household head employed in the public sector. [2] Base group for household head's education is 'No schooling'. [3] Western Region is base category for regional dummies.

Conclusion

This paper aimed at examining household poverty and district-level inequality in Ghana. The specific objectives that have been addressed in this paper are: (1) decomposed inequality using administrative districts as the unit of analysis to examine within and between contributions to national inequality; (2) examined trends of inequality in the only region (Eastern) of Ghana that experienced a reduction in inequality over the period 1991–2006; and (3) investigation of the relationship between district-level inequality and household poverty. The main findings of the study suggest that within-district inequality contributed relatively more to the increasing trend of national inequality between 1998 and 2006. Also, analysis of regional and district-level inequalities indicates that although overall inequality has been on the ascendency, some regions and districts recorded very significant reductions over the period 1991 to 2006. More interesting, however, is the fact that, in the single region that experienced a reduction in inequality, 7 out of 15 districts experienced an increase in equality. To this end, policy intervention directed towards reducing inequality in Ghana should therefore take into consideration variations in patterns and trends of the different components of national inequality (between and within analysis) and also should explore individual district inequality.

The effect of district-level inequality on household poverty showed statistical significance in most cases, but varying signs. Despite the methodological implications (which suggest caution in stretching the interpretation of the results), the evidence indicates that poverty reduction strategies will benefit greatly if disparity in welfare is taken into consideration. The current study provides a platform for more studies on the relationship between inequality and poverty. Among the perspectives that such studies could focus on are: (1) single district (other administratively determined geographical area) analysis; (2) identifying instruments for inequality or using other estimation techniques where data permit, to correct for bi-causality; and (3) exploring the relationship between poverty and inequality using other units of economic measurements (income, health, land and other assets).

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Appendix 1: Estimates and rank of regional poverty incidence in Ghana

Regions	**1991/92**	**1998/99**	**2005/06**
Western	42.00 (5)	13.60 (2)	8.10 (3)
Central	24.10 (2)	31.50 (7)	9.70 (4)
Greater Accra	13.40 (1)	2.40 (1)	5.80 (1)
Volta	42.10 (6)	20.40 (5)	15.30 (7)
Eastern	34.80 (4)	30.40 (6)	6.60 (2)
Ashanti	25.50 (3)	16.40 (3)	11.20 (5)
Brong Ahafo	45.90 (7)	18.80 (4)	15.00 (6)
Northern	54.10 (9)	57.40 (8)	38.90 (8)
Upper East	53.50 (8)	79.60 (10)	59.80 (9)
Upper West	74.30 (10)	68.30 (9)	79.10 (10)
Ghana	**36.50**	**26.80**	**18.10**

Appendix 2: Estimates and rank of regional inequality in Ghana

Regions	1991/92	1998/99	2005/06
Western	0.326 (2)	0.324 (5)	0.355 (3)
Central	0.338 (4)	0.332 (6)	0.388 (6)
Greater Accra	0.354 (8)	0.300 (1)	0.410 (9)
Volta	0.339 (5)	0.346 (8)	0.345 (2)
Eastern	0.327 (3)	0.304 (2)	0.319 (1)
Ashanti	0.376 (9)	0.380 (9)	0.377 (5)
Brong Ahafo	0.349 (7)	0.333 (7)	0.359 (4)
Northern	0.400 (10)	0.389 (10)	0.391 (8)
Upper East	0.346 (6)	0.316 (3)	0.399 (7)
Upper West	0.326 (1)	0.316 (4)	0.430 (10)
Ghana	**0.373**	**0.388**	**0.404**

Appendix 3: Summary statistics for regression analysis

Variable	Obs	Mean	Std. dev.	Min	Max
Consumption per equivalent adult	8687	2181822	2337226	46253.56	8.17E+07
District-level inequality	8687	0.339	0.054	0.139	0.482
Age of head of household	8687	45.345	15.635	15	99
Age of head of household squared	8687	2300.589	1592.729	225	9801
Sex of head of household (male)	8687	0.721	0.448	0	1
Number of infants in a household	8687	0.217	0.449	0	4
Employment categories	8687	2.771	0.654	1	4
Urban dummy	8687	0.416	0.493	0	1
Education categories	5654	3.181	0.912	1	5
Area of Land owned by household	3552	5.908	38.968	0.001	1616.866

Appendix 4: Correlation matrix

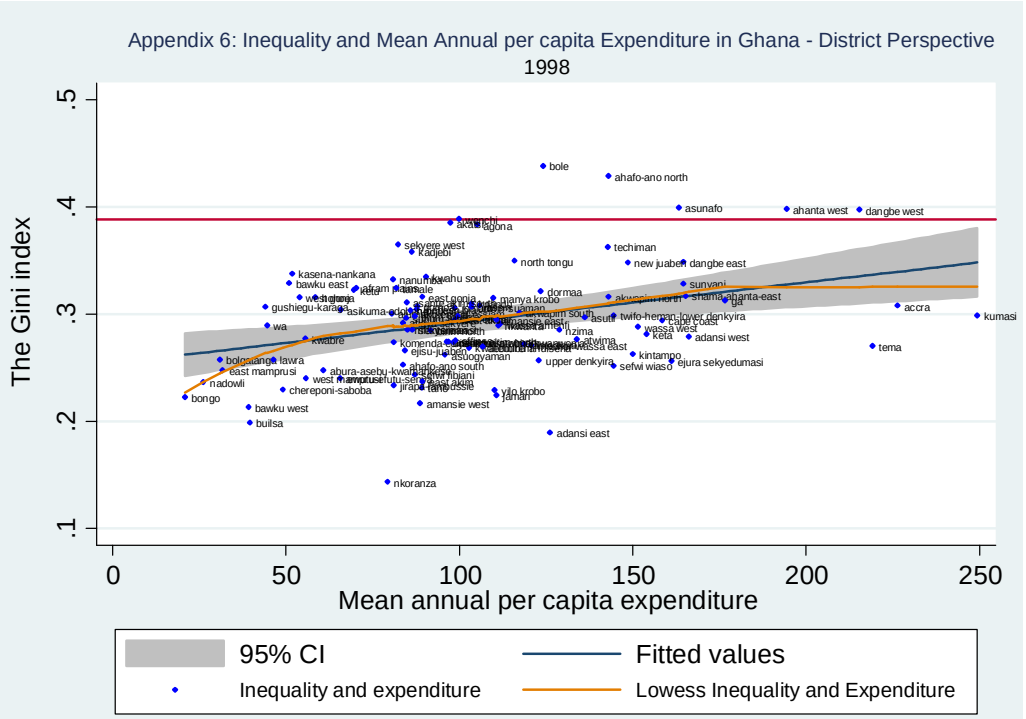
Variables	Consumption per equivalent adult	District-level inequality	Age of head	Square of age of head	Sex of head (male)	Number of infants in household	Urban dummy	Education of head category
Consumption per equivalent adult	1.00	0.09	-0.09	-0.08	-0.08	-0.15	0.34	0.27
P-value	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District-level inequality	0.09	1.00	-0.04	-0.04	0.03	0.00	0.18	0.15
P-value	0.00	0.00	0.00	0.00	-0.01	-0.71	0.00	0.00
Age of household head	-0.09	-0.04	1.00	0.98	-0.12	-0.17	-0.10	0.03
P-value	0.00	0.00	-	0.00	0.00	0.00	0.00	-0.05
Square of age of head	-0.08	-0.04	0.98	1.00	-0.13	-0.17	-0.10	0.02
P-value	0.00	0.00	0.00	-	0.00	0.00	0.00	-0.18
Sex of household head (male)	-0.08	0.03	-0.12	-0.13	1.00	0.12	-0.09	0.11
P-value	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
Number of infants in household	-0.15	0.00	-0.17	-0.17	0.12	1.00	-0.14	-0.08
P-value	0.00	-0.71	0.00	0.00	0.00	-	0.00	0.00
Urban dummy	0.34	0.18	-0.10	-0.10	-0.09	-0.14	1.00	0.29
P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Education of head category	0.27	0.15	0.03	0.02	0.11	-0.08	0.29	1.00
P-value	0.00	0.00	-0.05	-0.18	0.00	0.00	0.00	-
Area of land owned by household	0.07	0.06	-0.02	-0.01	0.04	0.04	-0.02	0.01
P-value	0.00	0.00	-0.30	-0.50	-0.01	-0.03	-0.25	-0.58

Appendix 5: Effect of inequality on poverty –
Dependent variable: Logarithm of consumption per equivalent adult

	Addition of variables that are likely to affect both poverty and inequality		
Explanatory variables	**Region**	**Education**	**Area of Land**
District-level inequality	1.07	-0.07	-0.32
	[7.42]**	[-0.43]	[-1.44]
Age of household head	-0.03	-0.03	-0.03
	[-10.43]**	[-8.41]**	[-5.51]**
Square of age of household head	0.00	0.00	0.00
	[8.40]**	[6.97]**	[5.14]**
Sex of the household head (male)	-0.11	-0.21	-0.21
	[-6.72]**	[-10.46]**	[-7.03]**
Number of infants in household	-0.22	-0.24	-0.20
	[-14.75]**	[-12.98]**	[-7.83]**
Household head is a private sector worker[1]	-0.27	-0.02	-0.03
	[-8.15]**	[-0.52]	[-0.38]
Household head is self-employed	-0.40	-0.12	-0.43
	[-13.64]**	[-3.87]**	[-8.11]**
Household head is unemployed	-0.35	-0.13	-0.05
	[-8.39]**	[-2.72]**	[-0.51]
Urban dummy	0.46	0.42	0.62
	[28.72]**	[22.54]**	[20.66]**
Central Region[3]	0.02	-	-
	[0.78]	-	-
Greater Accra Region	-0.19	-	-
	[-5.99]**	-	-
Volta Region	-0.16	-	-
	[-5.49]**	-	-
Eastern Region	0.02	-	-
	[0.55]	-	-
Ashanti Region	-0.05	-	-
	[-1.82]+	-	-
Brong Ahafo Region	-0.20	-	-
	[-6.49]**	-	-
Northern Region	-0.51	-	-
	[-15.40]**	-	-
Upper East Region	-0.87	-	-
	[-24.11]**	-	-
Upper West Region	-1.20	-	-
	[-32.22]**	-	-
Household head attained primary[2]	-	0.11	-
	-	[0.48]	-
Household head attained JSS/MSLC	-	0.28	-
	-	[1.22]	-
Household head attained SSS/equivalent	-	0.42	-
	-	[1.84]+	-
Household head attained higher than SSS	-	0.67	-
	-	[2.94]**	-
Area of land owned by household	-	-	0.00
	-	-	[3.12]**
Constant	15.10	15.10	15.27
	[177.28]**	[58.73]**	[97.03]**
N	8687	5654	3552
Adj. R^2	0.412	0.264	0.196
F-statistic	331.10	156.25	93.66

t statistics in brackets ----- + p<.10, * p<.05, ** p<.01 – [1] The reference group is household heads employed in the public sector. [2] The base group for head of household's education is 'No schooling'. [3] Western Region is the base category for the regional dummies.

Appendix 6: Inequality and Mean Annual per capita Expenditure in Ghana - District Perspective



Appendix 7: Inequality and Mean Annual per capita Expenditure in Ghana - District Perspective