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EXPLORING THE DYNAMICS OF MICRO-LEVEL CONSUMPTION INEQUALITY IN GHANA

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Exploring the dynamics of micro- level consumption inequality in Ghana

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Abstract
Despite the country's recent impressive growth record, inequality remains a pressing concern in Ghana as the benefits of higher incomes are not being evenly distributed. Existing micro-level studies on inequality have comprised sub-group decomposition and decomposition of income by factor components.

More recently, regression-based micro-level analyses have become more preferred as they address inherent weaknesses in earlier decomposition exercises. The lack of distinctive constructs for poverty and inequality however makes it difficult, if not impossible, to assess both measures clearly and independently. Although poverty and inequality are related concepts, they are by no means identical and the use of welfare ratios and household per capita expenditures as proxies for both is inadequate as it endorses the usage of similar policy interventions.

In this paper, we propose another measure of inequality at the micro-level. Household deviation scores are derived from the family of generalized entropy inequality measures, with greater deviation scores from the population mean indicative of greater micro-level inequality. By means of this novel construct, we are able to model the correlates of poverty and inequality separately, using a panel dataset for Ghana.

We find four (4) different cases of correlations for household poverty and inequality. While some factors are associated with both increasing poverty and inequality such as urban farming and higher household dependency ratios, other factors are associated with decreasing poverty and inequality such as urbanization and the provision of social safety nets. Perhaps more interestingly, some factors are associated with increasing (decreasing) poverty but decreasing (increasing) inequality. These findings on variations in the correlates of both poverty and inequality welfare outcomes allows greater policy concentration on not just poverty, as has been the case in many developing countries, but also on inequality. We conclude that policy interventions to reduce poverty do not necessarily translate into reductions in inequality. It would be important to design more nuanced interventions, therefore, to ensure that both welfare outcomes- poverty and inequality- are satisfactorily and simultaneously achieved.

Keywords
Inequality, poverty, Mean log deviation, Ghana Socioeconomic Panel Survey, Ghana.

JEL Classification
D31, I31, I32, O12

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English

Introduction

Sub-Saharan African countries have made some progress in poverty reduction- the headcount poverty incidence at the $1.25 level decreased from 60% to 49% between 1993 and 2010 (World Bank, 2014). There is however some substantial variation in various countries' progress in reducing poverty. For instance, while countries like Cameroun, Ethiopia and Ghana have experienced declines in poverty rates within the period, other countries like Kenya, Cote d'Ivoire and Zambia did not perform so well (Fosu, 2015).

A number of studies have emphasized the critical link between growth, poverty and inequality. Although increases in growth have been found to contribute to a reduction in poverty (Dollar & Kraay, 2002; Fosu, 2015), poverty is more resistant to economic growth where inequality is prevalent (Ravallion, 1997; Easterly, 2000; Adams, 2004). Fosu (2010) presents further support for the importance of inequality in the poverty–growth transformation. He argues that in low-income countries, policies that aim to reduce inequality might lead to an increase in poverty if individuals at the poverty margin fall below the poverty line as a result of such policy actions.

Using the World Bank's POVCALNET data on a set of 23 Sub-Saharan African countries, Fosu (2015) examined the role of income and inequality changes to poverty alleviation in these countries. He concluded that equal attention should be paid to reducing inequality in SSA, as to increasing economic growth, in the quest for poverty reduction. He adds that "...there need not be a trade-off between growth-enhancing and inequality-reducing policies" (Fosu, 2015: pp. 52). The paper also highlights the importance of countries' growth-stage as an important determinant of the responsiveness of d inequality – e.g. countries with lower income levels will tend to have a slower translation of income increases or inequality reductions to lower poverty rates.

Ghana became a lower middle-income country in 2011 following the discovery and production of oil in commercial quantities. Since the discovery, the country has recorded impressive increases in growth. In 2019 for example, Ghana's growth rate was 6.7% (World Development Indicators, 2020), with the highest recorded growth of 14% in 2011 (Aryeetey and Feeny, 2017). Indeed, the country is considered as one of the fastest growing economies in Africa. It is important to recognize however that the benefits of economic growth have not been equitably distributed among individuals within the country and inequality has been on the ascendency (Cooke et al., 2016). According to the GSS (2018), the national Gini coefficient has increased from 0.419 in 2005 to 0.430 in 2017. This indicates that although the country has been recording impressive growth rates over time, some groups are being left out, a situation which could potentially undermine progress with national growth and poverty reduction, weaken social cohesion and exacerbate social tensions within the country.

According to Kuznets (1955), economic growth affects inequality and countries at initially low levels of growth are characterized by increasing inequality; beyond a certain level of growth

however, inequality begins to decrease. The positive association between high economic growth and rising economic inequality therefore makes Ghana an ideal case study for the examination of the dynamics and determinants of inequality over time. Increasing inequality in Ghana can be explained using a couple of scenarios. In the first, inequality increases as a result of increases in consumption by richer households, relative to poorer ones, with negative implications for welfare of poorer households. In a second scenario, inequality increases as a result of a decrease in consumption among poorer households with, again, negative implications for their welfare. The objective of this paper is to shed light on the various forces that drive economic inequality at the micro level and to inform policy on how to minimise the adverse welfare implications of rising inequality on poor households. This empirical exercise is justified given that income levels are low and poverty implications of more equitable income distribution could be significant (Fofack and Zeufak, 1999). The research question is as follows:

1. What are the micro-level determinants of economic inequality in Ghana?

a. Do effects of household attributes on household expenditure deviations differ across rural/urban residents?

b. Are there common correlates of poverty and inequality at the household level in Ghana?

Successive governments have played an active role in increasing growth and reducing poverty in the country through social interventions like the current Livelihood Empowerment Against Poverty (LEAP) programme and other programmes aimed at improving health and education outcomes. Nonetheless, inequality in Ghana continues to persist and high poverty is a policy concern. For example, although Ghana experienced a decline in poverty from 24.2% to 23.4% between 2013 and 2017; the absolute number of people living in poverty increased by 400,000 people within the period (GSS, 2018).

Fofack and Zeufack (1999) suggest that a potential explanation for the non-trickledown of income may be related to the nature and causes of economic inequality. In this case, it is therefore essential to analyse the economic determinants of inequality at a more disaggregated level in order to assess its implications for individual welfare. The analysis uses data from the two waves of the Ghana Socioeconomic Panel Survey (GSEPS) covering the period from 2009 to 2014. The dataset is attractive for a number of reasons: First, the presence of consumption aggregates makes it possible to calculate household consumption levels and inequality measures for use in the analyses. As a second advantage, the GSEPS is a panel data set with two waves conducted, allowing for the continuous monitoring of the same group of individuals and households between 2009 and 2014; this facilitates an examination of the dynamics of economic inequality in Ghana. Finally, the dataset is nationally representative and allows for the generalization of empirical results.

The study makes a number of contributions to the existing literature; First, the panel nature of the data set allows a dynamic exploration of inequality, the first study of its kind for Ghana. Second, the regression-based approach adopted in the paper is fairly new and is more attractive as it overcomes a number of the limitations contained in the regular sub-group decomposition of inequality exercise. Third, the use of household deviation scores (from population means) as a proxy for micro-level inequality at the household level is a new and innovative approach. It is expected that this measure of inequality will serve as a d used welfare ratios and per capita expenditures and make it easier to distinguish between poverty and inequality analyses at disaggregated levels.

I. Existing literature on economic inequality

According to Brandolini and Smeeding (2008), a number of indicators may be used to assess differences in standard of living within society. Although studies have used income inequality as a measure of welfare differences, consumption expenditure is preferred in the present research. This is because expenditure inequality may be affected not just by income differences between individuals, but also by factors such as occupation, education, rural/urban residence, among others. Moreover, in developing countries like Ghana, household consumption may be less affected by income variations (Mala and Cervena, 2012).

A lot of existing studies on the determinants of inequality have been done from a macro-perspective. Here, regression analyses are typically conducted using time series data and a selection of macroeconomic variables such as fiscal policy, corruption, economic sector dualism, among others, to examine their effects on inequality, proxied by the Gini coefficient in many studies (Rehman et al., 2008; Skare and Stjepanovic, 2014). Fewer micro-level studies have been carried out to examine the variations in inequality at disaggregated levels. Existing studies have adopted two main techniques: First, a decomposition of the population by sub-groups (e.g. rural, urban, gender, etc) to understand how various factors affect inequality (Okatch, 2013). Second, a decomposition of income by factor components in order to establish what proportion of total income inequality is attributable to different income sources (Ssewanyana, et al., 2004). Here, for each income source, if the share of total income is higher than the contribution to total inequality, then that income source is said to be having an equalizing effect, and vice versa.

Regression-based inequality techniques are fairly new and tend to be more attractive as these overcome a number of the limitations contained in the regular decomposition of groups. While the analyses are built on some of the techniques used by inequality factor decomposition, potential influencers of inequality that might require separate modelling, as in the case of decomposition by groups, can be easily and uniformly integrated within the same econometric model by suitable specification of the explanatory variables (Cowell and Fioro, 2009). Although numerous studies have examined the determinants of poverty (Achia et al., 2010; Rahman, 2009), fewer studies have examined the influence of demographic and socio-economic factors on consumption inequality at the household level. Existing studies have focused more on Asian and developed countries, with less emphasis on sub-Saharan African countries.

Wodon (2000) used five (5) rounds of the Bangladesh Household Expenditure surveys from 1983 to 1996 to examine the determinants of household inequality. Welfare ratios were used as the dependent variable; these were constructed as the log of nominal per capita consumption divided by the poverty line of the area in which the household lives. Separate regressions were specified for rural and urban sectors because the returns to household characteristics were expected to differ between these localities. Wodon (2000) found that education, land ownership, occupation and geographic location were important determinants of inequality in Bangladesh. Rahman (2015) also employed similar welfare

ratios and also an OLS regression technique. Findings indicate that land ownership and farm assets, education, household dependency ratio and location were important determinants of inequality in Bangladesh. Work by Asplund and Barth (2005) also emphasized the importance of factors such as education and occupation in explaining inequality in Europe. In their work, Budria (2010) found that in Portugal, characteristics of household heads such as their age and marital status were important for explaining income inequalities. In the United States, Cowell and Fioro (2009) showed that Master/PhD qualification and age provided the highest contributions to inequality; while in Finland, an undergraduate degree and the number of income earners in the household were more important factors.

In sub-Saharan Africa, Okatch (2013) explored the determinants of income inequality, proxied by the log of household income, for Botswana, using a decomposition of income inequality at the household level, in order to explore relevant channels. Results indicated that primary education and age were negatively correlated with income inequality, while secondary education level, number of children and working adults were positively related with income inequality. Epo and Baye (2015) found that education, health, urban residency, household size, fraction of active household members working in the formal sector and farmland ownership were the main determinants of household income inequality in Cameroun.

In Ghana, Danquah and Ohemeng (2017) used the 2013 wave of the Ghana Living Standards Survey (GLSS) to examine the effect of household and community-level factors in explaining inequality in North and South Ghana. They proxied inequality by the logarithm of expenditure per adult equivalence and found that household characteristics such as urban residence, a lack of education, public and private formal economic activities, and a lack of coverage by the country's National Health Insurance Scheme (NHIS) are major determinants of inequality in Ghana.

Related studies have examined trends in inequality in Ghana (Aryeetey and McKay, 2007; Aryeetey et al., 2009) and the contribution of household characteristics to income inequality within the country as a whole (Canagarajah et al., 1998; Annim et al., 2012). All these studies have relied on earlier waves of the Ghana Living Standards Survey (GLSS), a cross-sectional dataset. The use of panel data in the present study confers a couple of advantages. First, it leads to more accurate inferences of model parameters given that the panel data may contain more degrees of freedom and sample variability (Hsiao et al., 1995); Second, there is a greater opportunity to capture complex human behaviours by, for instance, controlling for the impact of omitted variables. The present study therefore aims to correct potential weaknesses in earlier studies on inequality in Ghana by the use of panel data.

II. An overview of inequality trends in Ghana, 2009/10- 2013/14

2.1. Measuring Inequality

Inequality may be conceptualized as a situation where different individuals or households have different levels of income or expenditure. Economic (income or expenditure) inequality mainly focuses on the relative position of these individuals or households along the consumption distribution. There are a number of different ways to measure inequality, each with their attendant advantages and disadvantages. Generally, these measures are expected to satisfy five conditions comprising: anonymity (i.e. where focus is on actual distribution of expenditures rather than fairness); scale independence (i.e. inequality measure should not be affected by equal proportional changes in all incomes); population independence (i.e. measure should not be dependent on the size of the population); transfer principle (i.e. income transfers from rich to poor individuals should decrease the level of inequality); and decomposability (i.e. consistency between overall inequality and inequality observed in different sub-groups).

The Gini coefficient is one of the most widely used measures of inequality. The ease of interpretation of the Gini coefficient is one of the advantages of the measure- it ranges from zero to one, with zero representing complete equality and one representing complete inequality. The Gini coefficient is also attractive because it satisfies the four assumptions of anonymity, scale independence, population independence and transfer principle. Its main failing is in the decomposability assumption. The family of generalized entropy inequality measures, comprising the Theil indexes and the mean log deviation measure, however, satisfy all five (5) principles. Indeed, members of the Generalized Entropy (GE) class of measures are well-noted for their ease of decomposability. They have the following formula:

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

Values of GE range from zero to infinity, with 0 representing an equal distribution and higher numbers indicative of higher inequality. Values of α range from 0 to 2; these are the weights assigned to income distances at different sections of the income distribution. Lower values of α are sensitive to changes in the lower tail of the distribution while higher values of α are more sensitive to changes that affect the upper tail of the distribution. For the purpose of this research, we will use the GE (0) index, also known as the mean log deviation measure (MLD), as the basis for calculation of household deviation scores. The choice of the mean log deviation (MLD) measure is justified given its characteristic sensitivity to changes in the lower tail of the distribution. This focus is consistent with the greater concern attached to the lower end of the income distribution, by policy makers in developing country settings.

Following (Haughton and Khandker, 2009), the MLD measure may be constructed as:

$$MLD = \frac{1}{N}\sum_{i=1}^{N} \ln\left(\frac{\bar{y}}{y_i}\right)$$

n Where y_i represents the income or expenditure of household i, *N* represents the population or sample size, $\bar{y}$ represents the average income of the population or sample (i.e.$\bar{y}$ = *Y/N*)

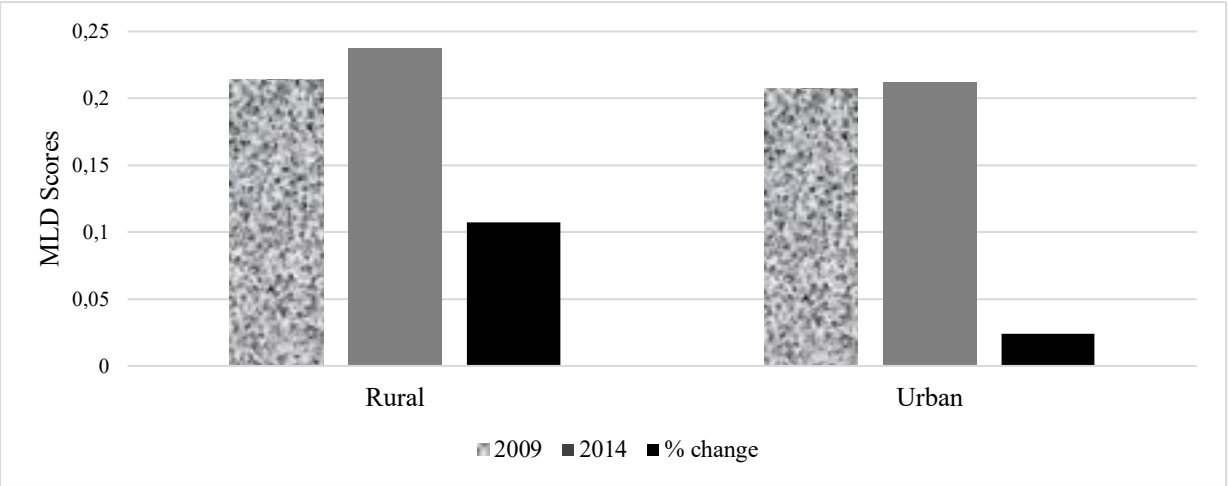
2.2. Sub-Group Decomposition of Inequality in Ghana using Mean Log Deviation measures

In this section, we use mean log deviation scores (see formula in above section) to analyse inequality in Ghana using consumption expenditure data from the 2009 and 2014 waves of the GSEPS. This decomposition is useful as it allows for the impact of the contribution to overall inequality within and between different sub-groups of the population to be assessed. Inequality decompositions are provided by rural/urban residence, gender of household head, educational levels and regional residence.

As mentioned above, an attractive characteristic of the MLD is its ability to decompose inequality into between and within effects. If the population is divided into several groups such that everyone belongs to one and only one group (for example by education level), the property of decomposability is that the overall inequality can be expressed as a sum of two terms capturing within and between group inequality (McKay, 2002). The former shows the degree of inequality that is due to variations between individuals in each of these groups. The latter measures how much inequality is due to differences in the average incomes or expenditures of each group. In Ghana, for all sub-groups discussed above (i.e. rural/urban residence, gender of household head, educational level and regions), the contribution of within-group inequality appears to be higher than between-group inequality. In essence, observed rising inequality in Ghana is driven primarily by within-group inequalities (Annim, 2012) (see Appendix 1 for full decomposition table by the different sub-groups).

Figure 1 presents mean log deviation scores for rural and urban Ghana. It is observed that inequality is higher in rural, compared to urban, Ghana. Although inequality has increased in both locations between 2009 and 2014, the increase in inequality in rural Ghana (0.214 to 0.237) is greater, compared to the increase in urban parts of the country (0.207 to 0.212). The rising inequality in rural areas may be explained by higher remittances received by some families whose members have migrated to urban areas (Lall, Selod and Shalizi, 2006); or by greater agricultural productivity from a smaller number of family members working on farm lands, when other family members migrate to urban areas (Bourguignon and Morrisson, 1998). In urban areas, the slight increase in inequality may be explained by migration from rural to urban areas which would intrinsically increase inequality by raising the proportion of poorer individuals in urban areas (Kuznets, 1955).

Figure 1: Sub-group inequality decomposition by Rural/Urban locality, GSEPS, 2009-2014
Source: GSEPS, 2009 & 2014



In Figure 2, although inequality appears to be higher in male-headed households, compared to female-headed households, inequality has decreased in the former, while it has increased slightly in the latter. According to Gonzales et al (2015), economic inequality is linked with gender inequality. The inequality gap between men and women appears to be declining in Ghana. This may be explained by increased economic opportunities available to women as a result of a national policy focus on female education and employment generation. Indeed, it is noted that targeted interventions from government and donor agencies to vulnerable individuals within the economy such as women, children and the disabled is on the rise.

Figure 2: Sub-group inequality decomposition by Gender, GSEPS, 2009-2014
Source: GSEPS, 2009 & 2014

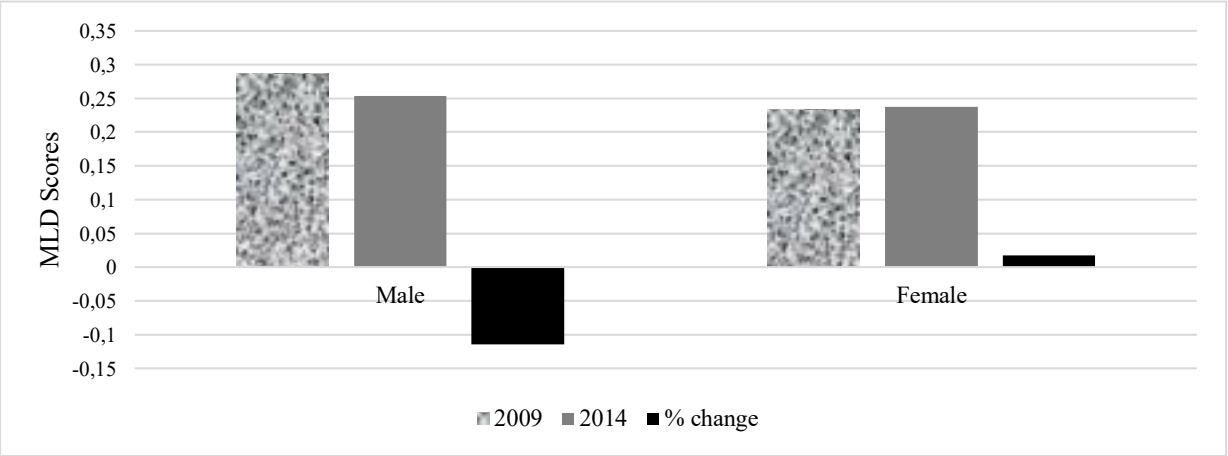


Figure 3 presents results of inequality decompositions by the education level of the household head. Here, the highest rates of inequality are observed among individuals with primary and secondary school education in 2014. Research on the effects of education on economic inequality are inconclusive. On the one hand, although education likely increases the assets of those with low income, similar to investing in physical capital (Becker and Chiswick, 1966; Mincer, 1970); on the other hand, since high-income individuals enjoy more education than low-income individuals, education could worsen inequality (Chenery et al., 1974). Where the latter situation holds, then where higher education levels are funded by government expenditures, as with primary and secondary school, this can lead to decreases in inequality (Sylvester, 2002; Behr, 2004). It is observed, from Figure 3, that while inequality has decreased across all educational groups, the largest decline in inequality between 2009 and 2014 is observed among individuals with no formal training. One of the possible reasons could be as a result of well-targeted social programmes.

Figure 3: Sub-group inequality decomposition by Education, GSEPS, 2009-2014
Source: GSEPS, 2009 & 2014

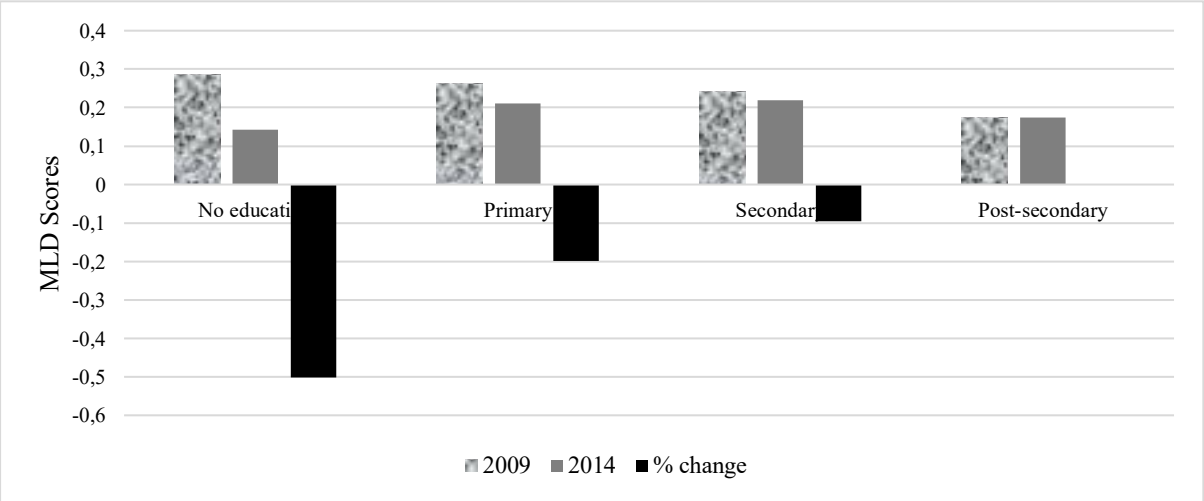
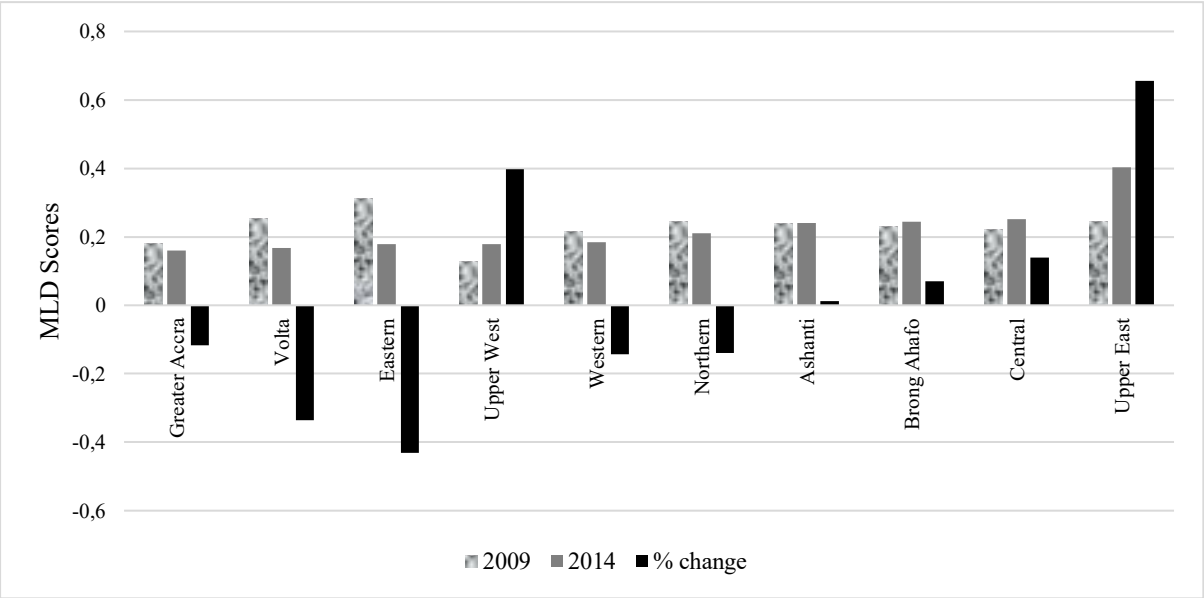


Figure 4 decomposes inequality by each of the ten regions in Ghana. The region with the highest inequality in 2014 is the Upper East region, with an MLD score of 0.404. The region with the lowest inequality is the Greater Accra region with an MLD score of 0.160. This is the region with the highest rate of urbanization in the country and the highest expenditures, albeit an increasing population share. Between group differences in inequality may be as a result of higher infrastructural investments in certain regions, compared to others.

Figure 4: Sub-group inequality decomposition by Region, GSEPS, 2009-2014
Source: GSEPS, 2009 & 2014



Some regions show large changes in inequality over time. For example, the largest increase in inequality have been observed in the Upper East and Upper West regions between 2009 and 2014. Regions like the Volta and Eastern Regions have experienced the largest decreases in inequality between 2009 and 2014; this finding is consistent with work by Annim (2012).

III. Data and methodology

3.1. Data

The Ghana Socioeconomic Panel survey (GSEPS) is a nationally representative dataset covering 5,010 households. The data collection exercise is a result of collaboration between Yale University and the Institute of Statistical, Social and Economic Research (ISSER). A two-stage stratified sample design was used for the survey. Stratification was based on the then-ten (10) regions of Ghana . The first stage involved selecting geographical precincts or clusters from an updated master sampling frame constructed from the 2000 Ghana Population and Housing Census. A total of 334 clusters (census enumeration areas) were selected from the master sampling frame. The clusters were randomly selected from the list of EAs in each region. The selection was based on a simple random sampling technique. A complete household listing was conducted in 2009 in all the selected clusters to provide a sampling frame for the second stage selection of households. The second stage of selection involved a simple random sampling of 15 of the listed households from each selected cluster.

In order to identify the correlates of economic inequality, a number of household and geographical controls are included. These comprise the gender of the head of household; the age of household head; marital status of household head; and education level and employment status of head. Dependency ratios for household heads are calculated as the ratio of dependents (i.e. household members below 15 years of age and above 65 years of age) to total household membership. A dummy variable for rural or urban residence is also included. A dummy variable is created with a value of 1 for household who have land for agricultural purposes. We also include a control for social interventions or programmes. I.e. a dummy variable of 1 for households who report being registered under the country's National Health Insurance Scheme (NHIS). We also control for ethnicity and religion, and finally include spatial regional controls.

3.2. Estimation Strategy

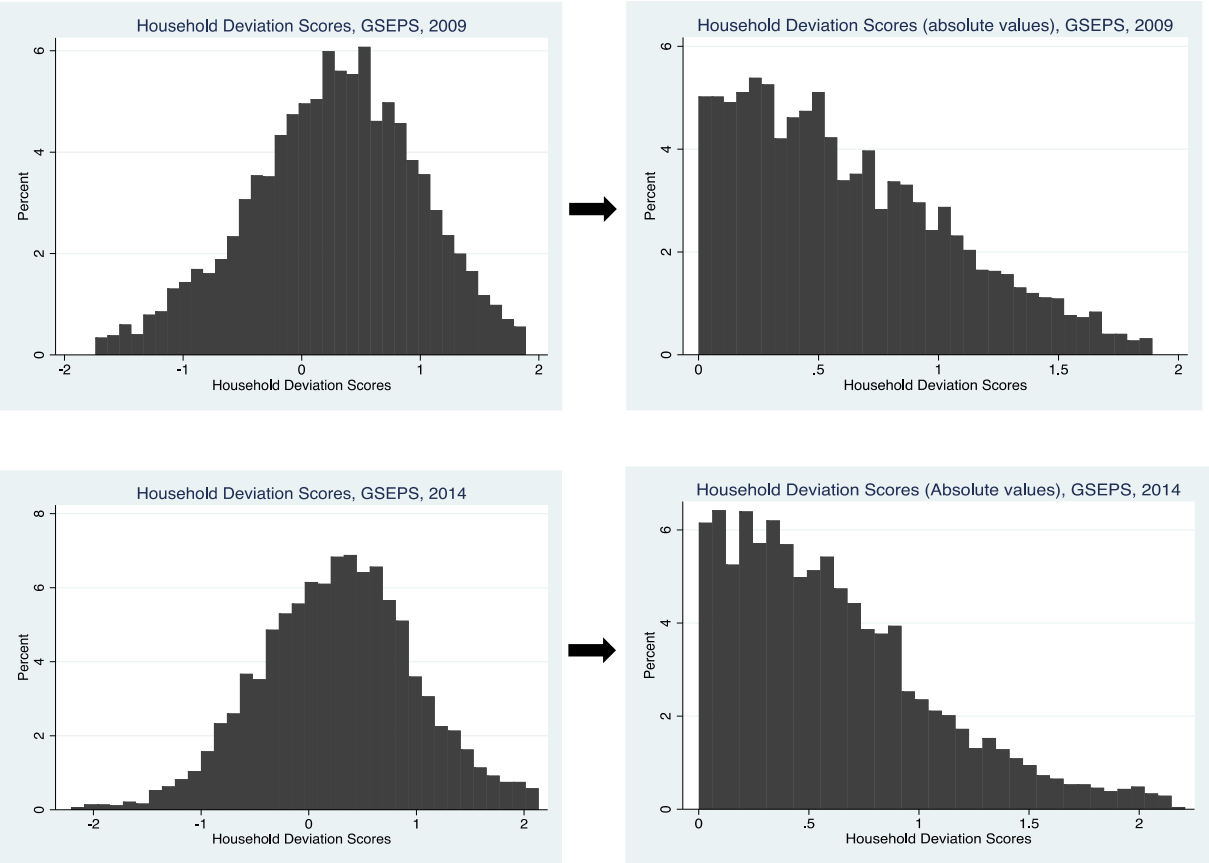
3.2.1. Determinants of Household Expenditure Deviations

The dependent variable is the deviation of household expenditures from the population mean, our proxy for micro-level inequality. Following the formula for the Theil L index given in equation (2) above, we proxy each household's expenditure deviation (ExpDev) as the ratio of the population mean to the household's expenditure. This may be expressed mathematically as follows

$$ExpDev_h = \log \frac{\bar{y}}{y_h}$$

Where $\bar{y}$ refers to the population expenditure mean; y_h refers to the household's total expenditure. The application of this formula yields a single deviation score for each household. The distribution of each household's deviation from the population mean is illustrated in Figure 5. Deviation scores closer to zero (i.e. the population mean expenditure) are indicative of lower inequality. Households with increasingly higher or lower expenditures than the population mean are characterised by scores that increasingly deviate from zero, depicting greater inequality.

Figure 5: Graph of household Distribution of Household Deviation scores, 2009/10- 2013/14
Source: GSEPS, 2009 & 2014



In order to facilitate the interpretation of regression results, we transform household expenditure deviations scores by computing only absolute values:

$$Abs\_ExpDev_h = \left|\log\frac{\bar{y}}{y_h}\right|$$

We therefore treat deviation scores on either side of the line of equality symmetrically. We however include a dummy variable with a value of 1 for high-expenditure households (i.e. negative deviation scores) and a value of 0 for low-expenditure households (i.e. positive deviation scores).

Although a Hausman test indicates the greater suitability of a random-effects model, regression results are presented for both fixed-effects and random- effects specifications. As mentioned above, the regression strategy is particularly useful as standard sub-group decomposition exercises (as carried out above) do not control for characteristics correlated with certain variables such as education, residence, etc.

The random effects model may be presented as follows

$$Abs\_ExpDev_{ht} = a_0 + a_1 X_{ht} + a_2 T_t + \tau_h + e_{ht}$$

Where Abs_ExpDev_{th} are the absolute values of households' expenditure deviations from the population mean in each wave. For separate rural and urban regressions, household expenditure deviation scores are calculated with respect to population means in these respective locations. X_{ht} is the vector of explanatory variables; T_t refers to a term containing the year and region indicator variables and their interactions. These year-region interactions account for factors common to all households in a given location and year, such as ecological, economic, or political shocks, or other region-specific time trends. A household random effect τ_h, is included, as well as e_{ith}, as the idiosyncratic error term for each household and time period.

3.2.2. Correlates of Poverty in Ghana:

As a secondary research objective, we examine the effects of various factors on poverty *and* inequality in Ghana. Poverty is proxied by the log of real expenditures per adult equivalence. The random effects model is specified as follows:

$$LnPov_{ht} = \beta_0 + \beta_1 X_{ht} + \beta_2 T_t + \tau_h + e_{ht}$$

Where $LnPov$ is the log of real expenditure per adult equivalence for household, *h*, at time t; other variables are as specified in (5) above. We run separate for rural and urban areas.

IV. Estimation and results

The first part of this section presents summary statistics for variables used in the study. The second part presents results from the (fixed and) random-effects estimation presented in the previous section. In the final part, we explore simultaneous effects of various household characteristics on poverty and inequality at the household level.

4.1. Descriptive Results

Table 1 summarizes statistics for explanatory variables, using a balanced sample and survey weights. Higher household deviation scores in 2014, compared to 2009, show that inequality has increased within the period, even if only slightly. The proportion of households headed by males decreased from 64.6% in 2009 to 61.4% in 2014, indicating a converse increase in the proportion of households headed by females. On average, household heads were about 46 years and 50 years in 2009 and 2014, respectively. Majority of household heads (63.7% in 2009 and 59.3% in 2014) are married, although the proportion has decreased over time. With respect to education of household heads, the highest percentage of heads have completed a secondary school education (74.6% in 2009) and 2014 (68.4% in 2014). Seventeen percent and 19.4% of heads have a primary school education in 2009 and 2014, respectively. Eight percent of heads in 2009 have post-secondary education; this proportion increased to 10% by 2014. Finally, less than 1% of heads and 2% of heads in 2009 and 2014 respectively have no formal education.

Table 1: Summary Statistics, GSEPS, 2013/14
Source: Ghana Socioeconomic Panel Survey, 2009/2014

	2009		2014	
	Mean	**SD**	**Mean**	**SD**
Household Deviation scores	0.591	0.424	0.612	0.453
Gender of household head (male=1)	0.644	0.479	0.614	0.487
Age of household head (years)	46.484	15.961	49.91	15.524
Marital status of household head (married=1)	0.637	0.481	0.593	0.491
Highest education level of Household head				
No education	0.006	0.077	0.019	0.137
Primary education	0.171	0.377	0.193	0.395
Secondary education	0.746	0.435	0.684	0.465
Post-secondary	0.076	0.266	0.104	0.305
Household dependency ratio	0.374	0.306	0.374	0.317
Household head is employed (yes=1)	0.621	0.485	0.888	0.315
Urban residence	0.549	0.498	0.549	0.498
Household owns/uses land (yes=1)	0.457	0.498	0.486	0.5
Household head registered with NHIS (yes=1)	0.495	0.456	1	0

Ethnic Group of Head				
Akan	0.514	0.5	0.504	0.5
Ewe	0.125	0.331	0.124	0.329
Ga	0.133	0.34	0.132	0.338
Mole-Dagbani and other similar groups	0.228	0.419	0.241	0.428
Religious Denomination of Head				
Christian	0.757	0.429	0.757	0.429
Muslim	0.141	0.348	0.139	0.346
Traditionalist	0.043	0.202	0.037	0.19
No religion	0.059	0.235	0.066	0.249
Urban residence	0.549	0.498	0.549	0.498
Regions of residence				
Western Region	0.098	0.297	0.098	0.297
Central Region	0.119	0.323	0.119	0.323
Greater Accra Region	0.205	0.404	0.205	0.404
Volta Region	0.081	0.273	0.081	0.273
Eastern Region	0.094	0.293	0.094	0.293
Ashanti Region	0.181	0.385	0.181	0.385
Brong Ahafo Region	0.098	0.297	0.098	0.297
Northern Region	0.07	0.255	0.07	0.255
Upper East Region	0.033	0.179	0.033	0.179
Upper West Region	0.022	0.146	0.022	0.146
Observations	3878		3878	

The dependency ratio is calculated as a ratio of dependents (children under 15 years of age and elderly individuals above 65 years of age) to total household size. The higher the ratio, the greater the degree of dependency. The dependency ratio appears to have remained constant between 2009 and 2014 at about 0.374. While 62% of household heads are employed in 2009, this proportion increases to almost 90% by 2014.

In the sample, 45% of households in 2009 and 48.6% in 2014 own or have access to farming lands. While half of the sample in 2009 is registered under the national health insurance scheme (introduced in 2004), a hundred percent of the analytic sample is covered in 2014. Fifty-five percent of households were resident in urban areas in 2009. This proportion did not change substantially between 2009 and 2014. Other descriptive statistics are provided for cultural/ethnic groups, households' religious affiliations and regions of residence.

4.1.1. Regression Results of Determinants of Household Expenditure Deviations and Discussion

Results from the fixed and random effects models are presented in Table 2. These regressions were estimated with robust standard errors. Significant F-statistics indicate statistically that the range of explanatory variables contribute significantly as a group to the explanation of the determinants of consumption among households in Ghana.

Three (3) specifications are run for each model- The first specifications include the full sample, the second includes only the urban sample and the third includes only the rural sample.

Table 2: Results of Fixed and Random Effects Models (absolute mean deviation scores as dependent variable), GSEPS, 2009/14

	Fixed Effects			Random Effects		
Variables	**All**	**Urban**	**Rural**	**All**	**Urban**	**Rural**
Male head	0.02628	0.05547	0.05746	0.04080***	0.05280**	0.03067
	(0.46)	(0.77)	(0.68)	(2.48)	(2.36)	(1.34)
Age of head	-0.01991**	-0.01736	-0.02946**	-0.00319	-0.00313	-0.00783**
	(-2.01)	(-1.34)	(-2.12)	(-1.20)	(-0.78)	(-2.18)
Age (squared)	0.00015*	0.00015	0.00023*	0.00005*	0.00005	0.00009**
	(1.71)	(1.19)	(1.84)	(1.92)	(1.19)	(2.47)
Married head	-0.05659	-0.00451	-0.06487	-0.06062***	-0.07132***	-0.07794***
	(-1.63)	(-0.09)	(-1.29)	(-3.69)	(-3.04)	(-3.38)
Primary	0.01822	0.06994	-0.06890	0.10547*	0.02230	0.12864*
	(0.12)	(0.32)	(-0.47)	(1.81)	(0.21)	(1.80)
Secondary	0.01475	0.11919	-0.10289	0.06754	0.01892	0.08760
	(0.10)	(0.55)	(-0.68)	(1.17)	(0.18)	(1.23)
Post-secondary	0.08730	0.11948	0.08923	0.10909*	0.00330	0.15852*
	(0.58)	(0.54)	(0.53)	(1.79)	(0.03)	(1.91)
Dependency ratio	-0.18103	-0.20523	-0.14977	-0.28910***	-0.20314**	-0.46078***
	(-1.36)	(-1.06)	(-0.78)	(-4.46)	(-2.12)	(-5.25)
Dependency ratio (squared)	0.29804*	0.31355	0.29446	0.38675***	0.33949***	0.54396***
	(1.87)	(1.30)	(1.26)	(4.68)	(2.61)	(5.01)
Employed	-0.00319	-0.03408	0.03888	-0.01997	-0.02371	-0.00408
	(-0.11)	(-0.72)	(0.98)	(-1.28)	(-0.91)	(-0.21)

Urban	-	-	-	-	-	-
				0.05587***		
	-	-	-	(-3.64)	-	-
Farmland	-0.07099**	-0.04373	-0.06658	-0.02527	0.04951**	-0.01178
	(-1.98)	(-0.65)	(-1.56)	(-1.58)	(1.99)	(-0.57)
Social Safety net	-0.10291*	-0.06126	-0.05826	-0.07886***	-0.10113***	-0.07155***
	(-1.71)	(-0.75)	(-0.71)	(-4.44)	(-3.84)	(-3.25)
Muslim	0.29905	-0.01883	0.21867	0.04102	-0.03643	0.06407*
	(1.54)	(-0.06)	(0.99)	(1.59)	(-0.82)	(1.94)
Traditionalist	0.09752	0.39962**	0.00465	0.09456**	0.05273	0.08526*
	(0.78)	(2.14)	(0.03)	(2.13)	(0.58)	(1.88)
No religion	-0.09058	-0.05936	-0.18077**	0.00817	0.01096	0.00445
	(-1.46)	(-0.57)	(-2.36)	(0.32)	(0.26)	(0.14)
Akan	0.03231	0.11187	-0.03896	0.02714	-0.00816	0.02370
	(0.48)	(0.98)	(-0.37)	(1.21)	(-0.24)	(0.79)
Ewe	0.10439	0.01942	0.10730	-0.02686	-0.06256	-0.00922
	(0.81)	(0.14)	(0.55)	(-0.90)	(-1.37)	(-0.25)
Ga	-0.16698	-0.17141	-0.18017	-0.01357	-0.01286	0.00299
	(-1.41)	(-1.25)	(-0.68)	(-0.43)	(-0.30)	(0.07)
High-Expenditure	-	-	-	-0.02060	-0.07726***	-0.03528**
	0.02060	0.07092**	0.00325			
	(-0.85)	(-2.17)	(-0.11)	(-0.85)	(-4.37)	(-2.10)
Western Region	-	-	-	-0.04993	-0.09889*	-0.16321**
	-	-	-	(-1.06)	(-1.66)	(-2.57)
Central Region	-	-	-	0.00668	-0.06223	0.00956
	-	-	-	(0.13)	(-0.83)	(0.13)
Greater Accra	-	-	-	0.08797	-0.03706	0.14738*
	-	-	-	(1.43)	(-0.42)	(1.78)
Volta Region	-	-	-	0.00285	-0.10238	-0.06026
	-	-	-	(0.06)	(-1.54)	(-0.64)
Eastern Region	-	-	-	-0.01560	-0.05171	-0.04931
	-	-	-	(-0.29)	(-0.63)	(-0.68)
Ashanti Region	-	-	-	0.03744	-0.08903	0.05575
	-	-	-	(0.78)	(-1.29)	(0.83)
Brong Ahafo	-	-	-	0.06178	-0.02460	0.03204
	-	-	-	(1.32)	(-0.36)	(0.48)

Upper East	-	-	-	0.12643*	-0.04965	0.16128*
	-	-	-	(1.93)	(-0.55)	(1.79)
Upper West	-	-	-	0.10863	0.31972	0.00600
	-	-	-	(1.34)	(1.63)	(0.08)
Year (2009)	-0.07537	-0.13956**	-0.12162	-0.04993	-0.09889*	-0.16321**
	(-1.23)	(-2.00)	(-1.35)	(-1.06)	(-1.66)	(-2.57)
Constant	1.23364***	0.93947***	1.55960***	0.64885***	0.76801***	0.73732***
	(3.94)	(2.69)	(3.48)	(6.75)	(5.14)	(5.74)
Wave*Region interactions	YES	YES	YES	YES	YES	YES
Model Diagnostics						
r2_w	0.03838	0.04296	0.06727	0.02172	0.02220	0.03010
r2_b	0.00407	0.01637	0.00587	0.07617	0.09088	0.11536
r2_o	0.00573	0.01882	0.00819	0.06178	0.07541	0.08812
N	4735	2278	2457	4735	2278	2457

*T-statistics in parentheses: * p<0.10, ** p<0.05, *** p<0.001*

Results confirm that indeed, returns to household characteristics differ between rural and urban households. Male, compared to female, household headship is associated with an increase in expenditure deviation from population means, indicating increasing inequality. This effect is particularly significant in urban households. Recalling from Figure 2, we note that inequality does appear to be higher among male-headed households; this relationship remains even after controlling for other factors. It is widely recognized that income gaps exist between males and females (Jones, 1983). Men tend to have more opportunities and be more active in the Ghanaian labour market and their salaries, higher than women (Baah-Boateng, 2012). In urban areas, women are more represented in informal activities which generally tend to have worse compensation structures. Males also tend to have more assets, compared to women (Doss et al., 2011). These factors explain the higher inequality among male-headed households, compared to females.

Increasing age of household heads is associated with declining inequality in the study for particularly rural households. Human capital theory suggests that age may be used to capture the level of experience that individuals have. Therefore, older household heads may have acquired more experience, allowing them to increase their income and consumption levels and reduce income gaps. The relationship between age and inequality is however non-linear (Okatch, 2013; Danquah and Ohemeng, 2017), particularly among rural households' heads. Before 44 years of age, older age is associated with reduced inequality; after 41 years of age, however, increased ages of household heads are associated with worsening inequality.

Married household heads in rural and urban households are associated with smaller expenditure deviations from respective population mean, compared to unmarried heads. Couples may marry as a result of complementarities on a host of different characteristics including age, education, income levels, among others. Becker (1973, 1974, 1991) suggests that complementarity in these characteristics leads to optimal positive assortative mating; a situation which may in turn have positive implications for household production, expenditure and equality.

Education also appears to have important implications for household expenditure deviations in rural households. Access to education appears to increase inequality among rural households in the random effects model specification. In Ghana, few individuals in rural areas are educated (Danquah and Ohemeng, 2017) and those who are educated are often engaged in non-farm enterprises while uneducated counterparts are primarily engaged in agricultural activities, with relatively lower returns (Senadza, 2011). The differential returns between educated non-farm enterprise owners and uneducated agricultural workers may therefore serve to widen the income gaps in rural communities.

Increasing dependency ratios among rural and urban households are associated with initially lower inequality. However, beyond a 42% and 30% dependency ratio for rural and urban households, respectively, greater increases in dependency ratios are associated with increasing inequality. Inequality is generally lower in urban areas, compared to rural areas; this is consistent with Figure 1. This may be due to difference in household characteristics, and/or in returns to characteristics in these localities (Wodon, 2000). In urban areas for example, the provision of old-age pensions and expanded work opportunities may explain lower inequality levels.

We find that households engaged in farming activities in urban areas are associated with increasing inequality, likely as a result of low productivity. Provisions of social safety nets like the national health insurance scheme (NHIS) are also associated with smaller household expenditure deviations from the population means, indicating that lower inequality is associated with social safety nets (Danquah and Ohemeng, 2017). The national health insurance scheme (NHIS) is one of the pro-poor social intervention schemes established in Ghana to improve access to health care through the removal of out-of-pocket payments at the point of service delivery.

Inequality appears to be higher among rural Muslims and Traditionalists, compared to Christians; and also, in rural parts of the Central and Upper East regions, compared to the Northern region. Households with higher expenditures are also associated with lower inequality (Morduch and Sicular, 2002). We also find that inequality was lower in 2009, compared to 2014, indicating that controlling for various factors, inequality appears to be worsening over time.

4.2. Correlates of Poverty and Inequality in Ghana

In this section, we examine the correlates of poverty and investigate whether variables are similarly or differentially related with inequality at the household level. Following standard practice, we use the log of expenditure per adult equivalence as a proxy for household poverty. Interesting comparisons (see Figure 4) are then drawn from regression output from inequality (see Table 2) and poverty (see Table 3) regressions.

Table 3: Results of Fixed and Random Effects Models (real expenditure per adult equivalent as dependent variable), GSEPS, 2009/14

	Fixed Effects			Random Effects		
Variables	**All**	**Urban**	**Rural**	**All**	**Urban**	**Rural**
Male head	-0.16101**	-0.32169***	-0.05550	-0.03170	-0.00462	-0.06259*
	(-1.96)	(-2.64)	(-0.49)	(-1.31)	(-0.14)	(-1.79)
Age of head	0.00301	-0.01049	0.01380	-0.01029***	-0.01084*	-0.00798
	(0.25)	(-0.60)	(0.78)	(-2.74)	(-1.93)	(-1.57)
Age (squared)	-0.00007	0.00003	-0.00015	0.00006	0.00005	0.00005
	(-0.62)	(0.20)	(-0.87)	(1.60)	(0.83)	(1.04)
Married head	-0.03738	-0.03861	-0.03749	-0.08848***	-0.08671***	-0.08174**
	(-0.71)	(-0.50)	(-0.52)	(-3.80)	(-2.65)	(-2.44)
Primary	-0.07289	0.16809	-0.08715	-0.02759	0.17117	-0.16705
	(-0.37)	(0.42)	(-0.37)	(-0.31)	(1.22)	(-1.49)
Secondary	-0.01451	0.19518	-0.00118	0.06978	0.25422*	-0.07278
	(-0.07)	(0.49)	(-0.00)	(0.81)	(1.84)	(-0.65)
Post-secondary	0.08685	0.29615	0.13423	0.26612***	0.43121***	0.20608*
	(0.42)	(0.73)	(0.51)	(2.92)	(3.03)	(1.68)
Dependency ratio	0.03171	0.10462	0.00219	-0.21515***	-0.12606***	-0.28754***
	(0.41)	(1.01)	(0.02)	(-6.34)	(-2.59)	(-6.09)
Employed	0.02974	-0.01058	0.01423	0.06300***	-0.02784	0.10611***
	(0.74)	(-0.17)	(0.25)	(2.84)	(-0.80)	(3.55)
Urban	-	-	-	0.32434***	5.48862***	-
	-	-	-	(14.41)	(26.02)	-
Farmland	-0.01117	0.01226	0.00823	-0.18115***	-0.25221***	-0.11603***
	(-0.21)	(0.14)	(0.12)	(-7.86)	(-7.23)	(-3.72)
Social Safety net	0.07944	0.02976	0.08250	0.16773***	0.13921***	0.18178***
	(0.95)	(0.24)	(0.72)	(6.51)	(3.65)	(5.18)
Muslim	-0.07983	0.34760	-0.23101	0.03525	0.08271	-0.00444
	(-0.27)	(0.77)	(-0.57)	(0.93)	(1.38)	(-0.09)
Traditionalist	0.09464	0.53149	0.00743	-0.23266***	-0.18185	-0.24372***
	(0.56)	(1.20)	(0.04)	(-3.69)	(-1.14)	(-3.47)
No religion	-0.04342	-0.04855	-0.04359	-0.06236	-0.04239	-0.06711
	(-0.46)	(-0.30)	(-0.36)	(-1.62)	(-0.66)	(-1.40)
Akan	0.05623	0.08811	0.05582	0.09296***	0.13563***	0.05917
	(0.53)	(0.57)	(0.37)	(2.80)	(2.74)	(1.29)
Ewe	0.20112	0.26049	0.11790	0.10746**	0.12604*	0.09616*

	(1.11)	(0.93)	(0.49)	(2.54)	(1.86)	(1.76)
Ga	-0.11160	0.08343	-0.47384	0.07950*	0.08595	0.12684*
	(-0.60)	(0.36)	(-1.52)	(1.75)	(1.35)	(1.82)
Western Region	-	-	-	0.37015***	0.45291***	0.24481**
	-	-	-	(4.78)	(3.95)	(2.29)
Central Region	-	-	-	-0.10510	-0.00692	-0.24371**
	-	-	-	(-1.24)	(-0.06)	(-2.01)
Greater Accra	-	-	-	0.40206***	0.53040***	0.27123
	-	-	-	(5.07)	(5.21)	(1.46)
Volta Region	-	-	-	0.20498**	0.18901	0.10951
	-	-	-	(2.53)	(1.50)	(1.00)
Eastern Region	-	-	-	0.07383	0.20210*	-0.08184
	-	-	-	(1.01)	(1.93)	(-0.78)
Ashanti Region	-	-	-	0.27994***	0.37359***	0.15719
	-	-	-	(3.97)	(3.77)	(1.54)
Brong Ahafo	-	-	-	0.14848**	0.18782*	0.07968
	-	-	-	(2.00)	(1.76)	(0.76)
Upper East	-	-	-	0.19334**	0.34610**	-0.00159
	-	-	-	(2.09)	(2.30)	(-0.01)
Upper West	-	-	-	-0.11982	-0.21962	-0.20086
	-	-	-	(-0.89)	(-0.86)	(-1.23)
Year (2009)	0.03076	0.19255	-0.22661	0.02804	0.24447**	-0.18940*
	(0.34)	(1.64)	(-1.57)	(0.39)	(2.47)	(-1.80)
Constant	5.51683***	5.97472***	4.95127***	5.36877***	0.00000	5.52816***
	(14.14)	(9.86)	(9.19)	(38.11)	(.)	(28.80)
Wave*Region interactions	YES	YES	YES	YES	YES	YES
Model Diagnostics						
r2_w	0.08461	0.06818	0.13610	0.06199	0.03449	0.10718
r2_b	0.03458	0.00341	0.03809	0.34288	0.19104	0.20079
r2_o	0.04534	0.01080	0.05238	0.29487	0.16822	0.18604
N	4735	2278	2457	4735	2278	2457
F-Statistic/ Wald	42.94	19.56	25.27	5572.66	282204.13	.
Prob >F	0.0000	0.0062	0.0000	0.0000	0.0000	.

*T-statistics in parentheses: * p<0.10, ** p<0.05, *** p<0.001*

There are four (4) different cases of correlations for household poverty and inequality. In the *first* case, certain factors are associated with both increasing poverty and increasing inequality. These include ownership and/or use of farmlands in urban areas, higher dependency ratios, affiliations with traditionalist religions in rural households and residence in rural parts of some regions like the Central region. In the *second* case, factors are associated simultaneously with increasing poverty but decreasing inequality. These include older household heads in urban areas and married household heads in both rural and urban households.

Table 4: Comparing Correlates of Poverty and Inequality from Random Effects model specification
Source: Own production

	Increasing Poverty	**Decreasing Poverty**
Increasing Inequality	**Case 1:** • Farmlands (urban) • Dependency ratio (rural and urban) • Rural Traditionalists (religion) • Some regions (e.g. rural Central)	**Case 3:** • Higher education in rural areas
Decreasing Inequality	**Case 2:** • Older household heads (urban) • Being married (rural and urban)	**Case 4:** • Social safety nets (i.e. NHIS) (rural and urban) • Urbanization

In the *third* case, it is observed that compared to household heads with no education, heads with some education in rural Ghana are associated with decreasing poverty but increasing inequality. As discussed above, this situation is related to the lower affordability of education in rural areas, which, while raising incomes and reducing poverty among the few educated individuals, leads to a widening of the gap between educated and non-educated heads.

In the *fourth* case, factors are associated with both lower poverty and lower inequality. These include provision of social safety nets like the country's national health insurance scheme, increased urbanization and provision of greater employment opportunities for rural household members.

V. Conclusion and Policy Applications

This paper analysed the micro determinants of inequality in Ghana from 2009 to 2014 using panel regression models in order to facilitate a deeper understanding of the determinants of economic inequality in Ghana between 2009 and 2014. Sub-group inequality decompositions indicated that inequality in Ghana is largely due to within- rather than between-group inequality. Multivariate regression analyses provided additional insights into the determinants of inequality at the micro level. Factors like male household headship, education, higher dependency ratios and religious affiliation tend to exacerbate inequality while other factors like the age of household head, being married, urbanization and access to social safety nets appear to reduce inequality. The returns to these household characteristics are found to differ by rural and urban residence.

The study also examined simultaneous correlates of household poverty and inequality in Ghana. In this paper, we proposed another measure of inequality at the micro-level. Household deviation scores were derived from the family of generalized entropy inequality measures, where greater deviation scores from the population mean are indicative of greater micro-level inequality. By means of this novel construct, we were able to model poverty and inequality independently, using a panel dataset for Ghana. We found four (4) different cases of correlations for household poverty and inequality. While some factors are associated with both increasing poverty and inequality such as urban farming and higher household dependency ratios, other factors were associated with decreasing poverty and inequality such as urbanization and the provision of social safety nets. Perhaps more interestingly, some factors were associated with increasing (decreasing) poverty but decreasing (increasing) inequality. Policy applications of our research findings are discussed below.

Urban agriculture appears to be an area worth examining as a potential sector for policy intervention, given the increasing levels of urbanization in the country, with attendant implications for food availability and security. We find that households that practice agriculture in urban areas are associated with poverty and greater inequality- some investments should therefore be made to increase agricultural productivity here through for instance, provision of necessary inputs for more intensive food cultivation.

Households with greater dependency ratios are found to be associated with worse poverty and inequality outcomes in both rural and urban Ghana. After a dependency ratio of 30% and 42% in urban and rural households, respectively, further rises in household dependency ratios are associated with worsening inequality. This situation indicates a need to reduce fertility levels, for instance, through the prevention of unwanted or mistimed births, in order to improve families' welfare outcomes. This goal can be achieved through increased focus on family planning programs and effective education on available contraceptive options.

Although education improves households' poverty outcomes, education in rural areas appears to worsen inequality as a result of the limited access to these opportunities in these areas. Steps should be taken therefore to uniformly remove constraints to

educational access in rural areas in order to encourage more school attendance, both at the basic and at higher levels. Existing policies such as the free senior high school (SHS) education initiated by the current government are a step in the right direction as this is likely to facilitate, at least partially, the attainment of this goal.

Urbanization is also found to be associated with lower poverty and inequality, likely as a result of the myriad of economic opportunities, infrastructure and social amenities available here. Policy should be focused on providing similar services and opportunities to rural residents in order to reduce poverty and narrow income and expenditure gaps in this setting. Regional differences in resources and amenities, particularly between northern and southern Ghana, also need to be addressed in order to eliminate differences in households' welfare statuses.

The provision of social safety nets such as the national health insurance (NHIS) scheme (and potentially others such as the Livelihood Empowerment Against Poverty (LEAP)) are a step in the right direction towards reducing both poverty and inequality in the country. Other interventions, focused on particularly vulnerable groups such as women, children, disabled individuals, among others should also be pursued.

Although Ghana has witnessed large improvements in economic growth over time, with attendant reductions in poverty, this growth has not benefitted everyone equally. In order to achieve more inclusive growth, interventions need to be targeted to specific sub-groups and policies need to be properly tailored to the needs of otherwise overlooked groups. Our findings on the variations in the correlates of both poverty and inequality welfare outcomes allows greater policy concentration on not just poverty, as has been the case in many developing countries, but also on inequality. We conclude that policy interventions to reduce poverty do not necessarily translate into reductions in inequality. It would be important to design more nuanced interventions, therefore, to ensure that both welfare outcomes- poverty and inequality- are satisfactorily and simultaneously achieve.

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Appendices

1. **Appendix 1: Sub-group Consumption inequality Decomposition, Mean Log Deviation Indices**

	2009				2014			
	Population Share	**Mean**	**Exp. Share**	**GE (0)**	**Population Share**	**Mean**	**Exp. Share**	**GE (0)**
By Locality								
Rural	0.559	171.84	0.279	0.214	0.441	218.98	0.334	0.237
Urban	0.441	350.62	0.721	0.207	0.560	344.13	0.666	0.212
Within groups				0.210				0.223
Between groups				0.060				0.025
By Gender								
Male	0.646	258.78	0.615	0.287	0.608	287.74	0.605	0.254
Female	0.354	295.34	0.384	0.233	0.392	290.71	0.395	0.237
Within groups				0.268				0.247
Between groups				0.002				0.000
By Education								
No education	0.006	270.21	0.005	0.287	0.019	199.78	0.011	0.143
Primary	0.167	241.96	0.136	0.262	0.194	241.11	0.147	0.210
Secondary	0.747	300.53	0.758	0.242	0.684	323.19	0.694	0.219
Post-secondary	0.081	365.65	0.100	0.175	0.102	458.91	0.147	0.175
Within groups				0.240				0.211
Between groups				0.005				0.016
By Region								
Western	0.098	260.26	0.093	0.216	0.093	327.68	0.106	0.185
Central	0.114	293.40	0.123	0.221	0.116	200.73	0.080	0.252
Greater Accra	0.205	394.91	0.298	0.181	0.216	413.90	0.310	0.160
Volta	0.091	190.58	0.064	0.253	0.083	264.29	0.076	0.168
Eastern	0.097	260.82	0.093	0.313	0.096	230.6	0.076	0.178
Ashanti	0.190	276.23	0.193	0.238	0.178	4	0.188	0.241
Brong Ahafo	0.096	208.38	0.074	0.229	0.095	306.32	0.083	0.245
Northern	0.061	171.46	0.038	0.244	0.068	250.9	0.044	0.210
Upper East	0.030	149.78	0.017	0.244	0.033	0	0.025	0.404
Upper West	0.019	102.51	0.007	0.128	0.022	185.96	0.012	0.179
Within groups				0.228		217.85		0.210
Between groups				0.041		156.51		0.037

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