EXPLORING THE DYNAMICS OF HOUSEHOLD- LEVEL CONSUMPTION INEQUALITY IN GHANA

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Abstract

Despite the country's impressive growth record, inequality remains a pressing concern. The objective of this paper is to illuminate the various forces that drive consumption inequality at the household level in Ghana. The paper examines the dynamics of economic inequality between 2009 and 2014 using data from the Ghana Socioeconomic Panel Survey. Using a random effects estimation methods and a novel proxy for inequality- household mean log deviation scores, based on the Theil L index formula- we find that factors like male household headship, education, dependency ratios and some religious affiliations tend to exacerbate inequality in Ghana while other factors like the age of household head, being married, urbanization, access to farm lands and health insurance coverage appear to reduce inequality. It is important to note that in many cases, the returns to household characteristics differ by rural and urban residence. We also examine simultaneous correlates of poverty and inequality at the household level and find interesting results. Findings from the study are expected to have important policy implications for addressing poverty and inequalities in Ghana in the ongoing process of growth and poverty reduction schemes.

I.   INTRODUCTION

Economic inequality is a major area of concern for citizens and governments. As an indicator, economic inequality is an important tool for assessing the effect of various government policies on inequality and also for the appropriate design of inequality-reducing interventions and programs. Although economic growth has been universally recognized as an indicator of wellbeing of a population, the distributional elements of economic variables may be a more accurate gauge. In many developing countries, economic growth alone is an insufficient condition for improved welfare. Indeed, economic growth may lead to a widening of the gap between the poor and the non-poor, with attendant social problems (Stiglitz, 2013; Piketty, 2014; Boushey et al., 2017).

Ghana has recorded impressive increases in growth over time from approximately -7% in the early 1980s to 8.5% in 2017. As noted in Aryeetey and Feeny (2017), the country recorded its highest growth rate of 14% in 2011, largely due to receipts from the mining sector, and is considered as one of the fastest growing economies in Africa. Between 1992 and 2013, Ghana experienced a decline in poverty from 56.5% to 24.2%; the absolute number of people living in poverty also decreased within the period (Cooke et al., 2016). It is important to recognize however that the benefits of economic growth and poverty reduction have not been equitably distributed among individuals in the country.

Inequality has been increasing in the country and high poverty remains a policy concern (Cooke et al., 2016). According to the Ghana Poverty Report (2018), the national Gini coefficient has increased from 0.419 in 2005 to 0.43 in 2017. This indicates that although the country has been recording impressive growth over time, some groups are being left out. Although successive governments have played an active role in increasing growth and reducing poverty in the country through interventions aimed at increasing school enrolment and universal access to health care, for example, inequality in Ghana continues to persist. The benefits of economic growth are not evenly distributed among sub-groups within the population such as regions, urban/rural localities, gender, among others, a situation which could potentially undermine progress with national growth and poverty reduction, weaken social cohesion and exacerbate social tensions within the country.

The positive association between high economic growth and rising economic inequality makes Ghana an ideal case study for the examination of the dynamics and determinants of inequality over time. The objective of this paper is to shed light on the various forces that drive economic inequality at the micro level. 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 inequality differ across rural/urban residents?
   b. Are there common correlates of poverty and inequality at the household level in Ghana?

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 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 household 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 mean log deviation scores as a proxy for inequality is a supplement to the more common use of welfare ratios and per capita expenditures in the existing literature.

II.   AN OVERVIEW OF INEQUALITY TRENDS IN GHANA, 2009/10- 2013/14
i.   *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 class of measures are well-noted for their ease of decomposability. They have the following formula:

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

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 inequality scores. The choice of the mean log deviation measure is justified given its characteristic sensitivity to changes in the lower tail of the distribution; this focus would be consistent with the greater concern attached to these groups by policy makers in developing country settings.

If household i has an income or expenditure y_i , there are N people in this society, and total income or expenditure in the society is Y (i.e. $\bar{y}$ = Y/N) the mean log deviation (MLD) is estimated from the following equation (Haughton and Khandker, 2009):

$$MLD = \frac{1}{N} \sum_{i=1}^{N} \ln \left(\frac{\bar{y}}{y_i} \right) \tag{2}$$

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

In this section, we use the entropy class measure (mean log deviation scores) 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.

In Figure 1a, examining mean log deviation scores for rural and urban Ghana, although inequality has increased in both locations, the increase in inequality in rural Ghana is greater (0.214 to 0.237), compared to the increase (0.207 to 0.212) in urban sections of the country. Urban expenditures generally tend to be higher than in rural areas. Lower expenditures in the latter may be attributed to poorer infrastructure and human development capacity, market imperfections, among others. The persistent urban –rural gap is a key factor accounting for inequality nationally. The rise in inequality in rural areas may be attributed to the recent pull of labour from agriculture into the mining sector, leading to an increase in the income gap between people involved in the agricultural sector and those in the mining sector; the expenditure share of rural dwellers increased from 28% to about 33% between 2009 and 2014. Lower inequality in urban areas may be explained by certain household characteristics such as fewer children, better education, and better occupations.

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 (see Figure 1b). Male expenditure shares have fallen from 61.5% to 60.5% between 2009 and 2014, although this may however be explained by the decrease in their population share from 64.6% to 60.8%. Female expenditure shares on the other hand have risen from 38.4% to 39.5%, perhaps also partly attributable to an increase in their population shares from 35.4% to 39.2%. Nonetheless, part of the increase in women's expenditures, and subsequently rising inequality, may be due to increased opportunities available to them due to national policy focus on female education and employment generation.

[Figure 1a-d here]

There appears to be some disagreement in the literature on the effects of education on inequality. On the one hand, education provides individuals with useful skills which can be used in the labour market. As more individuals attain (higher) education, the income gap reduces and inequality falls. On the other hand, increasing education may actually lead to *increasing* inequality if individuals are provided with skills that are not in demand by the labour force. In Figure 1c, the highest rates of inequality are observed among individuals with primary and secondary school education in 2014. This could be as a result of the large number of graduates who are unable to secure employment after graduation. The largest decline in inequality is observed among individuals with no formal training. This may be explained by the dominant informal economy in the country and rising tendencies for self-employment. Generally, the percentage decline in inequality appears to be higher at lower levels of education. Inequality is unchanged among individuals with post-secondary education between 2009 and 2014.

The region with the highest inequality in 2014 is the Upper East region, with an MLD score of 0.404 (see Figure 1d). 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. The low inequality may be as a result of the myriad of government interventions and development programmes that are concentrated in this region which serve to narrow income gaps. 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. These regions have some of the lowest expenditures and the highest inequality levels in the country. Shepherd et al. (2006) however find that the urban centres in the northern parts of the country are the equal of their southern counterparts; it is the northern rural areas which remain particularly disadvantaged. 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). While population shares have fallen and expenditure shares have risen in the Volta region; in the Eastern region, population shares are largely unchanged and expenditure shares have declined.

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). While within-group inequality has increased in the rural/urban locality subgroup, it has decreased in other sub-groups i.e. gender, education, region (see Appendix 1).

III.   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). Many economists therefore consider consumption expenditure to be a better variant and measure of welfare, given that, to a large extent, expenditure is a function of goods and services.

A lot of existing studies on the determinants of inequality have been done from a macro-perspective. 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 and welfare of households. These have tended to focus on Asian and developed countries, with fewer emphasis given to countries in sub-Saharan Africa.

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 are important determinants of inequality in Bangladesh. Rahman (2015) also employs similar welfare ratios and also an OLS regression technique. Findings indicate that land ownership and farm assets, education,

household dependency ratio and location are 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 are important for explaining income inequalities. In the United States, Cowell and Fioro (2009) show 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.

Fewer regression-based analyses of micro-level determinants of inequality have been conducted in Africa. An exception is work by Okatch (2013) which explored the determinants of income inequality, proxied by the log of household income, for Botswana through a decomposition of income inequality at the household level, in order to explore relevant channels. Results indicated that primary education and age are negatively correlated with income inequality, while secondary education level, number of children and working adults are 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 are 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 cross-sectional dataset, the Ghana Living Standards Survey (GLSS). The use of panel data 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 the impact of omitted variables. The present study aims to correct these potential weaknesses in earlier studies on inequality in Ghana by the use of panel data.

IV.   DATA AND METHODOLOGY
i.   *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[1]. 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 sources 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 of head. Dependency ratios for household heads are calculated as the ratio of dependents (i.e.

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[1] Six (6) additional regions were introduced in 2018

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 own or have use rights to 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 national health insurance scheme. We also control for ethnicity and religion, and finally include spatial regional controls.

ii.   *Estimation Strategy*

Although a Hausman test indicates the greater suitability of a random-effects model, results are presented for both fixed-effects and random- effects. 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:

$$MLD_{ht} = a_0 + a_1 X_{ht} + a_4 T_t + \tau_h + e_{ht}$$

Where MLD_{th} are the absolute mean log deviation scores for household, h. 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.

V.   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.

i.   *Descriptive Results*

Household mean log deviation scores are employed as a proxy for micro-level inequality. These describe how each household expenditure deviates from the sample mean. The mean log deviation is zero when all households have the same income or expenditure. Households with higher or lower expenditures are represented with scores that increasingly deviate from 0, depicting greater consumption inequality. The histograms in Figure 1 show the distribution of household mean log deviation scores for each wave of data, with zero representing an equal distribution and greater dispersions from zero, on either side, representing increasing levels of inequality. Household inequality appears to have increased between 2009 and 2014 in the analytic sample.

Negative scores are transformed into positive values as shown in the graphs on the right. This transformation facilitates interpretation of inequality in the multivariate regression estimations- if zero represents equality, positive (negative) effects increase (decrease) dispersion away from zero and therefore increase (decrease) household-level inequality.

[Figure 2 here]

Table 1 summarizes statistics for explanatory variables, based on the analytic sample. The proportion of households headed by males has decreased from 64.6% in 2009 to 60.8%, indicating a converse increase in the proportion of households headed by females. On average, household heads are about 47 years and 50 years in 2009 and 2014, respectively. Majority of household heads (62.7% in 2009 and 58.3% in 2014) are married, although the proportion

has decreased over time. With respect to education of household heads, the highest percentage of heads has a secondary school education in 2009 (74.7%) and 2014 (68.4%). 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 here]

The dependency ratio is calculated as a ratio of dependent (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 decreased slightly between 2009 and 2014 from 0.382 to 0.374. In the sample, 45% of households in 2009 and 47.4% 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-six 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.

ii. *Regression Results of Determinants of Household Inequality and Discussion*

Results from the fixed and random effects models are presented in Table 3. 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. Following Wodon (2000), separate regressions are specified for rural and urban sectors because the returns to household characteristics may be expected to differ between these localities.

Results confirm that indeed, returns to household characteristics differ between rural and urban households. Male household headship in the random effects model is associated with an increase in dispersion and increased inequality, compared to female household headship. This effect is particularly significant in urban households. Examining Figure 1b, inequality does appear to be higher among male-headed households. Regression results indicate that this relationship is particularly true for urban households, controlling for a series of potentially confounding 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 are 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 but only significantly so among 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 consumption levels. The age squared term is included in the regression in order to account for the non-linearity of the variable. Household heads' experience and expenditures may decline at some point during their life cycle, for example after retirement. Indeed, the positive coefficient of the squared age variable indicates that the relationship between age and inequality is non-linear (Okatch, 2013; Danquah and Ohemeng, 2017). Karunaratne (2000) suggests that changes in the population age structure is one of the most important factors affecting income inequality trends especially in the long term.

Married household heads are associated with smaller deviations from the population mean, compared to unmarried heads. Again, this effect is only significant for rural households. 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 inequality.

Education also appears to have different returns to rural and urban 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 (Senadza, 2011). The higher returns to non-farm enterprises may therefore serve to widen the gap between the educated and non-educated in rural communities. In Ghana, rising education appears to encourage migration from rural areas with positive welfare implications for households. This situation may likely further widen the expenditure gap between rural household with and without educated members.

Dependency ratios appear to have mixed effects on inequality in rural and urban households. While higher dependency ratios increase inequality in urban households, they tend to reduce expenditure deviations in rural households. In urban households, the presence of additional dependents may place pressure on household resources especially as children may be engaged with school work and make little (if any) contribution to household production (Anwanyu 2005). In rural areas, children are useful as farm hands and may contribute to increased household production, leading to a reduction in inequality. Another explanation for inequality-reducing impacts of dependency ratios in rural areas may be that richer households may be the recipients of household members from poorer households, leading to a greater and more even spread of expenditure.

Inequality is generally lower in urban areas, compared to rural areas; this is consistent with Figure 1a. 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. Access to farm lands reduce inequality in rural areas, as expected (Wodon, 2000). This is significant in the fixed effects model. Provisions of social safety nets like the national health insurance scheme (NHIS) are also associated with lower mean deviations, particularly in rural areas, under the random effects model (Danquah and Ohemeng, 2017). The national health insurance scheme (NHIS) was one of the pro-poor social intervention schemes established with the view of improving financial access of Ghanaians, especially among the poor and the vulnerable, in order to enable them access quality health services.

Inequality appears to be higher among rural Muslims and Traditionalists, compared to rural Christians; and also, in the Central and Upper East regions, compared to the Northern region (Shepherd, 2006). Households with higher expenditures are associated with lower inequality (Morduch and Sicular, 2002).

iii.   *Correlates of Poverty and Inequality in Ghana*

Following standard practice, we use the log of expenditure per adult equivalence as a proxy for household poverty. Results from fixed and random effects models are shown in Table 3. Interesting comparisons are observed between Tables 2 and 3, using regression results from random effects models (see summary of results in Appendix 2).

Controlling for a host of other household characteristics including household composition, male-headed households are poorer, compared to female-headed households and are associated with greater inequality. Older household heads are poorer in urban households but are associated with lower inequality in rural areas. The relationships between the age of the household head and both welfare indicators are however consistently non-linear. While marriage is associated with increasing poverty, married heads are also associated with lower inequality. Education improves

household poverty status particularly at higher levels, but higher education is consistently associated with increased inequality, especially in rural parts of the country. Higher dependency ratios increase household poverty in both rural and urban areas; however, while higher dependency increases inequality in urban areas, it decreases it in rural areas. Urban households in Ghana have lower poverty and inequality, compared to rural households.

Access to farmlands is associated with increased poverty but lower inequality. Access to social safety nets like health insurance reduces household poverty and inequality, particularly in rural households. With respect to religious affiliations, Muslims is urban households have better poverty statuses, compared to their Christian counterparts. Traditionalists and household heads with no religion are affiliated with greater poverty. Compared to rural Christians, inequality is higher among rural Muslims and Traditionalists. Religion does not appear to play a significant role in poverty and inequality in urban households.

Ethnic groups commonly found in southern Ghana (i.e. Akans, Ewes, Gas) appear to be associated with lower poverty, compared to groups found in northern Ghana. There are no significant associations between household inequality and ethnicity. With respect to regional variations, the Northern region has poorer poverty outcomes, compared to others, particularly in urban households. Compared to the Northern region, inequality is worse in rural Central and Upper East regions, and in urban households in the Upper West region. Over time, while poverty and inequality has been falling in urban Ghana, rural Ghana is characterized by falling inequality but rising poverty.

There are four (4) different cases of correlations for household poverty and inequality. In the *first* case, factors are associated with higher poverty and lower inequality (e.g. age of household head, marital status, dependency ratios in rural areas, access to farm lands). In the *second* case, factors are associated simultaneously with lower poverty but higher inequality (e.g. post-secondary education, Akan ethnic groups, some regions in southern Ghana). In the *third* case, factors are associated with higher poverty and higher inequality (e.g. male household headship, dependency ratios in urban households, members of Traditional religions, households in rural parts of the central region). In the *fourth* case, factors are associated with lower poverty and lower inequality (e.g. social safety net like health insurance coverage, some ethnicity affiliations and regional affiliations).

VI. CONCLUSION

This paper analysed the micro determinants of inequality in Ghana from 2009 to 2014 using panel regression models, providing critical insights into 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, dependency ratios and religious affiliation tend to exacerbate inequality while other factors like the age of household heads, being married, urbanization, access to farm lands and health insurance appear to reduce inequality. The returns to household characteristics however differ by rural and urban residence.

The study also examined simultaneous correlates of household poverty and inequality in Ghana. The relationships were not always consistent- while some factors affected poverty and inequality in similar directions, other affected these welfare indicators in opposite directions, with important implications for policy. Although education improves households' poverty outcomes, education in rural areas appears to exacerbate household inequality as a result of the limited access to these opportunities. Steps should be taken therefore to remove constraints to educational access in rural areas in order to encourage more school attendance, both at the basic and at higher levels. Policies such as the free basic education may facilitate the partial attainment of this goal. Urbanization is also found to be associated with lower inequality, compared to rural areas, potentially as a result of the myriad of economic opportunities, infrastructure and social amenities. Policy should be focused on providing similar services and opportunities to rural residents in order to reduce high inequality levels observed among this group. Regional differences in resources and amenities,

particularly in northern and southern Ghana, need to be addressed in order to eliminate differences in households' welfare statuses. Access to farm lands in rural areas has also been found to be associated with poverty but lower inequality, indicating the need to resolve land tenure security issues currently prominent in the country and increase agricultural investments in rural areas. 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 in reducing both poverty and inequality in the country.

In conclusion, 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.

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Figure 1a)- d): Inequality Dynamics, GSEPS, 2009- 2014

Fig 1a: Inequality by Rural/Urban residence, GSEPS, 2009-2014

Fig 1b: Inequality by Gender, GSEPS, 2009-2014

Fig 1c: Inequality by Education, GSEPS, 2009-2014
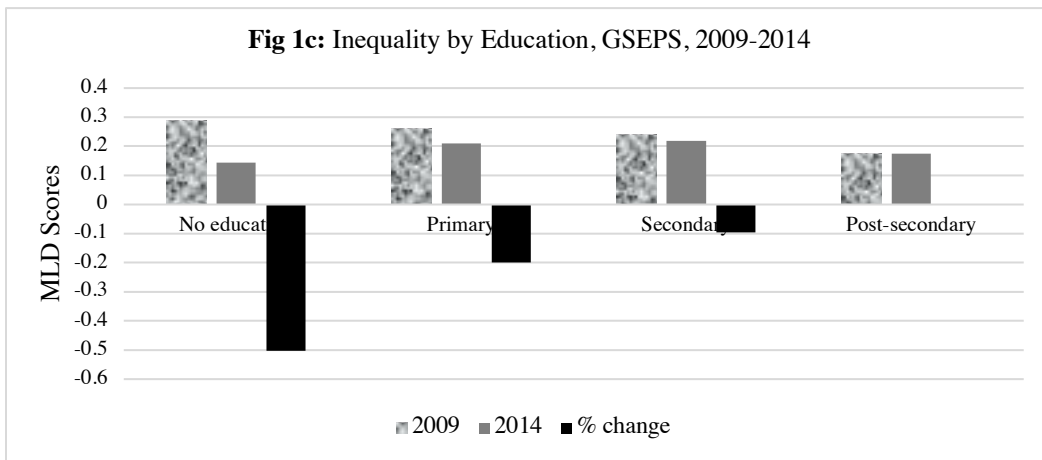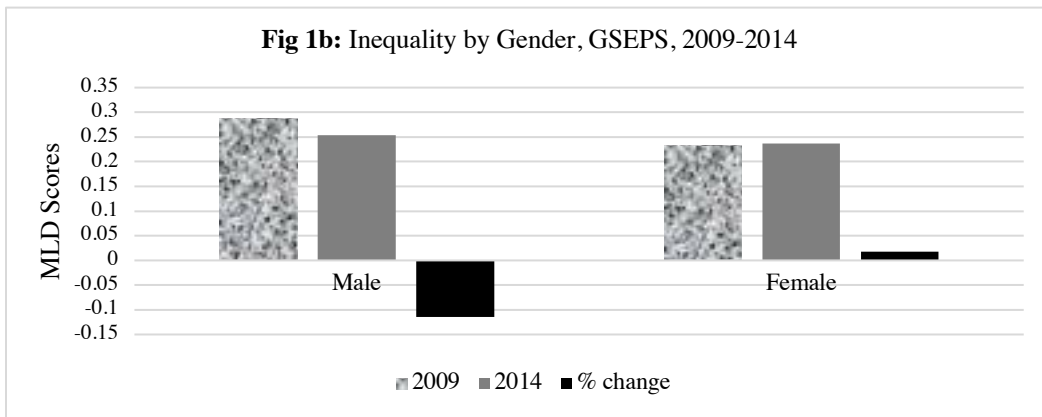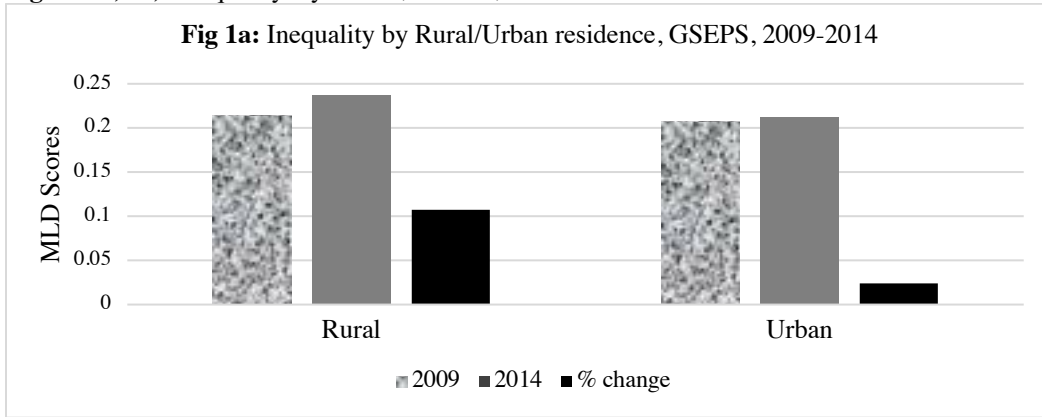
Fig 1d: Inequality by Regions, GSEPS, 2009-2014
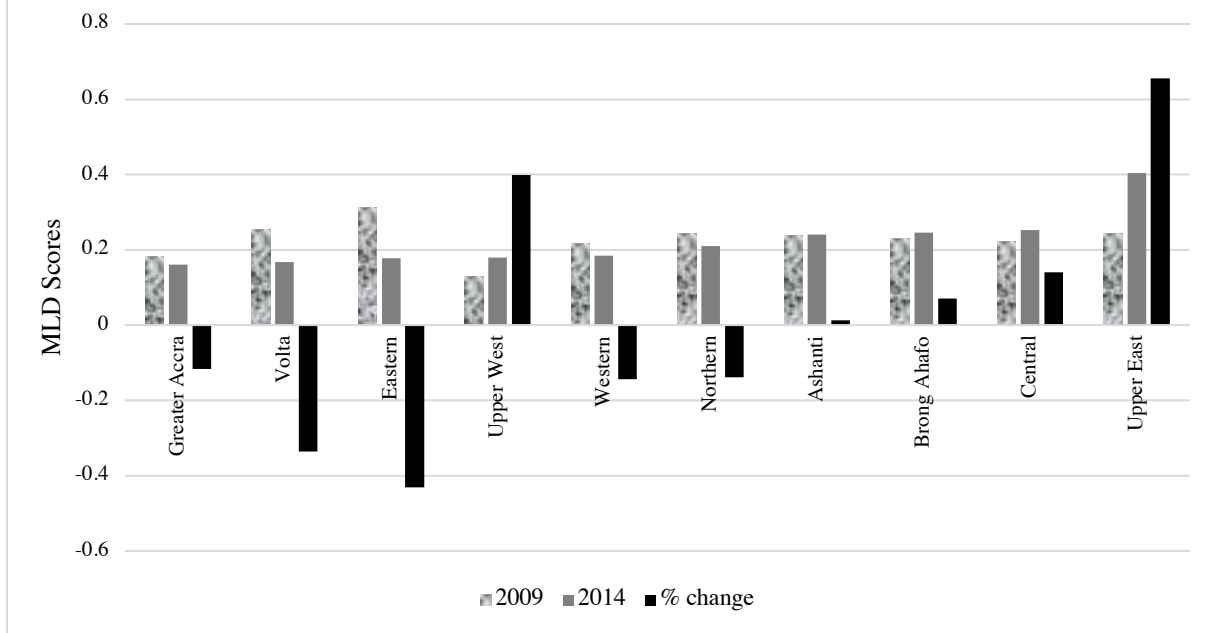
Figure 2: Graph of household Distribution of Mean Log Deviation scores, 2009/10- 2013/14
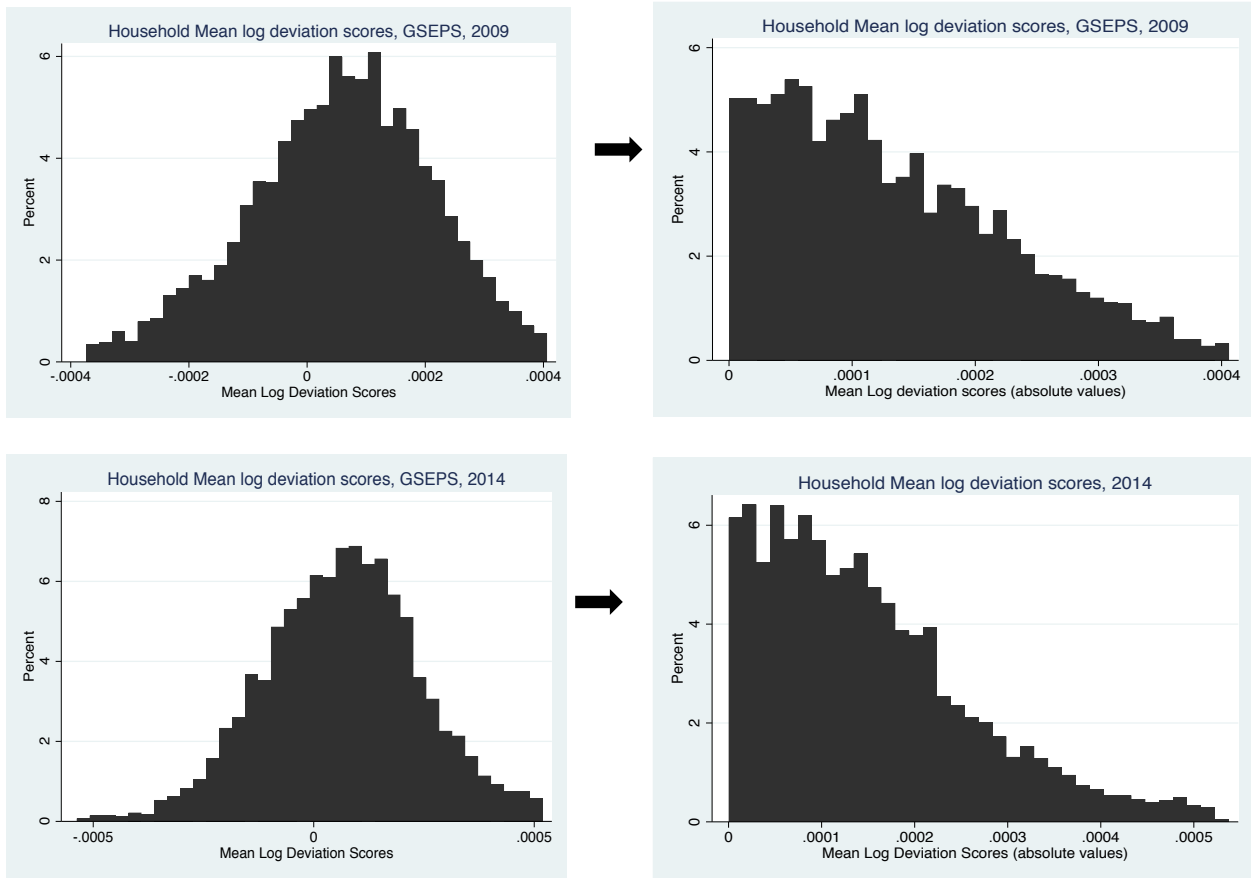
Table 1: Summary Statistics, GSEPS, 2013/14

Variables	2009		2014	
	Mean	**SD**	**Mean**	**SD**
Dependent Variable				
Mean Log Deviation scores	0.0001329	0.0000938	0.0001498	0.0001116
Explanatory Variables				
Gender of household head (male=1)	0.646	0.478	0.608	0.488
Age of household head (years)	47.446	16.357	50.054	15.661
Marital status of household head (married=1)	0.627	0.484	0.583	0.493
Highest education level				
No education	0.006	0.076	0.019	0.136
Primary education	0.167	0.373	0.194	0.396
Secondary education	0.747	0.435	0.684	0.465
Post-secondary	0.081	0.272	0.102	0.303
Dependency ratio	0.382	0.315	0.374	0.319
Household owns/uses land (yes=1	0.446	0.497	0.474	0.499
Registered with NHIS (yes=1)	0.504	0.457	1	0
Ethnic Group				
Akan	0.523	0.5	0.495	0.5
Ewe	0.134	0.34	0.127	0.333
Ga	0.129	0.335	0.139	0.346
Mole-Dagbani and other similar groups	0.216	0.412	0.24	0.427
Religious Denomination				
Christian	0.764	0.425	0.76	0.427
Muslim	0.129	0.335	0.138	0.345
Traditionalist	0.043	0.203	0.036	0.187
No religion	0.064	0.245	0.066	0.248
Urban residence	0.559	0.497	0.559	0.497
Regions				
Western Region	0.098	0.297	0.093	0.291
Central Region	0.114	0.318	0.116	0.32
Greater Accra Region	0.205	0.404	0.216	0.412
Volta Region	0.091	0.287	0.083	0.277
Eastern Region	0.097	0.296	0.096	0.294
Ashanti Region	0.19	0.392	0.178	0.382
Brong Ahafo Region	0.096	0.295	0.095	0.294
Northern Region	0.061	0.239	0.068	0.252
Upper East Region	0.03	0.171	0.033	0.178
Upper West Region	0.019	0.136	0.022	0.146
Observations	4657		4110	

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

Variables	Fixed Effects			Random Effects		
	All	Urban	Rural	All	Urban	Rural
Male head	0.00001	0.00001	0.00001	0.00001**	0.00002***	0.00000
	(0.44)	(0.33)	(0.34)	(2.52)	(3.00)	(0.63)
Age of head	-0.00001***	-0.00000	-0.00001***	-0.00000***	0.00000	-0.00000***
	(-2.78)	(-1.07)	(-2.92)	(-2.61)	(1.31)	(-5.76)
Age (squared)	0.00000**	0.00000	0.00000***	0.00000***	-0.00000	0.00000***
	(2.39)	(0.85)	(2.59)	(3.70)	(-0.53)	(6.44)
Married head	-0.00002*	0.00000	-0.00003**	-0.00002***	-0.00001*	-0.00003***
	(-1.77)	(0.25)	(-2.39)	(-5.02)	(-1.65)	(-6.25)
Primary	0.00000	0.00005	-0.00001	0.00003**	0.00001	0.00004**
	(0.15)	(0.81)	(-0.29)	(2.00)	(0.28)	(2.17)
Secondary	0.00000	0.00007	-0.00002	0.00002	0.00000	0.00003
	(0.13)	(1.00)	(-0.58)	(1.39)	(0.17)	(1.56)
Post-secondary	0.00002	0.00007	0.00002	0.00003**	0.00001	0.00004**
	(0.61)	(1.02)	(0.51)	(2.04)	(0.30)	(2.13)
Dependency ratio	0.00001	0.00003*	-0.00000	0.00000	0.00002***	-0.00002**
	(0.95)	(1.71)	(-0.19)	(0.39)	(3.21)	(-2.50)
Urban	-	-	-	-0.00001***	-	-
	-	-	-	(-3.48)	-	-
Farm land	-0.00002*	-0.00001	-0.00002*	-0.00001	-0.00000	-0.00000
	(-1.77)	(-0.52)	(-1.66)	(-1.48)	(-0.50)	(-0.11)
Social Safety net	-0.00002	-0.00003	-0.00001	-0.00002***	-0.00001*	-0.00003***
	(-1.47)	(-1.27)	(-0.79)	(-4.29)	(-1.83)	(-4.96)
Muslim	0.00007	0.00005	0.00007	0.00001	-0.00000	0.00002**
	(1.44)	(0.63)	(1.05)	(1.63)	(-0.09)	(2.08)
Traditionalist	0.00002	0.00014*	0.00000	0.00002**	-0.00001	0.00003***
	(0.72)	(1.86)	(0.02)	(2.15)	(-0.33)	(2.72)
No religion	-0.00002	-0.00001	-0.00003	0.00000	-0.00001	0.00001
	(-1.31)	(-0.53)	(-1.31)	(0.24)	(-0.56)	(1.02)
Akan	0.00001	0.00002	-0.00001	0.00001	0.00000	0.00001
	(0.51)	(0.87)	(-0.29)	(1.34)	(0.59)	(0.80)
Ewe	0.00002	0.00004	0.00002	-0.00001	-0.00000	-0.00001
	(0.82)	(0.87)	(0.46)	(-0.95)	(-0.22)	(-0.88)
Ga	-0.00004	-0.00004	-0.00001	-0.00000	-0.00000	-0.00001
	(-1.22)	(-1.17)	(-0.17)	(-0.32)	(-0.05)	(-0.61)
High-Expenditure	-0.00001	0.00001	-0.00002**	-0.00001***	0.00001**	-0.00004***
	(-1.05)	(0.75)	(-2.51)	(-3.65)	(2.34)	(-8.01)
Western Region	-	-	-	0.00000	0.00000	0.00000
	-	-	-	(0.23)	(0.22)	(0.22)
Central Region	-	-	-	0.00002*	-0.00000	0.00004**
	-	-	-	(1.73)	(-0.15)	(2.21)
Greater Accra	-	-	-	0.00000	-0.00000	-0.00001
	-	-	-	(0.36)	(-0.30)	(-0.22)
Volta Region	-	-	-	-0.00000	-0.00001	-0.00001
	-	-	-	(-0.21)	(-0.39)	(-0.36)
Eastern Region	-	-	-	0.00001	-0.00001	0.00002
	-	-	-	(0.89)	(-0.75)	(1.31)
Ashanti Region	-	-	-	0.00002	0.00001	0.00001
	-	-	-	(1.57)	(0.78)	(0.92)
Brong Ahafo	-	-	-	0.00000	0.00000	0.00000
	-	-	-	(0.27)	(0.28)	(0.01)
Upper East	-	-	-	0.00003**	0.00001	0.00004*

	-	-	-	(2.14)	(0.26)	(1.93)
Upper West	-	-	-	0.00003	0.00008*	0.00001
	-	-	-	(1.26)	(1.94)	(0.39)
Year (2009)	-0.00003**	-0.00003	-0.00004*	-0.00002**	-0.00001	-0.00004***
	(-2.14)	(-1.31)	(-1.89)	(-2.01)	(-0.88)	(-2.58)
_cons	0.00031***	0.00014	0.00044***	0.00016***	-	0.00025***
	(4.83)	(1.45)	(5.06)	(7.16)	-	(8.58)
Wave*Region interactions	YES	YES	YES	YES	YES	YES
Model Diagnostics						
r2_w	0.05012	0.05637	0.09694	0.03270	0.02998	0.06725
r2_b	0.00146	0.00089	0.03161	0.06868	0.04332	0.17308
r2_o	0.00377	0.00069	0.03431	0.05863	0.04420	0.13912
N	4735	2278	2457	4735	2278	2457
F-Statistic/ Wald	2.77	1.50	2.83	288.26	4071.18	.
Prob >F	0.0000	0.0500	0.0000	0.0000	0.0000	.

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

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

Variables	Fixed Effects			Random Effects		
	All	**Urban**	**Rural**	**All**	**Urban**	**Rural**
Male head	-0.16102**	-0.32178***	-0.05581	-0.03031	-0.00690	-0.06884**
	(-1.96)	(-2.64)	(-0.50)	(-1.25)	(-0.20)	(-1.97)
Age of head	0.00330	-0.01083	0.01359	-0.00908**	-0.01173**	-0.00697
	(0.27)	(-0.62)	(0.77)	(-2.43)	(-2.13)	(-1.37)
Age (squared)	-0.00007	0.00004	-0.00015	0.00005	0.00006	0.00004
	(-0.63)	(0.22)	(-0.85)	(1.22)	(1.03)	(0.76)
Married head	-0.03745	-0.03810	-0.03692	-0.08511***	-0.08774***	-0.07391**
	(-0.72)	(-0.49)	(-0.51)	(-3.65)	(-2.69)	(-2.21)
Primary	-0.08188	0.16943	-0.09075	-0.03594	0.17576	-0.17362
	(-0.41)	(0.42)	(-0.39)	(-0.41)	(1.25)	(-1.54)
Secondary	-0.02415	0.19669	-0.00492	0.06328	0.25908*	-0.07411
	(-0.12)	(0.49)	(-0.02)	(0.73)	(1.88)	(-0.66)
Post-secondary	0.07605	0.29749	0.12911	0.26226***	0.43511***	0.21399*
	(0.36)	(0.74)	(0.49)	(2.88)	(3.06)	(1.74)
Dependency ratio	0.03107	0.10443	0.00216	-0.21854***	-0.12462**	-0.29092***
	(0.40)	(1.01)	(0.02)	(-6.44)	(-2.56)	(-6.15)
Urban	0.00000	0.00000	0.00000	0.32888***	0.00000	0.00000
	(.)	(.)	(.)	(14.64)	(.)	(.)
Farm land	-0.01020	0.01137	0.00890	-0.18755***	-0.24970***	-0.12643***
	(-0.19)	(0.13)	(0.13)	(-8.17)	(-7.18)	(-4.06)
Social Safety net	0.08270	0.02887	0.08365	0.17573***	0.13693***	0.19478***
	(0.99)	(0.23)	(0.73)	(6.85)	(3.60)	(5.57)
Muslim	-0.08024	0.34490	-0.23098	0.03283	0.08437	-0.00887
	(-0.27)	(0.77)	(-0.57)	(0.86)	(1.41)	(-0.17)
Traditionalist	0.09783	0.53544	0.00998	-0.23459***	-0.18280	-0.24851***
	(0.58)	(1.21)	(0.05)	(-3.72)	(-1.14)	(-3.53)
No religion	-0.04492	-0.04806	-0.04426	-0.06655*	-0.04095	-0.07476
	(-0.47)	(-0.30)	(-0.37)	(-1.73)	(-0.64)	(-1.55)
Akan	0.05301	0.08744	0.05267	0.09040***	0.13625***	0.05176
	(0.50)	(0.56)	(0.35)	(2.73)	(2.75)	(1.13)
Ewe	0.19305	0.26256	0.11463	0.10458**	0.12799*	0.09205*
	(1.07)	(0.94)	(0.48)	(2.47)	(1.89)	(1.68)
Ga	-0.11546	0.08540	-0.47294	0.07712*	0.08736	0.12336*
	(-0.62)	(0.37)	(-1.52)	(1.69)	(1.37)	(1.76)
Western Region	-	-	-	0.37039***	0.45394***	0.24333**
	-	-	-	(4.77)	(3.96)	(2.27)
Central Region	-	-	-	-0.10786	-0.00306	-0.24170**
	-	-	-	(-1.27)	(-0.03)	(-1.99)
Greater Accra	-	-	-	0.39610***	0.53113***	0.25489
	-	-	-	(4.99)	(5.21)	(1.37)
Volta Region	-	-	-	0.21003***	0.18680	0.10859
	-	-	-	(2.59)	(1.49)	(0.99)
Eastern Region	-	-	-	0.07802	0.20031*	-0.07912
	-	-	-	(1.06)	(1.92)	(-0.76)
Ashanti Region	-	-	-	0.28007***	0.37384***	0.15708
	-	-	-	(3.96)	(3.77)	(1.54)
Brong Ahafo	-	-	-	0.15335**	0.18650*	0.08647
	-	-	-	(2.07)	(1.75)	(0.83)
Upper East	-	-	-	0.19624**	0.34812**	0.00213
	-	-	-	(2.12)	(2.31)	(0.02)
Upper West	-	-	-	-0.11272	-0.22377	-0.19949

	(1)	(2)	(3)	(4)	(5)	(6)
	-	-	-	(-0.83)	(-0.87)	(-1.22)
Year (2009)	0.02304	0.19311	-0.23413*	0.00849	0.24713**	-0.24484**
	(0.26)	(1.65)	(-1.66)	(0.12)	(2.50)	(-2.35)
_cons	5.54396***	5.97441***	4.97313***	5.40382***	5.47947***	5.61820***
	(14.28)	(9.87)	(9.36)	(38.48)	(26.02)	(29.45)
Wave*Region interactions	YES	YES	YES	YES	YES	YES
Model Diagnostics						
r2_w	0.44980	0.43750	0.48933	0.43542	0.40931	0.47352
r2_b	0.47602	0.29312	0.40134	0.57750	0.48053	0.48158
r2_o	0.47314	0.31993	0.42335	0.55093	0.46234	0.48829
N	4735	2278	2457	4735	2278	2457
F-Statistic/ Wald	42.94	19.56	25.27	5572.66	282204.13	.
Prob >F	0.0000	0.0500	0.0000	0.0000	0.0000	.

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

Appendix 1: Sub-group Consumption inequality Decomposition

	2009				2014			
	Popn. Share	Mean	Exp. Share	GE (0)	Popn. 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	230.64	0.076	0.178
Ashanti	0.190	276.23	0.193	0.238	0.178	306.32	0.188	0.241
Brong Ahafo	0.096	208.38	0.074	0.229	0.095	250.90	0.083	0.245
Northern	0.061	171.46	0.038	0.244	0.068	185.96	0.044	0.210
Upper East	0.030	149.78	0.017	0.244	0.033	217.85	0.025	0.404
Upper West	0.019	102.51	0.007	0.128	0.022	156.51	0.012	0.179
Within groups				0.228				0.210
Between groups				0.041				0.037

Appendix 2: Comparing Correlates of Poverty and Inequality from Random Effects model specification

Variables	Effects on Poverty			Effects on Inequality		
	All	Urban	Rural	All	Urban	Rural
Male head	↑	↑	↑ **	↑ **	↑ ***	↑
Age of head	↑ **	↑ **	↑	↓ ***	↑	↓ ***
Age (squared)	↓	↓	↓	↑ ***	↓	↑ ***
Married head	↑ ***	↑ ***	↑ **	↓ ***	↓ *	↓ ***
Primary	↑	↓	↑	↑ **	↑	↑ **
Secondary	↓	↓ *	↑	↑	↑	↑
Post-secondary	↓ ***	↓ ***	↓ *	↑ **	↑	↑ **
Dependency ratio	↑ ***	↑ **	↑ ***	↑	↑ ***	↓ **
Urban	↓ ***	-	-	↓ ***	-	-
Farm land	↑ ***	↑ ***	↑ ***	↓	↓	↓
Social Safety net	↓ ***	↓ ***	↓ ***	↓ ***	↓ *	↓ ***
Muslim	↓	↓	↑	↑	↓	↑ **
Traditionalist	↑ ***	↑	↑ ***	↑ **	↓	↑ ***
No religion	↑ *	↑	↑	↑	↓	↑
Akan	↓ ***	↓ ***	↓	↑	↑	↑
Ewe	↓ **	↓ *	↓ *	↓	↓	↓
Ga	↓ *	↓	↓ *	↓	↓	↓
Western Region	↓ ***	↓ ***	↓ **	↑	↑	↑
Central Region	↑	↑	↑ **	↑ *	↓	↑ **
Greater Accra	↓ ***	↓ ***	↓	↑	↓	↓
Volta Region	↓ ***	↓	↓	↓	↓	↓
Eastern Region	↓	↓ *	↑	↑	↓	↑
Ashanti Region	↓ ***	↓ ***	↓	↑	↑	↑
Brong Ahafo	↓ **	↓ *	↓	↑	↑	↑
Upper East	↓ **	↓ **	↓	↑ **	↑	↑ *
Upper West	↑	↑	↑	↑	↑ *	↑
Year (2009)	↓	↓ **	↑ **	↓ **	↓	↓ ***
Wave*Region interactions	YES	YES	YES	YES	YES	YES

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