Essays on trade openness, wage, poverty and intra-household time allocation in Ghana

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ABSTRACT

This thesis analyses the interrelationships between trade, poverty, labour market outcomes and household production in Ghana, with special attention to gender and spatial differences. This overall objective is subdivided into five specific objectives: (1) to assess the effects of trade openness on the gender wage gap and how these effects vary by geographical location of respondents using an augmented standard Mincerian type estimation approach; (2) to examine the gender and spatial differences in the effects of wage on intra-household time allocation to paid and unpaid work in Ghana using a two-step Instrumental Variable Tobit (IV Tobit) estimation technique; (3) to analyse the joint determination of spousal wages and hours of work among monogamous couples in Ghana using the same two-step IV Tobit approach; (4) to determine the effects of income/consumption poverty on gender disparities in intra-household time allocation to paid and unpaid work in Ghana using the Tobit regression; and (5) to estimate the extent of the relationship between time poverty and income/consumption poverty in Ghana using the Recursive Bivariate probit estimation technique.

Data for the analysis come from three main sources. Export and import data for goods were extracted from the United Nations (UN) International Trade Statistics Database. The export and import data for services were obtained from the International Trade Centre (ITC), the UN Conference on Trade and Development (UNCTAD) and the WTO Trade in Service Database. The data on Gross Domestic Product (GDP) and the household level data for the last three rounds of the Ghana Living Standard Survey (GLSS) (GLSS4, GLSS5 and GLSS6) were obtained from the Ghana Statistical Service.

The key findings from the analysis are the following: (1) The effects of trade openness on wages and gender wage gap vary by the type of wage and trade openness indicators. Irrespective of the type of indicator used, trade openness significantly narrows the gender wage gap but only among urban residents and not in the rural areas where the gap remains higher. (2) Females and rural residents spend more time on unpaid work than males and urban residents. The extent of reduction in hours of unpaid work due to a unit increase in wage is higher among males than females but virtually the same across geographical locations. The wage effect of labour supply is higher for males and rural residents than females and urban residents. (3) There is an element of a working spouse wage premium (regardless of respondents' ethnic affiliation or education level) and complementarity in employment and household labour decisions between couples. Women often have fewer formal employment opportunities open to them and also shoulder a heavier non-paid work burden. (4) Gender inequality in hours of work is more of an issue among the poor and rural residents than among the non-poor and urban residents. Income poverty has a higher effect

on inequality in total hours (discretionary time) while consumption poverty has a higher effect on inequality in unpaid hours of work. This suggests that the effects of income and consumption poverty on inequality in hours of work depend on the type of inequality indicator. (5) Although time poverty has fallen since the 1998/1999 survey period (GLSS4), it remains higher among females than males, and higher among urban residents than rural residents. The estimates show that both income and consumption poverty are negatively associated with time poverty. In other words, the results confirm the trade-off hypothesis that time poverty is a phenomenon among the non-poor, but the effect is higher for income poverty than for consumption poverty.

Following these key findings, this study recommends that Ghana's Trade Ministry should collaborate with other allied ministries to design policies that will ensure further integration of the economy into global trade. Such policies should be linked with labour market policies that will improve the welfare of females who are engaged in economic activities such as the non-traditional export sectors which are experiencing higher integration into global trade. Government must pursue infrastructural policies that will make rural residents more involved in the integration of Ghana's economy into global trade.

Government policies on wage regulation, employment or labour laws and other labour market reforms should be geared at minimising gender inequality in the labour market to ensure more equitable wage rates. Labour unions should focus on real wage rather than nominal wage in their negotiations with government and other employers on the conditions of service of their members since real wage has higher effects on both household production and labour supply than nominal wage. The Ministry of Employment and Labour Relations should collaborate with other allied bodies such as the Ghana Employers Association and trade unions to design labour market policies that will create flexible work conditions, in particular for women.

Policymakers should consider both consumption and income poverty in formulating policies aimed at addressing intra-household gender inequality and women's wellbeing. Such policies should pay particular attention to the entrenched 'feminisation of poverty' and other factors that deepen income poverty among women in Ghana. Overall, this study highlights the importance of devising policies and altering entrenched cultural stereotypes that will help to reduce the inequality gap between men and women. This will provide more women the opportunity to better themselves and play a more productive role in the formal labour market.

Key terms: Trade openness; Blinder-Oaxaca decomposition; gender wage gap; wage; income poverty; consumption poverty; intra-household time allocation; time poverty; Instrumental Variable Tobit; Bivariate Probit.

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LIST OF ACRONYMS

BOG	Bank of Ghana
BPM	Balance of Payments Manual
CGE	Computable General Equilibrium
CLAD	Censored Least Absolute Deviation
CPI	Consumer Price Index
EAs	Enumeration Areas
ECOWAS	Economic Community of West African States
FGT	Foster–Greer–Thorbecke
GAMA	Greater Accra Metropolitan Assembly
GDP	Gross Domestic Product
GLSS	Ghana Living Standard Survey
GPI	Gender Parity Index
GPRS	Growth and Poverty Reduction Strategy
HOSS	Heckscher-Ohlin-Stolper-Samuelson
HS	Harmonized Commodity Description and Coding System
IBE	International Bureau of Education
ILO	International Labour Organization
ISIC	International Standard Industrial Classification
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
ITC	International Trade Centre
IV	Instrumental Variable
JHS	Junior High School
JSS	Junior Secondary School
LPG	Liquefied Petroleum Gas
MENA	Middle East and North Africa
MLEs	Maximum Likelihood Estimates
MSLC	Middle School Leaving Certificate
NAFTA	North American Trade Agreement
NHE	New Home Economic
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
PPS	Probability Proportional to Population Size
PSID	Panel Study of Income Dynamics

PSUs	Primary Sampling Units
SADA	Savannah Accelerated Development Authority
SAM	Social Accounting Matrix
SDGs	Sustainable Development Goals
SHIP	Survey-based Harmonising Indicator Programme
SNA	System of National Accounts
SSA	Sub-Saharan Africa
SSS	Senior Secondary School
SSUs	Secondary Sampling Units
TUS	Time Use Survey
UEVE	Unbiased Error in Estimator
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USA	United States America
USAID	United States Agency for International Development
WLS	Weighted Least Squares
WITS	World Integrated Trade Solution
WTO	World Trade Organisation
2SLS	Two-Stage Least Squares

CHAPTER 1: PROBLEM STATEMENT AND METHOD OF THE STUDY

1.1 Introduction and background

The implications of trade policies for egalitarian gender relations such as the division of labour in the household and in the labour market have been the subject of both theoretical and empirical discourse (Fontana, 2004). This discourse has gained momentum, especially over the past decade due to an observed disconnection between economic growth and social developments such as income disparity, social inequality and exclusion across gender and geographical location in countries that have experienced high economic growth and significant trade performance (UNCTAD, 2012). For instance, gender equality and women's empowerment constitute core elements of the new global development frameworks such as the United Nations (UN) 2030 Agenda for Sustainable Development and the Addis Ababa Action Agenda on financing for development (UNCTAD, 2016). Sustainable Development Goals (SDGs) 8 and 10 consider decent work for all women and men, wage growth and lower wage inequality as central to the objectives of a new universal policy agenda (International Labour Organization, 2016).

Over the years, the prevailing assumption has been that lowering economic, geographical and cultural barriers to trade would propel high employment and productivity that would benefit men and women equally. The failure of the market forces to ensure the realisation of this outcome has provoked the questioning of the assumed 'gender neutral' effects of trade policies. Nonetheless, the literature suggests a two-way trade gender relationship. On the one hand, gender biases embedded in cultural and social norms have implications for distributional outcomes of trade such as wages, poverty and intra-household time allocation to paid and unpaid work. On the other hand, gender inequalities affect trade strategies for competitiveness as well as the extent to which trade policies may translate into desired economic performance (UNCTAD, 2014).

Although it is established that employment structure and wage is one of the channels through which trade policies affect poverty, the literature on trade liberalisation-gender wage differential[1] nexus suggests that it is not theoretically clear whether trade liberalisation narrows or widens the differential in women's and men's wages (UNCTAD, 2010; Winters, McCulloch, & McKay, 2004). The neo-classical theorists argue that trade openness engenders greater competition in an economy leading to the allocation of labour to its most productive use and reduction in costs.

[1] The gender wage gap or gender wage differential is the percentage shortfall in the average hourly wage of women relative to the average hourly wage of men for similar jobs (International Labour Organization, 2016). Thus it is measured as the difference between women's and men's earnings, expressed as a percentage of men's earnings.

Since gender discrimination and its associated wage differentials are economically costly to the extent that it leads to an allocation of resources that do not maximise output, trade liberalisation and increased competition would lead to a decrease in the gender wage differential. Proponents of the Heckscher-Ohlin model which focuses on the factor-price equalisation effect of trade contend that countries endowed with abundant unskilled labour tend to specialise in unskilled labour-intensive exports, leading to an increase in demand for lower-skilled labour. This will contribute to an increase in the wages of unskilled labour relative to skilled labour (Korinek, 2005). Since women in developing countries like Ghana are often employed in low-wage and lower-skilled jobs than men, the gender wage gap will theoretically narrow.

Contrary to these views is the arguments of the endogenous growth theorists that export-oriented firms use the wage differential as a tool to reduce cost and make themselves more competitive. They assert that in the integrated world economy, a firm's competitiveness is dependent on its ability to constantly innovate while producing at a low cost. These two expectations can only be realised by maintaining a discriminatory wage structure where low skilled workers are paid low wages in order to be able to employ more unskilled workers while meeting the wage demands (premium) of highly skilled workers who have high bargaining power. Such opportunities offered by new export-oriented industries could contribute to a sudden, large influx of unskilled workers into paid employment leading to a further decrease in their wages (Korinek, 2005; UNCTAD, 2014). In the context of many developing countries, men on average have higher levels of education and labour market skills than women. As a result, this would tend to widen the gender wage differential. This argument is supported by country level evidence provided by Seguino (1997) who assert that in South Korea women's wages in the export sector are kept low (gender wage gap is maintained) in order to be able to exploit this differential for competitiveness. The author concludes that gender-based wage inequality has been a stimulus to export demand.

Available statistics show that across countries, the gender wage gap has generally narrowed over time but has not been eradicated in most countries (International Labour Organization, 2016). The global gender wage gap is estimated to be 23%. This means that women earn 77% of men's earnings (International Labour Organisation, 2016). On average, the wage gaps are wider for low-income countries (21%) and high-income countries (19%) than for middle income countries, where the average wage gap is estimated to be 16%. The evidence in Africa indicates an improvement in gender wage equality in Botswana and Kenya but a slip in Ghana and Madagascar (World Economic Forum, 2017). Although gender wage gaps are pervasive in all types of enterprises due to gender-based occupational segregation, they are found to be particularly large among enterprises that pay high average wages (International Labour Organization, 2016).

Gender wage gap impedes economic growth, increases poverty and adversely affects the wealth and well-being of families and communities. The gender wage gap could discourage females' participation in the labour market, increase their fertility rate and eventually affect the development and quality of human capital for economic growth (Baldwin & Johnson, 1992). It may distort women's spending on the education and health of their children. This could consequently affect the efficiency of the labour force and long-run economic growth (Schober & Winter-Ebmer, 2011).

Wage and wage gaps have higher implications for poverty and inequality in mostly transitional and developing countries as they constitute one of the main sources of household income (Santos-Paulino, 2012). Costa and Silva (2008) estimated that in Latin America, the extent of reduction in poverty due to a complete elimination of gender wage gap varies from 1.1% in Chile to 10% in Brazil. In the same vein, wage, wage gap and poverty affect intra-household time allocation and time poverty. A recent study in the United States of America (USA) shows that complete elimination of the gender wage gap would result in an increase in female full-time market work by up to 32% in their childbearing years while their total time allocated to household work would decrease by as much as 21% (Theloudis, 2018). In essence, complete elimination of the gender wage gap would ensure relative equality in the time allocation among spouses (Theloudis, 2018). There is, therefore, a complex relationship between wage, poverty, intra-household time allocation and time poverty.

It is evident from the above statistics that wage affects the time allocation of men and women, married and unmarried differently, due to a number of factors. These factors include cultural values and social norms imbedded in ethnic practices, occupational and income status which influence the exercise of bargaining power in the household as well as spatial distribution of resources and social services that influence time allocation (Sayer, 2005; Song, 2007). Among couples, there are two competing debates that show the interaction between spousal time allocation and wages. On the one hand, the notion of a working spouse penalty/premium indicates that the wife's hours of work influence the husband's wages. On the other hand, the labour supply theory implies that the wife's hours of work are affected by the husband's wages. Although the validity of these claims has been conditioned on the occupational status (managers and non-managers), race/ethnicity and level of education, these factors largely determine one's time poverty status in the household (Hotchkiss & Moore, 1999; Song, 2007).

The issue of time poverty and its relationship with income poverty in the household has gained prominence since the seminal work on time poverty by Vickery (1977). The author explained that in order for households to achieve the threshold of income poverty, they require a minimal input of time regardless of the amount of money available, and a minimal input of money regardless of the time available (Gammage, 2010). Since then, subsequent studies have focused on the

interdependence and/or trade-offs between time poverty and income poverty. Extant literature suggests that time poverty and income or consumption poverty reinforce each other with negative consequences for the individual and household well-being (Blackden & Wodon, 2006). For instance, Harvey and Mukhopadhyay (2007) observed that families who work to earn a wage income to meet the income poverty threshold need to devote additional time in non-market (household) production in order to maintain a standard consumption threshold. Similarly, Burchardt (2008) asserted that some individuals are significantly limited by time and income constraints. As a result, they can escape income poverty only by incurring time poverty, or vice versa.

Time poverty is an important welfare indicator that describes an instance where one works a larger number of hours than desirable (Parra & Wodon, 2010). It is the direct result of intra-household allocation of time to competing activities such as paid work, unpaid work and personal care. Time allocation and time poverty constitute one of the four key areas of intra-household resources allocation classified by Rogers and Schlossman (1990). According to the authors, the other three areas are: 1) household tasks 2) access to goods for production and consumption, and 3) control over income. However, the focus of this study on time allocation is due to its wide range of policy implications including, income poverty and gender inequality within the household. Time poverty impedes individuals' ability to expand their capabilities through education and skills development that could enhance their economic returns in the marketplace (Blackden & Wodon, 2006; Burchardt, 2008). Time poor women are unable to participate in wage employment and labour market. Within a family, time allocation tensions can result in sacrificing the education of daughters, who are expected to perform household tasks (World Bank, 2012). These disproportionate household responsibilities create a cycle, as women slide further into poverty and have less time to invest in activities that yield economic returns.

Extreme income or consumption poverty has been found to be a major factor that exacerbates this problem because time spent on critical tasks, such as accessing safe drinking water or cooking fuel, preparing meals, or caring for children, is often extended due to lack of transportation, technology, and other sanitary conditions (Costa, Hailu, Silva, & Tsukada, 2009). Other compounding factors include household composition and life cycle issues such as age and gender composition of household members, seasonal and farm system considerations and economic incentives such as wages and other non-labour income (Blackden & Wodon, 2006). Though the theory of household production is inconclusive on the direction of the effects of wage on intra-household time allocation, there is enough evidence that women who are "time poor" are usually limited in their ability to invest time in expanding their capabilities and build their human capital (Blackden & Wodon, 2006; Bloemen & Stancanelli, 2014a). This, in turn, affects the wellbeing of these women and their future opportunities (Chant, 2008; Gammage, 2010). Unequal

distribution of responsibilities for unpaid work between women and men within the household also translates into unequal opportunities in terms of time to participate equally in paid activities (Ferrant, Pesando, & Nowacka, 2014).

Time use encompasses the activities done by different individuals from a representative selection of households, and the time spent on each activity which is measured in terms of the number of minutes or hours within a 24-hour period (Ghana Statistical Service, 2012b). Time use analysis has been related to unpaid care and gender inequality. It reflects how gender roles attributed to women and men, girls and boys, shape the division of labour within a household while social norms define certain activities as more feminine or more masculine than others (Ferrant, 2015). Global statistics show that women spend at least twice as much time in unpaid domestic work as men, and the disparity is much greater in many developing countries (United Nations, 2010). Women employed outside the homework significantly more hours than men due to the double burden of paid work and unpaid domestic responsibilities (USAID, 2015).

In the Ghanaian context, trade liberalisation in the form of almost complete removal of quantitative restrictions and considerable tariff cuts has remained an important component of the country's growth policy agenda including that of the Growth and Poverty Reduction Strategy (GPRS) II (Kanbur, 2009). It has been documented that trade liberalisation in Ghana's export sector in agriculture benefited medium and large farmers in the cocoa sector, where a handful of women are employed (Tran-Nguyen & Zampetti, 2004). Considering the fact that majority of women in developing countries like Ghana are mostly employed in subsistence agriculture while men tend to be employed in the export sectors, this finding raises concern about the extent to which greater openness to trade may influence labour market outcomes and intra-household gender inequalities in the country.

As in many African countries, there is limited literature on the relationship between trade openness and labour market outcomes in Ghana. There are also gaps in the literature on wages and intra-household gender inequalities. Available evidence on trade liberalisation and wages suggest that reduction in tariff was associated with a decrease in the real hourly wage of workers. In other words, trade liberalisation was bad for workers in the manufacturing sector to the extent that it would disproportionately reduce the earnings of unskilled workers while skilled workers would lose less (Ackah, Aryeetey, & Opoku, 2012). Similarly, studies on gender wage gap show that wages of females are lower than those of males in the labour market as a whole and within most broad occupations. There is a larger gender wage gap in favour of men in self-employment than in paid-employment (Baah-Boateng, 2012).

While the extent to which such wage differentials translate into unequal time allocation in the household remains research and policy issues, the Ghana Statistical Service report in 2012 on time use show marked gender difference in time allocation to paid and unpaid work. Women reported spending an average of 3 hours and 29 minutes per day on unpaid work which is more than 3 times the average time spent by men (69 minutes) on the same activities. In terms of remunerated work, men were found to spend far more time on work for formal establishments such as corporations and government (65 minutes) than women (23 minutes). In contrast, women reported spending more time on unpaid household work (2 hours and 35 minutes) than men who spend 40 minutes per day on the same activity (Ghana Statistical Service, 2012b). A trend analysis (presented in Figure 1-1) of the distribution of weekly hours of paid and unpaid[2] work, hourly real and nominal wages of males and females at age fifteen and above shows a general reduction in hours spent on unpaid but an increase in the number of hours spent on paid work.

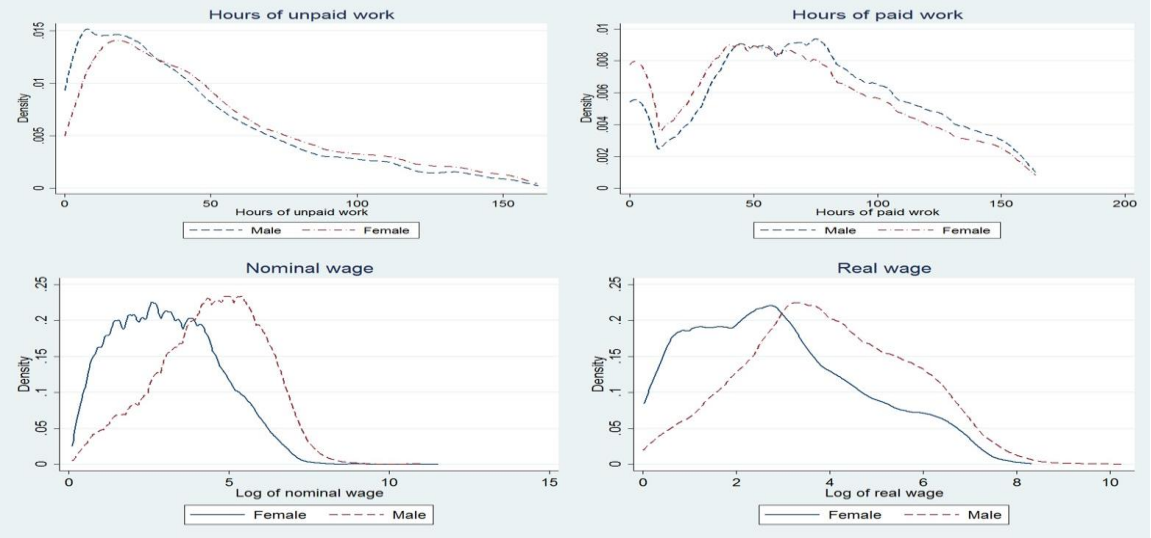

Figure 1-1: Weekly working hours and hourly wages by gender (1998-2013)

Source: Prepared by the author using GLSS data sets.

The Figure confirms the assertion that on average, males spend more time on paid work activities than females while the inverse holds for unpaid work. More females are concentrated at the upper end of the distribution of unpaid work while more males are concentrated at the lower end of the distribution. On the contrary, more females are concentrated at the lower end of the distribution of hours of paid work while more males are found at the upper end of the distribution. In addition,

[2] Paid work involves direct bilateral exchange activities with money as the means of exchange, while unpaid work is characterised by a high number of goods and services that are typically exchanged between several family members (Ott, 1992). The wages are restricted to only respondents who are employed on full-time basis by others outside the household. Both the working hours and wages are computed from pooled data from GLSS4, GLSS5 and GLSS6.

females continue to receive lower wages (both nominal and real) than males. More women are concentrated at the lower ends of the wage distributions while more men are concentrated at the upper ends of the distributions. The heavy burden of unpaid household responsibilities together with their relatively lower wages often contribute to time poverty among women (Hafkin & Taggart, 2001).

In spite of the higher time allocation to unpaid work and low wages of females, estimates of income poverty (see Figure 1-2) based on the last four rounds of the Ghana Living Standard Survey reveals that female-headed households have been relatively better off than their male counterparts. Over the past two to three decades, policies implemented by successive governments of Ghana to address the issue of poverty have mainly focused on income poverty. This is in part due to limited studies that enhance the understanding of poverty in terms of time allocation, the relationship between time poverty and income poverty, and the gender dimension of time allocation and income poverty within the household. This is the knowledge gap that this study empirically addresses.

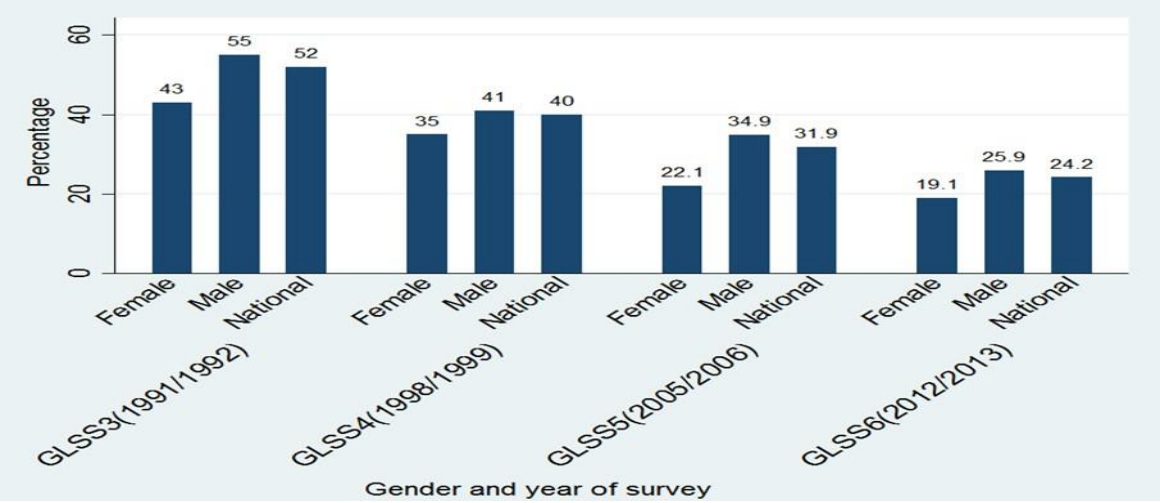

Figure 1-2: Poverty distribution in Ghana between 1998 and 2013

Source: Prepared by the author using GLSS[3] reports.

[3] Note: The average time allocations to paid and unpaid work were estimated using the last three rounds (four, five and six) of the Ghana Living Survey (GLSS) data set. Time allocation to unpaid work activities was computed by summing up all the hours spent by the individual on the various household activities. In the same vein, time allocation to paid work activities was computed by adding all the hours spent on main and all other secondary work done by the individual within the last seven days prior to the survey. The poverty estimates used to construct Figure 2 were obtained from the reports of the Ghana Statistical Service for the corresponding years. Both data-sets and the reports are available at http://www.statsghana.gov.gh/nada/index.php/catalog.

Though time and income poverty are common characteristics of households in all African countries, this study is motivated to focus on Ghana because of three main factors: 1) Surveys that combine both time use and income variables for household level analysis on time and income poverty across countries particularly in Africa are scarce. In instances where these variables are available in one data-set, there are differences in the scope, measurement, concepts, methodology and ways of aggregation of the results making comparison across countries challenging. 2) Time and income at the household level are complex and usually associated with a number of challenges such as differences in national conditions and policy needs which affect cross-country comparisons. 3) The characteristics of individuals within the household are heterogeneous and this makes it difficult to compare individual level results across countries. In the remaining sub-sections of this chapter, the problem statement, research questions, as well as the research design and method are presented.

1.2 Problem statement

While the debate on trade openness-gender wage differential nexus has direct implications for labour market outcomes (labour force participation and labour supply), it equally has indirect implications for household production and resource allocation due to the feedback effect between the household and labour market. In spite of these implications, the empirical literature on this debate in developing countries remains limited due to a number of issues including data availability and methodological challenges. The few empirical studies that have validated this debate both at the country-level and across countries have produced mixed results depending on the sectors and country-specific characteristics (Kuete & Voufo, 2016; Kumar & Mishra, 2008).

This study contributes to the debates on this issue from a Ghanaian perspective where entrenched sociocultural norms largely shape gender roles and access to resources for production in the household and the labour market. The study contributes to the method of computing trade openness indicators at the household level for a more disaggregated analysis that will take into consideration the heterogeneities among individuals, households and the economic activities in which they are engaged. The study pays attention to the effect of trade liberalisation on wage differential between men and women and the differential effects of wage on intra-household time allocation to paid and unpaid work in Ghana.

Theoretical and empirical evidence suggest that wage (either from trade or other economic activities) is one major factor that influences intra-household time allocation and time poverty. However, the extent of the effects and direction remain inconclusive, suggesting that country-specific context and household dynamics play instrumental roles (Bloemen & Stancanelli, 2014b). Among the key country-specific determinants of the effect of wage on time use is rural-urban

difference in access to time-saving infrastructure and services, and social norms that define acceptable feminine and masculine behaviours in the household.

In spite of their relevant implications for poverty intervention policies, these issues have not been empirically studied in Ghana. This study seeks to contribute to the literature by filling this gap. The study provides gender and spatial disaggregated analysis of the wage-intra-household time allocation nexus from a Ghanaian perspective. Although the issue of wage-time use relationship has been extensively studied in developed countries, very limited empirical literature exists in Ghana in spite of the fact that both wages and time use have been components of the last four rounds of the GLSS.

As indicated in the introduction and background, the last four rounds of the GLSS have shown that reduction in poverty over the two decades has favoured female-headed households (54.3%) more than male-headed ones (52%) (Ghana Statistical Service, 2007, 2014c). The poverty level has consistently remained lower among female-headed households compared to male-headed households which are contrary to the "feminisation of poverty[4]" hypothesis. Nonetheless, the time use modules in the last three rounds of the same Living Standard Surveys, as well as the 2009 Time Use Survey (TUS) reveal marked disproportionate gender time allocation to paid and unpaid work which usually disadvantage women. The implication of these findings is that women in Ghana are likely to be more time poor but income non-poor while the contrary holds for men.

However, studies suggest that women's relatively lower poverty status could be due to the fact that poverty indicators in Ghana have been based on consumption expenditure which food expenditures constitute the greater proportion (Orkoh, 2018). For instance, the sixth round of the GLSS report show that household's expenditure on food (actual and imputed) accounts for the largest share (46.7%) of Ghana's total annual household expenditure of Gh₵61507 million, with a mean annual per capita food expenditure of Gh₵1302 while the remaining 41% (Gh₵25177 million) represents other non-food expenditure. Out of the 41%, only 36.8% constitutes cash and 4.1% represent the imputed value of non-food items used by the household (Ghana Statistical Service, 2014c).

It is also established that female-household heads spend more on food than male-household heads although they earn less, an observation that implicitly supports the postulations of the

[4] The concept of feminisation of poverty means either one or a combination of the following three hypotheses: 1) women compared to men have a higher incidence of poverty; 2) women's poverty is more severe than men's; 3) over time, the incidence of poverty among women is increasing compared to men (Cagatay, 1998).

Engel's law that the proportion of total expenditure that is devoted to 'necessities' such as food declines as income rises (Levin et al., 1999; Moe, 2008; Udry & Woo, 2007). This suggests that women may be less consumption poor but more income poor while men may be more consumption poor but less income poor. The extent to which these potential gender differences in income and consumption poverty may influence the time allocation of males and females remains an empirical research question. The study contributes to the advancement of knowledge on the direction and extent of the relationship between income poverty and time poverty. It exploits the available data on income and time use to explore the linkage between time poverty and income poverty in Ghana

Another contribution of the study is to use two new time use indicators (female to male ratio of average time devoted to household activities as an indicator of gender gaps in unpaid work, and female to male ratio of total workload, an indicator of gender disparities in "discretionary" time). These indicators proposed by Ferrant (2015) to the Organisation for Economic Cooperation and Development (OECD) in 2014 were used to assess the effect of income poverty on gender disparity in time use. Although data on time use have constituted important components of the last four rounds of the GLSS, one of the challenges is that they have not been translated and transferred into policy-making on gender equality. This study therefore, seeks to take advantage of the availability of these data to contribute to the design and promotion of policies on gender equality, especially from the Ghanaian context. It also provides information on gender and geographical distribution of inequality in time poverty from a Ghanaian perspective. The study further advances our understanding of how gender-differentiated time use patterns are linked to income poverty, wage, and life cycle issues including age and gender composition of household members.

1.3 Research questions

The questions that this study seeks to answer are: 1) How does trade openness affect wage differential between males and females in Ghana, and how does the effect differ across the geographical location of respondents? 2) To what extent does wage differently affect intra-household time allocation to paid and unpaid work activities among males and females, as well as rural and urban residence in Ghana? 3) To what extent does wage affect spousal time allocation in the household and how does the presence of a working spouse affect the wage of the partner? 4) Does income poverty contribute to gender disparities in intra-household allocation of time to paid and unpaid work activities in Ghana? 5) What is the level of interdependence or trade-off between time poverty and income poverty within Ghanaian households, and how does inequality in time poverty vary across gender and geographical location?

1.4 Research objectives

The research objectives are divided into one general and five specific objectives

1.4.1 General objective

The general objective of this research is to assess the determinants of gender wage gap and intra-household time allocation to paid and unpaid work in Ghana with particular attention to trade openness, wage and income/consumption poverty respectively.

1.4.2 Specific objectives

The specific objectives of this research are:

- To assess the extent of the effect of trade openness on the gender wage gap in Ghana and how the effect varies by the type of wage indicator and geographical location of respondents.
- To examine the gender and spatial differences in the effects of wage on intra-household allocation of time to paid and unpaid work activities in Ghana.
- To analyse the joint determination of spousal wages and hours of work among monogamous couples in Ghana.
- To determine the effects of income/consumption poverty on gender disparities in intra-household time allocation to paid and unpaid work activities among monogamous couples in Ghana.
- To estimate the relative effects of income/consumption poverty on time poverty and how the effects vary by gender and geographical location of respondents in Ghana.

1.5 Research design and method

This study draws on the positivist paradigm where a quantitative method is the means for testing objective theories and hypothesis (Creswell, 2012). This has been the predominant method used in the literature for studies of this nature, though in rare cases, the qualitative method in the form of interviews has been used to supplement the quantitative findings by providing insight into the nature of strains experienced by people and the coping strategies that they adopt (Burchardt, 2008). Given the focus of this research, the qualitative aspect will not necessarily be useful and the focus falls on the quantitative aspects.

It is important to indicate that this study will be based on pooled cross sections analysis of the GLSS data. The choice of this type of design is largely influenced by the nature and structure of

the available data set. The GLSS is a nationwide household survey designed to generate information on living conditions in the country. The survey collects detailed information from households, including their demographic characteristics, education, health, employment and time use, migration and tourism, housing conditions, household agriculture, and access to financial services and asset ownership. Over the years, the sample size and scope of coverage of the survey have been expanded. For instance, the sample size has increased from over 4,500 households containing over 20000 persons in the GLSS3 to 16772 households, and 72372 individuals in the current GLSS6.

The Ghana Statistical Service has produced six rounds of the GLSS. However, information on employment and time use were only captured in the third (1991/1992), fourth (1998/1999), fifth (2005/2006) and sixth (2012/2013) rounds. Although the third round of the survey contains information on employment and time use, the data on this survey were not used. The reason is that there are inconsistencies in the capturing of unpaid work activities. Unlike the fourth, fifth and sixth rounds of the survey, only fetching water and wood were explicitly captured in the third round. The rest of the activities such as child care, care for the sick, care for the elderly, cleaning, laundry and shopping were all lumped together as other household activities. This makes it difficult to know exactly how much time was spent on each of the activities that have been put together. It also makes it difficult to know exactly the number of activities that were actually captured under the other household activities which are comparable with the activities in the remaining surveys

The dataset on employment and time use modules of the last three rounds were pooled together as one composite data set for the analysis. The study used pooled cross sections because the data sets were obtained by collecting random samples from the large Ghanaian population independently of each other at different points in time. The fact that the random samples were collected independently of each other implies that the sample sizes are unequal and will contain different statistical units at different points in time.

One advantage of this design is that it allows for the application of all the methods which are applied in cross-section analysis including the corrections for heteroscedasticity, specification testing, instrumental variables, and maximum likelihood estimations. Nonetheless, since the study will be using pooled cross sections, the year dummies will be included to account for aggregate changes over time (Wooldridge, 2010). Theoretically, this study will rely on the collective model of the New Home Economics (NHE) that provides utility functions for individuals and allows for the incorporation of household production functions that depends on time inputs. Specifically, the study will build on the framework proposed by Browning and Chiappori (1998).

The study employs four different empirical estimation techniques in achieving the objectives. Before explaining the estimation technique and sources of data for analysing the effect of trade openness on gender wage gap in Ghana, it is important to indicate that measures of trade openness can be divided into two categories: 1) measures of openness in practice; and 2) measures of openness in policy (UNCTAD, 2010). Measures of openness in practice indicate the actual importance of trade in the economy, while measures of openness in policy indicate the extent of policy measures that restrict or enhance trade. While the former mostly refer to trade-intensity ratios, the latter include import tariff rates, export taxes on international trade, and indices of non-tariff barriers (UNCTAD, 2014).

Due to data-related constraints on measures of openness in policy for a developing country like Ghana, this study considers two measures of openness in practice: trade (the sum of export and import) as a share of Gross Domestic Product (GDP) and export as a share of GDP. These indicators are computed using export and import data from the International Trade Statistics Database and Trade in Service Database. GDP and disaggregated household-level data on wages and time use were obtained from the Ghana Statistical Service. The household level data were extracted from the last three rounds of the GLSS 4, 5 and 6.

Concerning the estimation technique, the study adopts an approach which involves an estimation of the standard Mincerian type earnings equation, augmented with the inclusion of trade openness indicators to capture the effect of changes in trade openness on male and female earnings. This approach requires that the estimates of the Blinder-Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973) are reported. The approach involves two stages. The first requires an estimation of separate equations for male and female wage with the trade openness indicator as an explanatory variable of interest together with other correlates. The second stage requires an estimation of the male and female mean wage differential. In line with the Oaxaca-Blinder decomposition approach, the difference in average earnings are decomposed into three: 1) the part that is due to differences in characteristics between males and females (the explained part of the differential); 2) the contribution of differences in coefficients (the discrimination component, or the unexplained part of the differential) and 3) the interaction component accounting for the fact that differences in characteristics and coefficients exist simultaneously between the two groups. This approach has been used by previous studies (Kuete & Voufo, 2016; Litchfield, Justino, & Pham, 2008).

Following Finlay and Magnusson (2009), and Miluka, Carletto, Davis, and Zezza (2010) this study uses a Pooled Instrumental Variable Tobit (IV Tobit) estimation technique in achieving the second and third objectives (wage-time allocation nexus). In establishing the relationship between wage and intra-household time allocation, two main empirical challenges need to be addressed: 1) the

endogeneity inherent in wage due to correlation with the error term; 2) and the censored nature of the hours of work. Addressing the first challenge requires the use of either a Tobit or double huddle estimation technique to take into account the information on the respondents who reported zero hours of work on the day of the survey. However, using either of these estimation techniques does not address the endogeneity of wage. Wage is influenced by several other factors such as the respondent's membership of a trade union at the work-place, level of education, and the sector of employment which lead to a correlation between wage and the error term in the time use model (Hall, 1973; Sedigh, Devlin, Grenier, & Armstrong, 2016).

Similarly, some instrumental variable estimation techniques such as the Two-Stage Least Squares (2SLS) could be used to address the endogeneity of wage. Nonetheless, they may not address the issue of the censoring characterized of the hours of work and wages. This study, therefore uses the IV Tobit estimation technique to respectively address the problems of endogeneity and censoring in the wage and time use variables. This estimation technique requires the specification of structural equation system where hours of work is the dependent variable for the outcome equation and wage as the dependent variable for the first stage equation (Wooldridge, 2009).

The outcome equations for the paid and unpaid work activities become functions of wage where wage, in turn, is a function of the employment status, union membership and sector of employment of the individual. In addition to the variables used as instruments, the wage equation contains the same variables as the equation for hours of work because those variables that influence hours of work implicitly have effects on the wage. Estimating wages simultaneously with the other equations of the model improves the precision of the estimates of wage effects. It also eliminates possible biases due to correlations of the errors of the time use equations with the errors of the wage equation which may arise as the same unobservable factors driving wages may also impact on time allocation within the household (Neuwirth, 2004).

In order to address the fourth objective (income/consumption poverty and gender differences in time use), the study uses a Pooled Tobit model. The use of this estimation technique is informed by the fact that as a usual characteristic of time use data, there may be a zero-time allocation to some of the activities (both paid and unpaid) causing the observations on those activities to be censored. This would translate into the censoring of the two gender disparity indicators (gender gap in unpaid work and gender disparities in "discretionary time") that were computed. In such an instance, three estimation techniques, being the double-hurdle model, Heckman's model and a Tobit model could be used to assess the relationship between the gender disparity indicators and the regressors. However, the challenge that a large number of zeros pose is the misspecification of the participation equation. This would make the double-hurdle and Heckman's

model inappropriate compared to the Tobit model when the residuals are normally distributed (Min & Agresti, 2002; Wodjao, 2007).

It is important to stress that as far as this objective is concerned, the study contributes to the existing literature in two ways: First, using these indicators for the first time to capture gender roles and disparities in time spent in paid and unpaid activities and second, using the Tobit model to estimate the effect of income poverty on gender disparity in time allocation. It is also imperative to indicate that with the gender disparity, two equations are specified, one for the gender gap in unpaid work and the other for gender disparities in "discretionary time" or total time. These two indicators were further disaggregated into Gender Parity Index (GPI) and relative gap index. The gender gap indicator gives an overview of gender disparities in caring responsibilities. It captures how much less time women have to engage in other activities, such as paid labour, learning, engaging in a business network or skills training. It also captures country-specific features; such as access to child-care facilities as well as water infrastructure. The gender disparity in discretionary time serves as a measure for gender inequality in terms of possible deficits in discretionary time, or "time poverty" (Addabbo, 2003; Ferrant, 2015; Ferrant et al., 2014).

As far as the fifth objective (income/consumption poverty and time poverty) is concerned, the study uses a pooled Recursive Bivariate Probit regression. The choice of this estimation technique is also informed by the binary nature of the dependent variable (time poverty). The popular methods used to analyse the binary response of this nature include the discriminant analysis, probit model, and logistic regression which are based on the probability integral transformation for fitting nonlinear models to obtain maximum likelihood estimates (MLEs) (Nelson et al., 2006). A major drawback of the probit estimation techniques is that it lacks natural interpretation of regression parameters. Similarly, the discriminant analysis assumes that predictor variables are normally distributed and that variables jointly assume a multivariate normal distribution. These assumptions are usually violated when it comes to regression analysis of response variables that are dichotomous or discrete. The logistic regression estimation technique also makes no assumption about the variable distribution (Harrell, 2015). The advantage that the Recursive Bivariate Probit regression has over these estimation techniques, is that it addresses any potential issue of endogeneity and self-selections (Marra, Papageorgiou, & Radice, 2013; Wooldridge, 2002).

With respect to the design, the study relies on a secondary source of data. The time use modules of the fourth, fifth and sixth rounds (three waves) of the GLSS constitute the main sources of data. These modules contain information on the various housekeeping activities in which male and female are involved (Ghana Statistical Service, 2014). The information includes time (hours and minutes) spent on taking care of children, the sick, elderly, collecting food from the garden,

cooking and helping children with school work. It also captures information on the number of hours spent per week on main work and secondary work which are put together as hours spent on paid work activities. The GLSS data also contain information on variables such as income of the household and allocation of time to paid and unpaid work activities that allow for the computation of both time and income poverty indicators. It also contains information on wages of individuals within the households that allow for the analysis of wage and time allocation. The dataset on the last three surveys (GLSS4, GLSS5 and GLSS6) were obtained from the Ghana Statistical Service and reviewed in advance for any potential challenges. This contributed significantly to the inspection of the reliability and potential limitations of the data for the analysis. It also allowed for enough time for the data management and all other necessary corrections.

1.6 Chapter outline

The rest of this thesis is structured into the following nine chapters including the five empirical chapters which are based on the objectives:

Chapter 2 presents a comprehensive review of the theoretical and empirical literature on the interrelationships among trade openness, gender wage, poverty and intra-household time use. The sub-section on the review of the theoretical literature is further divided into trade-gender wage gap nexus, the unitary model and collective models, as well as the models of time poverty. It discusses the tenets of the competing theories on trade and gender, the unitary and collective models of time use and the downsides of their empirical application. It further juxtaposes these mainstream theories and assesses the appropriateness of each in achieving the objectives of this thesis. The empirical literature focuses on the methodologies and findings of the existing studies on all the objectives of this thesis.

Chapter 3 explains the theoretical models and empirical estimation techniques used in addressing the five specific objectives of the thesis. On each empirical estimation technique, a justification of its suitability for addressing a particular objective is explained in detail. The chapter concludes with a clarification on the strength and weakness of the theoretical models and empirical estimation techniques used.

Chapter 4 discusses the pattern of intra-household time allocation to individual activities which were aggregated into the variables of interest. It specifically looks at the trend of time allocation to household and labour market activities across gender and geographical location. It also presents and discusses the process involved in the aggregation of the variables on individual activities into the variables of interest. The chapter concludes with the main findings of the trend of time allocation in Ghanaian households for the respective survey years.

Chapter 5 presents the results and discussion of the empirical analysis of the effect of trade openness on gender wage gap (first objective). Extensive discussion of the results in relation to the extant literature and a succinct summary of the main findings are provided. The chapter begins with a short introduction, adds some descriptive analysis and ends with the regression results and discussion.

Chapter 6 presents and discusses the results on gender and spatial differences in the effects of wage on intra-household time allocation to paid and unpaid work activities in Ghana. The chapter is structured into three main sub-sections. The first section covers a brief descriptive analysis of the trends of wages and time allocation across the three survey years, in terms of gender, geographical location, education and marital status of respondents. The second section covers the discussion on the regression results while the final section concludes the chapter.

Chapter 7 is devoted to the discussion of the estimates of the cross-wage effect of time allocation to paid and unpaid work activities among couples in Ghana. The first section discusses the working spouse penalty/premium by focusing on the effect of wife's time allocation to paid and unpaid work on husband's wage as well the effect of the husband's wage on the wife's time allocation. The second section considers the effect of husband's time allocation on wife's wage and husband's wage on wife's time allocation while the final section concludes the chapter.

Chapter 8 provides the empirical evidence of the relationship between poverty and gender disparities in intra-household time allocation in Ghana. It discusses the results in relation to the findings of similar studies in other parts of the world with particular attention to Africa.

Chapter 9 looks at the results and discussion of the last objective (examination of the relationship between income poverty and time poverty in Ghana). This chapter tests whether, in the context of Ghana, the relationship between income and time poverty is either complementary or substitutive.

Chapter 10 summarises, concludes and identifies policy recommendations that need to be considered. It also highlights some of the potential limitations and areas that were not addressed within the scope of this thesis for further research.

1.7 Conclusion

Extant literature suggests that there is a considerable heterogeneity in the allocation of time between market and domestic work across households with the same observed market opportunities and demographic characteristics, in both developed and developing countries. However, the welfare and policy implications of this are usually overlooked in policy formulation especially in developing countries due to limited information on work at home and leisure. This

study sheds light on the factors that shape individuals' time allocation to paid work on the labour market and unpaid work activities within the household taking into account the role of gender differences.

As Ghana and other developing countries work towards the attainment of the targets of the Sustainable Development Goals (SDGs), analysis of intra-household time allocation will be pivotal in enhancing the effectiveness of the various investment and development policies designed to achieve such goals. This is because time allocation and time poverty are closely linked to the majority of the SDG targets on poverty, food security, health and well-being, education, energy, economy and employment, gender equality, inequality and consumption. To a large extent, the findings of this study inform policies that are aimed at enhancing a balance between paid work and production at home. Given that time allocation is more gendered, this study contributes to addressing the gender gap in time allocation in Ghana which usually disadvantages women. It fills the gap on commonly hidden time dimensions of income poverty from Ghanaian perspective and brings to the attention of policymakers the time pressure faced by household members.

CHAPTER 2: REVIEW OF THE LITERATURE

2.1 Introduction

In recent years, the gender-neutral assumption of trade policies has been challenged. There is a growing body of literature on the gender differential effects of trade policies on labour market outcomes due to socio-cultural norms that shape male and female role in the household. There is equally a vast literature on the interrelationship between labour market outcomes, poverty and household production. More importantly, there is a gradual shift in the focus of empirical research and policy formulation in most developing countries from alleviating income poverty to time poverty. Since the pioneering work of Vickery (1977), researchers and policymakers have developed interest in the policy implications of time poverty and its relationship with income poverty and wellbeing of individuals within the household.

Continuous research and analysis of the interrelationships between intra-household time use, time poverty and income poverty have moved the frontiers of economics of human behaviour during the past couple of decades (Lamb, 2014). This issue has impelled discussions in the literature because of the differences in the methodological approach to addressing it empirically. It has also attracted extensive research due to its implications for the welfare of household members. While some of the earlier studies suggest that the time poverty-income relationship can be either substitutive or complementary (Vickery, 1977), others conclude that the decisions about allocation of time in the home and market are endogenously determined (Korenman, Liao, & O'Neill, 2005).

The presence of such endogeneity poses a challenge to the identification of the direction of causality between time poverty and income poverty. The interrelationship becomes more complex when analysed within the context of gender differences in intra-household time use and time poverty. One critical issue that requires further theoretical exposition is the direction of the causation between income poverty and gender differences in time use. The precise nature of the nexus between the two needs to be better understood and operationalised to shape policymaking. A cardinal question of interest that this thesis investigates is: does income poverty cause gender disparities in time use; or does the presence of gender disparities in time use cause income poverty? This is the question that guides the review and discussion of the theoretical and empirical literature.

The rest of this chapter is structured as follows: As a starting point, the review of the theoretical and empirical literature is preceded by section 2.1.1 which presents the definition and discussion of the concepts that feature in the objectives of this study. The discussion is centred on trade

openness, time allocation to paid and unpaid labour or work, the definition of wage, and wage gap. It also focuses on household and income poverty as well as other relevant concepts used in this thesis. In this study, the term “work” is used synonymously for all activities comprising time spent in the production of goods in both the labour market and the household. Similarly, “labour” is used synonymously to market work. Implicitly, the terms labour and work are used interchangeably to mean the same throughout the discussion and analysis (Ott, 1992). Section 2.1.1 is followed by section 2.2 which details the theoretical debates among the standard (neoclassical) trade theorists, heterodox trade theorists, and heterogeneous firms theorists on trade and gender wage differential.

Section 2.3 presents the theoretical literature on the traditional time allocation theory (unitary model) initiated by Becker (1965) and Gronau (1973, 1976a) and the collective models (also known as the game theoretic approaches). The sub-sections under this section discuss the origin, strengths and shortcomings of the unitary model and the various versions of the collective models such as the cooperative, non-cooperative and dynamic bargaining models. Section 2.4 is devoted to the explanation of the model of time and income capability. The empirical chapters on wage and intra-household time allocation are underpinned by the unitary and bargaining game theoretic models while the chapters on poverty, gender inequality in intra-household time allocation and time poverty are based on the model of time and income capability which was first conceptualised by Vickery (1977) and later extended by Wodon and Bardasi (2006) and Burchardt (2008).

Section 2.5 reviews the empirical works done on the trade openness-gender wage gap nexus. Respectively, sections 2.6, 2.7 and 2.8 discuss the empirical findings on wage effect of intra-household time allocation to paid and unpaid work, the relationships between income/consumption poverty and gender inequality in time use, as well as income/consumption poverty and time poverty. The chapter concludes with a summary of the development of the theoretical literature as well as the main findings in the empirical literature.

2.1.1 Definition of concepts

The literature shows that there is trade openness in policy and trade openness in practice. Trade openness in policy represents the existence and extent of measures such as tariff, non-tariffs measures, and the effective rate of protection intended to restrict or enhance trade. On the other hand, trade openness in practice measures the degree to which a country is integrated into the world economy. In this study, the focus is on two indicators of trade openness in practice computed as trade (export and, the sum of export and import) as shares of GDP of the economic activity in which a respondent is engaged (UNCTAD, 2014).

Theoretical modelling of time allocation distinguishes between three main categories of time use: time allocated to paid work on the labour market, unpaid work in the household and leisure. The focus of this study is however not on the third element of time use (leisure) but the first two because leisure is implicitly captured in time poverty. In some instances, leisure is considered as "no work" though there is the need to distinguish between "no work" as voluntarily chosen free time and “no work” as the outcome of enforced inactivity due to either lack of employment opportunities (Antonopoulos, 2008) or some form of infirmity. The concept of time poverty can be understood in two ways. Following Bardasi and Wodon (2010) time poverty is defined as working long hours without choice because an individual’s household is poor or would be at risk of falling into income poverty if the individual reduces his or her working hours below a certain time-poverty line. Time poverty is therefore understood as the lack of enough time for rest and leisure after accounting for working time, whether in the labour market, for doing domestic work, or performing other activities meant for the wellbeing of the individual or others. The second way of understanding time poverty is to consider it as an instance where individuals who are extremely time-pressed are compelled to make inevitable trade-offs between equally important competing activities because they are unable to allocate sufficient time for them

Another variable of interest in this study is poverty which has been variously defined in the literature to include non-monetary based measures (Sen, 1983) and a variety of resources needed to escape poverty (Townsend, 1979). Other institutions such as the World Bank, European Commission and UN have extended the concept of poverty to include: 1) inadequate physical security, lack of political voice; 2) exclusion from social and cultural activities and 3) lack of participation in decision making and in civil, social and cultural life (Sanchez-Martinez & Davis, 2014). The Ghana Statistical Service gather information on households’ consumption expenditure and income that allows for the computation and use of both income and consumption poverty. Since evidence indicates that income and consumption poverty indicators have their advantages and disadvantages, both are used to check the sensitivity of the correlates though the focus is on income poverty.

With respect to the consumption poverty indicator, the Ghana Statistical Service[5] uses two nutritionally-based poverty lines: the lower poverty line and the upper poverty line. The lower poverty line determines what is needed to meet the nutritional requirement of a household member while the upper poverty line incorporates both essential food and non-food consumption.

[5] Detailed explanations of the choice of the poverty lines and the methods of computing the poverty indicators including all possible adjustments made in the computations over the years can be found in the reports of the Ghana Statistical Service on www.statsghana.gov.gh/nada/index.php /home#myCarousel.

Individuals' ability to consume above this poverty line indicates that they are able to purchase enough food to meet their nutritional requirements and their non-food needs (Ghana Statistical Service, 2014c). In this study, only the poverty indicator generated from the lower poverty line is used because it represents the minimum threshold for an individual to be considered as being poor. In order to compare the results across poverty indicators, income poverty is computed using the absolute poverty lines. The absolute poverty lines are a fixed cut-off level of income used by Ghana Statistical Service in it poverty analysis across all income distributions after they are adjusted for inflation(Ghana Statistical Service, 2014b).

In the literature, the term labour (work) refers to all transferable activities between individuals and which serve as inputs in the production of output. The distinction between paid work and unpaid work which has to do with the nature of the transaction taking place is essential in determining gender gaps (Beblo, 2001). Work is basically defined as any human activity that can be delegated to a third person for the production of goods and services meant to satisfy a person's needs. Charmes (2015) explains that the International Labour Organisation (ILO) defines the boundaries of paid work (the production boundary under the System of National Accounts (SNA)) as the work that produces goods and services meant for the market (including government and non-profit services), as well as all goods (excluding services) produced by households for their own final use. Time for paid work refers to the time contracted out that receives remuneration (Antonopoulos, 2008; Charmes, 2015).

Conversely, unpaid work is defined as household work that produces services for their own final use, such as domestic services, and care for children and adults within households or for other households (voluntary work) (Charmes, 2015; Marshall, 2011). Miranda (2011) defines unpaid work as the production of goods and services by household members that are not sold on the market. Unpaid work consists of all non-remunerated work activities that involve the procurement of inputs and production for the maintenance and survival of the household. The produced goods and services from unpaid work activities can also be consumed by other households. It can be categorised into domestic work and volunteer work. Domestic work includes but is not limited to food preparation, dishwashing, cleaning and upkeep of the dwelling, laundry, ironing, shopping, installation, servicing and repair of personal and household goods, childcare, and care for the sick, elderly or disabled household members (United Nations, 2010). Similarly, volunteer work includes volunteer services for organisations, unpaid community work, as well as informal work for other households (UNIFEM, 2000). In some literature, volunteer activities are considered as work because one could pay a third person to perform (Antonopoulos, 2008). In order to be consistent with the content of the data for the analysis, the definition of paid work is kept as a market labour while unpaid work is considered as household labour that excludes volunteer services for organisations, unpaid community work, as well as informal work for other households.

Wage is used in this study to represent remunerations, earnings, allowances, tips and service charges designated or calculated, payable to an employee in respect of work done. It also includes travelling allowances, attendance allowances, commission and overtime pay (Chiu, 2002). It, however, the excludes monetary value of in-kind payments or perks associated with the job (World Bank, 2013). In the Ghana Living Standard Surveys, an individual is considered as a wage and salaried worker if employed by others outside the household including workers who are paid on a daily or hourly basis or based on task. Wage is categorized under wage public, wage private non-agriculture and wage agriculture (Ghana Statistical Service, 2014c). Although income earned from self-employment (further categorized into Non-Agriculture and Agriculture) and other sources are captured, they are left out in the definition of wage to avoid any tendency of miscalculation. Wage is strictly interpreted to mean compensation due to an employee as a result of employment which is paid in a legal tender by checks on banks, convertible into cash on demand at full face value. Similarly, gender wage gap denotes the differences in the average wages of male and female expressed as a percentage of the average male wage (UNCTAD, 2014).

Intra-household is also a term which is repeatedly used throughout this study. The Ghana Statistical Service (2014c) defines a household as a person or a group of persons, who live together in the same house or compound and share the same house-keeping arrangements. In that context, a household is considered as being made up of a man, his wife, children and some other relatives or a house help who may be living with them including members of a household who are not necessarily related by blood or marriage. Given this definition of a household, the term intra-household means interactions among household members.

In this study, the interpretation of gender and gender inequality (equality) are derived from Hannan (2001). The author defines gender as the social attributes and opportunities associated with being male and female and the relationships between women and men and girls and boys, as well as the relations between women and those between men. The author explains that such attributes, opportunities and relationships are socially constructed and are learned through socialisation processes. In addition, they are context and time-specific, and changeable. Gender inequality refers to the unequal rights, responsibilities and opportunities of women and men and girls and boys. Equality does not mean that women and men will become the same but it implies that women's and men's rights, responsibilities and opportunities are not dependent on gender. Gender equality implies equal consideration of the interests, needs and priorities of both women and men with due cognisance to the diversity of different groups of women and men (Hannan, 2001).

2.2 Theories of trade and gender wage gap

The theoretical discourse on the interaction between trade and gender suggests a two-way causality between gender inequalities and trade. On the one hand, the neoclassical theory (which underpins this study) argues that expansion in trade promotes gender equality. On the other hand, the heterodox theorists consider gender inequality as an important source of competitiveness for firms in the international market. Within the neoclassical tradition, the perceived gender equitable effect of expansion in trade has been explained from two perspectives: 1) the standard trade theory which is also known as the Heckscher-Ohlin-Stolper-Samuelson (HOSS) theory and 2) Gary Becker's theory of labour market discrimination. The standard trade theorists argue that a country's factor endowments such as labour and capital determine its comparative advantage and the nature of its exports. They assert that a country will specialise and export those commodities that use its relatively abundant factor (resources) more intensively (Clarke & Kulkarni, 2010). This perspective hypothesises that there is a positive relationship between returns to the abundant factor that is used more intensively in production and exports and its demand. The returns to that factor of production will increase as its demand increases (UNCTAD, 2014).

Relating this prediction to the context of a developing country like Ghana where there is abundant labour relative to capital, what the theory implies is that trade liberalisation should contribute to an increase in the returns to labour or wages. Interpreting the hypothesis from the context of the skill level of the factors of production, it implies that trade is expected to increase the returns to abundant low-skill labour in developing countries relative to the returns to abundant high-skilled labour in developed countries (Green, Dickerson, & Arbache, 2001). Irrespective of the perspective from which the hypothesis is interpreted, the gender structure of the labour force in developing countries suggests that women should benefit from liberalisation more than men. The labour market is structured in such a way that females usually constitute a greater proportion of the unskilled labour force or low earners compared to their male counterparts. As a result, trade liberalisation is expected to contribute to gender equality by increasing the demand for women's labour and decreasing the demand for men's labour. This will consequently translate into a rise in the wages of women and a fall in the wages of men (AlAzzawi, 2014; Arbache, Kolev, & Filipiak, 2010).

Becker's (1957) theory of discrimination proposes a different mechanism but arrives at the same prediction as that of the HOSS that trade openness will narrow the gender gap. The central argument of the theory is that trade liberalisation could engender competitive pressure that will make it a disincentive for employers to discriminate against groups initially subject to discrimination (mostly women who constitute a greater proportion of the unskilled labour force)

(Black & Brainerd, 2004). Discrimination comes at a cost to firms as they will have to pay male workers a “wage premium” or a wage higher than the marginal product of labour. In view of this, trade openness in the form of import competition will influence firms in concentrated industries (industries in which large firms dominate the market) to reduce wage premium to male workers leading to a reduction in the gender wage gap.

Although these theories have been validated by empirical studies in developed countries particularly, they have been criticised on several grounds. A major counter-argument to the notion of the dominance of low skilled labour in developing countries is that this phenomenon varies by the level of development of a country. Countries that are relatively richer or developed may have more highly skilled workforce than countries that are less developed. Moreover, increased emphasis on gender equality has contributed to improvement in the level of education of women who are mostly perceived to dominate the low skilled category of the labour force in developing countries (AlAzzawi, 2014; UNCTAD, 2014). It has also been argued that the use of endowment as the basis for analysing gender inequality which is largely influenced by social norms, makes it necessary to question the assumption that gender discrimination is neutral (Tejani & Milberg, 2016).

Contrary to the perspectives of the neoclassical theorists, heterodox theorists argue that trade is determined by absolute or competitive advantage rather than comparative advantage. As a result, countries that are able to produce a given good more cheaply are able to dominate the international market and eventually outperform their competitors. This international competition stimulates firms (who compete on absolute unit cost rather than relative cost) to take advantage of the extant gender wage gap and employ more women in an attempt to reduce production cost in mainly labour intensive activities. The demand for females’ labour eventually increases relative to that of male, making women the source of competitive advantage for exporting firms that face intense competition in the international market (UNCTAD, 2014).

The heterodox theorists contend that in an event that export expands, employers’ strong desire to increase profit by maintaining differential wages between the workforce with weaker bargaining power (mainly women) and a small group of highly skilled workers could prevent the wage gap from declining even though women may experience job gains. In the same vein, an expansion of imports will propel competition among workers in import-competing industries. This has the tendency to affect the employment opportunities and wages of workers in weaker positions defined by their status, skills or sector of employment. The heterodox theorists focus on the effect of both horizontal (employer-worker) and vertical (amongst workers) power relations and how they affect gender equality in the labour market.

While the traditional (neoclassical) trade theories have been largely applied in the empirical literature, they have two limitations. The first limitation is that they emphasis comparative advantage as the basis of international trade. They also assume inter-industry trade without considering intra-industry trade (Helpman, Itskhoki, Muendler, & Redding, 2017). Building on these two weaknesses, another stream of theories called the new theories of international trade has been developed. Proponents of these theories focus on increasing returns to scale and consumer preference for variety as the basis of trade (Krugman, 1980). They have also extended the argument of the neoclassical theorists from inter-industry trade (countries export goods in one set of industry and import goods from another set of industries) to intra-industry industry trade where countries import and export goods within the same industry (Helpman et al., 2017). Helpman and Krugman (1985) showed that combining the neoclassical trade theories and their later extend version within the framework of the integrated equilibrium and augmenting it to allow for technological and cross-country variations makes it possible to explain the pattern of trade across countries and industries.

Nonetheless, both the traditional and new trade theories are limited in their application to disaggregated data. More so, they are built on the assumption of a representative firm within each industry (Helpman et al., 2017). These limitations have led to the development of a recent set of theories called the firm heterogeneous theories of international trade which are based on the works of Melitz (2003) and Bustos (2011). These theories argue that firms' participation in the foreign market comes at a cost called fixed entry cost or sunk cost which can be afforded by only a competitive fringe of potential firms (Helpman et al., 2017). Therefore lowering this cost of entering foreign market through trade liberalisation stimulates the export and adoption of new technologies by heterogeneous[6] firms.

These modern technologies involve different amounts of white and blue-collar tasks that can be performed by both male and female workers. However, most of the new technologies do not require physically demanding skills. As a result, firms that adopt these new technologies rely more on women for productivity in blue-collar jobs. This eventually contributes to the improvement of women's wages and other labour market outcomes relative to those of men. More importantly, women's labour market outcomes in blue-collar tasks improve while their labour market outcomes in white-collar tasks remain unchanged (Juhn, Ujhelyi, & Villegas-Sanchez, 2014). This review has shown that the theoretical debate on how trade affects gender wage gap is still evolving. The

[6] The literature defines the heterogeneity of firms in the context of the uncertainty inherent in foreign market entry and investment of firms.

multiplicity of the channels through which trade and labour market outcomes are related is reflected in the heterogeneity of methodology and conclusions of empirical studies.

2.3 Theories of intra-household time allocation and wages

The theoretical foundation of household allocation of time can be classified based on two distinct developments. The earlier framework labelled as the unitary model and later development of alternative approaches to household modelling labelled as the collective models by Alderman, Chiappori, Haddad, Hoddinott, and Kanbur (1995).The unitary model, developed in the 1960s and 1970s incorporated home production into the models of labour supply (Ilahi, 2000). However, its inherent inability to empirically account for heterogeneities in behaviour, characteristics and preferences among household members necessitated the development of new models (generally called the collective models) that address those challenges. The collective models of intra-household allocation of time have evolved along two strands. These are the cooperative and non-cooperative bargaining models (Ilahi, 2000).

Aside from these two strands of the literature, later economists have extended the principles of the collective models from static to dynamic analysis of the intra-household distribution of resources. Both the unitary models, collective models and their extended versions called the dynamic models can be situated within the neoclassical economic theory which focuses on the reconciliation of work and family life, and a balance between work time and leisure time. These factors need to be incorporated into policy design to support the increasing participation of individuals in the labour market. It is imperative to indicate that with the individual as the unit of analysis, this study is situated within the collective framework although a review of the unitary model is presented as the baseline literature.

2.3.1 The unitary model

The determinants of individual time use and division of labour within the household have been explained from varied economic approaches. However, the foundation of the modern framework for virtually all household level analyses of consumption and time use was initiated by Mincer (1962) and Becker (1965). This framework is mostly known in the literature as the New Home Economics (NHE) (Chiappori & Lewbel, 2015). Beblo (2001) has indicated that though Mincer (1962) was the first economist to underscore the need to distinguish between time allocation to market work, non-market work and leisure, the first systematic approach to the general theory of

time allocation can be credited to the work of Becker (1965). Alderman et al. (1995) have labelled Becker's original framework as the unitary[7] model.

Unlike the earlier approaches that considered consumption and leisure as distinct goods that provide separate utilities, Becker (1965) combined the consumption of goods with time use in the production of household utility. Comparing time use with consumption goods, Becker differentiated between types of time use and further indicated that these different types of time use and consumption goods could be combined in different ways to produce commodities within the household. For instance, total time may be considered as being divided between work in the market (for earning income) and work at home. Leisure is not explicitly dealt with but it is considered as a commodity that is produced only with housework time and without the input of market goods (Ott, 1992). From Becker's perspective, various types of time and consumption combine into a single household objective function with a single overall budget constraint (Chiappori & Lewbel, 2015). Within the framework of the unitary model, a household is treated as a single decision-making entity that maximises a single utility function under a common budget constraint which is calculated by pooling the incomes of all household members (Donni & Ponthieux, 2011).

In essence, the unitary model considers a household as a collection of individuals who behave as if they agreed on how best to combine their time, goods purchased in the market, and goods produced at home (Alderman et al., 1995). The model in principle assumes that even if a household consists of different individuals that household acts as if it is a single decision-making unit with a single set of preferences. The model portrays a household as if all members actually have the same preferences or because the structure of altruism and incentives within the household are in line with individual preferences (Bateman & Munro, 2003). Implicitly, consumption and labour supply are considered to be the observable results of the maximization of fixed household preferences subject to a household budget restriction (Vermeulen, 2002). It assumes the existence of intra-family consensus and neglects the internal structure of the household.

The original unitary model proposed by Becker has seen significant extensions and modifications. Though not considered in Becker's model, Mincer (1962) had earlier pointed out that at least with women, there is the need to distinguish between work at home and leisure. Gronau (1976b) later

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[7] See Alderman et al. (1995) for an explanation of the terms "collective" and "unitary" models. The authors used the term "collective" model to represent what is sometimes known in the literature as the bargaining model and the "unitary" model which is also referred to as the common preferences model, the altruism model, or the benevolent dictator model.

captured this idea in his revisit of Becker's theory of allocation of time by arguing that women's work at home should be evaluated in a way similar to market work. The author concludes that those types of work would respond to economic incentives such as changes in market wages, unearned income and productivity of work at home (Canavire Bacarreza & Ospina, 2015).

According to Donni and Ponthieux (2011), three justifications have been provided to support the individualistic hypothesis of the unitary model. The first justification considers the household as an entity that has a head or dictator with sovereign power over all the other members of the household whose preferences and utility functions are overridden by those of the head of the household. The second justification of the assumptions of the unitary model is what is known in the literature as Samuelson's (1956) consensus principle which suggests that household members agree on a common objective function known as the Bergson-Samuelson social welfare function in such a way that utility is an increasing function of all household members (Donni & Ponthieux, 2011). Vermeulen (2002) asserted that in an attempt to address the household decision-making problem Samuelson (1956) assumed a weakly separable household utility function with individuals' utility functions being substitutes for one another. In that case, it is a consensus among the members that allows for the achievement of the aggregate function of the household. The implicit interpretation of this assumption is that household members choose to behave as imaginary single individuals with rational preferences (Vermeulen, 2002).

The third justification of the individualistic hypothesis of the unitary approach is Becker's (1974a, 1974b) altruistic model and "Rotten Kid Theorem" which consider the household as consisting of agents (including the head) with personal preferences. However, the household head is an altruistic agent whose level of benevolence and wealth influence those of the other members of the household through the transfer of a portion of his resources (Donni & Ponthieux, 2011). The implication is that distribution of household income does not affect the consumption levels of household members because the household head will always adjust his transfers in order to maximise his utility. Any increase in the resources of the household will consequently increase the utility of the household head and the resources of the other members of the household. This means that the household head must consider the impact of his actions on the total resources of the family and not only his own income (Donni & Ponthieux, 2011). Though Becker's approach seem quite different from that of Samuelson in terms of his interpretation of how household members behave as a single unit, the two authors converge at the point where they both assume a weakly rational household preference (Vermeulen, 2002).

In spite of these justifications and the contribution of Becker's (1965) framework to economic analysis of household production, two groups of economists with distinct perspectives have highlighted some of the shortcomings of the model. The first group comprises some neoclassical

economists who have criticised the model that it is not based on methodological individualism, which happens to be the core of micro-economics (Chiappori, 1992; Katz, 1997). One expects that at the household level, the basic unit of decision making should be the individual and not a group of individuals with collective preferences. However, the unitary model does not account for such differences in the preferences of individuals within the household (Chowdhury, 2005; Fortin & Lacroix, 1997). Decisions taken by the household head is usually assumed to apply to all members of the households as if the household is run in a dictatorial fashion by a single decision-maker. Alderman et al. (1995) pointed out that the focus of certain policy initiatives based on this model is the amount of income the household receives, and not the identity of the individual recipient within the household who is the target of the public programme. Meanwhile, under some circumstance, the efficacy of such intervention programmes depends on the targeted member of the household. The authors therefore advise that models that seek to understand the long reach of some public interventions should reconsider their assumption that households behave as if they had a single decision maker.

Regarding to household income, non-labour income of the individual members of the household is pooled together as a single household non-labour income. This hypothesis of income pooling renders the source of such exogenous income less relevant in the analysis of a household's labour supply and consumption allocation (Vermeulen, 2002). Another restriction of the unitary model that has been rejected is the symmetry of the Slutsky matrix which requires that changes in the marginal compensation of the wages of two individuals in a household have the same effects on each other's labour supply (Browning & Chiappori, 1998; Fortin & Lacroix, 1997). The unitary model also assumes that it is the reservation wage rather than the market wage of an individual who does not participate in the labour market that affects the labour supply decision of other household members. However, this assumption has been criticised in the literature. Fortin and Lacroix (1997)[8] have tested (with empirical functional derivation) the unitary and the collective household labour supply models within a structural framework taking into account the set of parametric restrictions of each model. The authors ended up rejecting the income pooling restrictions embodied in the unitary model as well as its assumption of the symmetry of cross-wage effects.

Becker's original model was restricted to a two-way decision between household production and market work. Its extension to include the third aspect of time use which is leisure was made by

[8] In their paper on a test of the unitary and collective models of household labour supply, Fortin and Lacroix (1997) postulated a nonlinear unrestricted household labour supply system where the authors provided a detailed derivation and explanation of a set of parametric restrictions imposed by each model.

Gronou (1973, 1977). Though both Becker and Gronau derived individual time use by paying more attention to labour supply from the maximisation of a household utility function subject to budget and time constraints, none of them explicitly set up a formal theory for a multi-person scenario (Beblo, 2001). Following this weakness, Beblo (2001) built on previous works such as Radke (1996) and formulated a multi-person case model. The model which for the sake of simplicity was reduced to a two-person (male-female) household explains how specialisation and division of work among couples is determined by their comparative advantages in the competing time uses. The authors compare the household to a market where products are traded at prices which are determined by a partner's productivities in market work (measured by the wages) and household production.

The main conclusions drawn from the two-person household model is that a higher male wage rate explains the well-known gender-specific division of work. Also, a wage differential in the labour market which takes the form of poor promotion prospects or lower pay for women contributes to specialisation even if the husband and the wife have equal levels of education. In addition, the child bearing ability of women and the complementarity between the bearing and rearing of children lead to a female comparative advantage in household activities. In her illustration of how partners' wages determine their time allocation to paid work, unpaid work and leisure in a two-person household scenario, Beblo (2001) postulated that male and female allocate their time to all three time uses according to the equality of individual wage rate, marginal household productivity and the marginal rate of substitution between leisure and consumption when wages for male and female are equal.

However, if wages are not equal, specialisation equilibriums will take place where at least one of the partners chooses one or two of the following three scenarios of time use. When the woman's wage rate is equal to the marginal productivity of the household but the man's wage rate exceeds the household marginal productivity, he will allocate his time to market work (paid work) and leisure and supply no housework. In that case, it is the woman who performs all principal time uses. When the woman's wage rate falls short of the household marginal productivity but the man's wage rate is equal to the marginal productivity of the household, the man does market work, non-market work and no work while the woman specialises in household production and spends the rest of her time on leisure. This is because the wage rate that she could receive outside the household is too low for her to participate in the labour market. When the woman's wage rate falls short of the marginal productivity of the household but the man's wage rate exceeds the household marginal productivity, the woman specialises in non-market work while the man specialises in market work (Beblo, 2001).

Also, Pollak and Wachter (1975) argued that Becker's home production model does not provide a satisfactory explanation of the demand for commodities and the allocation of time as a function of commodity prices. The authors put across a caveat that unless strong assumptions regarding the structure of the household's technology, constant returns to scale and the absence of joint production hold, commodity prices depend on the household consumption pattern. As a result, price differences among households depict differences in taste and technology. However, since commodity prices are not determined solely by the prices of goods and technology, but also the consumption pattern of the household, it is disingenuous to treat the demand for commodities as a function of commodity prices. On the assumption of constant returns to scale of the household production, Wolff and Makino (2012), in their attempt to examine the extent to which the predictions of the unitary model are supported by data extended Becker's model.. However, they found that extra day-light had an ambiguous effect on constant returns to scale of indoor activities.

In their demonstration of how the original framework of the unitary model extends to modern collective household models, Chiappori and Lewbel (2015)[9] criticised Becker that he engaged in what they call extensive "casual empiricism," showing how his model could be used to interpret a host of observed economic phenomena, but he did not attempt any formal identification or estimation of parameters. The authors also criticised the unitary model that many of the behavioural implications of the consumption-leisure trade-off that Becker pointed out were difficult to verify empirically. This is partly because of the unitary model's observational equivalence between the purchasing behaviour of one person and that of a family.

The second group of economists who have criticised the unitary model is the feminist economists who expressed dissatisfaction with the tendency of the model to justify discriminatory allocation outcomes in the household on the grounds of economic rationality. From the perspective of feminist economists, gender biases are considered as exogenous to the household and constitute part of the household's aggregated preference function which remains unexplained (Katz, 1997). Ilahi (2001) acknowledges that the unitary model makes a useful contribution by providing a picture of the determinants of women's labour supply. Nonetheless, it suffers from two weaknesses. First, the author contends that the model fails to take into account the behaviour of males both inside and outside the household. Secondly, the empirical applications of the unitary model were meant for developed countries where women's home production may be of less interest to policymakers because there are few market failures. With the exception of a few studies

[9] Detailed demonstration and discussion of the econometric challenges, associated with the unitary model and its empirical application to data, can be found in Chiappori and Lewbel (2015). In the same vein, see Apps (2004) for a detailed discussion of the single-person and multi-person household models with all the functional derivations.

such as Khandker (1988) and Skoufias (1993) who considered some elements of gender and developing country-specific issues, application of the unitary model in developing countries where women's time in home production can be constrained by the failure or absence of market for basic services including water and energy has been limited (Ilahi, 2001).

This brief review of the literature on the unitary model reveals that neither Becker's original model nor its later extended versions could be empirically applied at the individual level. When applied to individuals and not the household as single unit, the unitary model violates the fundamental principles of the neoclassical utility theory (Katz, 1997). While its property of income pooling has been universally rejected, it also fails to meet the requirement of the symmetry of the Slutsky matrix on household data. Notwithstanding the methodological, empirical and welfare economic deficiencies of the unitary model (Vermeulen, 2002), it has shaped the approaches of later studies (collective models) and their empirical application to home production from the perspectives of developing countries and multi-person households. The next subsection presents a review and discussion of the models that incorporate a more general system of household production that account for the heterogeneity in household labour supply, domestic work and consumption, and savings decision.

2.3.2 The collective household models

The methodological weaknesses of the unitary model and its empirical implementation challenges have necessitated the development of theories that use game theoretic approaches to address the shortcomings. These alternative models to the unitary model are generically classified by Chiappori (1988, 1992, 1997b) as the collective models or individualistic models of the household. They address the allocation of resources in multi-person households giving cognizance to the different rational preference of the individuals. For instance, in relation to time use within a multi-person household, the wife allocates time by considering the time allocation of the husband, the children and other members whose actions directly or indirectly affect household production.

The models omit household production altogether (Apps, 2004) and consider a household as a micro society. Their main restriction is that the household arrives at a Pareto-efficient outcome (Bargain et al., 2006). The position of this outcome on the Pareto-frontier can be modelled as the result of a maximized household social function which is a weighted sum of the utility functions of the individuals that constitute the household. The magnitude of the Pareto-weight is however influenced by prices, the total income of the household as well as distributional factors such as the relative share of non-labour income in the household, differences in wage rates, age, and education (McElroy, 1990). It is also influenced by other household characteristics and

opportunities in the labour market which are largely determined by gender, the marital and parental status of the individual (Browning, Chiappori, & Lewbel, 2013).

The collective[10] framework directly addresses how individual household members reconcile their different rational preferences (Alderman et al., 1995), cooperation, exchange and bargaining within the household economy, and explores the effect of these processes on a wide range of allocation outcomes (Katz, 1997). Generally, the models can be categorised into cooperative and non-cooperative models. The following sub-sections present a review of the assumptions, strengths and weaknesses of each type of the collective models and where necessary, compare and contrast them with other models.

2.3.2.1 The cooperative models

The cooperative models share two main assumptions which are built on the strength of the cooperative game theory and more specifically of the axiomatic bargaining theory (Manser & Brown, 1980; McElroy & Horney, 1981). Firstly, individual household members have distinct tastes and preferences that cannot necessarily be aggregated into a single welfare or utility function. Secondly, the outcome of intra-household resource allocation varies systematically based on the bargaining power of the individual members in the household which is also dependent on their access to extra-household resources (Fafchamps, 2001; Katz, 1997). Central to the models is the fact that commodities may be privately or publicly consumed, and that the household makes Pareto efficient decisions (Chiappori, 1988, 1992, 1997b). The meaning of this assumption is that resources within the household, including time, are allocated in such a way that one's position or welfare cannot be improved without diminishing the welfare of the other. This can be interpreted in the context that the household maximises a weighted sum of individual utilities, where the Pareto weights may be dependent on prices, wages, incomes and the general economic environment in which the individual lives (Browning, Chiappori, & Weiss, 2014; Chiappori & Lewbel, 2015). In line with assumption two, the extent of Pareto efficient intra-household allocation of welfare obtained is dependent on the bargaining power of the household members.

The cooperative model is built on the premise that individuals from a household when they consider it to be more beneficial to them than remaining alone (Thomas, Contreras, & Frankenberg, 2002). In such a cooperative setting, household members who are considered as economic agents engage in agreement on how to share gains that accrue out of their cooperation

[10] In some literature, the collective models are also referred to as the bargaining models. This is because the collective models are generally based on the bargaining principles.

to live together as a single entity. The members of the household (mostly male and female) bargain and the differences between them are then determined by their bargaining power and/or willingness to bargain for their own interest rather than who makes the decision (Himmelweit, Simonetti, & Trigg, 2001; Himmelweit, Simonetti, Wells, & Higginson, 1998). The bargaining process can yield a favourable outcome or otherwise. A favourable outcome is achieved at the point where all parties of the bargaining process can walk away if they do not like the arrangement. This point is known as the “fall-back position or ”threat point” and it shows how individuals in the household would fare if the cooperation broke down or the level of utility that an individual can expect in the absence of cooperation with the other player or household member (Katz, 1997). If the outcome becomes more favourable to the individuals at the point that the cooperation fails, they are said to be in a better fall-back position.

The fall-back position determines the influence of power between household members in governing the household decision-making process and resource distribution (Himmelweit et al., 2001). In her work on “feminist criticism of the care economy”, Folbre (2014) asserted that women in predominantly patriarchal societies wield some bargaining power due to their indispensable contributions to the household economy. However, the extent to which women can exercise that power is constricted by their lack of control over the products of their labour and rules that inhibit their access to economic independence. Such rules, according to the author, include restrictions on women’s skill acquisition and property ownership.

The derivation of the implication of the demand for bargaining among members has been approached by different authors from different perspectives. Manser and Brown (1980) approached it from the dictatorial viewpoint using the Nash and the Kalai-Smorodinsky solution while McElroy and Horney (1981) focused on the Nash bargaining solution and derive conditions for a Nash demand system that eventually collapse to a traditional unitary model (Vermeulen, 2002). Sen (1990) looked at the bargaining models from the perspective of the perception of household members. The author contends that power in the household is influenced by people’s perception of their own contributions and those of other members of the household and this largely determines their fall-back position in the bargaining process.

It has been observed that a cooperative approach could lead to more benefits (economies of scale) than the unitary approach because of one or both of the following reasons (Haddad, Hoddinott, & Alderman, 1998). The first reason is that forming a household is a more efficient way to produce household goods. Secondly, some goods can be produced and shared among all household members such as a married couple but not by single individuals (Haddad et al., 1998). A point worth noting is the fact that the more a household member is perceived to contribute to the overall household resource, the greater the power and chances of commanding the resources.

This means that power, which differs among members within the household has implications for their entitlements of the accrued benefits from the cooperation (Sen, 1990). It further explains why members of a household will be committed to remain when the expected benefit of staying together as a unit is greater than remaining alone.

The point of departure of the cooperative model from the unitary model is the process of distribution of the benefits that accrue from the formation of a household among its members (Alderman et al., 1995). All the studies on structural models that use the cooperative approach differ in some respects; they share the common characteristic of producing Pareto-efficient outcomes, at least under symmetric information (Kooreman & Kapteyn, 1990; Manser & Brown, 1980; McElroy, 1990; McElroy & Horney, 1981). This common attribute makes the cooperative model more suitable than the non-cooperative model for analysing social institutions such as the family or household in the context of the Nash equilibrium which generates outcomes that are Pareto-dominated.

The cooperative models can be further classified into two based on how the threat point is modelled. These are the bargaining models with external conflict payoffs and bargaining models with internal conflict pay offs (Beblo, 2001). The threat point in the models with external payoffs is determined by the spouses' own incomes and extra-household environmental parameters such as parental wealth, non-wage income and social network or distribution factors. On the contrary, the threat point in the models of internal payoffs is determined by family public goods that both partners would benefit should they live non-cooperatively in the same household in the event of a disagreement. These goods include rented house and well-educated children (Alderman et al., 1995; Beblo, 2001). These two forms of the cooperative models have been the basis upon which intra-household allocation of available resources, including time for leisure, paid work outside the home and non-paid work within the household is explained (Fortin & Lacroix, 1997; Seiz, 1995; Vermeulen, 2002). These models have also been applied in other spheres of social relations, including marriage (Mattila-Wiro, 1999).

Though the cooperative model appears to be more suitable than the unitary model for an individual level analysis of resource distribution within the household, one important issue that remains debatable among researchers is whether it imposes constraints on labour supply that are empirically or otherwise testable (Fortin & Lacroix, 1997). Chiappori (1988) verified this possible restriction by modelling a two-member collective household that takes Pareto-efficient decisions. Examining this assumption in a three-good model, in which only total consumption and each member's labour supply are observable, Chiappori (1988) concluded that if the agents are assumed egoistic to the extent that they are only interested in their own leisure and consumption, then it is possible to derive falsifiable conditions upon household labour supplies from both

parametric and non-parametric perspectives. On the other hand, if agents are altruistic, then it will be useful to interpret restrictions obtained in the non-parametric context in comparison with the characterisation of aggregate demand for a private-good economy.

Fortin and Lacroix (1997) explain that though Chiappori (1988) was unable to derive any parametric constraints, he concluded that non-parametric constraints of the revealed type are imposed on the labour supply behaviour of the individual. It was later proved that some parametric restrictions are realistic under the assumption of egoistic individual preferences where one's utility index is dependent on his or her own egoistic utility and that of his or her spouse (Bourguignon & Chiappori, 1992). However, Chiappori (1997b) admitted that one of the shortcomings of the 1992 model was the absence of household production as agents were assumed to divide all their time between market activities and leisure. The author further recognised the inability of the model to allow for interpretation of, for instance, a low level of market labour supply in relation to the specialisation of one of the members in domestic production.

In an instance where there is an unrestricted functional form of the household labour supply system, both the unitary and the collective models impose testable restrictions which make them similar to some extent. However, Fortin and Lacroix (1997) contend that this restriction remains empirically untested and one reason is that all the proposed functional forms (Browning & Chiappori, 1998; Chiappori, 1997a; Kooreman & Kapteyn, 1990) implicitly impose an unrealistic labour supply when one set of restrictions is assumed. Another reason given by Fortin and Lacroix (1997) is that existing empirical studies seek to achieve either of the following two objectives: 1) test whether some restrictions of the unitary model are satisfied but do not necessarily compare with an alternative model or, 2) compare the restrictions of the unitary and the collective models under the assumption that labour supplies are exogenous. Though the latter studies support the very principles of the collective model, they neither permit an estimation of individual preferences nor allow for testing the restrictions imposed by the models, since prices are assumed to be fixed and equal for all individuals in the sample (Fortin & Lacroix, 1997).

Another identified shortcoming of the cooperative model is that, should its empirical implication be rejected, then it becomes impossible to establish whether the particular choice of bargaining concept should also be rejected or the general bargaining setting as opposed to the unitary model (Vermeulen, 2002). To circumvent this challenge, Bourguignon and Chiappori (1992), as well as Apps and Rees (2007) assumed that intra-household decisions are Pareto efficient. However, this is in contrast to the approach of Manser and Brown (1980) who imposed no restriction on the particular point on the Pareto frontier that the household would choose.

Katz (1997) criticised the models in that they treat individuals symmetrically with respect to their right and ability to enter and the household bargaining process but failed to explain the actual processes that lead to household resource allocation decisions. According to Katz (1997), the axiomatic nature of the Nash solution does not allow the models to explain how the threat points are utilised in the negotiation process and the nature of the conjugal contract[11] that enforces the particular allocation of household resources produced from the bargaining process. Generally, the models have been criticised as failing to explain which individuals make up the household. This renders the models unable to recognise systematic gender and age base power relations that constitute the basis upon which a household's resource allocation is structured.

2.3.2.2 The non-cooperative models

The non-cooperative models are distinct from the cooperative models in the sense that they relax some of the assumptions of the cooperative models. Prominent among such relaxed assumptions are the Pareto efficiency, income pooling, and binding contracts that can be enforced (Beblo, 2001). The outcome is that there are instances of Pareto inefficient allocation of resources including time within the household (Vermeulen, 2002). The non-cooperative[12] models hold that family members accept a bargaining rule that allocates decision-making powers based on threat points (Agarwal, 1997). In addition to allowing different preferences between individuals, they allow for individual production decisions and assume the presence of asymmetry between the parties with respect to information and the rule of the game (Haddad, Hoddinott, & Alderman, 1994). Within the non-cooperative frameworks, household members are assumed to maximise their utility by taking the behaviours of others as given.

The models place much emphasis on the gender of the person engaged in the bargaining and decision-making process. They also consider the process of resource distribution within the household. In addition, they are based on the three features of family life namely asymmetric information, enforcement problems and inefficiency (Katz, 1997). While cooperative models assume perfect information between household members, non-cooperative models assume that members of the same household are in most cases unaware of each other's income, ownership of assets and time use (Hochschild, 1990; Zelizer, 1997). Compared to the unitary approach, the non-cooperative models require an imposition of restrictions on observable household behaviours (Vermeulen, 2002). One important strength of the non-cooperative models as noted by Katz

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[11] Whitehead (1981) has explained concept "conjugal contract" as the terms on which household members exchange goods, income and service, including labour.

[12] Detailed explanation of bargaining and intra-household gender relations and determinants of intra-household bargaining power can be found in Agarwal (1997).

(1997), is that they offer richer characterisations of household structures and processes, and can endogenously account for differences in power among family members.

However, Beblo (2001) noted that non-cooperation among household members has the tendency of leading to coordination problems which may be addressed by formulating the coordination as either a principal-agent model or treating it as a kind of conflicting objective. As a result, most authors (Hadfield, 1999; Lundberg & Pollak, 1993, 1994) approached it using the coordination game approach. In their separate-spheres bargaining model which exhibits the characteristics of both the cooperative bargaining game and the coordination bargaining game models, Lundberg and Pollak (1993) considered two Nash equilibria conditions in a two-person (husband and wife) household in the provision of household public goods. The first instance is where the wife supplies one good and the husband contributes the other. The second scenario is the reverse provider roles where the husband provides one good out of his own resources, and the wife provides a separate good from her individual resources. Lundberg and Pollak (1993) explained that such decisions produce a pair of reaction functions that determine a Cournot-Nash equilibrium in which the public goods contributions are inefficiently low and dependent on the distribution of incomes of the individual within the family.

According to Lundberg and Pollak (1994), history and culture are sensitive elements that have an important influence in determining the choice between the equilibria. The achievement of a corner solution to the provision of such public goods might correspond with complete gender specialisation and social norms and traditional assignment of responsibilities. Consequently, the corner solution distribution is characterised by a situation where the household is dependent on the resources of both partners (Beblo, 2001). A similar coordination model suggested by Hadfield (1999) placed much emphasis on specialisation that results from human capital investment which is meant for securing a compatible match on the marriage market. Employing a joint utility function of the household in the theoretical analysis, Hadfield assumed that division of labour that predicts men's and women's tasks is dependent on institutional and historical facts.

The principal-agent approach of modelling intra-household decision-making rests on an assumption that the family is characterised by a relationship between an employer and employee or landlord and tenant, where one partner owns the productive resources (Katz, 1997). In the context of this study, the partnership can be considered as men and women or husband and wife. The approach makes provision for considering women's power as endogenous if men monopolize access to productive resources (Beblo, 2001). An alternative to this approach is the model of conflicting objectives which considers family members as free-riders of public goods produced by others. Within this framework, the decision on time allocation and the provision of public goods is determined by both partners. The partners choose between private consumption goods

purchased from income-generating activities and public consumption goods produced from unpaid activities.

Regardless of whether their actions (taking each other's behaviour as given) take place simultaneously in a Cournot-Nash framework or in a pre-specified order, they are dependent on the extent of dominance[13] or power within the household (Beblo, 2001). This dominance has in some instances been ascribed to the presence of asymmetry of decision-making between partners and the source of unequal division of unpaid work in the household. It is also an outcome of a Stackelberg game between spouses (Beblo, 2001; Fleck, 1996). As in the case of all the models discussed, one potential drawback of the non-cooperative models is that they do not necessarily result in Pareto efficient intra-household allocations. In many instances, it is possible to make an individual better off without making the other household members worse off (Vermeulen, 2002).

2.3.2.3 The dynamic bargaining models

Advances made on the bargaining models of intra-household allocation (see Konrad & Lommerud, 1995; Wells & Maher, 1996) revealed that in an environment where there are risk-averse agents and uncertain income flows, Pareto optimal allocation of resources, including time, will lead to changes in an individual's marginal utility which solely depends on changes in household aggregates (Wilson, 1968). As a result, in a multi-period environment, one's allocation will not depend on changes in his or her income but those of others. This means that an increase in one's income will not bring any changes to the sharing rule of the household (Ligon, 2011). In the bargaining frameworks, wage and price changes which result in systematic changes in the conflict outcomes are analysed based on a static period with a strong assumption that changes in wage are only exogenously determined (Ott, 1992). Nonetheless, if the changes of the conflict outcome have significant effects on the internal distribution within the family it is not certain whether such modifications depend solely on exogenous factors or whether the decisions made in the family also influence the external alternatives outside of the family (Beblo, 2001).

These downsides of the static bargaining models make the use of the dynamic bargaining frameworks more appropriate in explaining the behaviour of economic agents in a dynamic setting where decisions regarding current time allocation and changes in wages are determined by past

[13] Beblo (2001) explained the term "dominance" as the ability to make irreversible decisions and to force a partner to take these decisions as given while Fleck (1996) interpreted it as opposition to the dominated partner's choice. The lack of consensus in the interpretation and meaning of dominance in the literature leaves its operational definition to the discretion of the researcher in question and the context in which the term is being used in relation to intra-household resource allocation.

investment in human capital. The principal idea behind the dynamic model is that resource allocation decisions in one period affect the threat points of the subsequent period. As result, the current decision becomes a strategic variable insofar as it influences future bargaining power through human capital accumulation (Katz, 1997; Wells & Maher, 1996). The dynamic bargaining models account for the impact of dynamic time allocation decision on the human capital formation by combining the cooperative Nash-bargaining framework with the strategic component of non-cooperative games. Within this framework, a separation between couples is considered as the threat point (Beblo, 2001). The model depicts that time allocation is determined by intra-family bargaining between two partners and such bargaining takes place within the various phases[14] of the life cycle.

The central argument of the dynamic model is that in addition to their propensity to overinvest in human capital during their first period of life (pre-family), rational individuals have an incentive to choose suboptimal time patterns at the beginning of the family phase should this happen to improve their bargaining position in the last period. Beblo (2001) explained that during the pre-family period, each individual makes human capital investments non-cooperatively. However, in subsequent periods (family phase and time use decisions periods) especially, the ones related to time allocation to housework as compared to time spent in the labour market, human capital investment is determined by the partners' maximisation of the product of their gains from cooperation. Such outcomes are attributed to the presence of an asymmetry of the learning effects from market work compared to housework and the asymmetry of the marketability of the different labour skills.

In relation to wage, the model does not limit the determinants of changes in wage to only exogenous factors but it also considers the endogenous factors such as investment in human capital (Ott, 1992). From this perspective, human capital investment such as employee retraining (on the job training) endogenously determines both current income and future earnings through an increase in the stock of human capital. There is, however, a trade-off between investment in human capital accumulation and specialisation in work at home with each having its own

[14] In the work of Ott (1992), two phases of the life cycle were considered. These phases were extended to three (pre-family phase, family phase and time use decisions making phase) in the work of Beblo (2001). What distinguishes the dynamic bargaining model from the static bargaining models is its ability to account for the intertemporal dependencies in the behaviour of the individuals regarding decision making. In addition, the dynamic bargaining model is widely applicable to resource allocation within the household and intergenerational setting (Echevarria & Merlo, 1999). Detailed explanation of how the dynamic models have been applied in explaining the consumption-smoothing problems in the household in Bangladesh can be found in the work of Ligon (2011)

advantages and disadvantages for both the individual in question and the spouse or household as a whole. While specialisation in work at home results in an increase in household capital (production) it also leads to a loss in earning capacity for the partner who specialises because the surplus produced is shared between both spouses (Becker, 1981). Extending Becker's analysis to the internal distribution of the gains from specialisation in work at home, Ott (1992) asserts that the effect of specialisation and the accumulation of different kinds of human capital can be related to conflict outcomes in the household.

It is evident from the review of the dynamic model that intra-household decisions to allocate time between paid and unpaid work activities as well as changes in wages, are not only determined by endogenous factors but also exogenous factors such as previous and current human capital investment that can enhance one's bargaining power especially in the household. What is also obvious from this brief review of the neoclassical theories of intra-household resource allocation is that the basic unitary model has evolved over the years to take into consideration several individual characteristics. The focus is increasingly shifting from the perceived unitary household head to the individual members with the objective of understanding the dynamics (differences, conflicts and reconciliation processes) within the household that influence resource allocation. Research focus is also shifting from static to dynamic analysis of the determinant of bargaining power that drives resource allocation within the household.

So far, the review of the literature has been limited to the neoclassical theories of resource allocation (including time), with focus on gender specialisation in the labour market and home production. The subsequent sections situate this study into the specific aspect of these theories that directly address the objectives. As a reminder, this study seeks to: 1) assess the extent of effect of trade openness on gender wage gap and how the geographical location of respondents shape this effect in Ghana; 2) examine the gender and spatial differences in the effects of wage on intra-household allocation of time to paid and unpaid work activities in Ghana; 3) analyse the simultaneous determination of spousal wage and time allocation to paid and unpaid work activities in Ghana; 4) determine the effects of income/consumption poverty on gender disparities in intra-household allocation of time to paid and unpaid work activities in Ghana; 5) estimate the extent of the relationship between time poverty and income/consumption poverty in Ghana.

As indicated in the preceding paragraph, the second empirical objective examines the effects of wage on intra-household allocation of time to paid and unpaid work activities in Ghana. To a large extent, this objective can be based on the static neoclassical theory that explains the determinants of hours of work. This theory postulates that an increase in wage rate engenders two opposing effects on the labour supply of the individual (Borjas, 1980). The first is the income effect which indicates that an increase in wage rate increases the income of the individual and encourages the consumption of normal goods. In that case, if leisure is a normal good, then as illustrated in

panel A of Figure 2-1, a higher wage rate will induce the individual to demand more leisure and spend fewer hours on paid work in the labour market (Borjas & Van Ours, 2010).

The second is the substitution effect which is an increase in the opportunity cost of leisure (Ehrenberg & Smith, 2016). Also illustrated in panel B of Figure 2-1, an increase in wage makes leisure time costly. This induces the individual to consume less leisure and spend more time on paid work on the labour market. These opposing effects lead to ambiguous predictions about the directions of the relationships between wage and time use in the standard unitary preference models of household production (Kalenkoski, Ribar, & Stratton, 2009; Schultz, 1990). The net effect of wage increase is dependent on the dominance between the income and substitution effects and the perception of the individual regarding leisure. Given that leisure is a normal good, an increase in wage will induce the individual to spend more hours on paid work if the substitution effect outweighs the income effect. On the other hand, an increase in wage will cause a decrease in labour supply if the income effect outweighs the substitution effect (Ehrenberg & Smith, 2016).

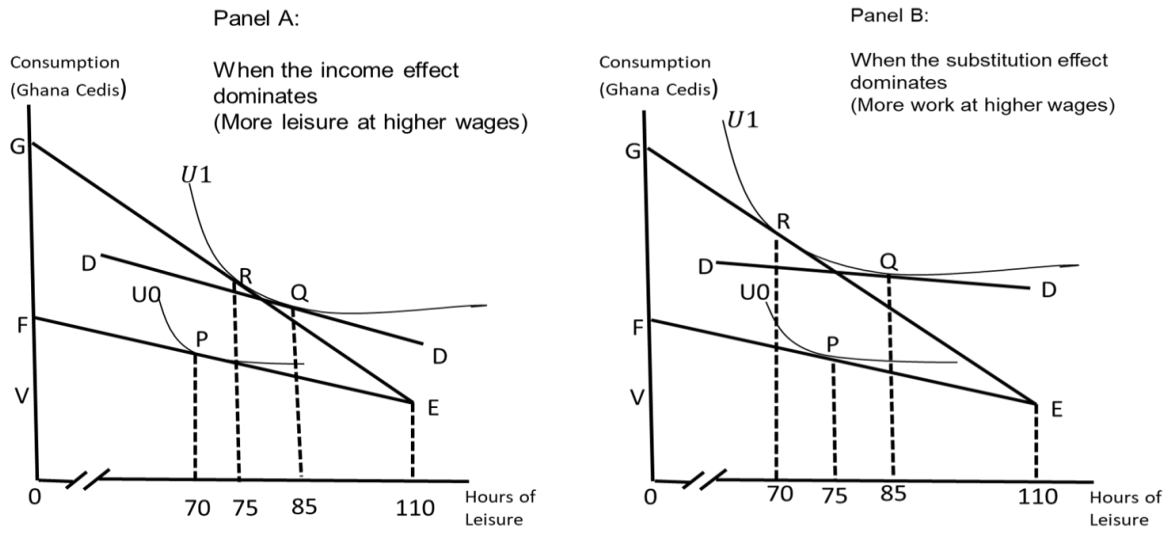

Figure 2-1: Effects of an increase in wage on hours of work and leisure

Source: Adapted from Borjas and Van Ours (2010)

The third objective on the simultaneous determination of spousal wage and time allocation to paid and unpaid work activities is underpinned by the theories of labour supply and the notion of working spouse premium/penalty as espoused by (Becker, 1991). On the one hand, the theory of labour supply postulates that a husband's wages affect the wife's hours of work. On the other hand, the notion of a working spouse premium/penalty suggests that the wife's hours of work impact the husband's wages (Song, 2007). The source of this premium has been explained from three theoretical perspectives: 1) The 'specialisation thesis'; 2) the 'selection hypothesis' and 3) the productivity theory (Barg & Beblo, 2007; Strike, 2012).

The ‘‘specialisation thesis’’ postulates that the division of labour in the household enables married men to specialise in market production and earn higher wages than their un-married counterparts because they spend less time on home production (Becker, 1991; Chun & Lee, 2001; Gray, 1997; Korenman & Neumark, 1991; Song, 2007). Contrary to this hypothesis is the selection hypothesis which indicates that married men who earn above average wage have certain observable qualities that make them more valuable in the marriage and labour market (Chun & Lee, 2001). The productivity theory also suggests that marriage makes men more productive in the labour market because they feel a sense of financial responsibility from home (Hill, 1979; Strike, 2012).

A comprehensive review of the empirical literature on these theories suggest that although no single theory completely captures all the sources of the wage premium, the findings of most of the existing studies such as Groothuis and Gabriel (2010) and Hill (1979) support the productivity theory of causal effect of marriage on wages of married men that men become more productive after marriage (Strike, 2012). Although the productivity theory seems to have gained dominant empirical supports, some recent studies provide evidence that makes the debate less conclusive.

In one strand of the literature, Nakosteen and Zimmer (2001) and Groothuis and Gabriel (2010) draw conclusions that support the selection theory that men’s income and their propensity to marry are positively correlated, whereas other related studies find evidence of working spouse penalty which is contrary to the notion of working spouse premium itself. Proponents of the working spouse penalty contend that married men who have gainfully employed wives face less intra-household division of labour but they earn lower wages than their counterparts who have non-working wives (Chun & Lee, 2001; Gray, 1997).

This contrary observation has been explained from the perspective of employers’ preference for single-earners, geographical mobility, and productivity and the income effect of wage on spousal labour supply. An explanation for the employers’ preference for single-earner argument is that employers perceive single-earner husbands to be more conforming to social expectation and values than dual-earner husbands. Secondly, by virtue of the principle of distributive justice in wage determination, employers consider single-earner husbands as having more needs compared to dual-earner husbands, hence the need to be given a higher priority (Song, 2007). Concerning geographical mobility, it is argued that dual-earner husbands are less mobile and prepared to accept discriminatory wage offers(Song, 2007).

Furthermore, dual-earner husbands are perceived by employers as being unproductive enough to support their households. As a result, their spouses must work in order to keep the household surviving. This perception about the productive capability of dual-earner husbands works to their disadvantage in wage determination. It is also argued that wives who are married to high income

earning husbands enjoy large income effects that allow them to work fewer hours than those married to low income earning husbands. The large income differential enables wives of high income earning husbands to reduce the number of hours of labour supply (Song, 2007).

The fourth objective which determines the effects of income/consumption poverty on gender disparities in intra-household allocation is underpinned by two theoretical expositions of gender differences in time use which are loosely discussed in the previous sections. These are the bargaining theory and the gender perspective (Coltrane, 2000). The bargaining theory stresses the relevance of rationality and relative resources, as well as a shift in economic, demographic and normative conditions, in explaining the changes in the time allocation of men and women. This theory associates the reduced comparative advantage of women in unpaid work (compared to paid work) to increase in their wages, educational attainments, age at first marriage and decline in fertility. It predicts that the strengthening of women's bargaining power due to increase in their education, employment and earnings should stimulate an increase in the unpaid working time of men in the household (Sayer, 2005).

On the other hand, the gender theorists see women's dominance in unpaid work as the result of the resiliency of gender inequality and other factors such as an unequal power relationship between men and women in the household, and not due to females' comparative advantage in these activities or their lower level of available resources. In the same vein, men's failure to spend more time on unpaid work in the household is a way of demonstrating their masculinity while strengthening their structural and cultural powers (Brines, 1994; Thompson & Walker, 1989). The gender theorists contend that although changes in demographics, the economy and norms may be contributing factors to the gendered time allocation, the recreation of gender inequality is the elementary cause (Sayer, 2005). Irrespective of the fact that the definition of femininity and masculinity has evolved to include wage, women's performance of domestic activities continues to be the barometer for measuring the extent to which they live up to their expectations as wives (Riggs, 1997).

According to Sayer (2005), domestic labour is fused into the norm of appropriate femininity and masculinity in such a way that it is considered acceptable for women to play the role of men but not the other way round. For instance, it is considered normal for a woman to spend more time on paid work but not appropriate for men to perform unpaid household activities. The gender perspectives conclude that it has become a social construct that women should do more unpaid work while men are not expected to increase their time spent on unpaid work. Also, women are expected to have less free time than men since it is their responsibility to ensure that all unpaid work is done in the household irrespective of the amount of time they spend on paid work (Sayer, 2005; Sayer, Bianchi, & Robinson, 2004). Having situated these objectives in their respective

theoretical contexts, the next sub-section considers the theory that underpins the time poverty and income poverty relationship (objective five). This section expatiates the two paradigms of the income capability model by paying attention to its gender ramifications for home production.

2.4 Models of two-dimensional measures of time and income-poverty

Becker's (1965) distinction between production-oriented time and consumption-oriented time in the NHE theory has served as the basis for economists to realise the normatively problematic and internally inconsistent nature of the conventional poverty thresholds used in evaluating poverty. The use of the conventional poverty threshold makes it difficult to identify households that suffer from time deficits related to household production which cannot be compensated for through the purchase of market substitutes (Antonopoulos & Memis, 2010). Vickery (1977) was the first among those economists to theorise a generalised definition of poverty with both income and time elements (Heggeness, Flood, & Pacas, 2012).

According to Beblo (2001)[15], Vickery (1977) criticised the official poverty threshold used in the USA which placed much emphasis on the price of food for a diet that was minimally nutritionally adequate for a household. The implicit assumption of that poverty line was that there was substantial time inputs because the raw ingredients needed to be purchased at the cheapest available outlet and prepared before they could provide nutrition. On the basis of this criticism, Vickery (1977) constructed a poverty threshold that was comparable to that of the absolute income poverty line in USA by making two distinct proposals: 1) the required hours of household production which were implicit in the poverty thresholds should be constructed for households based on size and composition; 2) the need to make some allowance for the time required for some basic personal care activities including but not limited to eating and sleeping which promote the wellbeing of the individual (Zacharias et al., 2012). Vickery (1977) therefore contributed to the literature by calculating substitutability of time and money near the income poverty line and derived a range of a two-dimensional measure of time and income-poverty using an earlier USA time budget survey (Burchardt, 2008).

Vickery's (1977) estimation of time deficits associated with full employment and her ability to explain the propensity of single-female-headed households to escape income poverty through employment has engendered the development of two distinct economic paradigms that

[15] See Burchardt (2008) for the detailed modelling process of the income capability model which is based on the principles of the two-dimensional poverty measurement. Similarly, (Bardasi & Wodon, 2010; Zacharias, Antonopoulos, & Masterson, 2012)are important sources for reference on the modification of the original model proposed by Vickery.

interrogate the conventional approaches to the computation and analysis of poverty (Zacharias et al., 2012). One category of researchers follows the original approach of Vickery while the other group adopts a somewhat different approach that produces the same results. Among the pro-Vickery researchers, two sub-groups can further be identified.

According to Zacharias et al. (2012), studies such as Douthitt (2000) and Harvey and Mukhopadhyay (2007) adopted Vickery's original approach of constructing thresholds for household production that may be implicit in the standard poverty thresholds and estimated time deficits based on such thresholds and hours of employment. Those studies measured the incidence of income poverty by using modified poverty lines or standard poverty-lines augmented by the monetised value of time deficits. The other sub-group (Antonopoulos & Memis, 2010; Burchardt, 2008) subtracted the monetised value of time deficits from household income. The only distinction between these two sub-groups is that while the former operationalised the measurement of poverty by estimating time deficits associated with actual hours of employment, the latter estimates time deficits associated with several possible values of hours of employment (Zacharias et al., 2012).

Zacharias et al. (2012) expounded that the second group that does not follow Vickery's approach of modifying the standard poverty lines, either examined the time poverty-income poverty nexus (Bardasi & Wodon, 2010; Gammage, 2010) or measured the prevalence of time-pressure (Goodin, Rice, Bittman, & Saunders, 2005). The two groups differ slightly in their approaches to the computation and interpretation of poverty thresholds. Using the distribution of individual working hours for both paid and unpaid work, Bardasi and Wodon (2010) specified universal time poverty lines for all adults that classify individuals as time poor or otherwise, depending on the income poverty status of their households and their ability to influence the threshold. Based on this approach, an individual in a poor household who works more than the predetermined threshold of the hours of work is considered as being time poor while an individual in a non-poor household whose working time exceeds the time poverty line is considered as time-poor only if they can reduce the hours below the threshold without falling into poverty.

On the other hand, Goodin et al. (2005) derived thresholds for household production (taking into consideration household size and division of household production), personal care, which is uniform for all adults, and employment differentiated by the actual or imputed hourly wage rate, which in turn is dependent on intra-household contributions to household income. With their approach, the amount of potential free time or discrete time is obtained by subtracting the combined total threshold values of employment (a measure of the household's minimum hours of employment to earn the poverty-level income), personal care and household production from the physically available hours (168 hours per week) (Zacharias et al., 2012). With this approach, time

pressure illusion can be measured by juxtaposing actual free time with potential free time (Burchardt, 2008).

As summarised in Figure 2-2, the central argument of the approaches of the two-dimensional measure of time and income poverty is that an individual has a fixed time (24 hours per day/168 hours per week) which forms part of the resources at his or her disposal. When this time is allocated, to paid, unpaid and personal care activities, the person time or income poor, or both time and income poor depending on other individual, household and community level characteristics. The models show that allocating a great deal of time to paid work may produce a high income but leave limited free time for personal activities that promote well-being while the inverse holds for more time allocated to unpaid work. While this framework depicts the relationship between income poverty and time poverty, it does not explain the causal link between time poverty and gender difference in time use.

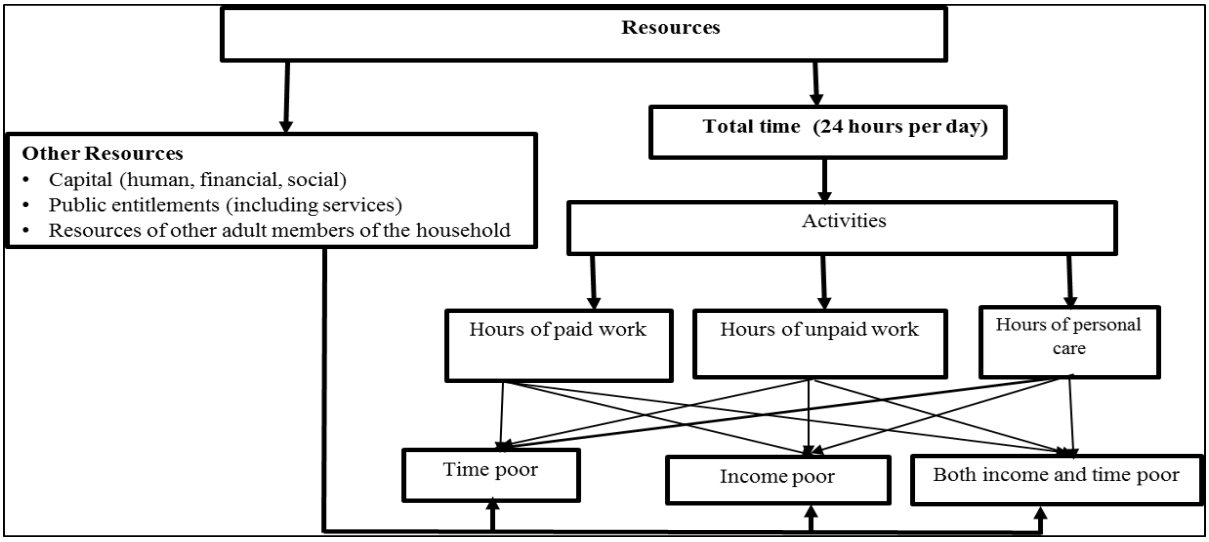

Figure 2-2: Framework of the two-dimensional measure of poverty

Source: Adapted from Burchardt (2008)

Williams, Masuda, and Tallis (2015) indicated that in contrast to the two-dimensional approach of measuring poverty, there is another group of researchers (Kalenkoski & Hamrick, 2013; Kalenkoski, Hamrick, & Andrews, 2011) who argued that given the relevance of time as a resource, there is the need to consider time poverty as an important risk factor separately from income poverty. The findings of some studies have revealed the extent to which the decoupling of time poverty from income poverty can aid public health and social policies (Bardasi & Wodon, 2006; Bittman, 2002; McGinnity & Russell, 2007). For instance, in their study on the extent to which income poverty and time poverty act as barriers to regular participation in moderate or higher intensity physical activities, Spinney and Millward (2010) concluded that from a public health and social policy perspective, time poverty may be more important than income poverty as

a barrier to engagement in regular physical activity. This conclusion supports a similar finding by Bittman (2002) who had earlier contended that income plays an insignificant role in determining leisure time. Instead, access to time for leisure participation is most powerfully determined by hours of employment, family responsibilities and gender.

The above evidence reveals another paradigm of research that seeks to examine the risk of time poverty in and of itself. This study can be identified with this strand of the literature which perceives the risk of time poverty as a separate entity worthy of investigation rather than infusing it into the computation of the conventional poverty indicators. Decoupling the risk of time poverty from income and consumption poverty will aid proper targeting of fiscal policies that seek to redress time burden of women in unpaid work. This may consequently enable women to spend more time on paid activities in the labour market, which can either earn them a livelihood or increase their leisure and improve their well-being (Chakraborty, 2010).

2.5 Empirical literature on trade and gender wage differential

The literature on the gender wage gap is diverse and reflects the extent to which researchers and policy-makers consider it as an important global issue. Available statistics for developed and developing countries (excluding those in Sub-Saharan Africa (SSA)) indicate that female workers in developing countries receive higher wages than their male counterparts compared with female workers in developed economies (Terada-Hagiwara, Camingue-Romance, & Zveglich Jr, 2018). It is estimated that between 2005 and 2010, female workers in developed countries earned only about 75% of the earnings of their male counterparts, while the distribution was about 83% in developing countries (Terada-Hagiwara et al., 2018). The wage differential in favour of females was the highest in Southeast Asia, the Middle East and North Africa (MENA), followed by those in upper-middle-income OECD countries and non-OECD Europe with those in Central and East Asia being the lowest (Terada-Hagiwara et al., 2018).

In the case of SSA, the evidence from the Survey-based Harmonising Indicator Programme (SHIP) data suggests the presence of large gender wage gaps that vary across countries. Comparable data available for seven countries in the year 2000 show that the ratio of average female-to-male weekly labour income ranged from 23% in Burkina Faso to 79% in Ghana. The only country in which females received higher wages than men was Malawi where the ratio was 105% (Arbache et al., 2010). Nonetheless, a recent Global Gender Gap report suggests unequal performance among SSA countries as some countries such as Botswana and Kenya seem to have made progress towards wage parity while others, including Ghana and Madagascar had retrogressed (World Economic Forum, 2017).

The identified sources of the wage differential in the empirical literature include socio-economic, cultural and institutional factors. However, the evidence on the relationship between trade openness (liberalisation) and wage gap remains inconclusive. In line with the theoretical debate, the findings from the literature have shown that trade openness either narrows, widens or has no significant effect on the gender wage gap. This inconclusive evidence could be attributed to the differences in scope, methodology, data, and estimation strategy used in the analysis. Studies on the changes in the gender wage gap in concentrated versus competitive manufacturing industries in the USA and Mexico suggest that trade increases wage inequality by reducing the relative wages of less-skilled workers (mostly women). However, the competition associated with trade openness benefits women by reducing the ability of firms to discriminate (Artecona & Cunningham, 2002; Black & Brainerd, 2004).

An assessment of the effect of trade-induced price changes on the gender wage gap in Mexico before and after the North American Trade Agreement (NAFTA) in 1994 indicates that the wage gap in manufacturing increased after the agreement (Ferrufino, 2011). Berik, Rodgers, and Zveglich (2004) maintained that competition from foreign trade in concentrated industries is positively associated with wage discrimination against women. In India, a similar observation was made by Menon and Van der Meulen Rodgers (2009) that increasing openness to trade was associated with large wage gaps in concentrated manufacturing industries. Similarly, Yasin (2011) noted that an increase in exports significantly increased the relative wage of the unskilled workers. Granted that females constitute the majority of this category of workers, then such an increase in wage could contribute to the narrowing of the gap.

Contrary to these studies is another strand of the literature that finds trade openness as a tool for gender equality. The main conclusion of this set of studies is that trade openness has a positive effect on the wages of both males and female. Nonetheless, trade induces stronger female labour force participation than male labour force participation. This drives the wage gap downwards due to the relative improvement in the wages of females (Almasifard, 2018). In their analysis of the impact of globalisation on gender wage inequality, Rasekhi and Hosseinmardi (2012) confirmed the narrowing effect of trade on the gender wage gap. Using a simulation approach to analyse the impact of trade liberalisation and dynamic labour adjustment on gender outcomes in wages and welfare in the USA, Brussevich (2018) asserted that trade liberalisation has higher wages and welfare gains for women than men. Berik (2000) argued that the restructuring of Taiwan after the 1980s which engendered greater export orientation adversely affected both men and women. However, it reduced gender wage inequality since men faced greater wage penalty than women. In Honduras, De Hoyos, Bussolo, and Núñez (2012) concluded that the expansion of the export-oriented sector contributed to gender equality both in terms of employment and labour earnings.

Another panel study of countries across the world (including countries in Europe, and Africa) conducted by Yamamura (2016) on the long-term effect of trade openness on gender gaps in wage, education, political empowerment and health shows that trade openness reduces gender gaps in wages but the magnitude of the effect decreases over time. Using aggregate data on developing countries, Sepehrivand (2017) argued that between 2001 and 2013, increased trade openness and external investment in developing countries contributed to an increase in women's wages leading to a decrease in the gender wage gap. Other pieces of evidence from Bangladesh and Brazil arrived at the same conclusion that trade-related outcomes such as expansion in jobs and reduced wages favour women more than men. These contribute to a significant reduction in the gender wage gap (Benguria & Ederington, 2017; Rahman, 2014).

Aside from these two strands of the literature, other studies suggest that the effect of trade liberalisation varies across skills, and capital or labour intensity of the industry in question. Yahmed (2013) noted that trade integration widens the gender wage gap among skilled workers but decreases the gap among unskilled workers. Although the author was not explicit in defining who constitute the skilled workers, it could be implicitly deduced from the established evidence that women would constitute the greater proportion. In their study of the effect of trade liberalisation on the gender wage gap in the Indian manufacturing sector, Furuta, Bhattacharya, and Sato (2017) found that trade liberalisation widened the gender wage in labour-intensive but not in the capital-intensive industries. Several other studies have found that trade narrows the gender wage gap among low-skilled workers in concentrated industries but widens the gap among medium and high-skilled workers in mostly less-competitive trade affected industries (Ederington, Minier, & Troske, 2009; Fafchamps, 2009; Ozler, 2000; Wolszczak-Derlacz, 2013).

It is evident from this brief review that the literature on the trade-gender wage nexus in Africa in general, and at the household level remains limited. Another important observation from the review is that most of the existing studies seem to have focused more on openness in policy rather than openness in practice. Studies conducted in South Africa and Cameroon, however, point to the fact that trade openness (liberalisation) contribute to a decline in the gender wage gap and an increase in employment particularly among higher-skilled female workers (Kuete & Voufo, 2016; Thurlow, 2006). An analysis of the impact of trade liberalisation policies on income redistribution in Egypt indicates that changes in the wage gap favoured unskilled women in the rural areas and skilled women in the urban areas more than unskilled men in the rural areas and skilled men in the urban areas (AlAzzawi, 2014).

The evidence in Ghana remains limited despite the progress that the country has made towards its integration into the global economy especially in recent years. For instance, imports increased by a little over 500% from Gh¢ 9088 million in 2009 to Gh¢ 55426 million in 2017, while exports

increased by approximately 813% from Gh¢ 6859 million to Gh¢ 62585.5 million within the same period. This translated into an improvement in the country's trade balance from a deficit of Gh¢ 2229 million to a surplus of Gh¢7158.9 million. The volume of trade increased by approximately 640% within this period from Gh¢15947 million to Gh¢118012.1 million (Ghana Statistical Service, 2014a, 2018a). Similarly, trade as a share of GDP (at a constant price) increased from 43% to 109% within the same period. This improvement in trade openness in practice could be a reflection of a considerable improvement in the country's trade openness in policy over the years. Ghana's trade liberalisation policy has taken the form of almost a complete removal of quantitative restrictions and considerable tariff cuts. The elimination of restrictions on international trade remains an important component of Ghana's Poverty Reduction Strategy (GPRS) II. These policies may have contributed to the higher integration of more sectors and economic activities into global trade leading to expansions in the level of production in all sectors and significant export growth (Cockburn, Decaluwé, Fofana, & Robichaud, 2008; Fontana, Joekes, & Masika, 1998).

A review of the empirical literature on the trade-gender nexus in Ghana indicates that very few studies have assessed the effect of the country's trade liberalisation policies on the welfare of men and women. However, the focus of these studies has been the effect of openness in policy (tariff reduction) but not openness in practice which is the focus of this study. More importantly, only a handful of these studies considered the effect of the country's trade reforms from the gender perspective. Throughout the review of the empirical literature, only Ackah et al. (2012) and Cockburn et al. (2008) were found to have used panel and Computable General Equilibrium (CGE) approaches to assess the effect of trade liberalisation on the gender wage gap in Ghana. Those two studies differ from this one in the sense that the authors focused on trade in openness in policy (tariffs) while this study focuses on openness in practice. Unlike this study that uses the collective household model which considers all household members aged 15 years and older, Ackah et al. (2012) adopted the unitary approach of the neoclassical theory by considering only household heads aged between 18 and 64.

A comparative study on the growth effects of increased openness in import-competing and export-oriented sectors in Ghana, Uganda, Senegal and Honduras, revealed that in the short term trade liberalisation increased the average gender wage gap in all three African countries because female wages fell more than male wages. More specifically, trade liberalisation increased the gender, skill, and rural-urban wage gaps. The study asserts that male workers, skilled workers, and urban workers were less affected because they were able to take advantage of the expanding export opportunities and were less exposed to increased import competition. In the case of Ghana, the authors attributed this to the greater participation of rural men in export-oriented cocoa production (Cockburn et al., 2008). A related study on the impact of trade policy on wages and

employment in Ghana found that liberalisation of the manufacturing sector contributed to a fall in the average wages of workers of firms in that sector. Workers employed in industries that were more exposed to liberalisation experienced lower wages. The fall in wages was more pronounced in firms which employed workers with low levels of education (Ackah et al., 2012).

In similar simulation studies, Bhasin and Obeng (2006), Bhasin (2012) and Quartey, Aidam, and Obeng (2007) used CGE models to assess the impact of trade liberalisation on poverty and income distribution of various categories of households. They established that the elimination of import and export duties would reduce the incidence, depth, and severity of poverty of all categories of households. The authors, however, did not consider the gender element but focused on the spatial and regional distribution of poverty in the country. A recent household-level study that focused on gender distribution of the welfare effect of Ghana's adoption of the Economic Community of West African States (ECOWAS) Common External Tariff showed that the although geographical location of households is a major factor, the reform is expected to have pro-poor and pro-female effects (Orkoh, 2018). While all these studies attempt to assess the gender implications of trade openness, they do not consider openness in practice. Moreover, they have mainly been based on simulations and Social Accounting Matrix (SAM) data which makes it difficult to account for the heterogeneities in the socio-economic characteristics of individuals in the household.

Apart from these studies, other studies have analysed the gender wage gap using census, firm and household level data. However, they do not focus on the extent of the contribution of trade openness to the wage gap. For instance, Beaudry and Sowa (1994)estimated that women's average monthly wages were 21% less than men's wages after controlling for individual productive and occupational characteristics. A similar analysis of the wage gap by Verner (1999) showed that female employees earned 17% less than their male counterparts and the negative wage premium received by females outweighed their negative productivity. Schultz (2003) found a 23% gender pay gap in favour of men and four-fifth of the gap ascribed to differences in the human capital endowment.

In his analysis of gender segregation of occupation and wage differentials among paid-employees and self-employees in Ghana, Baah-Boateng (2012) found that wages of females were lower than those of males in the labour market as a whole, and within most broad occupations. The study also found a larger gender wage differential in favour of men in self-employment than in paid employment, while men in lower-paid female occupations were marginally worse off relative to men in male-dominated occupations. On the contrary, women in better paid male occupations were found to be worse off relative to women in female occupations. The author asserted that there was a larger wage gap attributed to favouritism for males and a lower proportion of the

earnings gap due to discrimination against females in the labour market as a whole. The study further concluded that discrimination against women constituted a greater proportion of the gender wage gap among self-employed workers while favouritism for males and discrimination against females in paid employment were virtually the same.

A comparative analysis of the wage gap in twelve developing countries including Ghana found that after adjusting for potential self-selection into employment, the estimated wage gap among Ghanaian workers remained insignificant (Zhou, 2017). While these few studies may not be exhaustive, it is obvious that none of them has paid attention to the role that Ghana's integration into global trade contributes to the wage gap. What this study does differently from the existing studies is to assess the effect of trade openness on the gender wage gap at the household level based on the economic activities in which the individuals are engaged. The study pays attention to the spatial (rural versus urban) differences in the effect of trade openness due to differences in access to infrastructure and the labour market by rural and urban residents. These make the current study relevant and timely as it accounts for the individual, household and spatial dynamics that may have an influence on the direction and extent of the effect.

2.6 Empirical literature on intra-household time allocation

The empirical literature on intra-household allocation of time available for different members to participate in both paid and unpaid work activities ranges from cross-sectional studies through cross-country comparison to panel studies. It also covers issues such as determinants of intra-household time allocation and gender difference in time allocation. Regarding the factors that determine the intra-household time allocation, the principal issues covered include the impact of social policy mostly in the form of income transfer to households and their implication for time allocation among household members (Canavire Bacarreza & Ospina, 2015; Parker & Skoufias, 2000; Rubio-Codina, 2010).

The literature also encompasses the effects of environmental conditions, infrastructure, education, employment, ethnicity and wages on intra-household time allocation (Craig, 2006; Gimenez-Nadal & Molina, 2014; Heiland, Price, & Wilson, 2014; Joesch & Spiess, 2006; Zaiceva & Zimmermann, 2014). From a gender perspective, an issue that has been extensively researched is gender differences in time allocation to child care (Bloemen, Pasqua, & Stancanelli, 2010) with very little concentration on care for the elderly. Ilahi (2000) categorised these broad determinants of time use into five main areas: 1) effect of economic incentives on intra-household time-use; 2) access to basic services such as water and energy and their gender differential impacts on time-use; 3) impact of idiosyncratic shocks such as changes in employment and health

on gender time use; 4) The extent to which agricultural commercialisation alters the gender time allocation and tasks; and 5) whether child care is an area that needs policy attention.

However, considering the objectives of this study, the review will be restricted to determinants of time allocation with emphasis on wage and its relationship with time use within the household. Although the review is mainly focused on the effect of wage, effort is made to cover the other control variables included in the analysis. Much attention is also paid to the connection between individual time poverty and household income poverty. Sub-section 2.6.1 reviews studies that have attempted to establish the relationship between wage and time allocation to paid and unpaid household work, while the sub-section 2.6.2 looks at studies on the connection between time poverty and income poverty.

2.6.1 Wage and intra-household time allocation

The literature on the relationship between wage and intra-household time allocation is still in its nascent stage in developing countries and particularly Ghana, probably due to the dearth of surveys that gather information on wage and time use at the household level. The little available evidence suggests that the examination of this relationship involves many complexities including, but not limited to, 1) the need to disentangle own-wage effect from cross-wage effect especially in a two-earner (husband and wife) household; and 2) the perceived existence of potential endogeneity (reverse causality) between wage and time allocation to paid and unpaid household work (Hersch, 2009). Other issues highlighted in the literature are the decision to consider a single household activity at a time or an aggregate of more than one household activity as a measure of household work, and whether to use variables from time-use surveys or regular surveys in computing the estimates of hours of work (Klevmarken, 2005).

Regarding the type of survey, Klevmarken (2005) investigated the extent to which an estimated wage rate and income effects are data dependent using three alternative measures of hours of work to estimate a labour supply function. The author compered measures from time-use surveys with measures from regular surveys. The difference between the two surveys is that while the former involves data collected on time spent on daily activities, the latter is based on the responses to a question about normal weekly hours of market work and household production. The results showed smaller effects of wage rate obtained from measures of normal hours of work compared to those obtained from data collected for a well-defined time period close to the date of interview, such as time-use data.

These complexities have partly contributed to an inconclusive literature on the direction of causality between wage and intra-household time allocation. One strand of the literature examines the implications of gender differences in home responsibilities for more subtle aspects

of market work outcomes such as the gender wage gap (Bryan & Sevilla-Sanz, 2011; Hersch, 2009; Hersch & Stratton, 2002; Keith & Malone, 2005; Maani & Cruickshank, 2010), while the other group of researchers look at the effect of wage and other socio-economic factors on gender time allocation to paid and unpaid work (Argyrous & Rahman, 2014; Bloemen et al., 2010; Bloemen & Stancanelli, 2014b; Kalenkoski et al., 2009; Song, 2007). For the purpose of this study, the review is focused on studies that evaluate the effect of wage on intra-household time allocation and those that have validated the effect of hours of work on wages with particular attention to couples.

Changes in wage have consequential effects on the time allocation decision of individuals in a household. It is intuitively expected that high wages should provide an incentive for household members to pursue market work, while accumulating experience needed for human capital development (Korenman et al., 2005). However, theoretical explanation shows that it is *a priori* difficult to specify the direction of this effect since the income and substitution effects of a wage increase work in opposite directions. This leaves the direction of the effect dependent on the proportion on which individual's labour supply function is located (Ilahi, 2000). This ambiguity and the complexities outlined earlier partly contribute to the mixed empirical evidence of the wage effect at the individual, household and regional levels. Ilahi (2000) noted that in South Asia, where rural labour market function better than in Africa or Latin America, the wage effect of female labour supply on market activities is higher. Nonetheless, evidence suggests that as families acquire higher income, they may prefer to pay attention to household production that enhances the wellbeing of the members, and this mostly becomes the responsibility of the mother (Korenman et al., 2005). This means that wage may have a differential impact on the time allocation of men and women to different unpaid work activities within the household depending on the individual and household level characteristics.

According to Daunfeldt and Hellström (2007) studies such as Graham and Green (1984), Gronau (1976a) and Wales and Woodland (1977), defined household (unpaid) work as an aggregate r of home activities, and contended that household characteristics are more important factors than economic factors (such as the relative wage) in explaining intra-household time allocation. However, Daunfeldt and Hellström (2007) clarified this issue, concluding that comparing the results from those studies with studies that use a single measure of household time may be misleading because households are defined differently between the studies. The authors consequently criticise studies that rely on aggregated indicators. Although they attempt to consider household production, they fail to account for intra-household allocation of time between different household activities.

Nonetheless, many studies have found results which show that aggregating a number of home activities may not necessarily render the effect of wage on own and relative allocation of time within the household insignificant. Neither will it cause the wage and income effects present in a disaggregated analysis to disappear when household production is defined as the sum of different home activities (Kooreman & Kapteyn, 1987), as argued in other studies (Daunfeldt & Hellström, 2007). Daunfeldt and Hellström (2007) admitted that it is possible that valuable information concerning the intra-household allocation of time may be missing when household production is defined as the sum of different household activities. However, this does not wipe out the statistically significant effects in an aggregated analysis.

One of those studies that used aggregated analysis was Skoufias (1994) who assessed the wage effects of time allocation on market work, domestic production, leisure and schooling by boys and girls in India. After controlling for the role of individual unobservable heterogeneity and self-selection into activities using panel data, the author found a positive and significant wage effect on the market labour supply of both men and women. The positive effect for female labour supply supports the findings of Khandker (1988) who concluded that an increase in wage offers influences a woman who is not already participating in the labour market to produce more of home-produced market substitutes in Bangladesh. Similarly, such an increase in wage offer induces a woman who is already participating in the labour market to spend more time on market production. However, the two studies draw contrasting conclusions on the wage effect on male labour supply as Khandker (1988) observed a negative effect.

Using the Australian TUS of 1992 to test the hypotheses on the allocation of husbands' and wives' time to household labour, Bittman, England, Sayer, Folbre, and Matheson (2003) found that even if women's earnings reduce their own unpaid work, they do nothing to increase their husbands' unpaid work. Also, women's earnings only reduce their housework when they contribute less than half of family income. Later studies (Fernandez & Sevilla-Sanz, 2006), based on the 2002-2003 Spanish TUS confirmed that despite the decline in the gender wage gap, specialisation in home production continues to be high, with women providing most household produced goods and services. They show that although a woman's time spent on home production decreases as her wage increases, at higher wage levels the effect becomes less pronounced. The authors concluded that a woman's relative share of housework decreases as her relative wage increase, but only up to the point where she earns the same as her husband. Also, women's time devoted to household activities, such as care where there are no credible alternatives, are less elastic to an increase in their relative wages (Fernandez & Sevilla-Sanz, 2006).

Applying a structural model of labour supply to the analysis of two parent families in the United Kingdom (UK), Parera-Nicolau and Mumford (2005) found a negative effect on an increase in the

hourly wage on the working hours of working mothers. The impact of wage on time allocation to paid work also manifests itself indirectly in the form of how decision-making power and responsibilities, as well as leisure time within the household, are distributed among household members (Schneebaum & Mader, 2013). In their assessment of the effect of wage and other individual and household level factors on the minutes used in home production, active leisure, market work, and child caregiving by mothers in the USA, Kimmel and Connelly (2007) found a substantial positive wage elasticity for caregiving time, while both leisure and home production time declines with increased wages. These results support the findings of their earlier study (Kimmel & Connelly, 2006) that explored (using data from the 2003 American TUS) the role that caregiving responsibilities play in mothers' time choices. The authors conclude that the caregiving choice of mothers respond positively to higher wages just as hours of paid work respond to increase in wages.

In a similar study, Kalenkoski et al. (2009) investigated the impacts of an individual's own wage and the partner's wage on parents' provision of child care and market work on weekdays, weekends and holidays, using data from the UK TUS conducted in 2000 on couples with children. The authors observed that an increase in partners' wages was positively associated with women's primary care on all days, but negatively associated with their market work on weekdays. While they found little evidence that men's time use responds to changes in their own wages, they concluded that increases in women's own wages increase their market work on weekdays. Also, increases in men's partners' wages increase men's passive child-care time on weekends and reduce their market-work time on weekends. The positive own wage effect for women is in line with the findings of Gupta and Ash (2008) who showed that women's own earnings are negatively associated with their housework hours, independently of their partners' earnings and their shares of couples' total earnings. Increases in wives' relative wages in two-earner households enable them to enjoy significantly more leisure time (relaxing and watching television) and spend significantly less time doing chores, cooking and cleaning. It also enables wives to spend more time with family members while the reverse is true for husbands (Friedberg & Webb, 2005).

The policy implications of the cross-wage effect of time allocation do not only make it a major focus of most studies but also fascinating to understand the underlying causes of its variation across geographical location and time. For instance, an examination of the behavioural responses of married couples to relative changes in the wages of their husbands and wives in the USA show very small estimates of own wage and cross-wage elasticities for men. For women, there are positive own-wage and cross-wage elasticities which to some extent can be interpreted as a strong negative response of female labour supply to changes in their husband's wages (Devereux, 2004). In Denmark, Browning and Gørtz (2012) observed that relative wages have an impact on the power relations between partners in the household. They elucidated that

conventional wage has a dominant effect on leisure to the extent that the partner who has a higher wage takes less leisure. This indirectly follows an intuition of a trade-off between time spent on paid work and leisure as partners who spend more time in the labour market to gain more wage have a lower propensity of enjoying more leisure.

Studies on the continuous narrowing of the gender wage gap in the USA over the last three and a half decades have shown how it has impacted intra-household time allocation. Siegel (2012) applied a general equilibrium approach to the analysis of data from the Panel Study of Income Dynamics (PSID) for the USA from 1968 to 2007 to assess why fertility did not decline to lower levels during that period. The authors explained that the common force behind the observed trends in fertility and hours worked was due to the narrowing of the gender wage gap. They argue that rising relative wages increased women's labour supply and the higher opportunity cost associated with it accounted for the lower fertility. It also leads to a partial reallocation of home production from women to men and a higher use of labour-saving inputs into home production. It improved women's bargaining power in the family resulting in a shift of household work from women to their husbands. Further counterfactual analysis of the implications of gender wage equality for family time allocations shows that complete elimination of the gender gap would increase the proportion of women in full-time market work by up to 32%, whereas couples' time into home production would decrease by up to 21% as women would reduce their household work by up to 7 hours per week (Theloudis, 2018).

Argyrous and Rahman (2014) found that mothers in Australia perform a larger share of childcare, regardless of their earning power or their partner’s availability to take on some of the tasks. This result corroborates findings of Bloemen and Stancanelli (2014b) who noted that in France, parents' market and non-market hours respond significantly to changes in their own wages. An increase in the own wage rate increases own market hours but reduced the hours of housework or childcare of both parents. They also concluded that the wife's wage rate has a significant and positive effect on the husband's housework and childcare hours but the wage rate of the father has a significantly negative effect on the mother’s hours spent on paid work.

Studies that have analysed the relationship between wage and time allocation have adopted several approaches and covered a broad scope of time allocation. For instance, Sedigh et al. (2016) investigated the effect of wages on the sleep duration of individuals in the labour force using the 2005 and 2010 Canadian General Social Surveys (Time Use) and applying an instrumental variables approach to address any potential endogeneity of wages. The authors concluded that an increase in the wage rate leads to a decrease in sleep per week. After accounting for the potential confounding effects of sleep-related (insomnia) problems and general economic conditions associated with the economic downturn experienced by Canadians in the

year 2010, the authors found that the sleep time of female non-insomniacs is even more responsive to wage rate changes.

The literature on wage and intra-household time use provides varied results of studies that seek to achieve similar objectives depending on several factors such as the type of estimation technique, data used, the presence or otherwise of unobserved heterogeneities emanating from cultural and social norms, as well as the socio-economic conditions under which the studies were carried out. For instance, comparing the findings to those of studies such as Bloemen and Stancanelli (2014a) and Kimmel and Connelly (2007), there are some obvious differences that may be partly ascribed to the scope and nature of the data used. The disaggregated nature of the data used by Kalenkoski et al. (2009) revealed some dynamics that could not be captured using a data set that is not disaggregated into weekdays, weekends and holidays. This confirms the claim by Klevmarken (2005) that depending on the data source, estimates of hours of work give widely different results in terms of both level and change. The use of both aggregated and disaggregated indicators show the significant association between wage and intra-household time allocation.

In the African context, the literature on the relationship between wage and intra-household time allocation remains limited. The few available studies have explored the impact of an array of non-wage related factors such as an exogenous increase in non-market income (Ranchhod & Wittenberg, 2007), environmental degradation (Dimoso & Antonides, 2008), and differences in time allocation to various household activities from the perspective of gender, age and geographical location (Arbache et al., 2010; Floro & King, 2016). Others have also looked at the pattern of children's time allocation to labour and schooling (Bock, 2002) and the effect of employment status on gender time allocation to paid work (Komatsu & Floro, 2016).

From a Ghanaian perspective, there is no study on the relationship between intra-household time use and wage, although data on time use has been a component of the time use and employment module of all six rounds of the GLSS since 1987. As in the case of most African countries, the identified studies on time use have focused on a wide range of socio-economic factors but none has considered the effect of wage. The issues covered are the impacts of infrastructure such as electricity and water on time use by men and women (Costa et al., 2009; Coulombe & Wodon, 2008). Another closely-related study (but different in scope) that has looked at time use is Morka (2015), who examined the factors that determine domestic and market time use of children and the impact that these activities have on their school attendance.

This review has shown that there is enough evidence of strong own and cross-wage effects on intra-household time allocation. These effects are largely influenced by the focus and scope of

the study in question, and the data and estimation technique used. What is conspicuous from this review is that an increase in own wage has a positive effect on time allocated to paid work by both men and women, but the responsiveness of women's time is higher. The cross-wage effect on the time allocation of partners in the household is stronger for mothers' child care. High wages of fathers are associated with more hours spent on childcare by mothers but an increase in mothers' wages does not necessarily increase father's hours spent on childcare (Garcia, Molina, & Montuenga, 2009). A summary of some selected studies in Table 2-1 depicts the diversity of the findings and the need for country-specific studies to add to the extant literature.

Table 2-1: Summary of selected studies reviewed

Author and date	Method used	Main conclusion
Skoufias (1994)	Pooled time series and Heckman's Two-Step approach	An Increase in the opportunity cost (wage) of time of one family member affects the amount of time devoted to various activities by that family member and the time allocation of other family members.
Khandker (1988)	Probit and Tobit regression	An increase in women's wage has a significant positive effect on their time allocation to market production and negative effects on their time allocation to home production. A 1% increase in women's wages is associated with a 13% increase in their time allocation to market production.
Fernandez and Sevilla-Sanz (2006)	Weighted Ordinary Least Squares (OLS) procedure	A woman's time allocation to home production decreases as her wage increases but the effect is less pronounced as her wage gets higher. Furthermore, the time devoted to those household activities where no credible threats exist (such as care) is less elastic to an increase in the relative wages of women.
Parera-Nicolau and Mumford (2005)	Simulated Maximum Likelihood.	Working mothers do not increase their working hours when their hourly wages increase. Instead, they are more likely to reduce their hours.

Author and date	Method used	Main conclusion
Kimmel and Connelly (2006)	Simultaneous four-equation system	Married women whose husbands earn higher wages spend less time on paid labour and more time on childcare on both weekdays and weekends and spend more time in home production on weekdays
Kimmel and Connelly (2007)	Seemingly Unrelated regression (SUR) and OLS	Substantial positive wage elasticity for caregiving time, while both leisure and home production time declines with increased wages.
Kalenkoski et al. (2009)	Tobit, Censored Least Absolute Deviations (CLAD) and OLS	Increases in partners' wages increase women's primary care on all days and decrease their market work on weekdays, while increases in women's own wages increase their market work on weekdays. Little evidence that men's time use responds to changes in their own wages. An increase in men's partners' wages increases men's passive child-care time and reduces their market-work time on weekends.
Gupta and Ash (2008)	Nonparametric estimation technique	Women's own earnings are negatively associated with their housework hours, irrespective of their partners' earnings and their shares of couples' total earnings.
Devereux (2004)	Weighted Least Squares (WLS), Grouped Two-Stage Least Squares (G2SLS) and Unbiased errors in variable estimator (UEVE)	Small estimates of own-wage and cross-wage elasticities for men. Positive own-wage and cross-wage elasticity for women which suggest a negative response of female labour supply to changes in their husband's wages.
Browning and Gørtz (2012)	Seemingly Unrelated Regressions	Relative wages have impacts on power relations. For leisure, this effect is dominated by a conventional wage effect,

Author and date	Method used	Main conclusion
		in which the partner who hasa higher wage takes less leisure.
Siegel (2012)	General Equilibrium Modelling approach	Relative wages increase women's labour supply due to higher opportunity cost and reduce their fertility rate. It also contributes to a partial reallocation of home production from women to men, and a higher use of labour-saving inputs into home production. A decline in gender wage gap makes leads to an increase father's time for raising children.
Argyrous and Rahman (2014)	Simultaneous equation regression	Mothers perform a large share of childcare, irrespective of their earning power or their partner's availability to take on some of the tasks.
Bloemen and Stancanelli (2014b)	Simultaneous equation regression	Own wage positively affects own market hours and negatively affects own housework and childcare hours. Father's wage has a significantly negative effect on the mother's market hours while her wage rate has a significantly positive effect on his housework hours.
Sedigh et al. (2016)	IV approach and Heckman Two-Step procedure	A 10% increase in the wage rate leads to 11–12 min decrease in sleep per week. Sleep time of female non-insomniacs is even more responsive to wage rate changes after addressing the issue of selection bias.
Stratton (2002)	Panel analysis	Marital and cohabitation differentials are quite distinct. The higher wage for cohabiting men is driven by selection and is eliminated by first differencing. Nonetheless, a higher wage for married men (and long-term cohabiters) are due to

Author and date	Method used	Main conclusion
		differential wage growth. Wage rises more rapidly after marriage.
Barg and Beblo (2007)	Panel and non-parametric matching approach.	Husbands' wages are mostly due to positive selection. There is weak evidence for specialisation to explain the conditional Male Wage Premium (MWP) between married and cohabiting men.
Breusch and Gray (2004)	Tobit Type II selection (or Heckman) model	Men enjoy higher marriage premium than women who enjoy smaller but substantial positive premium. There is no significant difference in the premium among men in the various marriage states, while the differences among women in the marriage states are large and significant.
Pollmann-Schult (2010)	Panel analysis	Married men enjoy a wage premium even after controlling for self-selection into marriage. In contrast to specialisation hypothesis, men do not substantially reduce their housework time after marriage; neither does housework time significantly affect the wage rate.
Groothuis and Gabriel (2010)	Heckman's estimation technique	Among working couples, the marriage premium for husbands and wives are directly related to the education level of their spouses. This suggests that positive assortative mating could be due to the labour market effects of intellectual augmentation of married households.
Hersch and Stratton (2000)	Panel analysis	Male marriage wage premium is not significantly affected by controls for home production activities. Household specialisation does not lead to marriage premium.
Hotchkiss and Moore (1999)	IV estimation	Managers who have working wives earn lower wages than their counterparts who

Author and date	Method used	Main conclusion
		have non-working wives. The labour supply decisions of managers' wives are unaffected by their husbands' wages. However, labour supply decisions of the wives of non-managers are affected by their husbands' wages. Non-managers do not experience a working spouse penalty.
Lincoln (2008)	OLS	Strong evidence of the gendered division of labour, but little support for the anticipated wage effects of the specialisation thesis.
Strike (2012)	Review of the empirical studies	Marriage enhances men's productivity and enables them to spend more time in the labour market. Men who earn above-average wages are more attractive in the marriage market and more likely to marry.

Source: Prepared by Author

2.7 Income/consumption poverty and gender inequality in time allocation

Evaluating the connection between time and poverty (income and consumption) dimensions are essential in shedding light on the possible complementarities or trade-offs that individuals face within households. The relationship is somewhat cyclical and complex in nature. For instance, gender segregation in access to economic opportunities which engenders gender differences in both income and consumption poverty, in turn, reinforces gender differences in time use and access to inputs. This perpetuates market and institutional failures that predisposes mostly women, to time poverty (World Bank, 2011). The literature suggests that people who are time poor have limited opportunity to increase their income and consumption by engaging in more productive work. Time poor individuals may also be more dependent on the earnings of other household members to secure their consumption needs (Bradshaw, Castellino, & Diop, 2013). These make the identification of time poor individuals an important means of highlighting their predisposition to income or consumption poverty, especially in the context where separate budgets and separate spheres of activity prevail (Gammage, 2006).

An analysis of time poverty, income poverty and time use patterns requires a consideration of the close association between poverty and gender-based inequalities (Kizilirmak & Memis, 2009). This is due to the pervasiveness of the feminisation of poverty (a higher incidence of poverty

among women than men; poverty among women being more severe than among men, and the increasing trend of the incidence of poverty among women compared to men over time) across geographical location and time. Women's higher vulnerability to time poverty has been attributed to their propensity to work more hours in both paid and unpaid work while consuming less leisure time than men (Bradshaw et al., 2013; Tarkowska, 2002).

Some studies have explored the gender differences in time use and determinants of time poverty within households (Argyrous & Rahman, 2014; Beblo, 2001) while others have explored the relationship between time poverty and income poverty (Kizilirmak & Memis, 2009). On gender differences in time use, evidence suggests that there exist marked discrepancies between men and women in terms of both the quantity and quality of free time enjoyed (Mattingly & Blanchi, 2003). Analysis of cross-sectional data evinces that women spend more time on unpaid work than men and such a difference is largely influenced by marriage, childbirth and employment, which have little or virtually no effect on the time that men spend on unpaid work (Coltrane, 2000; Zick & Bryant, 1996). This difference is found across countries and regions. García-Mainar, Molina, and Montuenga (2011) noted that in five European countries (Denmark, France, Germany, Italy, and Spain) there is inequality in childcare between fathers and mothers and the disparity is more obvious in the Mediterranean countries. The total workload (paid and unpaid labour) of women in Ireland is on average around forty minutes longer per day than men. Although in a dual-earning couples household the division of labour is less gendered, parenthood leads to reallocation of time for both men and women (McGinnity & Russell, 2008).

The situation in other transition and developing countries is not different. A study on an indigenous village in the Bolivian Amazon depicts a heavier overall labour burden on the female population across all age groups (Ringhofer, 2015). Hirway (2010) found a negative relationship between unpaid workload and income levels of women. The author also indicated that the women live in ultra-poor households rank at the bottom as far as the burden of total work is concerned. Drawing on previous studies and comparing the findings with her study across some selected developing countries, Chant (2008) asserted that, generally, the inequality in hours of work between men and women is most distinct among the low-income groups, to the extent that the poorer the household, the longer women work. The author indicated that her fieldwork experience in the Philippines revealed marked gender inequality in time allocation to parenting and household labour. In her assessment of gender roles in non-market production activities during the period of the Millennium Development Goals (MDGs) Murphy (2015) explained that many women in low-income locations and those from the poorest populations spend all their productive time on household activities such as the collection of water and firewood, cooking, cleaning, caring for children and the old as well as subsistence farming and food production.

Women in India spend on average 5.1 hours on housework a day, while men spend only 24 minutes. Women in South Africa spend on average 3.5 hours on housework, care of persons, and community work, while men spend only 1.4 hours (United Nations, 2015). Within the framework of the Tobit estimation, Memiş and Antonopoulos (2010) used the 2000 South African TUS data to explore how gender, poverty, unemployment and location affect the total amount of unpaid work burdens on households. The authors concluded that under strained conditions that require households to spend more time on unpaid work, women spend significantly more of their time to fulfil these obligations than men. This suggests the presence of inequality that needs to be recognised and redressed.

In Tanzania, about 76% of all adult women collect water, compared with only 33% of men, and the average time spent by women in this activity is about 30 minutes (Budlender, 2007; Fontana & Natali, 2008). Men and women in Mozambique allocate virtually the same time to economic activities. However, women are almost entirely responsible for household chores and care work (Arora, 2015). In the Ghanaian context, the 2009 TUS report shows that 74% of men were engaged in remunerated activities and are captured in the System of National Accounts[16] (SNA) while 66% are engaged in extended SNA and unpaid activities.

The contrary was observed for women as 69% of them were engaged in paid work and SNA activities and, 95% in extended SNA and unremunerated activities. The report further reveals the existence of perceptible gender difference in paid employment. It indicates that 17% of men compared to 11% of women were likely to be employed in formal establishments where there are the best conditions in terms of remuneration and social protection. On the other hand, 29% of women compared to 19% of men were engaged in paid domestic employment(Ghana Statistical Service, 2012b).

Collectively, it is a fact that women work more hours than men (Budlender, 2007). However, there are some observable dynamics across countries when a single work burden is considered at a time. While in some developing countries (Guinea, Lao People's Democratic Republic and Malawi) women spend more time than men collecting firewood, in Ghana the situation is the opposite. Men spend more time on firewood collection than women. In Malawi women spend an

[16] According to the Ghana Statistical Service (2012b), the SNA is an internationally agreed framework for estimating the GDP of a country. The SNA is an internationally agreed set of standards that govern the compilation of macro-economic aggregates. Ghana is, therefore, using the SNA of 1993 (SNA 93) which provides a comprehensive framework of accounts with common definitions and concepts to describe the Ghanaian economy.

average of 19 minutes, but men only three minutes each day collecting firewood, but in Ghana men spend 42 minutes per day compared to 25 minutes spent by women (United Nations, 2015).

The underlying causes of the pattern of gender differences in time use remains a policy and research discussion as several factors, including household composition and life cycle issues (age and gender composition of household members), employment regimes, seasonal and farm system considerations have been identified as contributing factors (Anxo et al., 2011). Regional and geographical factors such as ease of access to water and fuel, availability of infrastructure, and distance to essential economic and social services such as schools, health centres, financial institutions, labour-saving technologies, market, and prevailing social and cultural norms have also been associated with this pattern (Asian Development Bank, 2015; Blackden & Wodon, 2006). Other empirical findings reveal that institutional factors such as marriage and children exacerbate the gender gap while market work hours erode men's and women's free time in different ways (Mattingly & Blanchi, 2003).

Although some of the factors mentioned above such as infrastructure and labour-saving technologies can be used as proxies for assessing the impact of income poverty on gender differences in time use, it is not clear whether such infrastructure are designed to have a direct impact on time use. One empirical study that has examined the direct effect of income poverty on gender differences in time use in South Africa shows that income poverty among women and men has a symmetric impact on their time allocation. The authors concluded that being income poor increases the amount of time women spend on unpaid work but it does not seem to have any significant impact on men’s time spent on unpaid work (Kizilirmak & Memis, 2009). The study indicates that the direction of the relationship runs from income poverty to gender differences in time use and not the inverse. The scantiness of empirical literature on the direct impact of income poverty on gender differences in time use calls for more empirical studies across geographical location and time to advance knowledge and shape policy design and implantation towards work-life balance.

2.8 Empirical literature on income/consumption poverty and time poverty

Some studies have computed time-adjusted income poverty measures which depict an intertwined nature of income poverty and time poverty in such a way that any poverty indicator that does not capture both is underestimated However, empirical evidence shows that the connection between the two is not all that clear *a priori* hence the need for separate measurement of income poverty from time poverty because the two are not necessarily mutually dependent (Kalenkoski & Hamrick, 2014). There is a two-way causality between time poverty and income poverty in such a way that more time spent on paid work for higher income means a trade-off of

available leisure time (Öneş, Memiş, & Kızılırmak, 2013). For instance, income poor individuals may not be able to access substitutes for household chores and care work by hiring the services of others outside the household, or buying time-saving appliances. Conversely, time poor individuals may not be able to devote enough time to paid work activities, and this may further worsen their income poverty condition. In addition, time poverty affects the future monetary income of individuals by reducing their available time for human and social capital accumulation and the potential earnings for their respective households (Öneş et al., 2013).

The literature on the relationship between time poverty and income poverty has produced varied results (Bittman, 2002; Burchardt, 2008; Kalenkoski et al., 2011; Wodon & Bardasi, 2006). In their study on the measurement and analysis of the determinants of time poverty in Guinea, Wodon and Bardasi (2006) concluded that well-being measured by a consumption quintile is more weakly associated with time poverty. The analysis across geographical location and gender revealed that men in the top fourth and fifth quintiles living in rural areas were more likely to be time poor than their poorer counterparts while in the urban areas only those in the fifth quintile were found to be time poor. Women were found to be relatively less time poor except those in the third and fourth quartiles.

One may argue that the variations in the level of significance of the impact of consumption poverty on time poverty across gender and geographical location in Blackden and Wodon's (2006) study could be due to consumption choices of the individuals and household heterogeneities which may differently impact their tendency of being time poor. However, in a similar study among men and women in peasant households in Mozambique, Arora (2015) found that the unequal gender allocation of responsibilities between economic activities and household chores leave women with burdened responsibilities that render them significantly time-poorer compared to men. Though actual income or consumption poverty indicators were not used in the analysis of the determinants of time-poverty, the study finds individual economic power, such as assets which to some extent can be considered as a proxy for wealth to be an insignificant predictor of time-poverty faced by women. This study also provides more insight into the dynamics of time poverty in a setting where there is minimal heterogeneity of the characteristics of the respondents. Although it fails to shed light on the situation in the urban areas where the demand of work, the standard of living and other socio-economic conditions may influence time allocation, it generally supports the evidence found in Guinea that women are generally more time poor than men.

The findings of these two studies are in contrast with the strand of the literature which argues that higher income individuals have the option of buying time, making them less likely to be time poor. Their ability to pay for services such as food preparation, childcare, housekeeping and other home maintenance as well as the flexibility of their schedules, free them more time from committed

activities for other activities (Hamermesh, 2002; Kalenkoski et al., 2011). This strand of the literature argues that low income is associated with fewer resources that can lessen the work or reduce the demand for women's time in either home production activities or paid work in the labour market (Floro, 1995). Floro (1995) asserted that middle-class working women, can use hired help, day care centres, household durable goods, labour-saving equipment such as microwaves or washing machines, purchased food, and laundry services to alleviate the pressures of home maintenance and childcare activities, reducing the time in undertaking overlapped activities. The author concluded that poor working women are much more constrained in their ability to purchase market substitutes for their time.

Hamermesh and Lee (2007) found evidence of a potential trade-off between income poverty and time poverty among men and women in Australia (2001), Germany (2002), the USA (2003), and Korea (1999) using data from the TUS for the corresponding years. The study finds that time stress is more prevalent in households with higher full earnings and whose members work longer in the market or on essential homework. The authors conclude that adults in households with higher earnings perceive more time stress for the same amount of time spent in market work and household work. The impact of higher full earnings on generating time stress was particularly prevalent in the United States. In their study on the feminisation of poverty in Korea with a focus on time use and time poverty, Noh and Kim (2015) conclude that women from poor household experience multiple poverties in the process of working long hours to ensure the survival of their households.

Using income to account for the impact of income poverty, Ribeiro and Marinho (2012) found that female (both children and adults) in Brazil were the time-poorest individuals in urban and rural areas. Their findings suggested that increase in income can increase one’s tendency of being time poor. Thus time poverty is more of an issue among individuals who are income non-poor. Chatzitheochari and Arber (2012) conducted a similar study in the UK using the 2000 UK TUS data to analyse the differential configuration of time poverty on weekdays and weekend days. The authors’ found evidence of class and gender inequalities. They also concluded that working women experience multiple and more severe free time constraints, which could serve as an additional barrier to their leisure and participation in social activities or functions. Women in both intermediate and routine occupations faced a lower risk of being time-poor. However, the opposite was observed for those in managerial and professional occupations.

Evidence on South Africa shows a significantly positive effect of income poverty on the amount of time women spend on unpaid work, but among men, the impact is insignificant (Kizilirmak & Memis, 2009). This study provides valuable information and sets the basis for further research by using income poverty instead of consumption poverty and other proxies. The differences in the

significance levels across gender could be partly due to the way in which the authors measured income which was used for the computation of the poverty indicator. According to the authors, the South Africa TUS (TUS, 2000) data contained only one categorical variable on the usual monthly income of the household. In order to obtain a continuous variable that would enable them to compute the income poverty indicator, they allocated the mid-point value for each category as the actual monthly income per household.

These averages could deviate significantly from the real values or the averages of the income of the households, especially given the fact that the income variable was censored to the right with unknown maximum value (R10000 or more). The effect of income poverty on time use is reflected in the time spent on survival strategies by households. A study by Kardam and Alyanak (2002) revealed that income poverty affects the unpaid time allocation of households in their search for leftovers from local food market. It further affects their time for retrieving fuel and construction materials, substituting homemade alternatives for clothes and processed food as well as searching for bargain items.

In Lesotho, wealthier and more educated individuals were found to be more likely to be time poor than those in the lower category of the wealth quintile and those who have low levels of education (Lawson, 2007). What appeared to be unusual from that study is that the results across gender were in contrast to the general consensus in the literature that time poverty is more of an issue among females than males possibly due to females' multiple roles in the household and the labour market. The author found higher proportions of men than women to be time poor. One of the reasons that the author ascribed to that observation was that there was a disproportionately large number of men in the upper tail of the distribution of the time use variable, possibly due to their predominant engagement in farm work/livestock work. This contributed to a marginal skewness of time use toward men. In view of the distribution of the time use, the author cited the sensitivity of time poverty analysis to the cut off points used for computing the time poverty indicator as a potential contributing factor.

This theoretically "unusual" finding has been discussed in the work of Walker (2013) who argued that the potential for time poverty as scope for revealing gendered aspects of inequality and well-being depends very much on how it is defined and measured. The author contended that restricting the definition of time poverty to pure lack of free or uncommitted time without considering the choices that are available to women and men about how they use their time is problematic. For instance, Walker (2013) described Lawson's (2007) allusion that more educated women appear to take on larger numbers of formal work hours without a disproportionate reduction in domestic duties as a distorted understanding of poverty. This is because the results imply that more opportunities to engage in formal work lead to increases in poverty which is

contrary to the conceptualisations of poverty as a lack of choice, or freedom. This brings into the discussion the importance of choice in time use.

Walker (2013) stressed the need to recognise an element of choice in time use in order not to necessarily interpret a busier day the same as time poverty. This is because ignoring people's own understanding and values in relation to their time use can lead to the possibility of developing policies which may affect people's time allocation to activities that do not necessarily promote their well-being. The author's argument is that the measurement of time poverty should be based on the perception and value judgement of the individual. In their attempt to analyse the key variables associated with discretionary time and time poverty, Kalenkoski et al. (2011) found that household income was not a statistically significant correlate of discretionary time or time poverty. It is evident from this review that proper conceptualisation and measurement of time poverty requires a more nuanced understanding of the available data for the analysis. This is also necessary for an effective examination of the complex relationship between time poverty and other household welfare issues.

2.9 Conclusion

This chapter has provided an overview of the theoretical literature on the trade openness-gender wage differential nexus, wage, poverty and intra-household time allocation. It has also provided a picture of the depth of the empirical literature on the links between trade and gender wage differential, intra-household time allocation to various activities, wage and income poverty. The review has shown that although significant progress has been made as far as the empirical analysis of the relationship between trade openness and gender wage gap is concerned, there is the need for more evidence on the issue in developing countries. There is also the need for more disaggregated analysis at the household level to enhance effective policy design and implementation in Africa in general and Ghana in particular. It is also evident from the review that household level studies on this issue remain woefully limited. This makes the current study timely and relevant for policy formulation and implementation.

Furthermore, it is observed that time allocation is influenced by several social, economic and cultural factors both within and outside the household. The interplay of these factors makes the interrelationships among wage and gender time allocation, income or consumption poverty and gender differences in time allocation, and time poverty and income poverty, *a priori* unpredictable. Given the paucity of the literature particularly on Ghana, there is the need for further examination of these relationships.

This study makes three main contributions to the existing literature. First, the study contributes to the method of computing trade openness indicators at the household level based on the economic

activity of the individual for a more disaggregated analysis of the trade openness-gender wage gap nexus in a developing country context. Throughout the review, a common trend observed was that studies that seek to examine the determinants of gender differences in time allocation simply regress time allocation to paid and unpaid work on other socio-economic covariates. This study extends the measurement of gender differences in time use by moving away from the existing approach. Instead, it constructs an index of the gender gap and discretionary time to capture gender roles and disparities in time spent on unpaid activities and total work (discretionary time use). These two indicators will enable policymakers to capture unequal distribution of activities within the family. The indicators will also enable policymakers to understand the full range of activities in which women are engaged. The study further assesses the extent to which income/consumption poverty influences these gender inequality indicators from a Ghanaian context.

CHAPTER 3: METHODOLOGY AND DATA

3.1 Introduction

This chapter presents the research design, the theoretical and empirical methods as well as the data used in achieving the objectives of this study. The chapter is subdivided into two broad sections. The first section covers the methodology which is further categorised into research design, sample design, theoretical and empirical models. The second section encompasses the data used in the analysis and this is also classified into four subsections: 1) brief description of the data and sample size; 2) aggregation of the time use variables into hours of paid and unpaid work; 3) computation of the gender inequality indicators; and 4) computation of the wages, time use and income/consumption poverty indicators. Similar to the review of the literature, the theoretical and empirical models are presented based on the respective objectives specified in the chapter one of this study. This style of presentation is adopted to ensure continuity and link-ups from the theoretical models to the empirical models. The chapter ends with a brief conclusion on the contents of all the subsections.

3.2 The research design

The definition of what constitutes a research design remains ambiguous in the literature since many authors have interpreted the term in different contexts and subject fields (De Vos, Strydom, Fouche, & Delport, 2011). Kumar (2014) classified research design into three types based on 1) the number of contacts (cross-sectional studies, before-and-after studies and longitudinal studies); 2) reference period (retrospective, prospective and respective-prospective); and 3) nature of the investigation (experimental, non-experimental and semi-experimental). All these types of designs can be categorised into quantitative or qualitative approaches. The use of any of these two designs is dependent on a number of factors including the nature of the data: 1) soft (word, sentences, photos, and symbols) or 2) hard (in the form of numbers). The other factors are the research process and assumption about social life, and the logic and path of conducting the research (Neuman, 2011).

Given the nature of the data at hand, the objectives of this study are achieved by following a quantitative approach based on an independently pooled cross-sectional research design. The quantitative research design relies on the positivist principles. This principles test objective theories by examining the relationship among variables that can be measured using instruments. The numbered data generated from the measurement process can be analysed using statistical procedures and the report written in a well-structured manner (Bernard & Bernard, 2012; Kumar, 2014). The quantitative research designs can be categorised into experimental and non-

experiment designs[17]. By virtue of the GLSS data used in this study, the design used was non-experimental in nature. De Vos et al. (2011) indicated that the most widely used non-experimental design in the Social Sciences is the survey which can be classified into a randomised cross-sectional survey design and a replicated randomised cross-sectional survey design. In this context, the GLSS design is randomised cross-sectional in nature.

The randomised cross-sectional designs are useful for finding out the prevalence of a phenomenon, situation, problem, attitude or an issue based on a cross-section of the research population at a given time (Kumar, 2014). When different rounds of such cross-sectional surveys are pooled together, the resultant data becomes the pooled cross-section data. The pooled cross sections are independent cross sections and they allow us to take into account the effect of time by testing for the differences in intercept terms or the slope coefficients between periods. This can be achieved by including the time dummies in the model. Pooled cross sections also increase the sample size and enhance the precision of the estimators, especially if the relationships being estimated are temporary stable. According to Wooldridge (2010), the pooled cross sections are independent surveys with each representing a random sample from the population. As a result, there is no correlation in the error terms within each survey's observations. As such, it is only by chance that the same individual will appear more than once in the pooled dataset, and in the event that this happens it will not be noticed. Since the distributions of variables in a pooled dataset change over time, the identical distribution assumption is usually fulfilled but the independence assumption is violated. Nonetheless, pooled datasets are very useful for policy analysis (Wooldridge, 2010).

3.2.1 Sample design and sample sizes of the GLSS

Since this study relied on a pooled secondary data from the Ghana Statistical Service, the sample design is based on those for the last three rounds of the surveys (GLSS4, GLSS5 and GLSS6). The sample designs for the GLSS were based on the survey list of the 1984 Population Census' Enumeration Areas (EAs) with information on population and household as the sampling frame. The Primary Sampling Units (PSUs) were the 1984 EAs while the secondary units were the households in the EAs. In designing the sample, the Ghana Statistical Service employed a

[17] See De Vos et al. (2011) for further discussions of the sub-categories of both experimental and non-experimental research design. According to the authors, the randomised cross-sectional survey designs examine several people at one point in time while the replicated randomised cross-sectional survey designs are repeated over selected time periods. The replicated randomised cross-sectional survey design is comparable to the longitudinal case study where repeated measurements are taken over time but not necessarily from the same individuals.

stratification technique by using geographical factors, ecological zones and location of residences as the main controls. The EAs were first stratified according to the three ecological zones namely Coastal, Forest and Savannah. Within each zone, further stratification was done based on the size of the locality into rural or urban (Ghana Statistical Service, 2000).

According to the Ghana Statistical Service, a two-stage sampling technique was used for the sample selection. The first stage involved the selection of 300 EAs using systematic sampling with Probability Proportional to Size (PPS) method where the size measure was the 1984 number of households in the EA. The process involved ordering of the list of EAs according to their sizes and strata. The size column was then cumulated, and with a random start and a fixed interval, the sample EAs were selected. The EAs that had grown in size over time were further divided into approximately equal parts with each segment constituting about 200 households. Only one segment was then randomly selected for the listing of the households. At the second stage of the sampling process, a fixed number of 20 households were systematically selected from each selected EA to give a total of 6000 households. The Ghana Statistical Service selected an additional five households as a reserve to replace missing households. This was followed by the selection of an equal number of households from each EA in order to reflect the labour force focus of the survey. The overall sample size therefore came to 8700 households nationwide. However, 8,687 households had been actually interviewed at the end of the survey (Ghana Statistical Service, 2000).

The Ghana Statistical Service has not changed the process of sampling over the years and the same sampling design has been used with some revisions. For instance, during the GLSS5, Ghana Statistical Service defined the EAs as the PSUs, while the households within each EA constituted the secondary sampling units (SSUs). The EAs were stratified into the 10 administrative regions and within each region, they were further sub-divided according to their rural and urban areas of location. They were also classified according to the three ecological zones (Coastal, Forest and Northern Savannah) as well as the Greater Accra Metropolitan Assembly (GAMA). The EAs, which were considered as the first stage of sampling, were increased from 300 during the GLSS4 to 550 during the GLSS5 with a fixed number of 15 households per EA. This translated into 17 EAs and a minimum of 400 households in each region. However, in the Upper East and Upper West regions, the number of EAs was increased from 27 and 17 to 40 and 34 because the minimum number of 400 EAs could not be achieved. This increased the total number of EAs and households to 580 and 8700 respectively (Ghana Statistical Service, 2008).

Although the same two-stage sampling methodology used in the previous surveys was used during the GLSS6, the number of PSUs and households were increased from 580 and 8700 to

1,200 and 18000 respectively, which represented an increase of about 107% over the GLSS5 figures (Ghana Statistical Service, 2014c). The first stage of the sampling process involved the selection of 1200 EAs from the PSUs. The PSUs were allocated into the 10 regions using PPS. The EAs were further classified into urban and rural localities of residence. The second stage involved the listing of households in the selected PSUs to constitute the SSUs where 15 households from each PSU were selected systematically. This resulted in a total sample size of 18000 households nationwide (Ghana Statistical Service, 2014c). Having discussed the research design, sample design and the sample size, the succeeding sub-section discusses the theoretical and empirical models.

3.3 Models for trade openness and gender wage gap

Different estimation approaches such as Blinder-Oaxaca decomposition, panel, time series, and CGE (simulations) models have been used in the literature depending on the data (cross-sectional or longitudinal) and the scope (firm or sector, country-wide or cross-country level analysis) of the study. Following Heckman (1976, 1979), this study uses the Oaxaca decomposition approach simultaneously with that of Heckman in order to correct for potential sample-selection bias in the wage equations. Considering the data used for the analysis, wages are observed only for respondents who participated in the labour force during the previous seven days preceding the survey, and this might be a selective group. The selectivity bias adjustment approach involves the deduction of the selection effects from the overall differential and then applying the standard decomposition formulas to the adjusted differential (Jann, 2008). Following Neuman and Oaxaca (2004), the employment and wage equations for individual *i* in gender group *j* can be specified as:

$$L_{ij} = H'_{ij}\gamma_j + \varepsilon_{ij} \quad (1)$$

$$Y_{ij} = X'_{ij}, \beta_j + \mu_{ij} \quad (2)$$

From equation 1, L_{ij} is the latent variable associated with being employed, H'_{ij}, is a vector of determinants of employment, Y_{ij} is the market wage, X'_{ij} is a vector of determinants of market wages, γ_j and β_j are the associated parameter vectors, and ε_{ij} and μ_{ij} are independent, identically distributed (iid) error terms that follow a bivariate normal distribution $(0,0, \delta_{\varepsilon j}, \delta_{\mu j}, \rho_j)$. From equation 1 and 2, the probability of employment can be expressed as:

$$Prob(L_{ij} > 0) = prob(\varepsilon_{ij} > -H'_{ij}\gamma_j) = \emptyset(H'_{ij}\gamma_j) \quad (3)$$

In equation 3, $\emptyset(\cdot)$ is the standard normal cumulative distribution function (C.D.F.). Note that wages are observed only for respondents who are employed. The observed wages for employed respondents can be expressed as:

$$E(Y_{ij}|L_{ij} > 0) = \beta'_{ij}\gamma_j + E(\mu_{ij}|\varepsilon_{ij} > -H'_{ij}\gamma_j) \quad (4)$$

$$= X'_{ij}, \beta_j + \theta_j \lambda_{ij}$$

From equation 4, $\theta_j = \rho_j \delta_{\mu j}$, $\lambda_{ij} = \emptyset\left(H'_{ij}\gamma_j\right)/\theta\left(H'_{ij}\gamma_j\right)$, and $\emptyset(\cdot)$ is the standard normal density function. The estimated equation for the employed respondent can be expressed as:

$$\left(Y_{ij}\middle|L_{ij} > 0\right) = X'_{ij}\gamma_j + \theta_j \lambda_{ij} + error \quad (5)$$

Since this study aims at estimating the wage differential between males and females taking into consideration the issue of potential selectivity bias, the Heckman's two-step approach and Oaxaca approach can be used simultaneously to estimable the wage decomposition as:

$$\bar{Y}_m - \bar{Y}_f = \overline{X'_f}\left(\widehat{\beta_m} - \widehat{\beta_f}\right) + \left(\bar{X}_m - \overline{X_f}\right)'\hat{\beta}_m + \left(\widehat{\theta_m}\widehat{\lambda_m} - \widehat{\theta_f}\widehat{\lambda_f}\right) \quad (6)$$

The employment (eq. 3) and hourly wage (equation 4) as well as the *a'priori* expectation of the variables included in each equation can be expanded as equations 7 and 8. Since the data used for the analysis was pooled from three rounds of the survey, the subscripts *t* and *i* represents the cross-sectional units and time points respectively.

$$\Pr(LFP_{it} = 1|H_i) = \alpha_0 + \alpha_1 Urban_{it} + \alpha_2 Age_{it} + \alpha_3 Agesq_{it} + \alpha_4 Mstatus_{it} + \alpha_5 Remit_{it} + \alpha_6 ChildU5_{it} + \alpha_7 Edu_{it} + \alpha_8 Health_{it} + \alpha_9 RHH_{it} + \alpha_{10} Ethnic_{it} + \varepsilon_{it} \quad (7)$$

$\alpha_1 > 0,\ \alpha_2 < 0,\ \beta_3 < 0,\ \alpha_4 < 0, > 0,\quad \alpha_5 < 0,\ \alpha_6 < 0,\ \alpha_7 > 0, \alpha_8 < 0, \alpha_9 < 0, > 0, \alpha_{10} < 0, > 0$

$$Wage_{it} = \beta_0 + \beta_1 Topen_{\kappa t} + \beta_2 Urban_{it} + \beta_3 Age_{it} + \beta_4 Edu_{it} + \beta_5 Firmsize_{it} + \beta_6 Tenure_{it} + \beta_7 Health_{it} + \beta_8 Sector_{it} + \beta_9 Skill_{it} + \epsilon_{it} \quad (8)$$

$\beta_1 > 0,\ \beta_2 > 0,\ \beta_3 > 0, \beta_4 > 0,\quad \beta_5 > 0,\ \beta_6 > 0,\ \beta_7 < 0,\ \beta_8 < 0, > 0\ , \beta_9 > 0.$

In equation 8, the subscript *k* represents the economic activity in which the individual is engaged while *t* represents the time of the survey. Concerning trade openness, two indicators were used. The first indicator was trade as a share of the GDP of the economic activity in which the individual is engaged. This was computed as the ratio of the sum of import and export to the GDP of the economic activity in question. The second indicator, which captures the penetration of a given economic activity into global trade was measured as export as a share of the GDP of that economic activity. These two indicators can be functionally expressed as equations 9 and 10:

$$Trade\ share_{\kappa t} = \frac{Import_{\kappa t} + Export_{\kappa t}}{GDP_{\kappa t}}, \quad (9)$$

$$Export\ share_{\kappa t} = \frac{Export_{\kappa t}}{GDP_{\kappa t}} \quad (10)$$

Aside these variables of interest, several studies have shown that the effect of trade openness (liberalisation) varies by the skill level of the individual. The literature shows that skill can be computed based on the level of education of the respondent using the International Standard Classification of Education (ISCED) (Wolszczak-Derlacz, 2013). The other criteria are the nature of the skills that are required to carry out the tasks and duties of a particular job but not necessarily the process by which the skill was acquired (Hoffmann & Scott, 1992). The manual for the

International Standard Classification of Occupations (ISCO) 08 which specifies the major groups, number of sub-groups and skill level, was used to re-categorise the status of the individual at work into low, medium and highly skilled. Using the correspondence table in the manual, managers, professionals, and technicians were classified as being high skilled. Clerical, service, sales workers, skilled agricultural and trade workers, plant and machine operators, and assemblers were classified as being medium skilled. Similarly, respondents who are in elementary occupations were classed as being low skilled while those whose skills were not elsewhere classified were dropped from the analyses. This study accounted for the effect of differences in skill by including this variable in the wage equation rather than considering each category as a sub-sample as done in previous studies (Wolszczak-Derlacz, 2013; Yahmed, 2013).

Based on the existing literature, it is expected that urban residence and a higher level of education should have positive effects on one's probability of being in the labour force. On the contrary, the square of age, remittance, the number of children under five years of age and poor health should be negatively associated with labour force participation. The effects of marital status, relationship to the head of the household and ethnic affiliation of respondent remain indeterminate. The extent to which these variables may affect labour force participation depends on other factors within the household including the occupational status of other household members and gender composition. In the wage equation, trade openness, urban residence, age, higher levels of education, firm size, tenure and higher levels of skills should have positive effects on wages. Inversely, poor health is expected to reduce wages while the relationship between the sector of employment and wage remains indeterminate.

In the household level data, the variable capturing the economic activity of the individual was re-categorised into Agriculture, Service, and Manufacturing and included in the models to represent the sector of employment. Tenure was computed as the number of years in which an individual has been working with his/her employer. In the same vein, firm size was measured as the number of workers in the workplace of respondents. The measurement and description of the rest of the variables included in both equations (selection into labour force and wages) are presented in Table A3, Appendix A. The inclusion of each of these variables is based on theory and the empirical literature.

3.4 Models for wage and time allocation among household members

As a recap the second objective of this study examines the wage effect of intra-household time allocation to paid and unpaid work in Ghana. Based on this objective, this study adopts the model of the neoclassical theory of the time allocation formulated by Becker (1965) and later extended

by Gronau (1977) as the theoretical model. The model is premised on an intuitive argument that work at home (home production) generates services that have close substitutes in the market while leisure (home consumption time) hardly has any good substitute in the market. On the other hand, work at home and work in the market are perfect substitutes in terms of the direct utility that they generate. This makes household members indifferent to the composition of the goods and services (whether produced in the market or at home) that they consume (Borjas, 1980; Gronau, 1977). Following Gronau (1977), this study assumes a single-person household (although also applicable to individuals in a multi-person household) where the person maximises an amount of commodity C. This commodity can be decomposed into goods and service G and consumption time K. It is worth noting that the composition of G does not in any way affect C. This function is expressed as:

$$C = C(G, K) \tag{1}$$

From equation 1, the value of the goods and services are decomposed into those that are produced in the household G_H and those that are produced in the market or purchased from the market G_M and express this as:

$$G = G_H + G_M \tag{2}$$

Home production of goods is a function of work at home H, which may also be expressed as:

$$G_H = f(H) \tag{3}$$

Equation 3 is subject to decreasing marginal productivity where $f' > 0$ and $f'' < 0$. According to Gronau (1977), the decrease in this marginal productivity is due to both fatigue and changes in input proportion of goods produced through work at home G_H. Another determinant of the decline in the value of marginal productivity is a change in the composition of G_H as H increases towards relatively cheaper activities in the labour market. The maximisation of the amount of the commodity C is subject to both endogenous budget and time constraints. The endogenous budget constraint is expressed as equation 4:

$$G_M = WN + R \tag{4}$$

In equation 4, the variable W denotes the person's wage rate which is assumed to be constant. The variables N and R respectively represent the market work and other sources of income which remittance is used as a proxy in this study. The time budget constraint is expressed as:

$$T = K + H + N \tag{5}$$

In equation 5, K is still the consumption time as indicated earlier. The necessary condition for the achievement of optimality requires that the marginal product of work at home is equal to the marginal rate of substitution between goods and consumption time where consumption time is also equal to the shadow price time W^* in equation 8 and 8a. Substituting equation 5 into equation 1, equation 5 can written as a single-variable maximization problem without constraints as[18]:

$$C = C(G, K) = C'(G, K, T - K) = C'(G, K, H + N) \tag{6}$$

Expressing equation 6 in the form of the Lagrangian function yields equation 7

$$L = C\{[G_M + f(H),], K\} + \lambda(WN + V - G_M^{\wedge}) + \mu(T - K - H - N) \tag{7}$$

When equation 7 is maximised with respect to $K, H, N,$ and G_M the first order conditions for the maximum are equations 8 and 8a. Note that if the individual decides to work in the labour market, market work becomes positive $(N > 0)$ and is equal to the marginal productivity and real wage rate W in equation 8a.

$$\frac{\partial C/\partial K}{\partial C/\partial G} = f' = W^*, \tag{8}$$

$$\frac{\partial C/\partial K}{\partial C/\partial G} = f' = W^* = W \tag{8a}$$

Up to equations 4 and 5, it assumed that there is no cost involved in entering into the labour market. However, practically, entry into the labour market is associated with both money (E) and time costs (z). This study assumes that these costs are low and independent of the amount of work done in the labour market(N). Introducing these costs into equations 4 and 5, yield equations 4a and 5a below:

$$G_M + \delta C = WN + R \tag{4a}$$

$$T = K + H + N + \delta z \tag{5a}$$

---

[18] In equations 8 and 8a, $W^* = \mu/\lambda$ denotes the shadow price of time measured in real terms, μ and λ are the marginal utilities of time and income respectively. Note that the wage rate W may be less than the marginal productivity at home f' due to a number of factors including the person's reluctance to perform home services outside his/her own home and the difference in the value of the marginal productivity between the person's own home and outside as a result of transport costs, monitoring costs and efficiency. In that case, there will be home production and the result will be a dichotomy of work in the market and leisure (Gronau, 1977).

In equations 4a and 5a, δ is a dummy[19] variable that captures a person's employment status. If δ is equal to one, then it means the person is employed ($\delta = 1, N > 0$). On the other hand, if it equal to zero, then it means he is unemployed ($\delta = 0, N = 0$). If the person decides to stay out of the labour force, he can enjoy any amount of time available ($T = K + H$). However, if he decides to join the labour force, he stands to lose z of time and C unit of amount of goods and services G.

The properties of this model can be analysed from two perspectives: 1) wage, and 2) non-wage income. The outcome of a change in wage rate is dependent on the person's previous employment status. If the person already works in the labour market, an increase in real wage (W) reduces the price of goods in terms of time and makes home production less profitable engendering substitution of goods for consumption time. The resultant effect is that there will be a reduction in work at home while the effect on leisure remains uncertain. The substitution effect reduces leisure while the income effect increases it. The effect of the increase in wage on market work depends on the extent of the reduction in the work at home and the change in consumption time. If the reduction in the work at home outweighs the consumption time, the person spends more time on paid work in the labour market. On the other hand, if the person was not previously working, the increase in wage will entice him into the labour market or he may be completely unaffected (Gronau, 1977).

The model predicts that an increase in wage should not affect the allocation of time of the unemployed but it should reduce the time spent on work at home by those who are employed. This means that there should be a negative correlation between work at home and an increase in the wage rate. The effect of the change in the wage rate on leisure, however, depends on the magnitude of the substitution effect and income effects as well as the gender of the individual. In the case of wives (females), the substitution effect usually dominates in her leisure. However, in the case of the husband (male) the substitution effect and the income effect may either cancel out or the income effect may dominate the substitution effect.

Similarly, if the person already works in the labour market, an increase in non-wage income is not expected to affect his hours spent on unpaid work at home. It should instead, reduce the hours spent on home production by those who are unemployed. From a gender perspective, non-wage income is expected to have a negative correlation with the hours spent by wives (females) on hours of unpaid work at home. With respect to husbands (males) who are already employed in the labour market, the negative effect should not be enough (it should be mostly insignificant) to cause them to reduce their hours spent on unpaid work/activities. In either case, non-wage

[19] The graphical presentation and discussion of this model can be found in the original article by Gronau (1977)

income is expected to be positively associated with time spent on leisure. The introduction of market entry costs does not change the results significantly as employed individuals are expected to spend less time on unpaid household work than the unemployed. Holding other factors constant, those who are employed are expected to spend more hours on both work at home and in the labour market while enjoying less leisure (Gronau, 1977).

3.4.1 Empirical estimation strategy

The cross-sectional nature of the data and the fact that the two variables of interest (time use and wage) are continuous make it possible to regress hours of work (both paid and unpaid) on wage using the OLS estimation technique. Nonetheless, there are a number of econometric issues that need to be addressed on wage and hours of work in order to at least minimise any potential biases of the estimates. Wage is endogenous in hours of work due to the possibility of measurement error, omitted variable bias and reverse causality (Sedigh et al., 2016). Hall (1973) indicated that wage may be unobserved for individuals who, for some reason, decide not to enter into the labour force. Omitting the data for this category of people has the potential to cause the estimates of wage to be downwardly biased since those omitted observations may cause negative disturbances.

On the left-hand side of the equation, the data on hours of work are usually censored at zero. Some studies have handled this problem by using the Tobit estimation technique which considers all those zeros as an outcome of a choice of the respondent (Daunfeldt & Hellström, 2007). However, evidence suggests that the type of survey, the method of data collection and the type of measurement of the variable can also contribute to such zero observations. For instance, using the 24-hour recall diary approach has been found to be associated with many respondents reporting zero hours of work in the household. Similarly, conventional measures of hours of work based on survey questions about normal weekly hours are usually characterised by exaggeratedly high concentration at peak hours (Klevmarken, 1999). This has been attributed to the fact that many respondents report their contracted number of hours but disregard or forget any non-work events at work and any irregular overtime work. In some instances, respondents who only work occasionally at their secondary work may find it difficult to retrospectively report normal hours of work (Juster & Stafford, 1991; Klevmarken, 2005).

This situation which usually results in many zero observations is comparable to under-reporting in typical consumer expenditure surveys. Depending on the researcher's sense of judgment of the potential source of the zeros (thus either by choice, through data generation process, or measurement error), different estimation techniques have been used in the literature. Most of the existing studies have handled similar problems using two separate estimation techniques. For

instance, Daunfeldt and Hellström (2007) used the Cragg-model together with an IV estimation technique to address the issues of left-censoring and potential endogeneity. Sedigh et al. (2016) employed the Heckman two-step estimation technique for the potential self-selection bias, and the 2SLS estimation technique for addressing the perceived endogeneity of wage. However, using any of these estimation techniques in isolation means addressing one problem at a time. For instance, using only the Tobit estimation or the Cragg model to account for the censoring of the data means that one risks leaving the endogeneity problem unaddressed. Similarly, using the 2SLS estimation technique will solve the problem of endogeneity only at the expense of the problem of left-censoring.

It is apparent from these examples that asserting the causal link between wage and hours of work entails a careful consideration of several factors that may inform the choice of the estimation technique in order to achieve efficient estimates. In the case of this study, two main problems that need to be addressed are endogeneity of wage and considerably high proportion of zero observations which may be attributed to the data collection and generation process, as well as the choice of the respondent. In order to address these problems simultaneously, this study employs the two-step IV Tobit estimation approach which was first considered by Nelson and Olson (1978) and described in Maddala (1983)[20]. The first step involves an estimation of a reduced form equation for wage using OLS. In this equation, all the exogenous variables that affect both wage and time use are included as regressors.

In the same vein, the reduced form equation for hours of work is derived using Tobit. In the second step, the predicted values of wage and hours of work from the first step estimation are used as instrumental variables in place of the observed values of wage and hours of work. The equation for hours of work is estimated by Tobit while the equation for wage is estimated by OLS. This approach has been used in a similar study by Song (2007). This study uses the Pooled Tobit approach to account for the time-varying part (assumed to be common for all cross-sectional units) by introducing the time dummy for the years of the three rounds of the survey (Wooldridge, 2010). The IV Tobit estimation technique requires the specification of two structural equations. From equation 5 or 5a, the outcome equation can be specified as:

$$H_{it} = \alpha_0 + W_{it}\beta + X_{it}\delta + \mu_{it} \qquad \text{for} \begin{cases} i = 1 \dots \dots \dots \dots \dots \dots \dots \dots \dots . n \\ t = 2005/6 \dots \dots \dots . 2012/13 \end{cases} \tag{9}$$

where H_{it} represents a vector of the endogenous dependent variables (number of hours spent on paid and unpaid work per week by an individual i at time t); α_0 is the intercept; W_{it} is a vector of

[20] Detailed explanation and derivation of the equations for the two-step IV Tobit estimation approach can be found in Maddala (1983:243-244).

the continuously observed endogenous explanatory variables (wage of individual i at time t). It is the same as the predicted fitted values from the first stage regression; β is the unbiased and consistent estimation on the average effect of wage on hours of work; X_{it} is a vector of the explanatory variables including non-wage income; while the residual μ_{it} is independently distributed. From equation 9, the first stage estimation equation can be derived as:

$$W_{it} = Z_{it}\pi_z + X_{it}\pi_w + \nu_{it} \quad (10)$$

where X_{it} is the same vector of explanatory variables and Z_{it} is the vector of the excluded regressors from the outcome equation with dimensions $1 \times k_w$ and $1 \times k_z$ respectively; ν_{it} is the independently distributed residual. In an expanded format, the estimated outcome equations can be expressed as:

$$Hoursunpaid_{it} = \alpha_0 + \beta 1 lnwage_{it} + \beta 2 lnremit_{it} + \beta 3 Age_{it} + \beta 4 Agesq_{it} + \beta 5 Mstatus_{it}$$

$$+\beta 6 Healthst_{it} + \beta 7 RHH_{it} + \beta 8 ChildU5_{it} + \beta 9 Urban_{it} + \beta 10 Female + \beta 11 Edu_{it} + \mu_{it} \quad (11)$$

$$\beta 1 < 0, \beta 2 < 0, \beta 3 > 0, \beta 4 < 0, \ \beta 5 > 0 \ or < 0, \beta 6 < 0, \beta 7 > 0 \ or < 0, \beta 8 > 0, \beta 9 < 0,$$

$$\beta 10 > 0, \quad \beta 11 < 0.$$

$$Hourspaid_{it} = \alpha_0 + \beta 1 lnwage_{it} + \beta 2 lnremit_{it} + \beta 3 Age_{it} + \beta 4 Agesq_{it} + \beta 5 Mstatus_{it} +$$
$$\beta 6 Healthst_{it} + \beta 7 RHH_{it} + \beta 8 ChildU5_{it} + \beta 9 Urban_{it} + \beta 10 Female + \beta 11 Edu_{it} + \mu_{it} \quad (11a)$$

$$\beta 1 > 0, \beta 2 < 0, \beta 3 > 0, \beta 4 < 0, \beta 5 < 0 \ or > 0, \beta 6 < 0, \beta 7 > 0 \ or < 0, \beta 8 < 0, \ \beta 9 > 0, \ \beta 10 < 0,$$
$$\beta 10 > 0.$$

In order to enhance knowledge of the within-group (i.e. among males and females; rural and urban residents) and across group (i.e. males versus females; rural versus urban) differences in the effect of wage, separate equations for hours of work were estimated for males, females, rural residents and urban residents. The essence of this approach is to analyse the vertical and horizontal differences in the effect of wage on intra-household time allocation in Ghana.

A summary of the scale of measurement and definition of the variables included in the equation is presented in Table B2, Appendix B[21]. The inclusion of each of these variables is based on

[21] $Hourspaid$, $Hoursunpaid$, $lnwage$, $lnremit$, Age and $Agesq$ represent hours of paid and unpaid work, natural log of wage, natural log of remittance, age and square of age of the respondent. Respectively, $Mstatus$, $healthstatus$, RHH, $Child$, $Urban$, $female$ and Edu represents marital status, health status, relationship to household head, geographical location, gender and level of education of the

theoretical justification and the findings of empirical studies. In equation 11, it expected that hours of unpaid work should be natively associated with wage, remittance, level of education, square of age living in the urban area, being single, being in an informal relationship, and being the head of the household. However, it is expected that a marital status, the number of children under five years of age that one has, age and being a female should have positive a relationship with hours of unpaid work. On the other hand, hours of paid work should have a positive association with wage, age, and urban residence. Non-wage income (remittance), the square of age, the number of children younger than five years of age, poor health status, being single or in an informal relationship are expected to have negative associations with hours of paid work. The direction of the relationship between hours of paid work and the respondent's relationship to the household head remains uncertain since the decision to participate in the labour market by the spouse, children, grandchildren, other relatives or servants is dependent on a number of factors within the household. For instance, some of these factors are the age of the person in question, and the number of dependents (children, elderly, and the sick).

3.4.2 Instrumental variables (IV) testing

The available literature suggests that there are several variables that can be used as instruments to moderate the relationship between wage and time allocation. Among such variables used in the literature are: education, union status or membership, the region of residence, industry or sector of employment (Sedigh et al., 2016). Other studies have used pre-tax wage, the square of pre-tax wage, capital income and the square of capital income as valid instruments (Daunfeldt & Hellström, 2007). This study explores the appropriateness of some of these variables available in the data and found union membership and sector of employment of the respondent to be good instruments for wage. There are enough theoretical and empirical bases for the use of these variables as appropriate instrument for wage. Extant studies suggest that union[22] organisation and membership significantly increase wages (Bryson, 2007; Farber, 2005). Evidence in Ghana and other countries such as Ivory Coast, India, Germany and Canada suggests that public sector

respondent. Marital status is categorised into married, informal relationship and single (never married, divorced, widowed or separated). Relationship to the household head is also categorised as head of the household, spouse, child/grandchild, other relative, and servant/adopted. Similarly, education is categorised as no education, basic education (completed primary or JHS) and secondary plus (completed at least SSS).

[22] The variable union is binary and it takes on the value 1 if there is a trade union at the place where the respondent works, and 0 if there is no trade union at the workplace. Likewise, the variable sector of employment is binary and it takes on the value 1 if the respondent works in the public sector and 0 if he or she works in the private sector.

workers enjoy a public-sector wage premium (Baffour & Turkson, 2015; Glinskaya & Lokshin, 2007; Venti, 1987; Younger & Osei-Assibey, 2017). More so, both union membership and sector of employment have been used as valid instruments by Song (2007) and Sedigh et al. (2016) in their respective studies on time use.

The validity of a particular instrument can be determined through appropriate post-estimation tests. In spite of the increase in the use of the instrumental variables Tobit estimation (IV Tobit) approach in the literature, there are fewer available tests for the validity of the instruments for censored variables compared to continuous uncensored dependent variables (Miluka et al., 2010). Some studies have attempted to circumvent this hurdle by using an indirect approach of running a joint significance test of the instruments in the first stage regression based on the Cragg-Donald F statistics and as a rule of thumb, compared the value to 10. If the statistic is greater than 10, then the instrument is considered valid, and vice versa if the statistic is less than 10 (Miluka et al., 2010). However, Finlay and Magnusson (2009) disputed the appropriateness of this approach on the grounds that while the coefficient of the included instrument can be concentrated out of the linear IV model, this is not possible under a more general specification. The authors applied the Classical minimum distance approach for conducting hypothesis test in the face of potentially weak instruments. This method involves indirect testing of the restrictions on the reduced-form coefficients imposed by the underlying relationship between the structural and reduced-form parameters (Finlay & Magnusson, 2009)

In this study, a test for the endogeneity of wage was done using the Wald test and the results for each model are reported at the bottom of the output tables. There are two main conditions that a good instrument must satisfy: 1) The IV must correlate with the endogenous variable; 2) the values of the instrumental variables and exogenous variables are unrelated with the values of the error term in the structural model. This makes the predicted values for the endogenous variable free of selection bias or unobserved characteristics, assuming a correctly specified model (Miluka et al., 2010).

3.5 Models for wage and time allocation among couples

From the preceding sections on the theoretical model of objective one, hours of work is a function of wage (W) and non-wage income (R) which is expressed in equation 4.1a. The subscripts M and H represent hours of market labour and household production. The hours of work is subject to the time constraint (T) which is also a function of hours spent on consumption goods(K), hours of household production(H) and hours of work in the labour market (N) as expressed in equation 5.1 a.

$$H_{NH} = f(W, R) \quad (4.1a)$$

$$T = f(K, H, N) \quad (5.1a)$$

3.5.1 Empirical estimation strategy

Based on equations 4.1a and 5.1a, the empirical estimation equation for wages and hours of work are derived as equations 6.1a and 7.1a:

$$W_{it} = Z_{it}\pi_z + X_{it}\pi_w + \nu_{it} \quad (6.1a)$$

$$H_{it} = \alpha_0 + W_{it}\beta + X_{it}\delta + \mu_{it} \quad (7.1a)$$

In equation 7.1a, H_{it} represents a vector of the endogenous dependent variables (number of hours spent on paid and unpaid work per week by an individual i at time t); α_0 is the intercept; W_{it} is a vector of the observed endogenous explanatory variables (wage of individual i at time t) or the predicted fitted values from the first stage regression; β is the unbiased and consistent estimation of the average effect of wage on hours of work; X_{it} is a vector of the explanatory variables including non-wage income; while the residual μ_{it} is independently distributed. Similarly, the variable Z_{it} in equation 6.1a is a vector of the excluded regressors from the outcome equation while ν_{it} is the independently distributed residual.

Since objective two requires a restriction of the analysis to couples in the household the two equations are modified to satisfy the conditions of the notion of working spouse premium and the theory of labour supply. The theory of the working spouse premium/penalty requires that the wife's(husband's) hours of work appears in the husband's (wife's) wage equation while the theory of labour supply hypothesis that the husband's (wife's) wages affect the wife's (husband's) hours of work. Other important factors to consider is that the wife's wage is endogenous in the husband's hours of work while the husband's hours of work is endogenous in the wife's wage. As mentioned in the previous section, the data is characterised by a high proportion of zero observations for the hours of work, which could be partly due to the data collection and generation process.

Addressing these issues in order to obtain reliable estimates requires a model that simultaneously takes into account each partner's wages and hours of work, the endogeneity between hours of work and wage, and the censoring nature of the data. Following Hotchkiss and Moore (1999), Jacobsen and Rayack (1996) and Song (2007), the papers employs the two-step IV Tobit estimation approach which has been described extensively in Maddala (1983) as well as by Cameron and Trivedi (2005). The first step of this estimation strategy requires the specification of a reduced form equation for the husband's (wife's) wage using OLS. This equation contains all the exogenous variables that affect both wage and time use. It also contains the husband's (wife's) hours of work as an explanatory variable. Similarly, the reduced form equation for the

husband's (wife's) hours of work also contains the wife's (husband's) wage and it is derived using Tobit.

The second step requires that the predicted values of wage and hours of work from the first step estimations are used as instrumental variables in place of the observed values of wage and hours of work. The wage equation is estimated by OLS while the equation for hours of work is estimated by Tobit. Following Cameron and Trivedi (2005), this study uses the bootstrap pairs procedure to correct the standard errors for the second-step estimates. The spousal wage and hours of work equations are specified as:

$$W_{it} = \gamma_{it} H_{it} + X_{it}\delta + \mu_{it} \quad (8.1a)$$

$$H_{it} = W_{it}\pi_w + Z_{it}\pi_z + \nu_{it} \quad (9.1a)$$

In equations 1 and 2, the variables W_{it} and H_{it} represent the vectors of paid and unpaid hours of work, and wages, respectively. The subscript *i* represents either the husband or the wife while the subscript *t* represents the time of the survey. The variable X_{it} and Z_{it} are the vectors of the exogenous variables that affect wages and hours of work. Although both X_{it} and Z_{it} contain some common variables, each contains a variable(s) that make(s) it possible to identify the structural model. While Z_{it} contains non-wage income (remittance used as a proxy) which affect hours of work but does not affect wage, X_{it} contains two variables (sector of employment and union at work place) which affect wage but not hours of work.

From equations 8.1a and 9.1a, the estimable equations for wages and hours of work are expressed as:

$$Hrs_{it} = \alpha_0 + \alpha_1 LnWage_{it} + \alpha_2 LnWagesq_{it} + \alpha_3 LnRem_{it} + \alpha_4 Age_{it} + \alpha_5 Agesq_{it} + \alpha_6 Ethnic_{it} + \alpha_7 Edu_{it} + \alpha_8 Child_{it} + \alpha_9 Urban_{it} + \mu_{it} \quad (10.1a)$$

$$LnWage = \alpha_0 + \alpha_1 Hrs_{it} + \alpha_2 Age_{it} + \alpha_3 Agesq_{it} + \alpha_4 Ethnic_{it} + \alpha_5 Edu_{it} + \alpha_{10} Urban_{it} + \alpha_2 Union_{it} + \alpha_3 Sect_{it} + + \upsilon_{it} \quad (11.1a)$$

In equation 3, *Hrs* represents a vector of hours spent on paid and unpaid work. Unpaid hours of work is an aggregated variable computed from hours spent on various household activities including cooking, sweeping, shopping, collecting food from the garden, taking care of the sick and caring for children. Similarly, hours of paid work is an aggregated variable computed from hours spent on primary and secondary occupations. An earlier study by Song (2007) suggests a nonlinear relationship between spousal wage and hours of work. The natural logs of both wage (*LnWage*) and the square of wage (*LnWagesq*) are therefore included in the analysis in order to capture this non-linear relationship. Also, included in the analysis is the natural log of remittance

(*Lnremit*) which is used as an exclusion restriction in the equations for hours of work. The rest of the control variables are Age (*Age*), square of age (*Agesq*), ethnicity (*Ethnic*), education (*Edu*), the number of children under age five, and place of residence or geographical location (*Urban*), included as other control variables in both equations.

It is important to indicate that ethnicity is made up of eight categories. These are the Akan, Ga-Dangme, Ewe, Guan, Mole-Dagbani, Grusi, Gurma and Other ethnic. Also, education has three main categories; 1) no education; 2) basic education (if a respondent completed primary or Junior High School) and 3) secondary education plus (if a respondent completed at least Senior Secondary School (SSS)). In the wage equation, two variables are included to capture the availability of a union at the workplace and sector of employment, as exclusion restrictions. The inclusion of each of these variables is underpinned by theoretical and empirical findings. It is expected that there will be a positive relationship between age and hours of work but a negative effect of the square of age on hours of work.

Based on the evidence in the literature (Gronau, 1977), remittance is *a priori* expected to have a negative effect on hours of work. It is also expected that the number of children under age five will have a negative relationship with hours of paid work but a positive relationship with hours of unpaid work. In contrast, an urban residence should have a positive effect on hours of paid work and wage but negative effect on hours of unpaid work. It is further expected that higher levels of education should be positively correlated with wages and hours of paid work but a negatively correlated with hours of unpaid work or household production. The extent and direction of the significance of wage, and the square of wage (in the hours of work equations), hours of work (in the wage equation) and ethnic affiliation are dependent on household-specific context and the nature of the interaction among the couples. It is therefore difficult to indicate the *a priori* expected sign of the regressors. Tables A1 and A2, Appendix A, respectively presents a brief description of the variables included in the analysis, and a summary statistics of the individual variables that were aggregated into paid and unpaid hours of work.

It is important to indicate that the same approach for testing the instrumental variables in the preceding section is employed in testing the instrumental variables in this restricted analysis.

3.6 Models for poverty and gender inequality in time allocation

Objective two of this study is to determine the effects of income poverty and consumption poverty on gender disparities in the intra-household allocation of time to paid and unpaid work activities in Ghana. The theoretical model for this objective is an extension of the neoclassical model by Gronau (1977) which was discussed under the theoretical model derivation for objective one in the previous section.

From equation 5 of the previous section, time is a function of leisure L, market consumption good H, and a consumption good G produced within the household.

$$T = f(L, H, G) \tag{1}$$

From equation 1, the utility function of an individual i in a two-member household of male m and female f can be written as:

$$U^i = u^i(L_i, H_i, G_i; Z_i, V_i) \qquad i = m, f \tag{2}$$

From equation 2, the variables Z_i and V_i are respectively vectors of demographic characteristics of the individual and the household which have implications for the time allocation decision of the individual. The household production function can be expressed as:

$$H_i = H(t_m, t_f;\ \alpha) \tag{3}$$

From equation 3, t_m and t_f are the hours of household work for male and female respectively. The characteristics of the household members that have implications for household production can be represented as $a = (\alpha_m, \alpha_f)$. Following Aronsson, Daunfeldt, and Wikström (2001) this study assumes that the household decision process can be interpreted as a two-stage procedure. In the first stage, the household members determine a production plan. This is followed by the second stage which has to do with how the resources are to be shared among the members within the household. In line with the collective approach, it is further assumed that the household decision process leads to a Pareto-efficient outcome. The domestic production plan can formally be written as a profit maximization problem as:

$$\underset{t_m, t_f}{Max}\,\Pi = PH(t_m, t_f;\ \alpha) - W_m t_m - W_f t_{f,} \tag{4}$$

In equation 4, W_m and W_f denote marginal (after tax) wage rates, and P is the price of the domestically produced good. The first order conditions for t_f and t_f can be combined to read:

$$\frac{\partial H(.)/\partial t_m}{\partial H(.)/\partial t_f} = \frac{W_m}{W_f}. \tag{5}$$

Given the production plan and the sharing arrangement, the second stage of the decision problem will be:

$$\underset{L_i, C_i, X_i}{Max} U^i(L_i, H, G_i;\ Z_i, V_i) \qquad i = m, f, \tag{6}$$

$$S.t \quad L_i + PH_i + W_i G_i = S_i, \tag{7}$$

where S_i denotes member i's part of the household's full income which is used as a proxy for his or her poverty status in this study. If L_i, H_i, and G_i in equation 1 or 6 represented by T_i (total hours spent on leisure, market consumption, and household production), then equation 6 can be re-written as:

$$\underset{L_i, C_i, X_i}{Max} U^i(T_i;\ Z_i, V_i) = S_i T_i\left(t_m, t_f; Z_i, V_i\right) - S_m T_m - S_f T_{f,} \quad i = m, f, \tag{6a}$$

Differentiating the total hours that a female spends on all three activities with those of male yields equation 7:

$$\frac{\partial T(.)/\partial t_m}{\partial T(.)/\partial t_f} = \frac{S_m}{S_f}. \tag{8}$$

In equation 7, S_f and S_m remain the relative income shares of female and male of the total household income, which is the proxy for the poverty status as already indicated while $\partial T(.)/\partial t_f$ and $\partial T(.)/\partial t_m$ are the relative shares of the total time allocated to the three activities by female and male. An increase in females' share of total income of the household reduces the ratio of female to males time spent on a given activity. Conversely, an increase in the share of income of male increases the ratio of time spent by male and female on a given activity.

3.6.1 Empirical estimation strategy

In choosing the empirical estimation technique, careful consideration is made of the distribution of the original variables and the underlying process involved in the generation of the measures of inequality. Ideally, OLS estimation technique could be used for the analyses since the computed dependent variables of interest are continuous. However, the original time use variables which were aggregated were characterized by more zeros (left-censored). As a result, using the OLS could produce biased estimates. In order to address this suspected biasness, the Tobit model introduced by Tobin (1958) was employed. The Tobit model which requires the development of moments (mean and variance) of the censored normal distribution assumes that the dependent variable follows a normal distribution (Wooldridge, 2010). For the purpose of comparing the robustness and reliability of the estimates, the results for both estimation techniques were explored. However, the magnitude and level of significance of the estimates suggest that the Tobit model must be preferred to the OLS model. Following Katchova and Miranda (2004) and Wooldridge (2010), the Tobit equations is specified as:

$$y_{it} = \begin{cases} y_{it}^* \ if\ y_{it}^* > 0 \\ 0 \ if\ y_{it}^* \leq 0 \end{cases} \tag{9}$$

The variables y_{it} and y_{it}^{*} are the actual values for the dependent variable and the latent variable. The actual value for the dependent variable is observed if the latent variable is above the limit and the limit is observed for the censored observations. The model combines aspects of the binomial probit for the distribution if y_{it} is equal to zero $(y_{it} = 0)$ versus y_{it} being positive $(y_{it} > 0)$ and the regression model for $E(y_{it}|y_{it} > 1, X_{it})$. All the positive observations on y_{it} could be collapsed and be treated as a binomial probit or logit estimation problem. However, doing so would mask some important information on time use and other characteristics of respondents. Similarly, all the zero observations on y_{it} could be discarded so that only the positive observations would be used. However, this could cause the data to be truncated. Fitting the model with Tobit estimations addresses these challenges and takes into account all the information in the variable y_{it} (Baum, 2006). From equation 9, the equation for the latent variable can be specified as:

$$y_{it}^{*} = \beta_0 + \beta_{it} P_{it} + \beta_{it}' Z_{it} + \varepsilon_{it} \tag{10}$$

$$\varepsilon_{it} \overset{iid}{\sim} N(0, \delta^2)$$

In equation 10, the variable y represents the measures of inequality in time use, β_0 and β_{it} represents the constant terms and a vector of slope parameters (marginal effects) of poverty, while β_{it}' captures a vector of the parameters of the other explanatory variables. The term P_{it} and Z_{it} represent vectors of poverty and other control variables. One advantage of the Tobit model is that it uses all the information, including information on censoring, and it provides consistent estimates. Similar to the probit model, it is a nonlinear model and it uses the maximum likelihood to combine the probit regression component of the log-likelihood function which can be expressed as:

$$\ell_{it}(\beta_{it}, \sigma_\mu) = I(y_{it} = 0) log\left\{1 - \Phi\left(\frac{X_{it}\beta_{it}}{\sigma_\mu}\right)\right\} + I(y_{it} > 0)\left\{log\emptyset\left(\frac{y_{it} - X_{it}\beta_{it}}{\sigma_\mu}\right) - \frac{1}{2} log\left(\frac{\sigma^2{}_\mu}{\mu}\right)\right\} \tag{11}$$

In equation 2, $I(.)$ is equal to one for positive observation and zero if the observation is equal to zero. The log-likelihood consists of the probabilities of observing a zero value for time spent on an activity and a classical regression for the positive values for time spent on the same activity. Equation 3 can be expanded into an estimated gender inequality[23] models as equations 4 and 5 with the *apriori* expectations. The subscripts t and i represent the cross-sectional units and time points respectively:

[23] In equation 11 and equation 12, the gender inequality indicators can be further re-specified to take into account the GPI and relative gaps as separate equations. This translates into four empirical models with the same *a priori* signs.

$$Ggap_{it} = \beta_0 + \beta_1 Pov_{it} + \beta_2 Age_{it} + \beta_3 Agesq_{it} + \beta_4 Edu_{it} + \beta_5 HHSize_{it} + \beta_6 Urban_{it} + \beta_7 ChildU5_{it} + \beta_8 Ethnic_{it} + \beta_9 Reg_{it} + \mu_{it} \quad (4)$$

β_1>0, $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 > 0$, $\beta_5 > 0$, $\beta_6 > 0$, $\beta_7 < 0, > 0$

$$Distime_{it} = \beta_0 + \beta_1 Pov_{it} + \beta_2 Age_{it} + \beta_3 Age_{it} + \beta_4 Edu_{it} + \beta_5 HHSize_{it} + \beta_6 Urban_{it} + \beta_7 ChildU5_{it} + \beta_8 Ethnic_{it} + \beta_9 Reg_{it} + \mu_{it}$$

(5)

β_1>0, $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 > 0$, $\beta_5 > 0$, $\beta_6 > 0$, $\beta_7 < 0, > 0$

$t = 1, 2$ and 3

3.6.2 Measurement and *a priori* expectations of the variables

In equations 3 and 4, $Ggap_{it}$ and $Distime_{it}$ represent gender inequality in time for unpaid work and total time (discretionary time use) respectively. Each indicator is further divided into GPI $\left(\frac{Female}{Male+Female}\right)$ and relative gaps$\left(\frac{Female-Male}{Male+Female}\right)$. This means that for the empirical estimation, the two equations produce four separate regression models. The variable Pov_{it} represents income or consumption poverty and it is measured as a binary taking on the value one if the respondent is poor and otherwise zero. From the equations, it is expected that income poverty or consumption poverty should have a positive association with inequality in time use because poor households lack the means to pay for services that predispose them to inequality in time use. For instance, such households or individuals cannot afford to pay others to perform certain activities that add up to their time allocation. In that instance, women tend to perform a greater proportion of the household work compared to men. This is particularly the case when women have limited sources of income. In addition, societal values and norms about time allocation in developing countries like Ghana usually limit women's autonomy over their time allocation. The constraints associated with norms of parenting and lack of adequate institutional policy designs to enhance equitable division of labour between men and women make women more susceptible to inequality in time allocation (Sayer, 2005; Sayer et al., 2004).

Age Age_{it} is measured as a continuous variable for respondents 15 years and older. Age is expected to have a nonlinear relationship with inequality in hours of work. It is expected that age will have a positive effect on inequality in hours of work. However, the square of age ($Agesq_{it}$) should have a negative association with hours of work due the possibility of the adult delegating some of the unpaid responsibilities (household production) to children and other young members of the household as one ages. Regarding discretionary time, the relationship can be positive or

negative depending on gender and age composition of the household and the nature of the division of labour and specialisation between males and females in the household.

The variable Edu_{it} is categorised into three: Respondents who have no education or completed only kindergarten (nursery) are categorised as no education. Those who completed any level of education lower than SSS is categorised as basic education while those who completed at least SSS are classified as secondary school plus. It is expected that high levels of education should be associated with lower levels of gender inequality in time use. This is because education is a form of human capital and constitutes all knowledge and skills that increase one's participation and productivity in the labour market (Becker, 1975). It enables more highly educated men and women to devote relatively more time to paid work, due to higher benefits in terms of money and status (Van der Lippe, De Ruijter, De Ruijter, & Raub, 2010). Higher levels of education must contribute to the narrowing of gender inequalities in time use in the household and the labour market because it places women in a better position to bargain well. Highly educated women have the means to pay for the services of others to perform some of the household activities that are societally feminised.

The extent to which household size will affect gender inequality depends on the composition of the household members. For instance, a household that has more dependents such as children younger than five years of age and the aged, is likely to be characterised by more caring responsibilities and other unpaid activities. Conversely, a household that has more active members may have less care work and more time for paid work. However, the validity of this argument is dependent on other factors such as gender composition, and the distribution of economic empowerment which influence the autonomy of time allocation in the household. In this study, it is expected that household size $HHSize_{it}$ should have a positive association with gender inequalities in time allocation.

Geographical location or place of residence may have a positive or negative effect on gender inequality depending on the prevailing cultural norms and believes, the level of infrastructural development, and the flexibility of the labour market. In this study, geographical location $Urban_{it}$ is a dummy variable that takes on the value 1 if the respondent lives in an urban area and 0 if he/she lives in the rural area. It is expected that urban residence should have a negative association with gender inequality due to the availability of and access to infrastructure such as water, electricity, affordable and efficient cooking energy as well as easy access to transport. Other factors such as the level of urbanization, educational attainment of women, and care services in the urban areas are expected to contribute to the reduction in both inequalities in gender gaps in unpaid work and discretionary time.

It is expected that the number of children under the age of five in the household $ChildU5_{it}$ should have a negative effect on gender inequality in time use. The presence and the number of children in this age category have two effects on parental time allocation which usually disadvantage women. Firstly, both situations require more time of mostly mothers on unpaid housework such as caring, assisting children with their school work, cleaning and laundry. Secondly, the number of children within this age category adds to the cost of living which can be met by parental involvement in paid work in the labour market. The NHE suggest that these two effects may engender specialisation in a two-parent household where the parent with the highest earning potential specialises in paid work while the other in housework (Becker, 1981). However, women are the ones who mostly end up sacrificing their time for paid employment for unpaid household work. This is because they on average earn lower than men regardless of their educational levels. Societal acceptance of feminine behaviour requires that women spend more time on domestic labour (Sayer, 2005; Sayer et al., 2004; Van der Lippe et al., 2010). This contributes to an unequal distribution of time in the household which reflects in inequalities in the labour market due to the feedback effects between activities in the household and the labour market.

The normative expectation of the culture of ethnic groups shapes the distribution of decision making power and access to resources. Ghana is made up of over 90 different ethnic groups with the Akan, Mole-Dagbani, Ewe and Ga-Dangme being the dominant ones. These different ethnic groups are characterised by a variety of kinship systems which influence gender equality in access to resources and power of decision making in the household. Mainly residing in the southern part of Ghana, the Akan constitutes the largest ethnic group and is organised along matrilineal lines while most other ethnic groups, in the Northern and Eastern parts are patrilineal. Among the ethnic groups, only the Ga ethnic groups are known to have somewhat anomalous bilateral inheritance and kinship structures (Baden, Green, Otoo-Oyortey, & Peasgood, 1994).

According to Baden et al. (1994), the matrilineal systems gives women greater access to resources outside marriage than patrilineal systems, but they offer little economic security to women. In this regard, the association between ethnicity ($Ethnic_{it}$) and gender inequality in time allocation in this study is *a priori* uncertain. Ethnicity is captured under eight categories with the following coding process: (Akan=1, Ga-Dangme =2, Ewe=3, Guan=4, Mole-Dagbani=5, Grusi=6, Gurma=7 and Other ethnic groups=8). The descriptive analysis of gender inequality in time use and ethnic affiliation of the respondent shows that gender inequality is lower among the Ga-Dangme ethnic group compared with the rest of the ethnic groups. As a result, this ethnic group was kept as the reference category in the regression analyses to avoid potential dummy variable trap. As an acceptable practice in pooled regression analyses, dummy variables for the periods 1998/99, 2005/06 and 2012/13 are included to represent the years of surveys. However, the survey year 1998/99 was kept as the reference category to avoid dummy variable trap.

Furthermore, Ghana is divided into ten administrative regions (Western, Central, and Greater Accra, Volta, Eastern, Ashanti, Brong Ahafo, Northern, Upper East and Upper West) with different distributions of resources, infrastructure, ethnicity and culture. The 2010 Population and Housing Census report on the distribution of the ethnic groups across these ten regions shows that most of the population of Central (81.7%), Western (78.2%), Ashanti (74.2%), Brong Ahafo (58.9%) and Eastern (51.1%) regions were Akan. The highest proportions of the population of Greater Accra were Akan (39.7%) and Ga-Dangme (27.4%). While 73.8% of the population of Volta was Ewe (73.8%), the Mole-Dagbani constitutes the predominant ethnic group in the Northern, Upper East and Upper West regions (Ghana Statistical Service, 2012a). These differences in ethnic affiliation and socio-cultural norms largely influence the impact of policies on the populace.

This study accounts for these geographical differences by including the regional dummies as explanatory variables in the analysis. The differences in distribution and access to infrastructure across the ten regions of the country make the *apriori* signs of the regional dummies uncertain. At best, one may argue that residents in the Greater Accra, Ashanti and Western regions should have lower rates of inequality in time use because they have better access to infrastructure and other energy-saving equipment than those in the other regions. However, this may not hold at all times because urbanisation and its associated poor transport system mostly affect the time that urban residents commute to work. The peculiar characteristics such as the employment status of the couples, differences in their levels of education, and other factors may also shape the division of labour and time use in the household.

3.7 Models for time and income/consumption poverty

As indicated in the section under the literature review, the relationship between time poverty and income poverty is not *a priori* clear. One strand of the literature suggests mutual dependence while another strand postulates a two-way causality between the two variables (Öneş et al., 2013). Following the argument of the latter strand of the literature, this study examines the relationship between time poverty and income poverty as independent variables. In most studies, the logistic and probit regression estimation techniques have been used to examine the socio-economic correlates of time poverty (Arora, 2015; Bardasi & Wodon, 2010; Kalenkoski et al., 2011; Ribeiro & Marinho, 2012). In some of these studies, income poverty or other proxies of income are included in the models as an exogenous variable.

However, even if income/consumption poverty and time poverty are treated as separate variables, there are enough bases for suspicion of potential endogeneity emanating from simultaneity between the two variables. There is potential bi-causality between income/consumption poverty and time poverty. The endogeneity could also be caused by an issue of omitted variable bias and

measurement error. It could also be caused by the fact that confounders which are associated with both the endogenous regressor(s) and the dependent variable are either unknown or not readily quantifiable (Cameron & Trivedi, 2005; Marra et al., 2013). Examples in this case, are the respondent's work experience and history of family income. An attempt is made to address the potential endogeneity especially the one that has to do with the influence of confounders using the IV technique.

The IV estimation technique involves the use of instruments that are correlated with the potential endogenous regressor (income poverty and/or consumption poverty), but uncorrelated with unobservable factors affecting the endogenous regressant (time poverty) to isolate the variation in time poverty that is independent of the income/consumption poverty (Marra et al., 2013; Wooldridge, 2010). Since the dependent variable (time poverty) and the endogenous regressors (income poverty and consumption poverty) are both binaries, the study uses the Recursive Bivariate Probit estimation technique. This estimation technique has been theoretically and empirically proven to be superior to conventional two-stage IV procedures(Bhattacharya, Goldman, & McCaffrey, 2006; Wooldridge, 2010).

According to Marra et al. (2013), the Recursive Bivariate Probit model is an effective approach for estimating the effect of a binary regressor on another binary outcome in the presence of unobservables. The Recursive Bivariate Probit is a system of two probit equations that allows the error terms to be correlated, and the binary dependent choice in one equation to be an endogenous regressor in the other equation. Let time poverty be a binary variable taking on the value 1 if the respondent is time poor and 0 otherwise. Suppose that time poverty is a linear function of income or consumption poverty and other correlates, the empirical and structural model for the determinants of intra-household time poverty can be specified as:

$$\Pr(Timepoor = 1|X_i) = a_0 + a_1 Poor + a_2 Age + a_3 Agesq + a_4 Hsize + a_5 Literate +$$

$$a_6 Urban + a_7 ChildU5 + a_8 Mstatus + a_9 Ethnic + \varepsilon_i \quad (1)$$

In equation 1, X_i represents the explanatory variables specified on the right-hand side, a_1 is the direct effect of income/consumption poverty on time poverty conditional on the other control variables. The control variables are age, square of the age of respondent, household size, level of education, urban residence, presence of a child under age five in the household, marital status, and ethnic affiliation of the respondent. The IV estimation approach requires the use of a variable to moderate the relationship between income/consumption poverty and time poverty. The use of such variable(s) must be both theoretically and empirically informed and it should have two properties: 1) Non-weakness, which means that the instrument should be partially correlated with the endogenous variable (income/consume poverty) but given that the other independent

variables have been netted out. If this condition does not hold then the IV estimator will be inconsistent (Bound, Jaeger, & Baker, 1995; Cameron & Trivedi, 2005). 2) the instruments should be orthogonal to the error term in the poverty equation. If this does not hold, then the instrument itself is endogenous and the estimate of income/consumption poverty is no longer a consistent (Angrist & Hahn, 2004).

A number of variables including asset and household ownership, savings account ownership, minimum balance in savings account, and the amount withdrawn from or added to savings in the past twelve months were explored. However, a stepwise approach of testing the reliability of these instruments showed that account ownership is more robust and significantly correlated with income/consumption poverty, than the rest of the variables. As shown by Mullahy and Sindelar (1994) in the context of alcohol consumption and wages, as well as Morris (2007) in the author's study of obesity and employment, the direct plus the indirect effect can be obtained by excluding the instrument from the model. From equation 2, the reduced-form equation can be specified as:

$$Time\ Poor = b_0 + b_1 Account + b_2 Age + b_3 Agesq + b_4 Hsize + b_5 Literate + b_6 Urban + b_7 ChildU5 + b_8 Mstatus + b_9 Ethnic\ + \varepsilon_2 \quad (2)$$

The correlation between ε_1 and ε_2 is given by the ρ (Wooldridge, 2010) and the total effect of income/consumption on time poverty can be re-specified as:

$$\Pr(Time\ poor = 1|X_i) = c_0 + c_1\widehat{Poor} + c_2 Age + c_3 Agesq + c_4 Hsize + c_5 Literate + c_6 Urban + c_7 ChildU5 + c_8 Mstatus + c_9 Ethnic + +\varepsilon_3 \quad (3)$$

$c_1 > 0,\ c_2 > 0, c_3 < 0,\ \ c_4 > 0,\ c_5 < 0,\ c_6 > 0,\ \ c_7 > 0,\ \ c_8 < 0\ or > 0,\ \ c_9 < 0\ or > 0$

In equation 8, c_1 is the total effect of income/consumption poverty on time poverty. The parameter c_1 of the equation for income/consumption poverty is the part of the variation in the IV (account ownership) plus other control variables. The estimate of income/consumption poverty is "purged" of the unobserved confounding influences due to non-random selection. From equation 8, the marginal predicted probability that a respondent will be time poor is given by:

$$\Pr(Time\ poor = 1|X_i) = \Phi(a_1\widehat{Poor} + \alpha_i X_i) \quad (4)$$

3.8 Description of the data

The data used for the analysis of this study were obtained from three main sources. The export and import data for goods (disaggregated based on a 6-digit structure of the Harmonized

Commodity Description and Coding System[24] (HS)) were extracted from the UN International Trade Statistics Database. The export and import data for services (reported according to the Balance[25] of Payments Manual (BPM) 6 methodology) were obtained from the ITC, UNCTAD and WTO trade in service database. This data is also based on the International Monetary Fund (IMF) statistics. The data on GDP (disaggregated by economic activity) and the household level data for the last three rounds of the GLSS (GLSS4, GLSS5 and GLSS6) were obtained from the Ghana Statistical Service. In order to integrate the trade openness indicators into the household level data for the analysis, two phases of matching process were performed.

First, using information about the various product nomenclatures in the Concordance Table[26] from the World Integrated Trade Solutions (WITS), the export and import data on goods in the HS form were mapped onto their respective International Standard Industrial Classification[27] (ISIC) forms. The manual for International Industrial Classification (I3) was used to classify all the commodities into their respective headings such as agriculture and livestock, canning and preservation of fruits and vegetables, and forestry. Similarly, the Trade Map User Guide was used to classify the services data into their corresponding HS levels. This allowed for re-aggregation of the export and import data for both goods and services into economic activities/industrial clusters that match the sub-classification of the GDP for the three sectors of the economy (Agriculture, Industry and Service) by the Ghana Statistical Service.

The Ghana Statistical Service has classified the agricultural sector into crops (including cocoa), livestock, forestry and logging and fishing. The industry sector has mining and quarrying (including crude oil), manufacturing, electricity, water and sewage, and construction as sub-sectors. The service sector has the following sub-sectors: 1) trade, repair of vehicles, household goods; 2)

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24 The HS is a system for classifying goods entering an importing country through the customs (Hunt & Koppel, 2006). It is a multipurpose international product nomenclature developed by the World Customs Organisation, and it comprises about 5000 commodity groups, each identified by a six-digit code and supported by well-defined rules to achieve uniform classification. A detailed explanation of its origin, uses and modifications over the years can be found at http://www.wcoomd.org /en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx.

25 Similarly, a detailed explanation of the structure and methodology used for the classification of the service data can be found in the BPM6 Compilation Guide (International Monetary Fund, 2014)

26 The concordance table used for the conversion can be accessed from the WITS via https://wits.worldbank.org/referencedata.html

27 The ISIC is a framework that consists of a coherent and consistent classification structure of economic activities based on a set of internationally agreed concepts, definitions, principles and classification rules. Readers may find detailed explanatory notes on the ISIC in United Nations (2008) and Ghana Statistical Service (2010).

hotels and restaurant; 3) transport and storage; 4) information and communication; 5) financial and insurance activities; 6) real estate, professional, administrative and support service activities; 7) public administration and defence, social security; 8) education; 9) health and social work; 10) community, social and personal service activities. Considering the data on export and import, some of these sub-sectors were combined (see Table A2 Appendix A) to ensure that they are compatible with the trade data. The trade openness indicators (volume of trade as a share of GDP and export as a share of GDP of the respective economic activities) were then computed for the economic activities which are presented and in Table A2and discussed in the section on results.

The second phase of the matching process required recoding the industry in which the respondent works (using the ISIC code as an identifier) to match the computed trade openness indicators. The World Bank's reference manual for its SHIP was used to recode the industries in the household level data. The recoded variable was used to match the trade shares of each economic activity onto the characteristics of the individual, household and economic activity in which the respondent is engaged. This process was performed for each round of the survey before all three datasets (GLSS4, GLSS5 and GLSS6) were pooled together as composite data for the analysis.

The household level data were extracted from the fourth, fifth and sixth rounds of the GLSS (GLSS4, GLSS5 and GLSS6). The Ghana Statistical Service has conducted six rounds of such Living Standards Surveys. The five rounds were conducted in 1987/88, 1988/89, 1991/92, 1998/99 and 2005/06 and each covered a nationally representative sample of households interviewed over a period of twelve months (Ghana Statistical Service, 2014b). Over time, the research design, and the sample size of the households and individuals covered in the various rounds of the survey have been revised. For instance, the GLSS4 which was carried out from April 1998 to March 1999 covered a representative nationwide sample of more than 5,998 households, containing over 25000 persons (Ghana Statistical Service, 2000). During the GLSS5 (carried out from September 4, 2005 to September 3, 2006), the sample was increased to 8,687 households in 580 EAs, containing 37128 household members. It was further increased to 16772 households and 72372 household members during the GLSS6 (Ghana Statistical Service, 2014c).

The surveys are structured into modules where detailed information on a variety of topics such as demographic characteristics of the population, education, health, employment and time use, migration, housing conditions, household agriculture, and non-farm businesses have been collected (Ghana Statistical Service, 2000). The surveys have also collected information on tourism, remittances, access to financial services and asset ownership, households' perception of governance, peace and security in Ghana (Ghana Statistical Service, 2014c).

Similar to the sample size, the Ghana Statistical Service has constantly revised the modules and the content by adding new modules in order to gather as much information on the living conditions of Ghanaians as possible. For instance, two new sections namely Tourism, and Migrants and Remittances were introduced in the GLSS5. Unlike the GLSS4 where the special focus was on collecting detailed labour force, income and expenditure data on all household members, the GLSS5 focused on Non-Farm Household Enterprises (Ghana Statistical Service, 2000, 2008). Compared to the previous rounds, GLSS6 included a Labour Force Survey module with additional sections on Child Labour. Also, the Ghana Statistical Service revised the survey methodology to account for additional indicators pertaining to the northern savannah ecological zone, where a major Government initiative, the Savannah Accelerated Development Authority (SADA) had just been initiated. Other modules administered as part of the survey were the Household Access to Financial Services and Governance, Peace, and Security modules (Ghana Statistical Service, 2014c).

Given the objectives of this thesis, the time use module constituted the main source of data while information on income, health conditions of the individual and demographic characteristics were extracted from their respective modules. As indicated in Chapter 1, the focus of this study on the last three rounds of the survey is due to the inconsistencies in the number and measures of household activities in the previous surveys. Information on time spent on economic activities, as well as a variety of housekeeping activities including the time spent on fetching water, child care, sweeping, garbage disposal and cooking, are collected within the modules. For each of these activities, people are asked whether they had spent any time on the activity in the last seven days, and if so, the number of hours involved (Ghana Statistical Service, 2000). The following chapter discusses the sample size of each of the three surveys used and the various revisions made to the content of the modules.

As indicated in Table 4-1 of the next chapter, each time use model has a different sample size. The sample size varies across activities within the same survey and across survey. For instance, the sample size for an activity such as fetching water varies from the sample sizes of the other activities in the same survey and across survey. The original individual level sample sizes for the GLSS4, GLSS5, and GLSS6 were 26411; 37128 and 72372. However, the sample sizes from each survey reduced and this contributed to a reduction in the pooled sample for the analyses of each objective. These reductions are due to a number of restrictions imposed on the computation of the aggregated variables of interest and removal of extreme outliers which could affect the estimates. After removing all the outliers and restricting the analysis to only full-time employees aged 15 years and older, the final sample sizes used in the analysis of each objective differ.

As far as trade openness and gender wage gap (objective one) is concerned, economic activities including armed forces (for which data was not available to allow for the computation of their corresponding trade openness indicators) were dropped. After dropping the variables for which there were no corresponding import and export data for computing the trade openness indicators, the pooled sample size for both trade as a share of GDP and export as a share of GDP reduced to 19431, which was the final sample size used for the decomposition analysis. This is made up of 10339 (53.21%) males and 9092 (49.79%) females. Across geographical location, the distribution was made up of 11266 (57.98%) urban residents and 8165 (42.02%) rural residents.

In this study, the definition of wage was broadened to include secondary occupations. Also, both nominal and real wages were considered to assess the implicit effects of inflation on the relationship between trade openness and wage on the one hand, and effect of wage on household production and labour supply on the other hand. The sample sizes used in addressing objective two (effect of wage on hours of paid and unpaid work by all household members) were 18454 for hours of paid work and 34301 for hours of unpaid work. Since the study assesses the gender dynamics in relation to time use, separate aggregated variables were created for males and females who are 15 years and older within the same household. The respective sample sizes for male and female hours of unpaid work are 17635 and 16666. With respect to hours of paid work, the samples for male and female are 9870 and 8584.

Concerning objectives three (spousal effect of wage and hours of paid and unpaid work) and four (poverty and gender differences in intra-household time allocation), the samples and the analyses were restricted to only couples in monogamous households where the husband and the wife live together. The rationale for this restriction is to enable us to match the partners and address any statistical challenges due to intra-household interactions among the couples. As presented in Table A1, Appendix A, this restriction lead to a final pooled sample of 10948. Since husbands and wives in the same household are matched onto each other, the sample size remains the same for both sexes.

As far as objective four is concerned, the analysis is restricted to only monogamous couples in order to address all potential statistical implications which could affect the reliability of the gender inequality variables that were computed. For instance, in a household where the husband has more than one wife, dividing the wives' hours spent on an activity by the husband's hours spent on the same activity will inflate the gender inequality indicator. This is because hours spent by more than one female will be divided by the hours spent by a single male. Also, the husband's hours could be matched with only one of the wives and not all of them. This would result in instances where the hours spent by the rest of the wives would be divided by zero hours of the husband. From a statistical perspective, the results will be infinite. However, this will appear as

missing in the data management and variable generation process. All these restrictions led to reductions in the sample sizes obtained from each survey as well as the pooled samples for the gender inequality indicators. The final samples for gender gaps in unpaid work and discretionary time which were used in the analyses were 13678 and 13860 respectively.

Following the same winsorising approach of transforming the variables and limiting the extreme values to reduce the effect of any possible spurious outliers, the final sample size used to address the fifth objective (income/consumption poverty and time poverty) is 56832 individuals. This is made up of 36484 males and 20348 females. The sample size for this objective appears to be higher than those of objectives three and four because the time poverty indicator was computed at the individual level and not at the household level.

3.9 Conclusion

This chapter described the research design that informed the choice of the estimation techniques used for addressing the objectives of this study. It also provided a detailed explanation of the sample design and the sample sizes of the three rounds (GLSS 4, 5 and 6) of the GLSS. Furthermore, the processes involved in arriving at the final sample sizes for the analysis were explained. It is evident from this chapter that analysis of intra-household time allocation requires a careful consideration of key issues such as endogeneity and outliers, which are mostly associated with observations from survey data. The next chapter describes the pattern of time use across the three survey years (1998/99; 2005/6 and 2012/13) and the approaches used to compute the time use indicators, time poverty, income poverty, consumption poverty and wages of the respondents.

CHAPTER 4: TIME USE AND VARIABLES COMPUTATION

4.1 Introduction

This section discusses the pattern of intra-household time allocation in Ghana based on the three surveys (GLSS4, GLSS5 and GLSS6) with much emphasis on the differences across gender (male versus female) and geographical locations (urban and rural). This segment describes the activities captured in the three rounds of the survey which were aggregated into paid and unpaid work. It also describes in detail how each of the variables of interest is aggregated and computed. The chapter concludes with a synthesis of the main issues discussed and the findings from the descriptive analyses.

4.2 Pattern of time allocation within Ghanaian households

In the last three rounds of the GLSS, the Ghana Statistical Service has gathered information on various unpaid household works. While the questions on six of the variables (collecting firewood, fetching water, ironing, taking care of children, cooking, running errands and shopping) have been consistent, others have been differently asked in ways that virtually mean the same and permit their aggregation. Table 4-1 presents the list of variables captured in each of the rounds of the survey while Tables 4-2 to 4-4 show the average hours spent by individuals at age15 and older in Ghana on these various activities from the perspective of gender and geographical location (rural and urban areas). The age limit is restricted to 15 years because of two main reasons: first, to avoid the issue of conflict surrounding what constitutes child labour and children's responsibilities in the household. The ILO Convention 138 (Minimum Age Convention, 1973) stipulates that children below the age of 15 should not be engaged in any form of work whether paid or unpaid. In line with this ratification, Ghana enacted the Children's Act in 1998 to prohibit children from engaging in any work that is exploitative or hazardous to their health, education, or development (Ghana Statistical Service, 2014c).

The second reason is to allow for consistency in the computation of the gender differences in paid and unpaid hours of work as well as the time poverty indicators. It is also imperative to indicate that the analysis is restricted to only individuals who were in full-time employment as of the time of the surveys. The essence for this restriction is to avoid any potential confounding effect of underemployment as this is one of the major labour market outcomes in developing countries such as Ghana.

Table 4-1: Activities performed by individuals 15 years and older

Variable (Paid and unpaid work activities)		GLSS4 (1998/99)	GLSS5 (2005/06)	GLSS6 (2012/13)
No	Unpaid work	Obs.(N)	Obs.(N)	Obs. (N).
1	Collecting firewood	4137	21249	42517
2	Fetching water	6259	21107	42519
3	Ironing	3819	21296	42518
4	Taking care of children	4879	21184	42486
5	Cooking	7345	21141	42518
6	Running errands	5196	21228	42518
7	Shopping	5844	21251	42519
8	Washing	5524	-------	-------
9	Washing vehicle	134	-------	-------
10	Washing dishes and pots	------	21359	42517
11	Washing clothes	------	21346	42521
12	Sweeping	7296	-------	------
13	Disposing garbage	3886	------	------
14	Cleaning	-------	21223	42514
15	Others	7928	21216	-------
16	Taking care of elderly	------	21230	42495
17	Taking care of the sick	------	21339	42496
18	Helping children with school work	------	------	42480
19	Collecting food from the garden	------	------	42494
Paid work				
1	Primary job	2595	14593	30973
2	Secondary job	2794	2537	4857
3	Third job	226	------	------
4	Fourth job	19	------	------

Source: Author's calculations using GLSS data.

The average hours spent on the various household activities and wage employment by males and females, and urban and rural respondents are presented in Tables 4-2, 4-3 and 4-4. Presented in line with the year of the survey, the results depict some important trends worthy of noting for policy purpose. One such observation is a considerable reduction in the average number of hours spent on all unpaid household activities over the past one and half a decades. For instance, Table 4-2 shows that during the 1998/1999 round of the survey (GLSS4), average hours spent on an important activity such as taking care of children was almost 21 hours, 15

minutes per week. However, in Table 4-4, the number of hours spent on the same activity reduced to 3.049 hours per week during the 2012/2013 round of the survey. Although the hours spent on cooking, which was the second highest during the fourth round of the survey has decreased, it remains the household activity on which individuals spend most of their time. Cooking requires more hours than taking care of children. Also, while the hours spent on fetching water has reduced from an average of 4 hours per week, individuals spent not less than one hour per week on this activity during the 2012/2013 round of the survey.

Our results show that the t-statistic is significant at the conventional levels (1%, 5% and 10%) for unpaid household work in all the three rounds of the survey with the exception of the GLSS4 where running errands, shopping and other activities appear to be insignificant. In all instances where the results are significant, the null hypothesis, that there is no difference between means is rejected. Across all the surveys, there are insignificant differences between means for secondary jobs. Across gender, females spend more time on almost all the household activities than males. It is consistently observed that across the three surveys, the only activities on which males spend more hours than females are ironing, and running errands. This observation does not come as a surprise since these activities are mainly the responsibilities of males in Ghanaian homes. During the 1998/1999 round of the survey, females were unusually found to spend twice the hours spent by males on washing vehicles. This result cannot be interpreted without due consideration of the skills required in carrying out such activities.

It can be observed in Table 4-3 that during the 2005/2006 round of the survey (GLSS5) the pattern of the hours spent on the various activities by males and females in the household did not change so significantly from the pattern in the 1998/1999 round. Nonetheless, there are some distinct observations in the time allocation to the various activities across the two surveys. First, the gap of the hours spent on cooking between males and females increases by an hour during the GLSS5. In addition to ironing and running errands, males spend more time on other activities than females. This means that from the period of the fourth round of the survey to the fifth round, the average time allocation to other activities by males in the household exceeded that of females.

Table 4-2: Weekly hours of work across gender and place of residence (GLSS4, 1998/99)

Variable	Male		Female		Urban		Rural		All
name/description	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean	Mean
Collecting firewood	999	3.159*	3138	4.165*	402	4.461*	3735	3.864*	3.922
Fetching water	1843	3.075*	4416	4.383*	2017	3.350*	4242	4.305*	3.997
Ironing	2306	1.480	1513	1.308	2108	1.523**	1711	1.276**	1.412
Caring for children	956	12.06*	3923	23.367*	1579	22.139***	3300	20.680**	21.152
Washing vehicle	107	3.134*	27	6.234*	79	3.257***	55	4.479***	3.758
Sweeping	1473	1.419*	5823	2.237*	2562	1.882*	4734	2.175*	2.072
Disposing garbage	629	0.916*	3257	1.113*	1077	1.148*	2809	1.055*	1.081
Cooking	1043	6.460*	6302	12.120*	2567	9.633*	4778	12.221*	11.316
Shopping	1220	2.935*	4624	3.377*	2087	3.161	3757	3.353	3.284
Running errands	2359	3.061*	2837	3.005*	1930	2.996	3266	3.051	3.031
Washing	1137	1.273*	4387	1.811*	2044	1.521*	3480	1.806*	1.700
Other	2812	2.883*	5116	3.404*	2854	3.151	5074	3.258	3.219
Main job	960	39.836*	2069	34.344*	1320	23.567*	1275	29.249*	26.359
Second job	1233	25.157*	1561	23.644*	561	24.096	2233	24.366	24.312
Third job	74	25.351**	152	21.316**	42	25.786	184	21.918	22.637
Fourth job	2	7.000	17	24.588	3	18.667	16	23.500	22.737

Note: *1%, **5%, ***10% using t-test (two-tailed test) of difference in means across group[28]
Source: Author's calculations using GLSS4 data.

During the 2012/2013 (GLSS6) round of the survey, three new variables were introduced: 1) taking care of the elderly, 2) collecting food from the garden, and 3) helping children with school work. These three variables could possibly replace the variable that captures other activities in the GLSS4 and GLSS5. Though the separate time allocation to these three activities appears to be lower than the aggregated variable "other activities" in the GLSS4 and GLSS5, there were no marked differences in the pattern of time allocation by males and females. What appears to be quite noticeable is that males and female spend virtually the same number of hours on the collection of food from the garden. In terms of helping children with school work, females seem to spend slightly more time than males.

Across geographical location, individuals in rural areas spend more time on cooking than their counterparts in the urban areas. This is quite understandable since they face a potential double burden of accessing time-saving and efficient energy, for cooking. The proliferation of improved, cleaner, faster, and more convenient sources of energy such as Liquefied Petroleum Gas (LPG) and electricity in the urban areas place urban residents in a better position to spend fewer hours on cooking than rural residents. Across the three surveys, the gap between rural and urban

[28] The null hypothesis states that the difference of mean hours between men and women, as well as rural and urban residents, is not significantly different from zero.

respondents on the number of hours spent on cooking has been fluctuating. It reduced from 2.588 hours in the GLSS4 to 0.099 hours in GLSS5 but increased to 0.344 hours in the GLSS6. In addition, people in rural areas spend more time on fetching water, sweeping, shopping and washing than those in the urban areas. These results could possibly be as a consequence of the marked infrastructural deficit in the rural areas which further compound their poverty situation.

On the contrary, Tables 4-2 and 4-4 show that urban residents spend more time collecting firewood than their rural counterparts. In the urban area, the use of firewood is rare and is mostly used by households in the slums and underdeveloped areas. Perhaps this is because households that use this form of energy would have to cover large distances in order to access it. It also appears that during the GLSS4, urban residents spent more hours taking care of children, washing vehicles, disposing of garbage and running errands than rural residents. Apart from time taking care of children, which appears to be quite unusual given the time demands for economic activities in the urban area, high ownership of vehicles in the urban areas makes the time allocation to this activity realistic. It can be observed that in the GLSS5 and GLSS6, rural residents tend to spend more hours on caring for children than urban residents. This could be partly due partly to the increasing number of day care centres, and partly to the ability of urban residents to hire the services of others to perform the duty of caring for their children.

The difference in time allocation to shopping also becomes very clear as rural residents allocate more time to this activity, possibly due to the inaccessibility of such shopping facilities in the rural areas. Therefore, commuting time adds to their time spent on such activity. More hours are also spent on taking care of the sick and the elderly in the rural areas than in the urban areas. Compared to the GLSS5, the pattern of time allocation between rural and urban residents did not change so much during the GLSS6. Though the time allocated to all the activities was generally lower than in the previous two surveys, the gap becomes bigger between rural and urban residents in terms of the time allocated to the collection of firewood. It increased from 0.529 hours per week to 0.934 hours. Also, rural residents allocate more time to the collection of food from the garden, and taking care of the sick and the elderly, than those in the urban areas. However, urban residents spend more time helping children with school work than those in the rural areas.

Table 4-3: Weekly hours of work across gender and place of residence (GLSS5, 2005/06)

Variable	Male		Female		Urban		Rural		All
name/description	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean	Mean
Collecting firewood	10112	0.363*	11137	1.279*	3594	0.168*	4999	0.697*	0.843
Fetching water	10102	0.626*	11005	1.828*	3596	0.458*	5008	0.612*	1.253
Washing clothes	10121	0.665*	11175	2.192*	3579	0.946**	5011	0.713*	1.466
Ironing	9933	0.259*	11251	0.144*	3516	0.346*	4968	0.136*	0.198
Cleaning	10074	0.520*	11067	1.860*	3566	0.630*	4992	0.747*	1.221
Cooking	10125	0.912*	11103	7.657*	3593	2.639*	5006	2.738*	4.440
Shopping	10085	0.495*	11166	1.601*	3565	0.783*	4987	0.867*	1.076
Running errands	10044	1.134*	11315	0.903*	3580	0.715*	4989	0.830*	1.012
Washing dishes/pots	10102	0.243*	11244	1.135*	3585	0.278*	5019	0.334*	0.713
Caring for children	10136	1.099*	11087	4.831*	3567	1.635*	5013	2.364*	3.049
Caring for the elderly	10051	0.031*	11165	0.051*	3578	0.022**	4979	0.031**	0.041
Caring for the sick	10064	0.073*	11166	0.109*	3560	0.051*	4958	0.092*	0.092
Other	10044	0.802*	11295	0.608*	3563	0.639	4992	0.960*	0.699
Main job	7017	41.796 *	7576	36.624 *	2835	45.982*	4409	35.667*	37.773
Second job	1162	20.384	1375	16.661	414	17.676	1056	18.572	15.934

Note: *1%, **5%, ***10% using t-test (two-tailed test) of difference in means across group

Source: Author's calculations using GLSS5 data.

The distribution of hours spent on paid work are summarised putting into consideration all the sources of occupation. The figure shows that hours spent on main occupation has increased for both males and females. On average, the hours spent by males on their main occupation have increased by 2 hours from 40 hours a week to 42 hours a week. In the same vein, females have also increased their hours spent on main occupation by 4 hours from 34 to 38. This means that the increase in the hours spent on main occupation is 2 hours higher among females than among males. Between the 1998/1999 and 2005/2006 surveys, there were reductions in the time spent on second jobs by both males and females. However, the reduction was higher for males than females. Between the 2005/2006 and 2012/2013 surveys, there were slight increases for both sexes. Nonetheless, the increase was relatively higher for females than males. Also, while males spend more hours on the third occupation in the GLSS4, females spend more hours on the fourth occupation than their male counterpart.

In summary, the tables show that although there has been a considerable reduction in the time allocation to all unpaid household activities since 1998, two main activities on which individuals still spend more time are cooking and taking care of children. The higher number of hours spent on these activities have implications for policies that are designed to promote active participation of individuals in the labour market. Such policies will have to take into consideration these factors and pay particular attention to rural households and females in both rural and urban areas. There seem to be a shift in time allocation from household production to labour market activities. This

sub-section, presents a detailed explanation of the pattern of the various activities on which information were collected during the last three rounds of the GLSS with focus on the gender and place of residents of respondents. The next subsection presents a detailed explanation of the processes by which these activities were aggregated into the indicators (wage, time allocation to paid and unpaid activities, gender inequality and poverty) used in addressing the objectives of this thesis.

Table 4-4: Weekly hours of work across gender and place of residence (GLSS6, 2012/13)

Variable name/ description	Male		Female		Urban		Rural		All
	Obs.	Mean	Obs.	Mean	Obs.	Mean	Obs.	Mean	Mean
Collecting firewood	19842	0.328*	22675	1.089*	17292	0.180*	25225	1.114*	0.734
Fetching water	19842	0.458*	22677	1.664*	17292	0.744*	25227	1.346*	1.101
Washing clothes	19843	0.516*	22678	1.902*	17293	1.284*	25228	1.235*	1.255
Ironing	19841	0.234*	22677	0.153*	17291	0.312*	25227	0.108*	0.191
Cleaning	19839	0.340*	22675	1.533*	17288	0.893*	25226	1.034*	0.976
Cooking	19842	0.539*	22676	4.599*	17291	2.500*	25227	2.844*	2.704
Shopping	19843	0.307*	22676	1.005*	17292	0.641*	25227	0.706*	0.679
Running errands	19842	1.050*	22676	0.814*	17291	0.742*	25227	1.049*	0.924
Washing dishes	19843	0.181*	22674	0.939*	17292	0.512*	25225	0.635*	0.585
Caring for children	19829	0.595*	22657	2.479*	17271	1.355*	25215	1.767*	1.600
Caring for the elderly	19832	0.067*	22663	0.177*	17277	0.091*	25218	0.150*	0.126
Caring for the sick	19832	0.054*	22664	0.133*	17277	0.080*	25219	0.107*	0.096
Food from the garden	19831	0.336	22663	0.326	17275	0.089*	25219	0.496*	0.331
Children's school work	19825	0.089	22655	0.097	17268	0.106*	25212	0.085*	0.093
Main job	14971	41.556*	16002	37.686*	1241	15.936*	3616	36.105*	39.557
Second job	2280	16.295	2577	16.351	11474	45.423	19499	16.458	16.325

Note: *1%, **5%, ***10% using t-test (two-tailed test) of difference in means across group
Source: Author's calculations using GLSS6 data.

4.3 Aggregation of the time use variables into paid and unpaid work hours

In this study the variables of interest such as wage paid and unpaid hours of work, income and time poverty, were computed from the original variables in the dataset. The computation of these variables involved a number of processes which will be explained in detail in the succeeding subsections. The explanation of the computation process is organised in the order of how the variables appear in the objectives. This section begins with the exposition of the computation process of paid and unpaid hours of work. This is followed by the explanation on how wage and the measures of gender inequality were computed and conclude the section with the computation process of time poverty and income poverty. In line with the focus of the study, the sample for each variable was restricted to only respondents who are fifteen years old and above. We assume that should a respondent in an unlikely situation spend all his/her time on either paid or unpaid

activity the maximum time available to him/her is 168 hours. As a result, all observations of the aggregated variables that were greater than 168 hours were discarded.

4.3.1 Computing the hours of paid work

In computing the hours of paid work, all the hours spent on paid employment in the last seven days preceding the GLSS were aggregated. In the GLSS 5 and 6, there were only two economic activities that were captured. These were primary or main occupations and secondary occupations. However, in the GLSS4 there were four types of occupations (main, secondary, third and fourth) for which the respondents were asked to provide the number of hours they spent on each. After the question on each economic activity, the respondents were asked whether they did that particular work at the same time as the main work. This variable was used as an indicator to identify all individuals who claimed to have worked on their secondary jobs at the same time as their primary jobs. The essence was to avoid double counting and ensure only the occupations on which the respondents spent different hours were considered. All extreme values reported in the datasets were addressed using the winsorising method to set the top 1% and bottom 1% of the weighted time use variables to the value of the 1st and 99th percentile.

4.3.2 Computing the hours of unpaid work

Similar to the process of computing the paid hours of work, the variable unpaid hours of work were computed by aggregating all the unpaid household activities on which the respondents spent their time in the last seven days preceding the survey. Since the study seeks to assess the gender dynamics in relation to time use, separate aggregated variables were created for males and females within the same household. Unlike other studies such as Daunfeldt and Hellström (2007), where the analysis was restricted to only couples, all male and female household members who are fifteen years and older were considered in order to account for the heterogeneities among household members. It stressed that following the contents of the data at hand, this study designated paid work by market labour and unpaid work by household labour. The same winsorising method was applied to address all outliers in the unpaid time use data before computing all the indicators.

4.3.3 Computing the gender inequality in time use indicators

Based on objective three of this study, two indicators are used: 1) gender disparities in time use and 2) discretionary time use. These two indicators can be measured in relative and absolute terms (UNCTAD, 2014). Beginning with the relative measures, the present study applies an approach proposed by Ferrant (2015) in a report to the OECD and UNCTAD (2014). Ferrant (2015) suggested that the relative measure of gender disparity in time use should be a ratio of

the average hours spent by females to the average hours spent by males on unpaid work activities. In the same vein, the gender discretionary time use should be measured as the ratio of the number of hours spent by females to the number of hours spent by males on total work. These two indicators can be functionally specified as:

$$Gender\ Parity\ Index(GPI)_i^t = \frac{F_i^t}{M_i^t} * 100 \quad (1)$$

In equation 1, F_i^t and M_i^t respectively represents the female and male values of average time (in the case of the gender disparities in time) on unpaid work and total time (in the case of the discretionary time) spent on unpaid work i at time t while the GPI measures either gender disparity or discretionary time use by males and females. A GPI value of 1 indicates equality between males and females while any value between 0 and 1 suggest a disadvantage against women. On the other hand, a value greater than 1 shows a disadvantage against males.

However, this approach has an inherent computational problem, especially in respect to the gender disparities in time use. Within some households, it is possible that the performance of unpaid activities is the sole responsibility of females with males performing none. In that case, dividing the average time of the female by the zero observation of the male in the household will produce an infinite result which appears as a missing value when computed. This makes it difficult to differentiate between these infinite values occurring as missing and the true missing values that occur in the course of the data collection. The implication is that the sample will be limited to only household members in which there are observations for both male and female while not accounting for households in which females are the sole performers of unpaid household activities. This study, therefore, uses a second approach which is operationally called the gender gap in time use. It involves a computation of the difference between the average number of hours spent by males and females and dividing the results by the average number of hours spent by females on the same activity. This can also be specified functionally as:

$$Relative\ Gap\ (RG)_i^t = \frac{F_i^t - M_i^t}{F_i^t} * 100 \quad (2)$$

Similar to the interpretation in equation 1, F_i^t and M_i^t in equation 2 respectively measures the female and male values of average (in the case of the gender disparities indicator) and total (in the case of the discretionary time use) time spent on unpaid work i at time t while the GPI measures either gender disparity or discretionary time use by males and females. A GPI value of 1 indicates parity or equality between males and females while any value between 0 and 1 suggests a disadvantage against women. On the other hand, any value greater than 1 shows a disadvantage against males.

Although these relative indicators have been widely used in the literature, they have some drawbacks that have to be clarified. One downside of a ratio is that in some instances a ratio of one, indicating gender equality in time use may be misleading since it provides no information about the context in which the change takes place and the direction of its individual components. To allow for accurate interpretation of the relative indicators, there is the need to make available detailed information about the data used to construct the measures (UNCTAD, 2014). For instance, in the context of this study, an increase in the ratio of female to male time use may not necessarily emanate from an increase in female time use, but can be due to a reduction in male time use while female time use remains unchanged or a fall in both with male time use falling more than that of females.

In order to minimise the biases introduced by these limitations, this study modifies the indicators by using the ratio of female hours to total work hours. This modified version helps to account for the observations for which the husband performs zero hours of work. This means that equations 1 and 2 can be re-specified as equations 3 and 4.

$$Gender\ Parity\ Index(GPI)_i^t = \frac{F_i^t}{F_i^t + M_i^t} * 100 \quad (3)$$

$$Relative\ Gap(RG)_i^t = \frac{F_i^t - M_i^t}{F_i^t + M_i^t} * 100 \quad (4)$$

Both equations have maximum values of 1 or 100% which indicate complete inequality against women. A value of 0.5 or 50% shows gender equality in hours of work while any value less than 0.5 or 50% indicates inequality against men.

4.3.4 Computing the wage indicators

As indicated in the section on data, both nominal and real wages were used in the analysis. The nominal wage was computed as the sum of the nominal income earned from main and secondary occupations. In July 2007, the Bank of Ghana (BoG) embarked on re-denomination of Ghana's currency (cedi) which led to the replacement of the old cedi (¢) with the new Ghana Cedi (Gh¢). Citing several reasons such as years of continuous decline in the value of the currency, high levels of inflation, and portability of the currency, the Bank of Ghana reduced the number of zeros by four such that ten thousand cedis would be equivalent to one Ghana cedi. Since the dataset used in the analysis span across the regimes of both the old and new currencies, an adjustment was made to the data on wage in the GLSS4 and GLSS5 which were conducted before the re-denomination. Wage was divided by ten thousand (10000) in order to standardise the data.

Also, wage had been captured in hourly, daily, weekly, monthly, quarterly and yearly units (Ghana Statistical Service, 2014c). However, to ensure consistency between the time use and time poverty indicators, all these units were put into weeks. For policy purposes, the weekly wages were further computed on hourly bases by dividing the total wage receipts in a given period by the number of hours worked (Ghana Statistical Service, 2014c). This means that the results are interpreted on hourly and not weekly, monthly or annual basis. The surveys collected information on only nominal earnings of the respondents from their main and secondary occupations. Nonetheless, this study goes further to adjust for inflation by computing the real wage since most economic decisions are made based on relative (real) wages. In computing the real wage, the nominal wage (the observed wage in the market) was divided by the consumer price index (CPI), where the CPI is also expressed as a ratio and not a percentage. This expression can be written as:

$$Real\ wage\ in\ time\ (t) = \frac{Nominal\ wage\ in\ time(t)}{\frac{CPI\ in\ time\ (t)}{100}} \quad (3)$$

4.3.5 Computing the income poverty variable

In this study, both income and consumption poverty indicators were used in order to assess the differences and similarities in their effects on gender inequalities in time use. While consumption poverty had already been computed by the Ghana Statistical Service, income poverty was computed by the author. As a starting point, top and bottom codes were applied to remove the extreme values which are usual characteristics of household income. The reason for performing the top and bottom coding is to address the problem of high sensitivity of many inequality measures to the values at the bottom and/or top of the income distribution. In order to get measures of income poverty in a population, it is necessary to compare income across different types of households. As a result, the differences in household size and composition are taken into consideration. For instance, in order to compare the income between a single adult household and a two adult household, there is the need to normalise the income of these households to that of some common household structure. This normalised income, which adjusts for household size, is called equivalised income and the normalising factor is known as the equivalence scale (Larrañaga, 2009).

In computing the income poverty indicator, it is important to set the poverty line which has been approached in different ways depending on the objectives and geographical location. Five different forms of poverty lines have been outlined in the literature: the absolute poverty line, the

relative poverty line, the subjective poverty line, the hybrid poverty line and the anchored poverty[29] line (OECD, 2013). However, to be consistent with the approach used by the Ghana Statistical Service in computing the consumption poverty indicators, this study uses the absolute poverty line which is a fixed cut-off level of income used by the Ghana Statistical Service. This is applied across all potential income distributions, after adjusting for differences in purchasing power due to inflation (Ghana Statistical Service, 2007, 2014b). The absolute poverty line is used because the objective of this study is to examine the effect of both income and consumption poverty on gender time use indicators. The Ghana Statistical Service used the absolute poverty line in the computation of the consumption poverty variable. The use of the absolute poverty line is to ensure that the income poverty is comparable to consumption poverty even though the two may not be the same in magnitude.

The usual approach adopted by the Ghana Statistical Service is that they use two nutritionally based poverty lines (lower and upper poverty lines) as the thresholds for classifying household members as either poor or otherwise. The lower poverty line measures the income needed to meet the nutritional requirements of household members. In this regard, individuals whose total expenditure falls short of this line are considered to be in extreme poverty, because even if they are to allocate their entire budget to food, they would not be able to meet their minimum nutrition requirements (Ghana Statistical Service, 2014b). On the other hand, the upper poverty line incorporates both essential food and non-food consumption and individuals who consume above this line are considered as being able to purchase enough food to meet their nutritional requirements and their basic non-food needs (Ghana Statistical Service, 2014b).

During the GLSS4 the lower and upper poverty lines were set at 700000 and 900000 cedis. In the GLSS5 survey period, the same poverty lines of 700000 and 900000 cedis are used except that the Ghana Statistical Service accounted for inflation using locality specific Consumer Price

[29] See OECD (2013) for a detailed discussion of the various types of poverty lines and the process involved in setting them. According to Förster and d'Ercole (2012), the main difference between absolute and relative poverty lines is that the absolute poverty line has been commonly used in developing countries while the relative poverty line has been used in developed countries particularly in the USA. This is partly due to the fact that a large proportion of the populations of developing countries survives with the bare minimum or less. Therefore, using the absolute rather than the relative poverty line often proves to be more relevant (Coudouel, Hentschel, & Wodon, 2002). Mostly, in developing countries, the consumption poverty indicators are used due to the perceived inaccuracy of the income values reported in Living Standard Surveys. Ghana Statistical Service (2007) and Ghana Statistical Service (2014b) reports provide a detailed explanation of the methodology used in computing and rebasing the poverty lines.

Index (CPI) at January 2006 prices. This yielded poverty lines of 2884700 cedis and 3708900 cedis which were equivalent to 37.8% and 48.6% of mean consumption levels in 2005/06. In the course of the GLSS6 survey period, the lower and upper poverty lines used were 792.05 Ghana cedis and 1314.00 Ghana cedis per adult per year. These were also equivalent to 27.1% and 44.9% of the mean consumption level in 2012/13 (Ghana Statistical Service, 2007, 2014b). Given these poverty lines in the data sets, the Foster-Greer-Thorbecke(FGT) (Foster, Greer, & Thorbecke, 1984) class of poverty measures were computed. The first three measures are the headcount index of poverty, the poverty gap, and the squared poverty gap. The focus of this study is the headcount index which is a measure of the proportion of the population that is counted as poor, often denoted by P_0 for each round of the survey. Since income was collected at the household level and not at the individual level, the files that contain the household level variables were merged onto the individual level files using the household identifiers as the linkage variable. Prior to merging these files, the individual level files were sorted to ensure that several individuals in the same household were matched on to their respective households. This process was done for each round of the survey before the three sub-aggregated files were appended together as a composite data set for the analysis.

4.3.6 Computing the time poverty variable

Imbedded in the measurement and computation of time poverty are a number of conceptual challenges that researchers face. Among these challenges are various decisions that the researcher has to make regarding: 1) the extent to which income should be treated independently of time, 2) the target population, and 3) aggregation across all adults in a household which comes with the risk of masking important differences in allocation of tasks in the household (Williams et al., 2015). The toughest challenge is possibly the choice of the poverty time threshold (either subjective or absolute). Time poverty has been computed by previous studies using both subjective and absolute approaches. The subjective[30] measure focuses on individuals' perceptions as to whether they feel time pressured or otherwise.

On the other hand, the objective approach is based on a fixed threshold of time needed for rest, leisure or other activities after taking into consideration time for personal care, paid work in the marketplace, and unpaid household labour. It involves a comparison of the time actually used by an individual with some absolute or relative standards. The difference between the relative and absolute standards is that the absolute is based on a fixed amount of time while the relative is

[30] See the works of Mothersbaugh, Herrmann, and Warland (1993) and Hamermesh and Lee (2007) for discussions on how the subjective approach has been applied to assess the effect of perceived time-stress on adherence to recommended dietary practices (RDPs), and how time stress varies by gender.

based on some proportion of mostly the median value of the discretionary time (Spinney & Millward, 2010). Currently, there has not been any consensus on a single threshold used in the literature. The use of a particular approach for deriving the threshold has been largely driven by the distribution of the available data and the discretion of the researcher in question (Ribeiro & Marinho, 2012; Spinney & Millward, 2010). However, to be consistent with the income and consumption poverty indicators, the approach used to address the objective was adopted.

Following Wodon and Bardasi (2006) and Spinney and Millward (2010), this study adopts the traditional approach and techniques used in computing income and consumption poverty indicators. The authors set two poverty lines: 1) The lower poverty threshold of 1.5 times the median number of the contracted hours (paid and unpaid) of all adults aged 15 years and older; 2) the upper poverty threshold of twice the median contracted hours (paid and unpaid) of all adults aged 15 years and older. These two poverty lines are, in principle, equivalent to the lower and upper income and consumption poverty thresholds. However, this study focuses on only the lower poverty threshold of 1.5 times the median number of contracted hours because that minimum threshold is enough to provide a picture of the extent of the association between income/consumption poverty and time poverty.

With this poverty line, the poverty measures of the FGT class (Foster et al., 1984), namely the headcount index of poverty, the poverty gap, and the squared poverty gap were computed. As far as the parametric regression analysis is concerned, the focus is on the headcount index since the study intends to assess its relationship with the income and consumption poverty indicators. Nonetheless, a detailed descriptive analysis of the poverty gap and the squared poverty is provided gap across some socio-economic indicators. Similar to the income poverty analysis, the headcount index is the share of the population which is time poor. It represents the proportion of the population that works a certain number of hours more than the designated time poverty threshold. Mathematically, the headcount index can be expressed as:

$$H = \frac{\rho}{n} \tag{1}$$

In equation 1, H represents the head count index, ρ and n respectively represents the proportion of the population that is time poor and the total population. Equation 1 can be expressed in programmable discrete terms as equation 4.

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{Z-Y_i}{Z}\right)^\alpha 1(Y_i \leq Z) \tag{4}$$

From equation 2, Y_i is the time use variable, Z is the poverty line and alpha (α) is the poverty sensitivity parameter. The poverty line and alpha can be either a number or a scalar. Similarly P-

alpha (P_α) is the poverty measure, 1(●) is an indicator variable that takes on a value of 1 if the argument of a poverty indicator is true (i.e. an individual is time poor) and zero otherwise. It is important to note that the poverty gap of the non-poor is set to zero. The estimate of P_α is the average of the poverty gaps raised to the power α.

4.4 Conclusion

In this section has presented and discussed the various facets of the methodology used to achieve the empirical objectives. Systematically, the process involved in computing the various variables of interest which were used in the analysis has been explained. The most important lesson learnt from this section is that while there are established procedures for setting income and consumption poverty lines, there is an on-going discourse on the procedure for setting the time poverty threshold. The bottom line is that appropriate time use indicators are essential for formulating developmental policies.

CHAPTER 5: TRADE OPENNESS AND THE GENDER WAGE GAP

5.1 Introduction

This section is divided into three main sections with some of the sections having sub-sections. The first section briefly discusses the trends of some economic and trade openness indicators in Ghana from the period 1993 to 2016. The essence of this discussion is to provide a picture of the economic activities and the level of the country's integration into global trade. It also explores the distribution of labour force participation and hourly wages with a focus on the economic activity and gender of respondents. The second section presents the econometric estimates of labour force participation, hourly wages and the contribution of trade openness to various components of the gender wage gap in Ghana. The concluding section provides a synopsis of the objective of the chapter, the main findings and policy recommendations.

5.2 Descriptive analysis

Figure 5-1 depicts that, since 1993, Ghana's GDP (both at basic prices and purchasers' value) has consistently increased, particularly, between 2010 and 2016. However, available statistics show that the increase in GDP has been mainly driven by the service sector as its contribution to GDP has remained higher than the industry and agriculture sectors. The GDP of the agriculture sector, which has been touted as the backbone of the economy over the years has consistently decreased from 30.6% in 2006 to 18.9% in 2016. On the contrary, the contributions of the industry and service sectors to GDP have increased from 20.8% to 24.3% and 48.8% to 56% respectively (Ghana Statistical Service, 2018b). The gap between the service sector and the other two sectors has consistently widened, mainly, between 2006 and 2016.

These developments may be due to the systemic and institutional factors that have affected the productivity of the industrial and agricultural sectors which employ the majority of Ghana's population. One such factor was the severe energy crisis that plagued Ghana's energy sector from the second half of the year 2006 to 2016 and caused the country to lose about 1.8% of GDP in 2007 and an average production worth of about US $2.1 million per day (or, US $55.8 million per month) in 2014 (Kumi, 2017). It is important to note that the observed increase in GDP does not necessarily mean a consistent increase in the GDP growth rate as the latter can be at a decreasing, constant or increasing, depending on many factors, including both domestic and foreign market developments.

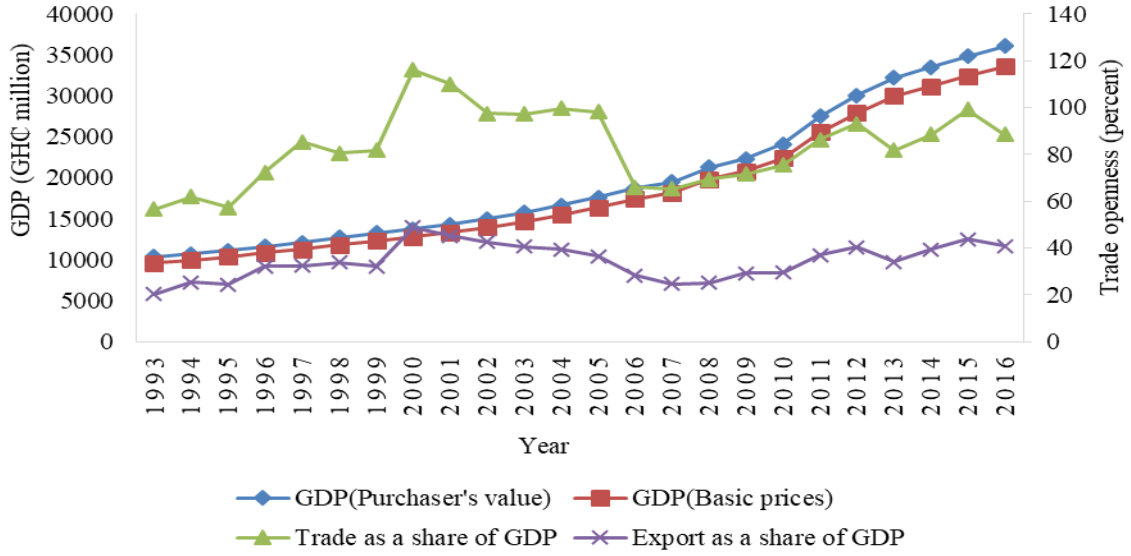

Figure 5-1: Trend of GDP[31] and trade openness (1993-2016).

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database

Ghana's GDP growth rate decelerated from an all-time highest (14%) in 2011 to 3.7% in 2016, possibly due to the cumulative impact of the energy crises that affected mainly the industrial sector contributing to a decrease in the GDP of the industrial sector from 14.6% in 2011 to -0.5% in 2016. The figure further shows that an increase in GDP has not always been associated with high levels of trade openness. Although the trend of trade openness has not been consistent over the years, it has not followed the same trend as GDP. At low levels of GDP (between 1993 and 2006), both the sum of exports and imports as a share of GDP and exports as a share of GDP, were higher than the period 2006 to 2016 when GDP had increased. The huge gap between trade as a share of GDP and exports as a share of GDP reflects the dominance of import over exports in Ghana as an import-dependent developing country.

Since the objective of this study is to examine the effect of trade openness on the gender wage gap, Table 5-1 presents the level of trade openness[32] (disaggregated into economic activities) for the corresponding years in which the GLSSs were conducted. The results show that generally, all the economic activities have experienced some level of openness (both trade as a share of GDP and export as a share of GDP) from 1998 to 2013. Considering exports as a share of GDP, the level of openness has been particularly high in the manufacturing (20% to 693%), followed by the mining and quarrying industries (4% to 285%), crops and livestock (less than 7% to 74%),

[31] Note that all the GDP values are in new Ghana cedi at 2006 constant prices.

[32] Trade openness at the economic activities or industries is computed by dividing the trade variables (exports and imports) by the GDP of the same activity.

forestry and logging (less than 1% to 4%) with the fishing industry being among the least liberalised. A similar trend is observed when trade as a share of GDP is considered. Although export data for some of the activities under the service sector were not available for the 1998/9 survey period, the results show evidence of openness of some of those economic activities for the two survey years (2005/6 and 2012/3) for which data were available.

Table 5-1: Trade openness disaggregated across economic activity and survey year

Economic activity	Trade as a share of GDP (%)			Export as a share of GDP (%)		
Survey year	1998/9	2005/6	2012/3	1998/9	2005/6	2012/3
Crops and Livestock	7.63	14.38	79.29	6.86	12.23	74
Forestry and Logging	0.35	0.94	6.86	0.28	0.12	3.99
Fishing	0.390	0.280	0.83	0.13	0.23	0.11
Manufacturing	93.270	257.370	1815.19	20.09	49.31	693.21
Mining and Quarrying	30.420	130.060	284.9	4.2	3.82	257.2
Electricity and Water	108.610	0.010	0.010	26.71	--------	--------
Information and Communication	19.910	51.190	3.71	0.25	2.63	0.07
Financial Services	-------	181.870	183.77	--------	182.15	71.05
Public Administration & Defence; Social Security	-------	24.72	93.07	--------	16.23	6.65
Transport and Storage	-------	50.82	187.99	-------	9.03	20.16
Real Estate, Professional Administrative & Support Services	-------	47.49	480.18	--------	19.93	64.06

Source: Author's calculations using data from the Ghana Statistical Service and UN International Trade Statistics Database.

The distribution of economic activity by gender of the respondents (see Figure 5-2) indicates that 52% of men and 48% of women participated in the labour market during the seven days preceding the GLSS. Apart from manufacturing, the rest of the economic activities are male-dominated. The only economic activity in which there seems to be almost equal distribution of males and females is crops and livestock. The higher percentage of females in manufacturing confirms the findings of earlier studies on developing countries which suggest a strong positive correlation between female intensity of manufacturing (the number of female workers per 100 male workers) and export growth (Swamy, 2004). The results depict the pervasiveness of segregation (separation of men and women into different occupations) in economic activities such as fishing, mining and quarrying, information and technology as well as transport and storage. This distribution also gives an idea of how the entrenched social norms that shape gender roles in the household affect equal employment opportunity of men and women in Ghana.

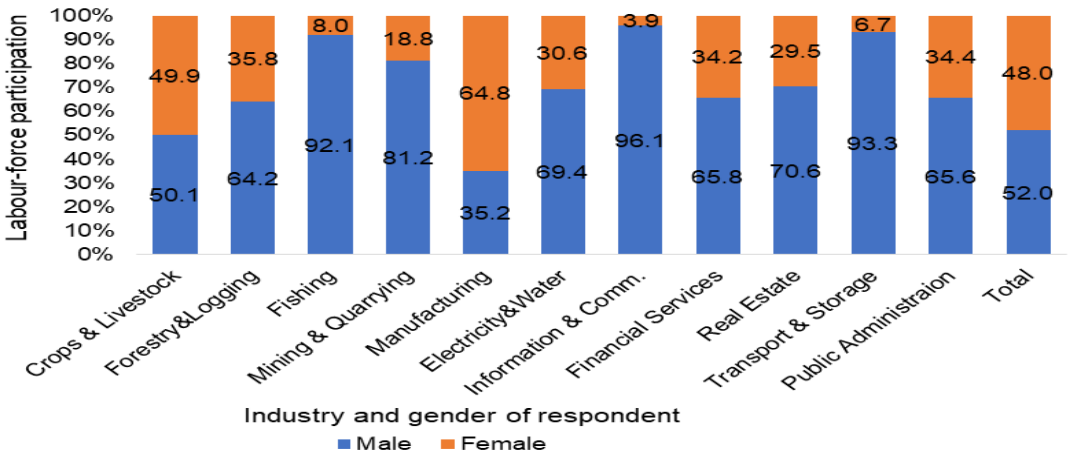

Figure 5-2: Distribution of labour force participation, gender and economic activity

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

The average weekly hours of paid work in Figure 5-3 shows that across all the economic activities, men work more hours than women. The difference is more pronounced among workers who are engaged in forestry and logging, mining and quarrying, information and communication, and real estate activities. Although transport and communication (see Figure 5-2) is a male-dominated economic activity, it appears to be the only activity in which men and women spend virtually the same number of weekly hours of work. Similar relative equality in hours of work is observed among workers who are engaged in fishing. While the proportion of women in the fishing industry is lower than that of men, they spend more hours on fish preservation and other downstream activities that requires more time.

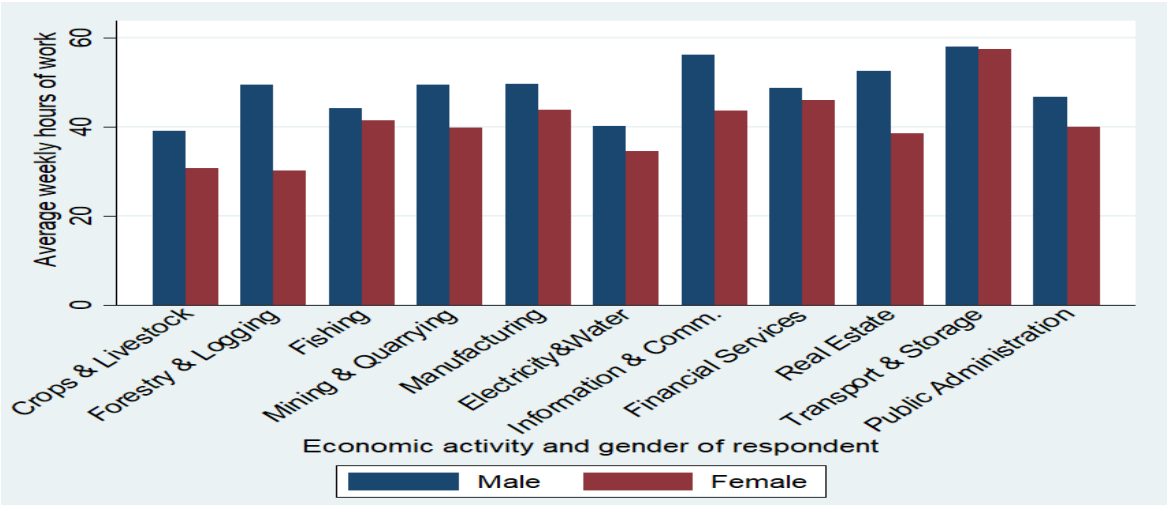

Figure 5-3: Average weekly hours of paid work across gender and economic activity

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

Consistent with the distribution of employment and hours of paid work across economic activity, the distribution of wages across gender and economic activity in Figure 5-4 shows that males generally receive higher hourly wages than females. The differences are particularly higher in male-dominated economic activities such as mining and quarrying, electricity and water, forestry and logging and fishing. Conversely, the differences in wages between males and females are low in economic activities under the services sector such as information and communication, financial services, transport and storage as well as real estate. The results in the two figures illustrate the segregation, disparities in wages, and discrimination that women face in the labour market in Ghana. Ghana has ratified the major ILO Conventions that seek to promote fundamental principles and rights at work. However, lack of comprehensive policy formulation and legal mechanisms hamper these efforts (FAO, 2012).

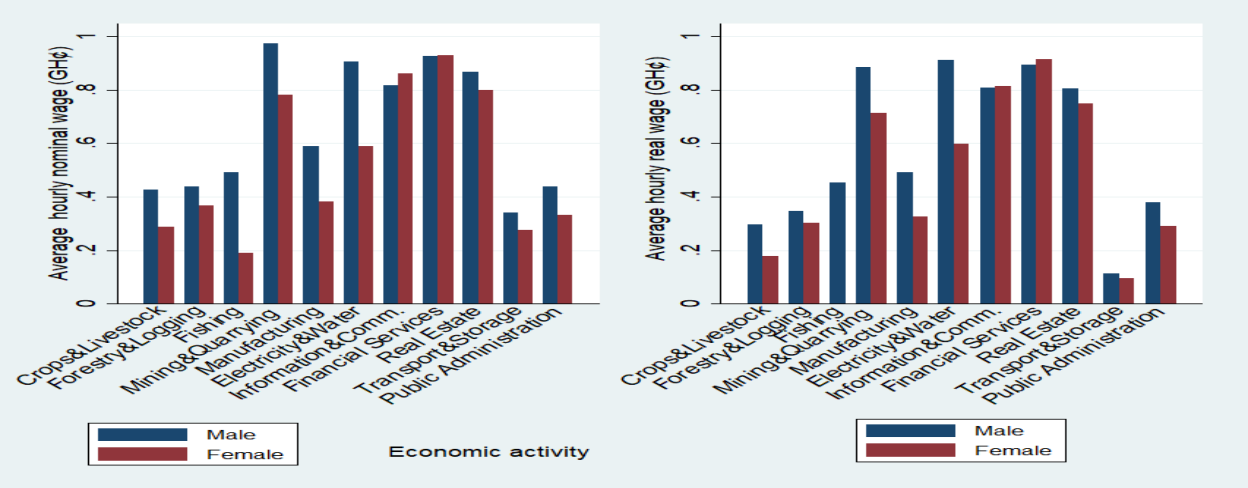

Figure 5-4: Average hourly wage across gender and economic activity

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database

5.3 The econometric estimates

The econometric estimations are done at two levels. The first phase is the analysis and discussion cover the Heckman sample selection estimates of employment and wages. This is followed by the discussion of the decomposition estimates as the second stage of the analysis. In order to assess the distributional effect of trade openness on the gender wage gap across the geographical location of respondents, separate decomposition models were specified for urban and rural areas. As indicated in the section on estimation technique, this study corrects for the potential sample-selection bias in the wage equations following the procedure by Heckman (1976, 1979), which involves using the Blinder-Oaxaca decomposition technique simultaneously with the Heckman estimation technique. This approach produces the first stage estimates of the labour force participation and wages and the second stage estimates of the wage gap and its three

components which are the explained (endowments), unexplained (coefficients) and interaction parts. Although the emphasis of this study is on the contribution of trade openness to the gender wage gap and the three components, it is important to briefly discuss the first stage estimates (correlates of labour-force participation and wages).

Beginning with the estimates of the labour-force participation, the results in Table 5-2 indicate that urban residents are more likely than their rural counterparts to be in the labour force. This observation confirms the 2014 GLSS report on labour-force participation and employment. The report of the GLSS6 shows that the rate of wage employment is about one-third (32.5%) in the urban area, while the corresponding proportion in rural areas is much lower (8.6%) (Ghana Statistical Service, 2014c). In line with both theoretical and empirical literature, the results indicate that age has a non-linear relationship with the probability of joining the labour-force. At a certain age the probability of being in the labour-force decreases partly due to poor health, the need for leisure, and other factors based on the decision of the individual or potential employers.

Apart from age and place of residence, poor health, relationship with the head of the household, and ethnic affiliation of the respondent appear to be important determinants of their probability of participating in the labour force. The ethnic affiliation of the respondent appears to be an important determinant of one's probability of engaging in economic activity. Compared with a respondent from the Akan ethnic group (which is the biggest ethnic group in Ghana), a respondent from the Guan, Mole-Dagbani, Grusi Gurma or "Other ethnic" is significantly less likely to engage in economic activity. The results on ethnic affiliation illustrate household living arrangement and socio-cultural norms and practices that have potential effects on labour force participation of mostly women in a developing country like Ghana. This is evident by the lower likelihood of females, compared to males engaging in some economic activity.

Similarly, poor health significantly reduces the likelihood that a respondent would have participated in the labour force during the seven days preceding the survey. The extent of this effect is, however, higher in the rural area than in the urban area. This is possibly because of the limited access to child care centres in the rural areas where parents could leave children for care to enable to them participate in the labour market. Education has a significantly positive effect on a respondent's probability of engaging in economic activity. The magnitude of the effect is particularly higher for respondents who have completed at least SSS. Remittance shows the expected intuitive signs that a percentage increase in remittance (non-wage income) significantly reduces the probability of a respondent participating in the labour force.

The Heckman sample selection estimates of hourly wage of respondents are presented in Tables 5-2 and 5-3. The inverse Mills ratio (Lambda) reported at the bottom of each table indicates that

adopting the OLS technique in the estimation of the subsample for paid employees would not have suffered from selectivity bias. However, since the significance of the Lambda can be due to other factors including the specification of the model, it is advisable to adopt the Heckman estimation approach in order to ensure consistency in the analysis and also to avoid any tendency of producing biased estimates. The results in Table 5-2 show that at 1% level of significance, a percentage increase in trade as a share of GDP is associated with approximately 2.3% increase in nominal wage[33] among males, 1.2% increase among females and an average effect of 1.9%, *ceteris paribus*. With respect to export as a share of GDP, the extent of the effects are 8.7% and 3.9% among males and females respectively.

Considering real wage, the estimate (see Table 5-3) for the models of trade as share of GDP increases to 3.0% among males, but remains unchanged among females. Concerning the models for export as a share of GDP, the estimate increase to approximately 10% and 6% among males and females. Consistently export as a share of GDP has relatively higher effects on hourly wages compared to trade as a share of GDP. These results may be interpreted in three ways: 1) It could be that the contribution of import to hourly wage is minimal; 2) export intensity requires labourers with heterogeneous skills leading to higher variations in wages; 3) a greater proportion of the imported commodities are finished or semi-finished products that require highly skilled human capital.

What the result suggests is that greater integration of Ghana's economy into global trade has the potential to contribute to the expansion of some sectors and economic activities leading to job creation and improved wages. However, the gender and spatial distribution of such improved wages largely depend on the type of the economic activity or sector, gender composition of the workers and geographical location of those activities that experience improvement in trade openness. These factors are crucial in determining the extent to which trade openness will either widen or narrow the gender wage gap which is discussed in subsequent sub-sections of this chapter.

Consistent with the literature on the education-earnings nexus (Blundell, Dearden, & Sianesi, 2004), education has a positive effect on hourly wages. Respondents who have completed basic education and those who have at least a secondary school qualification receive significantly higher wages than their counterparts who have no education. As evident from Table 5-2, the magnitude of the effect (relatively higher for males than females) increases with higher levels of

[33] Note that wage is log transformed while trade openness remains as a proportion of the trade variables to GDP. The interpreted coefficient is derived by multiplying the original coefficient in Table 4 by 100 (Yang, 2012).

education. The results further reveal that the size of the economic activity/industry in which a respondent work (measured as the log of the number of employees) has a significantly positive effect on an hourly wage. Thus a 100% increase in the size of the firm is associated with an increase in the hourly wage by almost 5% for both sexes, *ceteris paribus*. In Table 5-3, the estimates increase a bit to 6%. These positive effects support the earlier studies on this relationship (Gerlach & Schmidt, 1990; Margirier, 2007; Oi & Idson, 1999).

Table 5-2: Estimates of the hourly nominal wages across gender

Dependent variable	**Trade as a share of GDP (%)**			**Export as a share of GDP (%)**		
(Hourly nominal wage)	**Male**	**Female**	**All**	**Male**	**Female**	**All**
Trade openness	0.023***	0.012***	0.019***	0.087***	0.039***	0.073***
	(0.002)	(0.003)	(0.002)	(0.006)	(0.009)	(0.005)
Urban	0.022	-0.035	0.013	0.020	-0.034	0.011
	(0.021)	(0.040)	(0.019)	(0.020)	(0.040)	(0.018)
Age	-0.006***	-0.001	-0.006***	-0.006***	-0.001	-0.005***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Basic education (Ref: None)	0.066**	0.023	0.062**	0.059**	0.021	0.055**
	(0.030)	(0.057)	(0.027)	(0.030)	(0.057)	(0.027)
Secondary education plus	0.226***	0.219***	0.238***	0.212***	0.217***	0.224***
	(0.033)	(0.071)	(0.029)	(0.032)	(0.070)	(0.029)
Poor health	-0.081***	-0.055	-0.074***	-0.072***	-0.054	-0.068***
	(0.025)	(0.040)	(0.022)	(0.025)	(0.040)	(0.021)
Firm size	0.049***	0.051***	0.049***	0.047***	0.050***	0.047***
	(0.003)	(0.006)	(0.003)	(0.003)	(0.006)	(0.003)
Tenure	0.251***	0.223***	0.249***	0.245***	0.221***	0.245***
	(0.009)	(0.018)	(0.008)	(0.009)	(0.018)	(0.008)
Medium skill (Ref: Low)	0.070***	0.221***	0.087***	0.087***	0.219***	0.098***
	(0.025)	(0.044)	(0.022)	(0.025)	(0.044)	(0.021)
High skill	0.298***	0.390***	0.308***	0.330***	0.398***	0.332***
	(0.029)	(0.051)	(0.025)	(0.029)	(0.051)	(0.025)
Manufacturing (Ref: Agriculture)	0.073**	0.020	0.070**	0.015	0.002	0.021
	(0.036)	(0.073)	(0.032)	(0.036)	(0.072)	(0.032)
Service	0.197***	0.217***	0.201***	0.221***	0.225***	0.221***
	(0.032)	(0.069)	(0.029)	(0.031)	(0.068)	(0.029)
Female			-0.094***			-0.096***
			(0.025)			(0.025)
Constant	-0.041	-0.321*	-0.078	-0.064	-0.337*	-0.092
	(0.059)	(0.175)	(0.057)	(0.058)	(0.174)	(0.056)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Lambda	0.014**	0.042***	0.021**	0.008	0.045***	0.016**
	(0.021)	(0.053)	(0.021)	(0.021)	(0.053)	(0.020)
Wald chi2	5410.36***	2833.35***	8403.32***	5849.05***	2915.24***	8896.23***
Censored obs.	7605	4226	13052	7605	4226	13052

Dependent variable	Trade as a share of GDP (%)			Export as a share of GDP (%)		
(Hourly nominal wage)	Male	Female	All	Male	Female	All
Uncensored obs.	8826	8409	16014	8826	8409	16014
Observations	10339	9092	19431	10339	9092	19431

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

In addition to education and the size of economic activity/industry, the number of years of employment (tenure) and education have significantly positive effects on the hourly wages of respondents. While tenure has relatively higher effects on males' hourly wage, higher skills have higher effects on the hourly wages of females. Also, a poor health condition of a respondent in the week preceding the survey has a negative effect on his/her hourly wage. A respondent who experienced either illness, injury or both receives a lower wage compared to his/her counterpart who is in good health. An episode of either illness, injury or both has a significantly higher effect on a male's hourly wage than on a female's. Although the perceived endogeneity between health and wages is addressed in this analysis, the results confirm the evidence in the literature (Cai, 2009; Contoyannis & Rice, 2001; Pelkowski & Berger, 2004). Quite unusually, age appears to have a negative effect on hourly wage. However, to some extent, this may be ascribed to the high rate of unemployment among Ghanaian youth which could have a consequential effect on their labour market participation and earnings.

Table 5-3: Estimates of the hourly real wages across gender

Dependent variable	Trade as a share of GDP (%)			Export as a share of GDP (%)		
(Hourly real wage)	Model I	Model II	Model I	Model II	Model I	Model II
Trade openness	0.030***	0.019***	0.026***	0.109***	0.057***	0.094***
	(0.003)	(0.004)	(0.002)	(0.007)	(0.009)	(0.006)
Urban	0.001	-0.060	-0.009	-0.001	-0.056	-0.010
	(0.023)	(0.043)	(0.020)	(0.022)	(0.042)	(0.020)
Age	-0.006***	0.001	-0.005***	-0.006***	0.001	-0.005***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Basic education (Ref: None)	0.072**	0.031	0.068**	0.064**	0.030	0.059**
	(0.033)	(0.061)	(0.029)	(0.032)	(0.060)	(0.028)
Secondary plus	0.196***	0.191**	0.205***	0.179***	0.189**	0.189***
	(0.035)	(0.075)	(0.031)	(0.034)	(0.075)	(0.031)
Poor health	-0.082***	-0.065	-0.077***	-0.072***	-0.064	-0.070***
	(0.027)	(0.043)	(0.023)	(0.027)	(0.043)	(0.023)
Firm size	0.060***	0.060***	0.060***	0.057***	0.058***	0.057***
	(0.004)	(0.007)	(0.003)	(0.004)	(0.007)	(0.003)
Tenure	0.208***	0.178***	0.206***	0.201***	0.177***	0.201***

Dependent variable	Trade as a share of GDP (%)			Export as a share of GDP (%)		
(Hourly real wage)	Model I	Model II	Model I	Model II	Model I	Model II
	(0.010)	(0.019)	(0.009)	(0.010)	(0.019)	(0.009)
Medium skill (Ref: Low)	0.053*	0.209***	0.071***	0.075***	0.207***	0.085***
	(0.027)	(0.047)	(0.023)	(0.026)	(0.047)	(0.023)
High skill	0.277***	0.375***	0.287***	0.315***	0.385***	0.317***
	(0.032)	(0.055)	(0.027)	(0.031)	(0.054)	(0.027)
Manufacturing (Ref: Agriculture)	0.020	-0.008	0.021	-0.046	-0.022	-0.033
	(0.039)	(0.078)	(0.035)	(0.038)	(0.076)	(0.034)
Services	0.213***	0.257***	0.221***	0.243***	0.268***	0.247***
	(0.035)	(0.073)	(0.031)	(0.034)	(0.073)	(0.031)
Female			-0.098***			-0.100***
			(0.027)			(0.027)
Constant	-0.058	-0.438**	-0.106*	-0.088	-0.465**	-0.125**
	(0.064)	(0.186)	(0.061)	(0.063)	(0.185)	(0.060)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Lambda	0.011**	0.063***	0.022**	0.004	0.068***	0.016**
	(0.023)	(0.056)	(0.022)	(0.022)	(0.056)	(0.022)
Wald chi2	1456.57***	471.12**	1875.23***	1657.47**	487.62**	2080.39***
Censored obs.	2737	683	3420	2737	683	3420
Uncensored obs.	7605	8409	16014	7605	8409	16014
Observations	10342	9092	19434	10342	9092	19434

Standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

In order to account for the effect of the economic activities in which a respondent is engaged, the economic activities are re-aggregated into their respective sectors (Agriculture, Industry and Service) and Agriculture is kept as the reference category. The results show that compared to the agriculture sector, hourly wage is significantly higher among respondents whose economic activities fall under either the industry or service sector. The magnitudes of the effects are relatively higher for respondents who are engaged in activities under the service sector than for those in the manufacturing sector. Considering the service sector, the estimates of the two trade indicators reveal that the hourly wages are higher among females than males. These results remain consistent across all the models and wage indicators.

5.3.1 Decomposition of the gender wage gap

Having discussed the socio-economic correlates of the respondents' participation in the labour-force and hourly wages, this subsection further discusses the estimates of the Oaxaca decomposition by focusing on the contribution of trade openness to the various components of

the wage gap. Considering trade as a share of GDP, the results in Table 5-3 indicate that the means of log nominal wages are 0.658 for men and 0.451 for women, yielding a wage gap of 0.207. Similarly, the estimates for exports as a share of GDP show that the corresponding mean log of wages for males and female are 0.470 and 0.338 with a gap of 0.132. In Table 5-4, the corresponding average real wages of men and women are 0.623 and 0.348 for the estimates of trade as a share of GDP and 0.623 and 0.341 in the estimates for export as a share of GDP. The mean log of wages for the interaction term which measures the simultaneous effect of differences in endowments (explained part) and coefficients (unexplained part) reduces the wage gap in all the models.

Note that these results are expressed on the logarithmic scale with log wages used as the dependent variable. When the results are retransformed to the original scale (Ghana cedis), the corresponding (geometric) means of nominal wages in the models for trade as a share of GDP (see models II in Table 5-4) are Gh₵1.931 and Gh₵1.569 for male and female paid employees. This amounts to a difference of approximately 23%. The values of the explained parts indicate that if women had the same characteristics as men, their wages would increase by a little over 11% while a gap of 16% remains unexplained.

As far as exports as a share of GDP is concerned, the corresponding geometric mean of wages and gaps for men remains almost unchanged. However, the geometric mean wage for women decreases marginally from Gh₵1.569 in the models for trade as a share of GDP to Gh₵1.563. This translates into a marginal increase in the wage gap from 1.231% to 1.235%. Similarly, adjusting women's endowment levels to those of men would increase women's wages by a little over 10% while approximately 17% of the gap remains unexplained. In addition to the gap, the effects of export as a share of GDP on the three component of the wage gap are relatively higher than the effects of trade as a share of GDP. Considering the models for real wage, the average wages of both sexes are lower than those in the models for nominal wage. However, the gender wage gap and contribution of trade to the three components of the wage gap are higher than those in the models for nominal wage. The wage gap increases to 35% for the estimates of trade as a share of GDP and 33% for estimates of export as a share of GDP. The estimates indicate that inflation contributes to widening the wage gap to the disadvantage of women.

Narrowing the discussion to the contribution of trade openness to the various components of the gender wage gap, Table 5-3 shows that trade openness reduces the explained part (the part due to the characteristics of the individual) of the wage gap but increases the unexplained part (the part due to discrimination). However, its contribution to the interaction (net effect) of the explained and unexplained parts is negative. This suggests that, given the data used in this analysis, trade openness generally reduces the gender wage gap in Ghanaian households. Nevertheless it has

differential effects on each component of the wage gap. These results are consistent across all the models irrespective of any form of restrictions imposed on the data, the type of openness indicator and wage.

Table 5-4: Decomposition with Heckman correction for sample selection bias

Dependent variable	Models for nominal wage				Models for real wage			
(Hourly wage)	Trade/GDP (%)		Export/GDP (%)		Trade/GDP (%)		Export /GDP (%)	
	Model I	Model II	Model I	Model II	Model I	Model II	Model I	Model II
Male wage	0.658***	1.931	0.658***	1.931	0.623***	1.864	0.623***	1.864
	(0.012)	(0.022)	(0.012)	(0.022)	(0.013)	(0.024)	(0.013)	(0.024)
Female wage	0.451***	1.569	0.447***	1.583	0.348***	1.416	0.341***	1.407
	(0.080)	(0.126)	(0.080)	(0.125)	(0.100)	(0.142)	(0.100)	(0.140)
Wage gap	0.207**	1.231	0.211***	1.235	0.275***	1.347	0.281***	1.325
	(0.081)	(0.100)	(0.080)	(0.099)	(0.101)	(0.133)	(0.101)	(0.1337)
Explained part	0.102***	1.107	0.099***	1.104	0.098***	1.104	0.097***	1.101
	(0.021)	(0.023)	(0.021)	(0.023)	(0.023)	(0.026)	(0.023)	(0.026)
Trade openness	-0.013***	0.987	-0.017***	0.983	-0.016***	0.984	-0.019***	0.981
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Unexplained part	0.145*	1.156	0.156**	1.169	0.225**	1.253	0.240**	1.271
	(0.079)	(0.092)	(0.079)	0.092	(0.100)	(0.125)	(0.100)	(0.127)
Trade openness	0.035**	1.036	0.059***	1.061	0.049***	1.050	0.082***	1.086
	(0.014)	(0.015)	(0.014)	(0.015)	(0.017)	(0.018)	(0.017)	(0.086)
Interaction	-0.039***	0.961	-0.043***	0.958	-0.049***	0.952	-0.055***	0.947
	(0.014)	(0.014)	(0.014)	(0.014)	(0.017)	(0.017)	(0.018)	(0.017)
Trade openness	-0.012**	0.988	-0.021***	0.979	-0.016**	0.984	-0.028***	0.972
	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)	(0.008)
Observations	19431	19431	19431	19431	19431	19431	19431	19431

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Note: The independent variables in models I and II are mean log wage and exponential estimates

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

The only difference is that the contributions of export as a share of GDP to the three components of the wage gap are relatively higher than the contributions of trade as a share of GDP. These reflect the results in Tables 5-2 and 5-3 where export as a share of GDP has relatively higher effects on the wages of males and females compared to trade as a share of GDP. The established fact from this analysis is that within the past one and a half decades, Ghana's integration into global trade has contributed to a significant improvement in wages of both sexes and a reduction in the gender wage differential in the labour market.

In a developing country like Ghana where opportunity and quality of employment remain a challenge, the geographical location of respondents is very important. Wage employments are

more easily accessible in the urban areas than in the rural areas. This study assesses the effect of these relative differences by decomposing the gender wage gap across the place of residence of respondents. The results in Table 5-4 show that regardless of the trade openness indicator used, the gender wage differential in the rural area (approximately 38% to 39%) is more than twice the gap (approximately 15% to 16%) in the urban area. In the models for real wage (see Table 5-4), the gap in the rural area remains virtually the same but in the urban area, it increases to approximately 31%. Consistent with the estimates of nominal wage, the contribution of trade openness in the rural area remains insignificant despite the increase in the gap in the urban.

Table 5-5: Decomposition of the nominal wage gap across place of residence

Dependent	**Trade as a share of GDP (%)**				**Export as a share of GDP (%)**			
variable	**Rural**		**Urban**		**Rural**		**Urban**	
Log hourly wage	**Model I**	**Model II**	**Model I**	**Model II**	**Model I**	**Model II**	**Model I**	**Model II**
Male wage	0.514***	1.673	0.730***	2.074	0.514***	1.673	0.730***	2.074
	(0.018)	(0.030)	(0.015)	(0.031)	(0.018)	(0.030)	(0.015)	(0.031)
Female wage	0.192	1.212	0.589***	1.802	0.186	1.204	0.578***	1.783
	(0.144)	(0.175)	(0.090)	(0.163)	(0.141)	(0.170)	(0.090)	(0.160)
Wage gap	0.322**	1.381	0.141	1.151	0.328**	1.389	0.151*	1.163
	(0.145)	(0.201)	(0.091)	(0.105)	(0.142)	(0.198)	(0.091)	(0.106)
Explained	0.114***	1.245	0.098***	1.103	0.104***	1.110	0.099***	1.104
	(0.037)	(0.179)	(0.024)	(0.027)	(0.037)	(0.041)	(0.024)	(0.027)
Trade openness	-0.002	0.998	-0.020***	0.980	-0.010	0.990	-0.021***	0.979
	(0.003)	(0.003)	(0.007)	(0.007)	(0.009)	(0.009)	(0.007)	(0.007)
Unexplained	0.219	1.245	0.072	1.075	0.229	0.996	0.088	1.092
	(0.144)	(0.179)	(0.089)	(0.096)	(0.141)	(0.032)	(0.089)	(0.097)
Trade openness	0.019	1.019	0.039**	1.040	0.026	1.026	0.063***	1.065
	(0.018)	(0.019)	(0.019)	(0.019)	(0.020)	(0.021)	(0.018)	(0.019)
Interaction	-0.011	0.991	-0.029*	0.971	-0.004	0.996	-0.036**	0.965
	(0.032)	(0.032)	(0.015)	(0.015)	(0.032)	(0.032)	(0.016)	(0.015)
Trade	-0.003	0.997	-0.013*	0.987	-0.006	0.994	-0.023***	0.977
	(0.005)	(0.005)	(0.007)	(0.007)	(0.006)	(0.006)	(0.008)	(0.008)
Observations	8165	8165	11266	11266	8165	8165	11266	11266

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Note: The independent variables in models I and II are mean log wage and exponential estimates

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

In spite of the large gender wage differential observed in the rural areas, the contribution of trade openness to the various components of the gap is significant in the urban areas but insignificant in the rural areas. It can be deduced from the results that there could be other factors that prevent rural residents from benefitting equally to their urban counterparts from opportunities associated with the increased integration of Ghana's economy into global trade. These factors may include

infrastructure, market access, and information which work to their disadvantage. The results further indicate that in an event that expansion in trade improves the wages of rural residents, women stand to be disadvantaged due to pervasively deep-seated socio-cultural norms in the rural areas which alter significantly the distribution of the earnings of men and women.

Table 5-5: Decomposition of the real wage gap across geographical location

Dependent variable	**Trade as a share of GDP (%)**				**Export as a share of GDP (%)**			
	Rural		**Urban**		**Rural**		**Urban**	
	Model I	**Model II**	**Model I**	**Model II**	**Model I**	**Model II**	**Model I**	**Model II**
Male wage	0.489***	1.631	0.689***	1.991	0.489***	1.630	0.689***	1.991
	(0.019)	(0.032)	(0.016)	(0.033)	(0.019)	(0.031)	(0.016)	(0.033)
Female wage	0.201	1.223	0.435***	1.551	0.194	1.214	0.420***	1.523
	(0.143)	(0.175)	(0.119)	(0.185)	(0.139)	(0.169)	(0.119)	(0.182)
Wage gap	0.288**	1.333	0.253**	1.259	0.295**	1.344	0.268**	1.308
	(0.144)	(0.192)	(0.121)	(0.155)	(0.141)	(0.189)	(0.120)	(0.158)
Explained part	0.113***	1.201	0.094***	1.100	0.102***	1.108	0.097***	1.101
	(0.037)	(0.041)	(0.028)	(0.030)	(0.037)	(0.041)	(0.028)	(0.030)
Trade openness	-0.002	0.998	-0.024***	0.977	-0.011	0.989	-0.023***	0.978
	(0.004)	(0.004)	(0.009)	(0.008)	(0.010)	(0.010)	(0.008)	(0.008)
Unexplained part	0.196	1.216	0.199*	1.220	0.207	1.230	0.220*	1.246
	(0.143)	(0.174)	(0.119)	(0.145)	(0.139)	(0.171)	(0.119)	(0.148)
Trade openness	0.028	1.029	0.055**	1.056	0.044**	1.045	0.088***	1.092
	(0.019)	(0.019)	(0.024)	(0.025)	(0.021)	(0.022)	(0.023)	(0.025)
Interaction	-0.021	0.979	-0.039**	0.961	-0.014	0.986	-0.048**	0.953
	(0.033)	(0.032)	(0.020)	(0.019)	(0.033)	(0.032)	(0.020)	(0.019)
Trade openness	-0.005	0.995	-0.018**	0.982	-0.009	0.991	-0.032***	0.969
	(0.006)	(0.006)	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	0.010
Observations	8165	8165	11266	11266	8165	8165	11266	11266

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Note: The independent variables in models I and II are mean log wage and exponential estimates

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

5.4 Conclusion

This chapter discussed the trend of Ghana's integration into global trade within the past two decades, the distribution of labour-force participation and wages among males and females and the contribution of trade openness to the gender wage differential using the Blinder–Oaxaca decomposition technique simultaneously with the Heckman sample selection approach to address the potential issue of selection bias in the wage equations. The descriptive analysis shows that although the trend has not been as consistent as GDP, Ghana's integration into global

trade has increased considerably between 1993 and 2016. The same upward trend is observed for the trade openness indicators of the majority of the economic activities under consideration. The results reveal evidence of pervasive gender inequality in labour-force participation and hourly wage across the economic activities considered in this analysis.

The econometric estimates indicate that place of residence (geographical location), age, health status, relationship to the household head and ethnic affiliation of respondents are important determinants of labour force participation of men and women in Ghana. Similarly, trade openness, education, size of the firm/industry in which a respondent is employed, tenure (years of working in current occupation), health status, skills, and the sector of the economic activity in which a respondent is engaged significantly affect hourly wage. It is evident from the discussion that after accounting for trade openness, the characteristics of the individual, the household and the economic activity in which respondents are engaged in, the gender nominal wage gap is approximately 23% to 24% while the real wage gap increases to 33% to 35%. The contributions of trade openness to the components of the wage gap are higher in the models for real wage than in the models for nominal wage.

Across geographical location, the magnitude of the gap in the rural area is higher than the gap in the urban area. Nonetheless, the contribution of trade to this large gap remains insignificant. The results confirm the prediction of the standard trade theory that trade openness promotes gender equality but only among urban residents and not in the rural areas where the gap remains relatively higher. With a particular focus on rural residents, the Trade Ministry must collaborate with other ministries such as Employment and Labour Relations to design policies that will enhance females' active participation in economic activities such as the non-traditional export sector that has recently experienced expansion in trade. An important caveat that must be observed in interpreting the findings of this study is that they do not account for respondents in the informal sector which is dominated by self-employees, contributing family workers and casual worker. This is due to the strict definition of wage earners as those who are paid by others for work done outside their homes. This means that only the direct effect of trade openness on wage employees is accounted for, but not the indirect effect on self-employees and other categories of workers in the informal labour market.

CHAPTER 6: WAGE AND TIME ALLOCATION AMONG HOUSEHOLD MEMBERS

6.1 Introduction

This chapter presents and discusses the results of the descriptive and econometric analyses of the wage and intra-household time allocation nexus for all household members who are at least fifteen years old. This broad objective addresses two specific questions: 1) To what extent do the effects of wage on intra-household time allocation to paid and unpaid work vary across gender and geographical location? 2) Are the effects the same when inflation is taken into consideration? The presentation of the regression results on this objective begins with a brief descriptive analysis of the variables of interest. The rest of the chapter is structured into three main sections. Section 6.2 discusses the results on the descriptive while section 6.3 discusses the results of the regression analysis of the wage effect of intra-household time allocation while section. Sub-section 6.3.1 focuses on the wage and unpaid hours of work, whilst sub-section 6.3.2 discusses the wage effect of hours of paid work with an emphasis on gender and geographical differences. This chapter ends with concluding remarks on the main findings from the analysis.

6.2 Descriptive analysis

This section begins with an overview of the distribution (Figures 6-1 to 6-9) of the aggregated time use variables and wage across gender, geographical location, education, marital status and relationship of the respondent to the household head. In some instances, the hourly wages reported in this study may be higher than the ones reported in the GLSS reports because this study considered both primary and secondary occupations of the respondent while the Ghana Statistical Service focused on wages from main or primary occupations only. However, in computing the paid working hours, respondents who indicated that they did primary work at the same time as the secondary jobs were counted once, as having done primary jobs. This is because the worker would be in one of the workplaces (either the primary occupation or secondary occupation) at a time and cannot be at both workplaces at the same time.

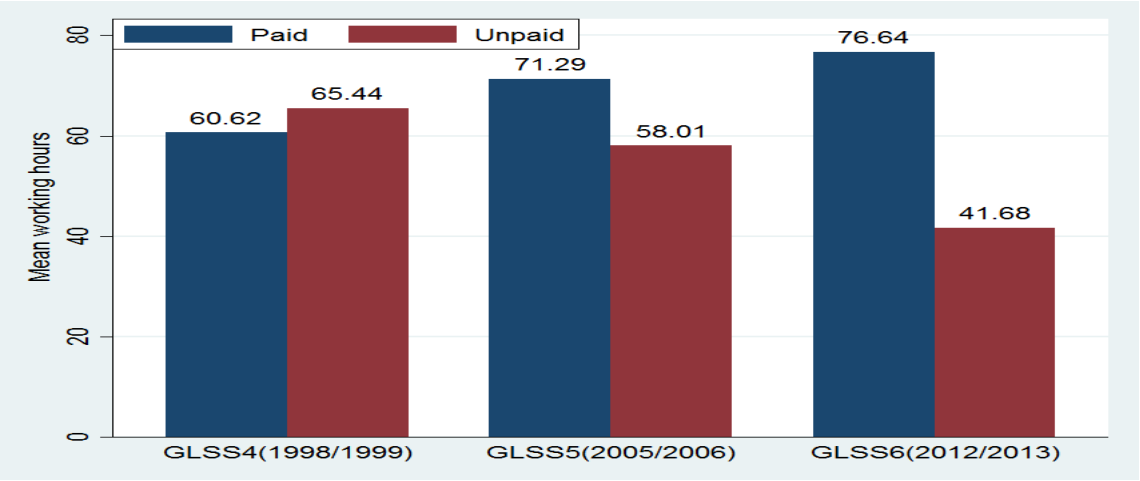

Figure 6-1: Paid and unpaid working hours across year of survey (1998-2013)

Source: Prepared by the author using GLSS data sets.

It can be observed from Figure 6-1 that during the 1998/1999 survey period, unpaid working hours were more than paid working hours. However, the opposite is observed in the 2012/2013 survey period. Within the one and half decade (1998-2013), time spent on unpaid work activities by individuals in Ghana has reduced while paid working hours have increased considerably. The average unpaid working hours have reduced by 37% from approximately 67 hours in 1998/1999 survey period to 42 hours per week during the 2012/2013 survey period. However, paid working hours have increased by 26% from 61 hours to 77 hours a week within the same periods of the surveys. Consistently, higher reductions in the number of unpaid working hours are offset by lower increases in paid working hours and vice versa. For instance, when unpaid working hours reduced by 9 hours between the 1998/1999 and 2005/2006 survey periods, paid working hours increased by 10 hours. While unpaid working hours reduced by 16 hours between the 2005/2006 and 2012/2013 survey periods, the increase in paid working hours was just 6 hours. This should have some implications for leisure and other self-care activities.

A number of socio-economic developments may have accounted for the observed trend of paid and unpaid hours of work in Ghana. Key among these factors is the improvement in the employment rate in Ghana between 1992 and 2013. Although the rate of growth has been slow, employment levels in Ghana rose from 5.77 million in 1992 to 12.03 million in 2013, representing a 3.7% average annual employment growth compared to 3.0% in SSA (International Labour Organisation, 2014). Although the quality and decency of most of the employments remain contentious, the overall employment levels in the country are marginally higher than that of the average of SSA, with a higher employment-to-population ratio in Ghana than in SSA (Aryeetey & Baah-Boateng, 2015). Another contributing factor could be the positive trends in educational enrolments, the improvement in GPI, and the over 20% improvement in literacy rate since 2003, through the implementation of several policy interventions. For instance, public expenditure on education takes 25.8% of total government expenditure and 6.3% of GDP (UNESCO, 2014).

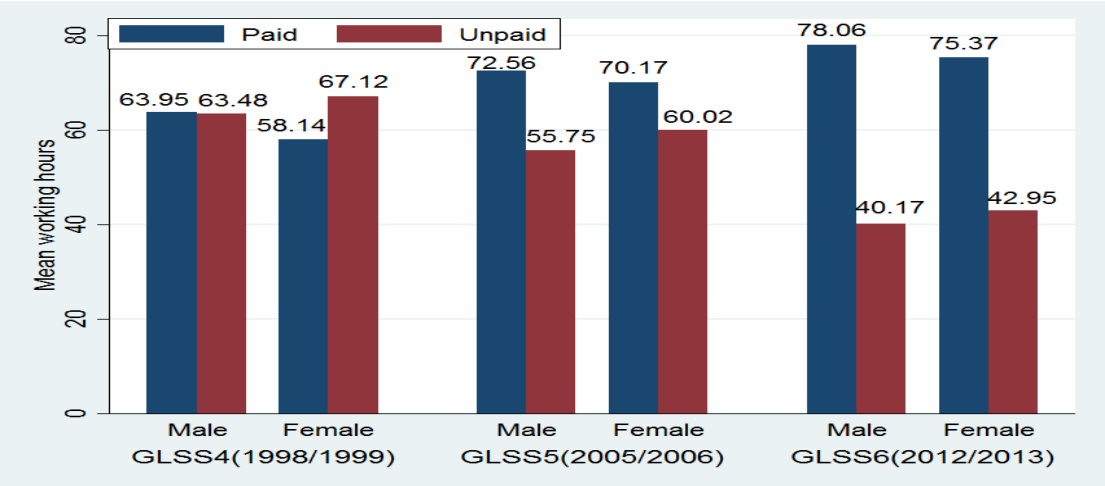

Figure 6-2: Hours spent on paid and unpaid work across gender (1998-2013)

Source: Prepared by the author using GLSS data sets.

From a gender perspective, Figure 6-2 depicts that unpaid working hours have reduced from as high as 68 hours per week among women in the 2005/2006 survey period to about 43 hours a week in the 2012/2013 survey period. This translates to around a 38% reduction in unpaid hours spent by females on household activities. On the contrary, an approximately 39% reduction is observed among males within the same period. This means that females continue to be disadvantaged as they spend about 3 hours (1%) more than males on unpaid work. In essence, there has been a general reduction in unpaid working hours but there exists a gap between males and females. Also, paid working hours have generally increased. However, the percentage increase (29%) among females has been higher than the percentage increase (22%) among males. Regardless of the reduction in the gap between the average paid working hours of male and female from 6 hours in the 2005/2006 survey period to 3 hours in the 2012/2013 survey period, females still spend more total (paid and unpaid) working hours than males in Ghanaian households.

Across geographical location, a similar pattern of reduced unpaid working hours and increased paid working hours is observed. Nonetheless, Figure 6-3 depicts that while the average hours spent on unpaid work has reduced by 46% among individuals in the urban areas the reduction is 31% among respondents in the rural areas. On the other hand, the increase in average paid working hours for urban residents (36%) is twice the 18% increase among rural residents. This has contributed to a reduction in the gap of paid working hours between rural and urban residents from 11 hours in the 1998/1999 survey period to approximately 3 hours in the 2012/2013 survey

period. However, the gap between rural and urban residents of unpaid working hours has increased from 15 hours in the 1998/1999 period to 17 hours in the 2012/2013 period.

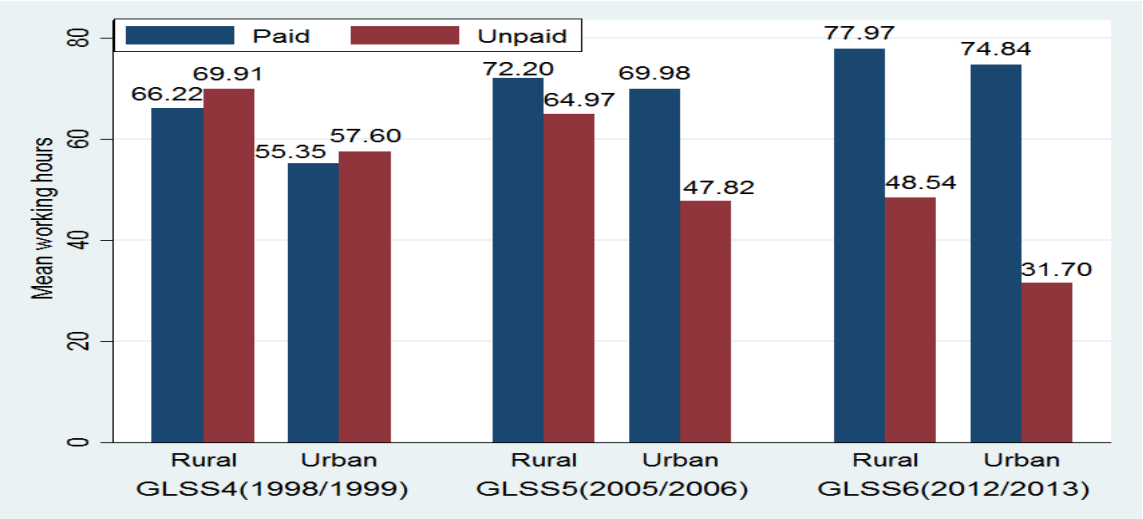

Figure 6-3: Hours of work across place of residence (1998-2013)

Source: Prepared by the author using GLSS data sets.

One's level of education has a direct effect on his/her wage and has indirect implications for the number of hours that he/she spends on paid and unpaid work. In view of this, the distribution of paid and unpaid working hours across level of education and year of survey are presented in Figure 6-4. The figure shows that individuals who have a higher level of education spend less time on unpaid working activities than those who have lower levels of education. This does not necessarily mean that those who have higher qualifications spend more time on paid work than those with lower qualifications. With the exception of the 1998/1999 survey period where lower unpaid working hours corresponded with higher paid working hours among individuals who have higher qualifications, both paid and unpaid working hours have remained relatively lower among this category of respondents.

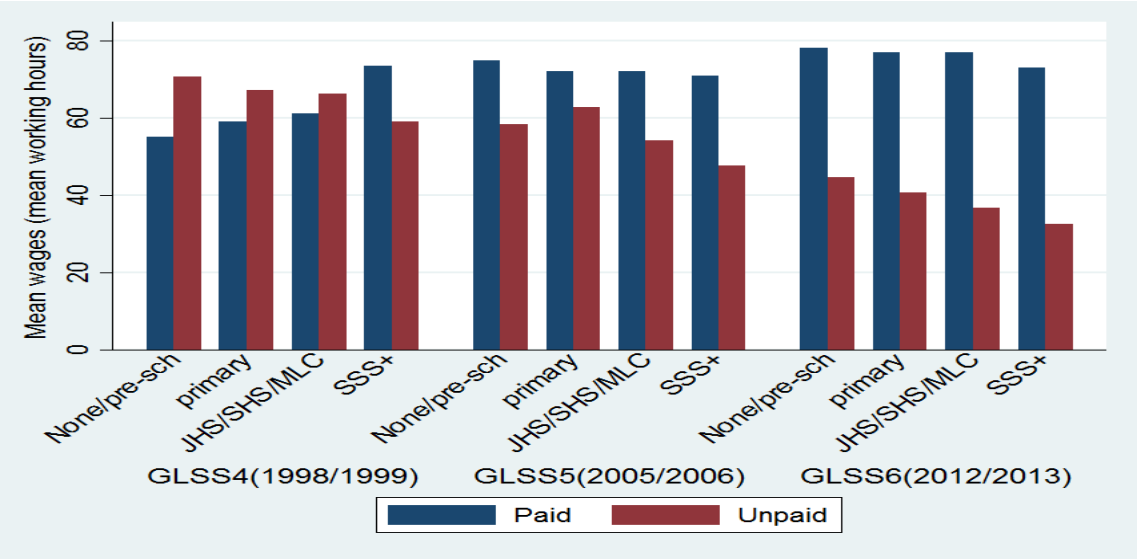

Figure 6-4: Hours of work across level of education (1998-2013)

Source: Prepared by the author using GLSS data sets.

In most households in developing countries such as Ghana, marriage comes with its additional responsibilities that shape the time allocation of individuals. In most cases, females are the ones whose time allocation is shaped by marriage when procreation takes place. In view of this Figure 6-5 presents the distribution of time allocation across marital status and the year of the survey. It is important to indicate that the category “single” is made of the respondents who have never gotten married before, and those who are widowed, divorced and separated. The figure depicts that in all the three surveys, married respondents spend more time on both paid and unpaid working hours than those who are in informal relationships, single. This result is expected since married individuals, particularly those who have children, have additional responsibilities that require additional time allocation both within and outside the household. Also, in the GLSS 5 and 6, those who are in single happen to spend less time on and paid work activities than those who are either married or in informal relationship. However, those who are in some form of informal relationships spend less time on paid work than those are either married or single.

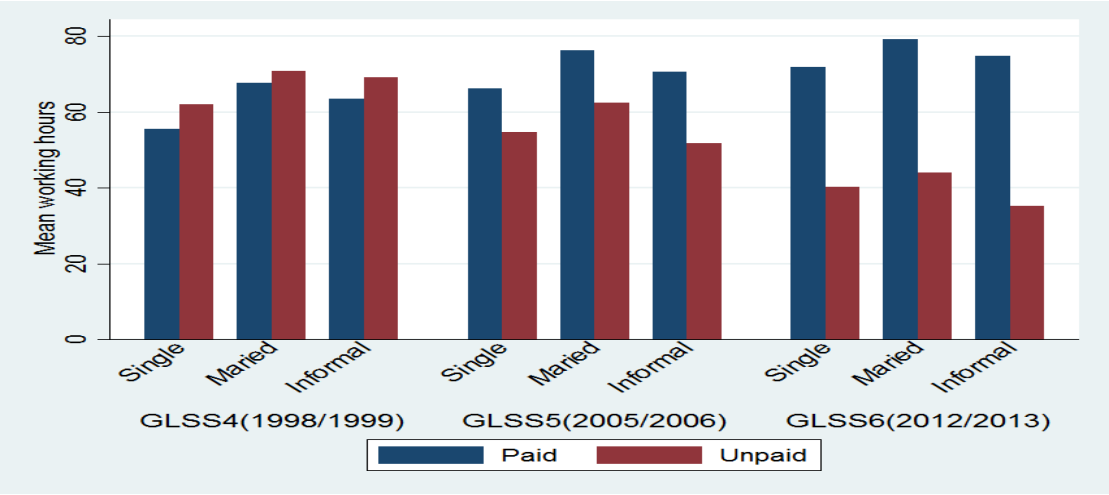

Figure 6-5: Hours of work across marital status (1998-2013)

Source: Prepared by the author using GLSS data sets

Similar to the average paid working hours, Figure 6-6 depicts that within a one and a half decade period, average hourly wages (both nominal and real) have generally increased. Between 1998 and 2013, both nominal and real hourly wages have increased from less than one Ghana cedi to almost two cedi. It can further be observed from the figure that in the 2005/2006 survey period, inflation had a higher impact on the real wage of the respondents than the 1998/1999 and 2012/2013 survey periods. The average CPI (expressed as a ratio) which was used to deflate the nominal wage was higher in that survey period than the other periods. This contributed to a higher loss in the purchasing power of the hourly wage of the respondents. As indicated earlier, the GLSS5 report shows that average hourly nominal wage was 55 Ghana Pesewas (Gh₵0.55) (Ghana Statistical Service, 2008). However, in this study, it was found to be virtually 1 Ghana cedi (Gh₵1.02). Similarly, the GLSS6 report shows that the average hourly wage was Gh₵1.17 (Ghana Statistical Service, 2014c). However, it was found to be Gh₵1.96 in this study which makes it Gh₵ 0.75 higher because all other secondary sources of employment were considered.

Figure 6-6: Hourly wage across year of survey (1998-2013)

Source: Prepared by the author using GLSS data sets

Across gender, Figure 6-7 shows that generally, males receive higher wages than females. Between 1998 and 2013, the wage difference between the two sexes reduced considerably even though it widened in the 2005/2006 survey period. For instance, during the fourth (1998/1999) round of the survey, the average nominal male wage was more than twice that of the female. The difference was again higher during the 2005/2006 survey period but became smaller during the 2012/2013 survey period. The reduction in wage difference could be due to several factors such as improvement in women's education and skills that allowed more women who command higher value to participate in the labour market. It can also be observed from the figure that relatively, the high inflation in the 2005/2006 survey period affected the real wages of males more than females. While the real wage of males decreased by about 74%, that of females reduced by 71%. Males were more affected by the higher inflation than women. The variation in real wage may be partly due to gender differences in the spending patterns and the type of commodities that were mainly affected.

Figure 6-7: Hourly wage across gender of respondent (1998-2013)

Source: Prepared by the author using GLSS data sets.

Figure 6-8 presents the distribution of the average hourly wage across the place of residence (geographical location) of the respondents taking into consideration the years of the surveys. The figure mimics the same trend of the increase in wage over time. In addition, it consistently depicts that urban residents receive higher average hourly nominal and real wages than their rural counterparts. Also, the higher reduction in the real value of wage during the 2005/2006 survey period due to high inflation made respondents in the rural areas worse off than urban respondents. While the reduction in the real value of the wage of rural respondents was about 79% that of urban respondents was about 72%.

Figure 6-8: Hourly wage across place of residence (1998-2013)

Source: Prepared by the author using GLSS data sets.

This subsection on objective one described in detail the two main variables of interest (wage and time allocation to paid and unpaid work) across gender, place of residence, and level of education, marital status of the respondent and relationship of the respondent to the head of the household. One of the major findings is that within that one and half decade, Ghanaians have reduced their time allocation to unpaid work but increased their paid working hours considerably. This finding cuts across gender, place of residence, level of education and marital status. Further, in line with their increased working hours, their wages (both nominal and real) have also increased and the increase is consistent across all the socio-demographic characteristics of the respondent. Considering the differences in wage across socio-demographic characteristics of the respondents, male, and urban residents were found to have higher wages than their female and rural counterparts. In an event of low real wage due to high inflation in the 2005/2006 survey period, males were more affected than females. The next sub-section presents the parametric regression results on the effect of wage and other control variables on intra-household time allocation to paid and unpaid work.

6.3 The estimation results

Although the focus of this thesis is not on the factors that influence wage, the first stage regression results are presented at the Appendix B to allow for verification of the significance of the instruments used in moderating the wage-intra-household time use relationship. It can be observed from Table B1 to B4 at the appendix B, that all the instruments (sector of employment and union membership) have significantly positive effects on wage. The results show that being a member of a trade union and working in either the parastatals or the public sector significantly increase one's wage. These results support those of Sedigh et al. (2016) who asserted that union status directly affect wage so long as the members of the union earn higher wages than non-members.

Previous studies have also found the sector or industry of employment of respondents to be relevant instruments for asserting the relationship between wage and intra-household time use (Ásgeirsdóttir & Ólafsson, 2015). It is important to indicate that six models each are specified for hours of paid and unpaid work activities. These models are classified under nominal and real wages. Each broad category is further classified into male, female, rural, urban and national (all) giving a total number of twenty-four models. The presentation and discussion of the results are structured into two sub-headings: 1) correlates of unpaid working hours across gender and place of residence; and 2) correlates of paid working hours across gender and place of residence.

6.3.1 Correlates of unpaid working hours

Before presenting the regression estimates, it is important to indicate that under each results table, the P-values of the Wald test of exogeneity are reported. The insignificance of the P-values in all the Tables shows that the instruments used are reliable. Therefore, the standard Tobit estimator should not be employed. Tables 6-1 and 2 contain the results of unpaid working hours across gender and place of residence of respondents. Observe from Table 6-1 that an increase in wage by 1 Ghana cedi (Gh₵) reduces weekly hours of unpaid work by approximately 6 (in terms of nominal wage) and 7 hours (in terms of real wage) which can be channelled into other productive work or activities that promote the wellbeing of the individual. However, the extent of the reduction is relatively higher for males than females. At 1% level of significance, unpaid working hours of males and females reduce by approximately 7 hours and 5 hours respectively when nominal wage increases by 1 Ghana cedi (Gh₵), *ceteris paribus*. In terms of real wage, the extents of reduction for male and female are approximately 9 hours and 6 hours respectively. The relatively higher reduction in males' time allocation to unpaid work compared to that of a female does not violate the general expectation, since the socio-cultural roles of males in most developing countries such as Ghana do not compel them to perform more domestic activities compared to their female counterparts. Instead, males are seen as breadwinners. As such, they are generally expected to spend more time on income-generating activities.

While the negative response of female time allocation to unpaid household work corroborates the findings of Argyrous and Rahman (2014), it is in contrast with those of Devereux (2004) and Gupta and Ash (2008) who observed that mothers perform a large share of childcare irrespective of their earnings. The observed responsiveness of unpaid working hours of females to an increase in wage can be interpreted from different perspectives. Within the context of bargaining theory, it can be argued that an increase in the educational attainment and wage of women strengthens their bargaining power and reduces their comparative advantage in unpaid work (relative to paid work). This enables them to reallocate more time to paid work (Sayer, 2005). However, within the context of developing countries such as Ghana, where labour market rigidities and socio-cultural norms shape women's time allocation, it remains unclear whether they will have the space to

reallocate such reduced hours to either paid work in the labour market or leisure. The results also suggest evidence of entrenched socio-cultural norms that do not permit females to experience the same extent of the effect of wage as their male counterparts.

The negative effect of wage on unpaid working hours is also observed when the regression analysis is performed on sub-samples of rural and urban residences. Nonetheless, the effect is virtually the same for both urban and rural residents. Keeping all other factors constant, an increase in hourly wage by Gh₵1 reduces unpaid working hours of rural and urban residents by approximately 6 hours. With respect to real wage, the extent of reduction is approximately 7 hours for both rural and urban residents. It can be inferred from these results that although rural residents spend more time on unpaid work than urban residents, if rural residents have the means to increase their earnings, they will equally be able to pay for the services of others to perform some of their unpaid activities in the household to enable them to reallocate their free time to either leisure or activities that will improve their well-being.

Another important point is that the type of wage used for analysis matters. It is obvious from the results that real wage has higher effects on hours of unpaid work than the nominal wage does. This corroborates the general assertion that time allocation decisions of rational economic agents are also influenced by the relative value of wage and not only the nominal value. The comparison of the relative effects of nominal and real wages on the time allocation across gender and geographical location remains one of the contributions of this study since no study has paid attention to it. Large proportions of the extant studies have mainly focused on the relative effects of wage on time allocation among couples (Bloemen & Stancanelli, 2014a; Craig, 2006; Daunfeldt & Hellström, 2007; Sayer, 2005), while others have only concentrated on nominal wage. However, in developing countries such as Ghana, where price instability is rife, it is imperative to account for inflation in order to compare the effects of real wage and nominal wages on time allocation decision among members in the household to guide policymakers on wage-related policies.

Aside from wage, other control variables were included in the analysis. The literature suggests that non-wage[34] income plays an important role in intra-household time allocation (Alderman & Chishti, 1991; Ilahi & Grimard, 2000; Ilahi & Jafarey, 1999). As a result, remittance was used as a proxy for non-wage income to assess its effect on time allocation across gender and geographical location. The results in Table 6-1 indicate that an increase in remittance reduces male's hours of unpaid work but increases female's hours of unpaid work. The observed positive

[34] Several variables have been used as proxies for non-wage income in the literature. These include remittance, value of home assets, and value of productive assets (Ilahi, 2000), value of the family farm and value of the home (Skoufias, 1993).

effects on female's hours of unpaid work contradict conclusions of some of the earlier studies that an increase in unearned income reduces individuals' supply of labour and work at home (Gronau, 1977).

The results rather corroborate the observations of Ilahi and Grimard (2000) who conclude that an increase in remittance increases time spent on housework with no appreciable effect on leisure. Skoufias (1993) also draws similar conclusion that non-wage[35] income increases housework and leisure of females but it lowers market work and raises home time of adult men. The inconclusiveness surrounding the direction of the effect of remittance on unpaid hours of work underpin the argument of Ilahi (2000) that within the context of time allocation, proxies for non-wage income play two confounding roles as a genuine proxy of wealth and non-wage income on the one hand. While, the other hand, they constitute part of the production function of the household. This makes it difficult to identify exactly what they measure.

Table 6-1: Estimates of unpaid hours of work across gender

Dependent variable	**Nominal wage (Ghana cedi)**			**Real wage (Ghana cedi)**		
Hours of unpaid work	**Male**	**Female**	**Both**	**Male**	**Female**	**Both**
Log hourly wage	-7.082***	-4.548***	-5.820***	-8.821***	-5.874***	-7.406***
	(0.503)	(0.475)	(0.348)	(0.569)	(0.626)	(0.420)
Log remittance	-0.241*	0.088	-0.124	-0.207	0.105	-0.100
	(0.127)	(0.142)	(0.103)	(0.129)	(0.152)	(0.102)
Children under 5	0.857***	1.278***	1.069***	0.857***	1.275***	1.068***
	(0.070)	(0.103)	(0.066)	(0.071)	(0.106)	(0.052)
Age	0.656***	0.550***	0.583***	0.607***	0.522***	0.546***
	(0.077)	(0.077)	(0.054)	(0.077)	(0.076)	(0.061)
Age square	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Basic education(Ref: None)	-5.770***	-6.495***	-5.937***	-3.728***	-5.232***	-4.286***
	(0.590)	(0.558)	(0.467)	(0.589)	(0.576)	(0.455)
Secondary education plus	-8.963***	-12.816***	-10.402***	-2.239***	-8.618***	-4.907***
	(0.601)	(0.655)	(0.565)	(0.806)	(0.826)	(0.605)
Informal (Ref: Married)	-8.682***	-5.587***	-7.792***	-9.051***	-5.878***	-8.145***
	(0.763)	(0.852)	(0.611)	(0.800)	(0.779)	(0.643)
Single	-20.669***	-5.639***	-14.750***	-21.176***	-6.045***	-15.236***
	(0.580)	(0.840)	(0.507)	(0.614)	(0.824)	(0.453)

[35] Note: Under each results table, the P-values of the Wald test of exogeneity are reported. The P-values of these statistics are insignificant, indicating that the instruments used are reliable. The extent of the insignificance can also be verified from the first-stage regression estimates in Table A3 Appendix A.

Dependent variable	Nominal wage (Ghana cedi)			Real wage (Ghana cedi)		
Hours of unpaid work	**Male**	**Female**	**Both**	**Male**	**Female**	**Both**
Spouse (Ref: Head)	7.000***	8.727***	4.864***	7.559***	9.244***	5.483***
	(2.002)	(0.753)	(0.628)	(2.084)	(0.648)	(0.516)
Child/Grand child	32.737***	18.923***	24.675***	33.206***	19.273***	25.103***
	(0.805)	(0.825)	(0.650)	(0.857)	(0.836)	(0.598)
Other relative	24.184***	10.813***	16.655***	26.989***	12.580***	18.972***
	(2.149)	(1.790)	(1.281)	(1.716)	(1.735)	(1.375)
Servant/Adopted	21.743***	6.907*	13.464***	28.229***	10.562**	18.543***
	(3.266)	(4.077)	(2.710)	(3.035)	(4.616)	(2.013)
Urban	-6.699***	-6.563***	-6.833***	-7.375***	-6.926***	-7.336***
	(0.518)	(0.569)	(0.417)	(0.461)	(0.511)	(0.406)
Female	--------	--------	2.356***	---------	--------	2.339***
	--------	-------	(0.465)	--------	-------	(0.429)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17635	16666	34301	17635	16666	34301
Test of exogeneity (P-value)	0.361	0.482	0.426	0.213	0.342	0.312

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

In addition to remittance, age and square of age are included in the analysis to examine the non-linear relationship between age and time allocation. In Table 6-1, age has a positive and significant effect on unpaid hours of work of both sexes but age square indicates a negative association. This nonlinear relationship implies that at certain age levels, adults cease to perform household responsibilities. This observation could be partly due to the fact that in most traditional homes in Ghana, children are responsible for performing certain household responsibilities such as fetching water, washing dishes, running errands and cleaning. Across geographical location, (see Table 6-2) the same nonlinear relationship is observed between age and unpaid hours of work. The extent of effects is rather higher for rural residents than their urban counterparts. The observed nonlinear relationship lends support to some studies (Sedigh et al., 2016) that have found similar results.

In typical traditional homes in developing countries, one's relationship to the household head largely determines his/her role in the household. Furthermore, the relative resources theorists argue that the allocation of housework reflects power relations between men and women, children and adults (Bianchi, Milkie, Sayer, & Robinson, 2000). The end results of this power relations are that unpaid household work becomes the responsibility of the economically dependent, such as women and children. In view of this, a variable that captures the relationship of the respondent to the household head was included in the analysis. With the head of the household as the reference

category, the results in Table 6-1 show that there is an element of delegation of responsibilities from household heads to other household members who may be considered as the economically dependent. Compared to the head of the household, children/grandchildren, other relatives and servants/adopted children tend to spend more hours on unpaid work than even the spouse. Children/grandchildren, other relatives and servants who are males and those in rural areas (see Table 6-2) spend more time on unpaid work than their female and urban counterparts do. Consistent with intuition, female spouses spend more time on unpaid than male spouses, while spouses in the rural area spend more time on unpaid work than their urban counterparts.

Not only does one's status in the household shapes his/her time allocation decision, but his/her marital status has also been found in the literature to be an important factor. Women's time allocation to unpaid work increases upon marriage (Sayer et al., 2004). In this study, three categories of marital status (married, informal relationship and single) were included in the analysis. The category *single* is made up of those who have been divorced, widowed, separated or never married. Married people were considered as the base category. From Tables 6-1 and 6-2, the results depict that compared to those who are married, respondents who are single and those who are in informal relationships spend less time on unpaid work. The extents of the effects are particularly higher for males than for females. They are also higher among single respondents than those who are in informal relationships.

Across geographical location (see Table 6-2), the effect is higher for the single persons and those who are in informal relationships in the rural areas than for those who are in the urban areas. As already indicated, marriage comes with additional responsibilities that are not only limited to the immediate family, but also the extended family of the couples, such as daughters-in-law, and other in-laws. Married women in mostly rural areas are responsible for cooking for the entire family and taking care of their fathers-in-law who may be sick or incapacitated. These additional responsibilities contribute to increased unpaid working hours among married women.

Another control variable found to have a significantly positive effect on unpaid hours of work is the number of children under the age of five in the household. In line with the majority of the findings in the literature, this study finds the effect of an additional child to be higher for females than for males and for rural residents than urban residents. These results indicate the extent of the burden that the presence of an additional child under five years of age imposes on females compared to males. They implicitly show the extent of unequal access to alternative child care services between rural and urban areas and how social norms on parenting affect females more than males.

When gender and geographical location are treated as variables rather than sub-samples in the models for the unpaid working hours, Observe from Table 6-1 that compared to a male, a female spends a little over 2 hours more on unpaid work. The results, based on the geographical location of respondents, indicate that being in the urban area reduces hours of unpaid work for both sexes. Compared to males' and females in the rural areas, their counterparts in the urban areas spend approximately 7 hours less on unpaid work and these results are significant at 1% level. This also indicates the unequal access of rural and urban residents to time-saving equipment, infrastructure and social services.

In addition to gender and geographical location, it also appears that higher levels of education reduce hours of unpaid work for both sexes regardless of their geographical location. The extent of the effect is higher among respondents who have completed at least secondary school than those who have completed basic education and for females than males. Across geographical location, the effect is higher among respondents who have completed basic education than those who have completed at least secondary or high school. Similar negative effects of education on hours of unpaid work have been reported in existing studies (Anneli, 2001; Medeiros & Costa, 2005; Song, 2007). Since education is positively correlated with economic empowerment, it may implicitly contribute to a reduction in hours of unpaid work through an individual's ability to afford alternative services in carrying out unpaid work in the household.

Table 6-2: Estimates of unpaid hours of work across geographical location

Dependent variable	**Nominal wage (Ghana cedi)**			**Real wage (Ghana cedi)**		
Hours of unpaid work	**Rural**	**Urban**	**Both**	**Rural**	**Urban**	**Both**
Log hourly wage	-5.676***	-5.725***	-5.820***	-7.312***	-7.224***	-7.406***
	(0.553)	(0.408)	(0.364)	(0.549)	(0.563)	(0.434)
Log remittance	-0.335**	-0.043	-0.124	-0.301*	-0.026	-0.100
	(0.166)	(0.103)	(0.101)	(0.168)	(0.108)	(0.085)
Children under 5	1.514***	0.632***	1.069***	1.517***	0.628***	1.068***
	(0.087)	(0.067)	(0.059)	(0.106)	(0.064)	(0.059)
Age	0.580***	0.555***	0.583***	0.549***	0.512***	0.546***
	(0.087)	(0.074)	(0.053)	(0.080)	(0.081)	(0.058)
Age square	-0.007***	-0.006***	-0.007***	-0.007***	-0.005***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Basic education(Ref: None)	-5.274***	-7.119***	-5.937***	-3.733***	-5.286***	-4.286***
	(0.505)	(0.734)	(0.361)	(0.518)	(0.727)	(0.442)
Secondary plus	-11.315***	-10.353***	-10.402***	-6.072***	-4.694***	-4.907***
	(0.753)	(0.704)	(0.404)	(0.840)	(0.824)	(0.590)
Informal (Ref: Married)	-8.835***	-6.285***	-7.792***	-9.252***	-6.552***	-8.145***
	(0.701)	(0.733)	(0.552)	(0.782)	(0.822)	(0.562)

Dependent variable	Nominal wage (Ghana cedi)			Real wage (Ghana cedi)		
Hours of unpaid work	**Rural**	**Urban**	**Both**	**Rural**	**Urban**	**Both**
Single	-14.773***	-14.235***	-14.750***	-15.317***	-14.649***	-15.236***
	(0.695)	(0.525)	(0.453)	(0.638)	(0.609)	(0.498)
Spouse (Ref: Head)	5.869***	3.600***	4.864***	6.500***	4.194***	5.483***
	(0.737)	(0.641)	(0.497)	(0.800)	(0.648)	(0.507)
Child/ Grand child	24.150***	24.899***	24.675***	24.626***	25.271***	25.103***
	(0.982)	(0.771)	(0.584)	(0.966)	(0.838)	(0.581)
Other relative	17.603***	16.100***	16.655***	19.896***	18.362***	18.972***
	(2.685)	(1.407)	(1.305)	(2.472)	(1.392)	(1.267)
Servant/Adopted	11.562***	14.121***	13.464***	16.542***	19.156***	18.543***
	(3.427)	(3.120)	(2.341)	(3.368)	(2.783)	(2.383)
Female	1.312**	3.359***	2.356***	1.291**	3.344***	2.339***
Urban	--------	--------	-6.833***	--------	-------	-7.336***
	-------	--------	(0.382)	--------	-------	(0.365)
	(0.561)	(0.486)	(0.356)	(0.610)	(0.432)	(0.402)
Survey year(dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19221	15080	34301	19221	15080	34301
Test of exogeneity (P-Value)	0.322	0.443	0.426	0.648	0.255	0.447

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

As a general approach to modelling and testing for differences in the intercept term or slope coefficients between the periods of the three surveys, dummy variables for 2005 and 2012 were included in the analysis with 1998/199 survey period as the reference category in order to avoid the dummy-variable trap while allowing the intercept to have different values in each period of the survey. The coefficients of the year dummies (not reported) confirm the downward trend of unpaid working hours since 1998. From 1998 to 2005, hours of unpaid work have reduced by at least seven hours a week for both sexes and among rural and urban residents. Equally, from 1998 to 2012, hours of unpaid work have reduced by not less than 18 hours a week for both sexes and among rural residents. This subsection has shown that wage has differential effects on the unpaid working hours of males and female, as well as rural and urban residents. Even though it reduces the hours of unpaid work for both sexes, the effect is significantly higher for females and rural residents than for males and urban residents. The next subsection presents the correlates of paid working hours with a focus on wage.

6.3.2 Correlates of paid working hours

The point estimates of the gross effect of wage on hours of work have remained contentious and *a priori* ambiguous even though the dominant findings suggest a negative effect. It can have either income or substitution effects depending on several socio-economic factors such as gender, the

income level of the individual and the unit of measurement of work (Borjas, 1980). This study, contends that by virtue of differences in geographical location, socio-economic status and social norms, increase in wage may have differential effects on paid hours of work for males and females as well as rural and urban residents. As a result, separate regressions are run for males and females, and for rural and urban residents. As depicted in Table 6-3, an increase in wage by Gh₵ 1 is associated with an increase in hours of paid work by approximately 2 hours per week. Across gender, the extent of the effect is relatively higher for males than females. Holding all other factors constant, the increase in a male's hours of work due to an increase in wage by 1 Ghana cedi is about three times that of a female. Consistent with the results on hours of unpaid work, the extent of the effect of wage on hours of work is higher than the effect of nominal wage.

The positive effect of wage on hours of paid work for both males and females support the theoretical and empirical literature. Within the context of the neoclassical proposition, it can be inferred that wage has a substitution effect on labour supply in Ghana. However, the higher effect of wage on males' labour supply of the effect for females means that in developing countries, the theoretical interpreting of results of this nature has to be done with consideration of the norms and country-specific features that may have effects on women's time allocation to both paid and unpaid work. For instance, labour market rigidities, gender segregation and other unfavourable working conditions that usually work to the disadvantage of women may play an important role in determining the extent to which women may be able to allocate more hours to paid work even if wage increases. Similarly, societal values and norms that requires mothers to be primary care givers and not earners may have some influence on gender equity in time allocation to unpaid work in the household (Sayer, 2005).

Across geographical location of the respondents, the results in Table 6-4 evince that the positive effect of wage on paid working hours is higher for rural residents than urban residents. At 1% level of significance, an increase in nominal wage by Gh₵ 1 increases the paid hours of work of rural residents by 2.450 hours (approximately 147 minutes a week). In the same vein, an increase in the real wage by 1% induces an increase in the hours of paid work for respondents in the rural areas by 3 hours per week. It may be argued that, given the economic opportunities in the urban areas, increase in wages should have higher effects on the paid hours of work of urban residents than their rural counterparts. However, the report on the sixth round of the GLSS provides two bases upon which the higher wage effect on rural residents is justifiable: 1) The report indicates that out of the 77.1% of the population, 15 years and older, who are economically active, those in the rural areas are more likely than those in the urban areas to be economically active; 2) it also shows that approximately four out of every five persons in rural areas are employed (81.7%) compared to 69.9% in urban areas (Ghana Statistical Service, 2014c). These figures are

supported by the 2015 Labour Force Survey Report which shows that about 70.4% of the population in rural localities is employed compared with 65.1% in the urban areas.

Similar to the results across gender, the positive effect across geographical location points to the fact that increases in wage have substitution effects on hours of paid work of both rural and urban residents. At the national level, the substitution effect outweighs the income effect, rendering the total effect substitutive. It is evident from the results that real wage has higher effects on time allocation to both paid and unpaid work than nominal wage does. This suggests that time allocation decisions of Ghanaians to both household production and labour supply are influenced by the relative value of their wages.

Consistent with the evidence in the earlier studies (Gronau, 1976a; Song, 2007), none-wage income (proxied by remittance) appears to have an insignificant negative effect on hours of paid work across gender and geographical location. Similar to the effect of wage, the effect of remittance (in Table 6-3) is relatively higher for females and rural residents than males and urban residents. Theoretically, the negative effect occurs because remittances raise the reservation wage of individuals and discourage them from participating in the labour market. It also induces a substitution effect on individuals' time allocation to paid work, while inducing positive effect or no change in leisure consumption depending on country-specific contexts (Ilahi, 2000). While the first explanation may be more applicable to developed countries where there are employment opportunities and flexible labour market conditions, it is the second explanation that is more likely to support findings of this study. This is because remittance affects all facets of consumption expenditure and investment of many households in developing countries, including Ghana (Adams & Cuecuecha, 2013; Combes & Ebeke, 2011). This study argues that, due to the high unemployment rate and other unfavourable labour market conditions in developing countries, the concept of reservation wage and its perceived impact on labour market participation are more of theory than practice. Empirically, our findings lend support to the works of earlier researchers who found negative associations between non-wage income and hours of paid work (Alderman & Chishti, 1991; Ilahi & Grimard, 2000; Ilahi & Jafarey, 1999)

As observed in the section on unpaid hours of work, age has a nonlinear relationship with hours of paid work. While hours of paid work are increasing functions of age, at certain age levels, individuals reduce their labour supply even if wage continues to increase. The threshold at which age responds negatively to increase in wage is lower (40 years in the model for nominal wage and 42 years in the models for real wage) for males: 44 years in the model for nominal wage and 46 years in the model for real wage.

Table 6-3: Estimates of paid hours of work across gender

Dependent variable	Nominal wage (Ghana cedi)			Real wage (Ghana cedi)		
Hours of paid work	**Male**	**Female**	**Both**	**Male**	**Female**	**Both**
Log hourly wage	2.904***	1.065**	2.037***	3.593***	1.351**	2.540***
	(0.518)	(0.536)	(0.392)	(0.591)	(0.616)	(0.465)
Log remittance	-0.582***	-1.149***	-0.946***	-0.600***	-1.154***	-0.957***
	(0.167)	(0.192)	(0.144)	(0.148)	(0.152)	(0.131)
Children under 5	-0.309***	-0.362***	-0.407***	-0.309***	-0.363***	-0.407***
	(0.095)	(0.117)	(0.068)	(0.098)	(0.104)	(0.057)
Age	0.441***	0.245**	0.349***	0.461***	0.252***	0.363***
	(0.111)	(0.111)	(0.072)	(0.085)	(0.093)	(0.068)
Age square	-0.005***	-0.003**	-0.004***	-0.005***	-0.003***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Basic education (Ref: None)	0.637	0.734	0.887**	-0.168	0.454	0.342
	(0.681)	(0.630)	(0.436)	(0.679)	(0.674)	(0.479)
Secondary education plus	1.423*	3.873***	2.449***	-1.288	2.887***	0.563
	(0.821)	(0.794)	(0.595)	(0.943)	(0.999)	(0.711)
Informal (Ref: Married)	-1.506*	2.084***	-0.373	-1.382	2.143**	-0.278
	(0.822)	(0.790)	(0.606)	(0.943)	(0.840)	(0.647)
Single	-9.881***	0.057	-6.697***	-9.672***	0.148	-6.542***
	(0.621)	(0.884)	(0.509)	(0.631)	(0.874)	(0.519)
Spouse (Ref: Head)	9.266***	16.182***	11.221***	9.020***	16.063***	11.008***
	(2.379)	(0.762)	(0.605)	(1.990)	(0.854)	(0.737)
Child/Grand child	18.945***	17.594***	17.883***	18.810***	17.525***	17.773***
	(1.128)	(0.903)	(0.672)	(0.956)	(0.951)	(0.814)
Other relative	19.965***	20.179***	19.681***	19.013***	19.783***	18.982***
	(2.526)	(2.558)	(1.674)	(2.677)	(2.663)	(2.086)
Adopted/Servant	28.613***	14.381	21.883***	26.453***	13.527	20.327***
	(4.973)	(9.717)	(5.265)	(4.575)	(9.419)	(4.550)
Urban	-0.747	1.553**	0.233	-0.453	1.645***	0.428
	(0.578)	(0.634)	(0.377)	(0.594)	(0.581)	(0.417)
Female	-------	--------	-4.837***	--------	-------	-4.823***
	--------	-------	(0.437)	--------	-------	(0.517)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9870	8584	18454	9870	8584	18454
Test of exogeneity (P-value)	0.465	0.312	0.411	0.336	0.387	0.345

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets.

Across gender, age and the square of age are significant. However, across geographical location, the results are much more significant for urban residents than for rural residents. The sizes of the coefficients imply that additional increases in age increase the hours of work of males and urban residents more than of females and urban residents. In the same vein, when paid hours of work begin to reduce due to further increases in age, the effect is higher for males and urban residents than females and rural residents. When both gender and geographical location are considered as variables in the models rather than sub-samples, the results in Tables 6-3 show that females in the urban area spend more hours on paid work than their rural counterparts while the results are insignificant among males. Observe from Table 6-4 that in both rural and urban areas, females spend less time on paid work than males. The difference in the rural area is almost twice the difference in the urban area. In the full sample, females spend approximately 5 hours less than males and this is significant at 1% level. This result confirms the descriptive analysis and the GLSS reports on higher employment among rural residents and males.

In addition to age, the relationship of the respondent to the household head has a positive significant association with the hours of paid work. Compared to the head of the household, the effects are higher for children, grandchildren and other members of the household. In Table 6-3, female spouses and other relatives spend more hours on paid work than males. However, compared to the head of the household, adopted/servants who are males spend more time on paid work than females. Across geographical location (see Table 6-4), there seems to be virtually no difference in the extent of effect except that adopted/servants in the urban areas spend more time on paid work than their rural counterparts. One possible reason is that approximately 29% of children between 7 and 14 years who are economically active are engaged in one form of child labour or the other to contribute to household income(Ghana Statistical Service, 2014c).

Similar to the household head, marital status has a differential effect on time allocation to paid work. Contrary to some of the findings in the literature (Bloemen et al., 2010), the results in Table 6-3 indicates that compared to males who are married, males who are in informal relationships and those who are single spend significantly less hours on paid work. Among females, the results are positive and particularly significant for those who are in informal relationships. It could be argued that married persons have more responsibilities that require them to work for more hours in order to meet their financial demands. It can be inferred from these results that married individuals, particularly females and rural residents in Ghana are more likely to bear what is termed in the literature as “double burden of work” (Ferrant et al., 2014).

Several empirical studies have documented that parents who have younger children have a low probability of participating in the labour market. Even if they participate, they are more likely to work part-time (Bianchi, 2000; Connelly, 1992). The results in Tables 6-3 and 6-4 confirm this

observation that an increase in the number of children under five in the household by one person is negatively associated with the hours of paid work for both sexes and across geographical location. The effect is relatively higher for females and urban residents than for males and rural residents. What appears to be a bit interesting is the fact that the effect is higher among urban residents than rural residents. This could be due to the differences in family structure and the more communal lifestyle in the rural area compared to the individualistic lifestyle in the urban area, and higher inclination of urban residents towards nuclear family than rural residents.

Regarding education, the results in Tables 6-3 and 6-4 show that a higher level of education is associated with more hours of paid work and this is particularly significant for a respondent who has completed at least secondary education. Keeping a respondent who has no education as the reference category, the extent of the effects are higher among females than males, and urban residents than rural residents. These results follow intuition since respondents who have completed higher levels of education have higher probability of being employed. As observed in the descriptive analysis, males spend more time on paid work than females. However, these results have to be interpreted with some caveat since the number of hours that one would spend on work depends on several factors including experience, the nature of the task and the occupational status of the person in question. As usual, the annual dummies for the survey years were included in the analysis to capture the changes in the hours of work over the periods of the three surveys. The results in Tables 6-3 and 6-4 confirm Figure 6-1 in the descriptive analysis that, between 1998 and 2013, there has been a significant increase in the hours of paid work for both sexes and across geographical location. Compared to the reduction in the hours of unpaid work, it appears that the increase in the paid work is higher.

Table 6-4: Estimates of paid hours of work across geographical location

Dependent variable	**Nominal wage (Ghana cedi)**			**Real wage (Ghana cedi)**		
Hours of paid work	**Rural**	**Urban**	**Both**	**Rural**	**Urban**	**Both**
Log hourly wage	2.450***	1.456**	2.037***	3.040***	1.845**	2.540***
	(0.456)	(0.591)	(0.382)	(0.574)	(0.740)	(0.451)
Log remittance	-1.234***	-0.692***	-0.946***	-1.252***	-0.697***	-0.957***
	(0.181)	(0.176)	(0.138)	(0.172)	(0.158)	(0.120)
Children under 5	-0.345***	-0.473***	-0.407***	-0.344***	-0.473***	-0.407***
	(0.106)	(0.100)	(0.074)	(0.087)	(0.102)	(0.072)
Age	0.122	0.735***	0.349***	0.137	0.745***	0.363***
	(0.089)	(0.141)	(0.075)	(0.084)	(0.111)	(0.066)
Age square	-0.002*	-0.007***	-0.004***	-0.002**	-0.007***	-0.004***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Basic education(Ref: None)	-0.295	3.745***	0.887**	-0.947*	3.346***	0.342

Dependent variable	Nominal wage (Ghana cedi)			Real wage (Ghana cedi)		
Hours of paid work	**Rural**	**Urban**	**Both**	**Rural**	**Urban**	**Both**
	(0.551)	(0.856)	(0.409)	(0.519)	(0.831)	(0.511)
Secondary education plus	-0.060	5.844***	2.449***	-2.316***	4.469***	0.563
	(0.824)	(0.894)	(0.507)	(0.896)	(1.157)	(0.736)
Informal(Ref: Married)	-0.376	0.301	-0.373	-0.254	0.366	-0.278
	(0.736)	(1.023)	(0.596)	(0.696)	(1.128)	(0.632)
Single	-7.469***	-5.120***	-6.697***	-7.270***	-5.010***	-6.542***
	(0.618)	(0.942)	(0.510)	(0.699)	(0.811)	(0.595)
Spouse (Ref: Head)	11.172***	11.461***	11.221***	10.917***	11.306***	11.008***
	(0.751)	(1.039)	(0.696)	(0.850)	(0.922)	(0.644)
Child/Grand child	17.793***	17.915***	17.883***	17.647***	17.840***	17.773***
	(0.885)	(1.148)	(0.709)	(0.857)	(1.186)	(0.674)
Other relative	20.354***	19.502***	19.681***	19.524***	18.983***	18.982***
	(2.418)	(2.948)	(1.941)	(2.163)	(2.896)	(1.952)
Servant/Adopted	11.940	24.683***	21.883***	10.152	23.534***	20.327***
	(12.731)	(5.135)	(4.407)	(12.493)	(5.047)	(4.785)
Female	-6.038***	-3.297***	-4.837***	-6.021***	-3.287***	-4.823***
	(0.587)	(0.648)	(0.450)	(0.649)	(0.622)	(0.506)
Urban	-------	--------	0.233	--------	--------	0.428
	-------	-------	(0.452)	-------	-------	(0.424)
Survey year(dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10764	7690	18454	10764	7690	18454
Test of exogeneity (P-value)	0.377	0.184	0.287	0.374	0.164	0.270

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets.

6.4 Conclusion

Between 1998 and 2013, the time allocation of Ghanaians to unpaid work has reduced considerably, while hours allocated to paid work have increased. This suggests that Ghanaians have reallocated some of their time from unpaid work to paid work. This shift in time was pervasive across gender and geographical location. Although the gap has narrowed across gender and geographical location, females still continue to spend more time on unpaid work than males do, while males spend more time in the labour market than females do. Similarly, rural residents spend more time on both paid and unpaid work than urban residents do. The distribution of nominal and real wages (dependent variable of interest) shows a consistent increase in hourly wage within the period under study. Wage appears to be higher among males and urban residents than females and rural residents although rural residents spend more time on both paid and unpaid work than urban residents do.

The regression analyses show differential effects of wage on intra-household time allocation to paid and unpaid hours of work. As expected, an increase in wage reduces unpaid hours of work across gender and geographical location. The extent of reduction is higher among males than females but virtually the same across geographical location. Wage has a positive effect (substitution effects) on labour supply across gender and geographical location. Nonetheless, the effect is higher among males and rural residents than females and urban residents in spite of the fact that rural residents receive lower average wages than urban residents do. Real wage has a higher effect on both labour supply and hours of unpaid work than nominal wage does, suggesting that the extent of the effect of the relative value of wage on hours of work in Ghanaian households dominates the nominal value of wage.

These differential effects of changes in wage on time allocation require that government policies that seek to use wage as an instrument to achieve gender and spatial equality in labour force participation, labour supply and household production, will have to consider these factors. Government needs to pay more attention to policies that improve the education of females and rural residents and address the entrenched social norms and values that perpetuate gender inequality in household production and labour supply in Ghana. Labour unions must also focus on real wage rather than nominal wage in their negotiations with government and other employers on the conditions of service of their members, since real wage has higher effects on both household production and labour supply than nominal wage.

CHAPTER 7: WAGE AND TIME ALLOCATION AMONG COUPLES

7.1 Introduction

The presentation and discussion of this chapter are structured into two main sub-sections. The first section begins with the effect of spousal time allocation on wages (spousal premium or penalty) while the second subsection covers the cross-wage effects of spousal labour supply and household production. The essence of this analysis is to examine the extent of interaction between time allocation and wages of the wife and those of the husband. The estimates of both the OLS and two-step IV Tobit models are presented for the sake of comparison of the potential biases. In the OLS model, the hours of work are treated as an exogenous variable. However, in the IV estimates, correct the endogeneity are corrected using the predicted values of the hours of work. The statistic and P-values of the Durbin-Wu-Hausman test of exogeneity reported at the bottom of the output tables show that the OLS estimates are downwardly biased; hence the need to reject the hypothesis that the hours of work are exogenous in the wage equations.

7.2 Estimates of spousal hourly wages

Tables 7-1 and 7-2 present estimates of the wife's hours of paid and unpaid work and other control variables in the husband's logged hourly wage. Tables 7-3 and 7-4 in turn present the estimates of the husband's hours of paid and unpaid work in the wife's hourly wage equation. The estimates of the full sample models in Table 7-1 show evidence of a working spouse premium. Thus an increase in the wife's hours of work significantly increases the husband's hourly wage.

Earlier studies, such as those of Hotchkiss and Moore (1999) and Song (2007), found no evidence of a premium/penalty in the full models but rather in a sub-sample analysis based on the occupation and race or ethnic affiliation of the respondent. Song (2007), for instance, found a working spouse penalty among managers and a working spouse premium among non-managers. Song (2007) also discovered the existence of a working spouse penalty for white husbands and a working spouse premium for Hispanic husbands, but the wife's hours of work had no effect on the wages of black husbands. In the current study, the consistency of the results was tested by running a sub-sample analysis across ethnic groups using both paid and unpaid hours of work. The results in Table 7-2 show consistent evidence of a working spouse premium for the husband across all eight ethnic groups in Ghana. Evidence of this spousal premium is confirmed by the negative relationship between hours of unpaid work and a husband's logged hourly wage (spousal penalty)

Table 7-1: Effect of wife's hours of work on husband's wage

Dependent variable	Models for paid hours of work				Models for unpaid hours of work			
Log husband's hourly wage	Nominal wage		Real wage		Nominal wage		Real wage	
(Ghana cedi)	OLS	IV Tobit	OLS	IV Tobit	OLS	IV Tobit	OLS	IV Tobit
Wife's weekly hours of work	0.001***	0.027***	0.001***	0.026***	-0.004***	-0.022***	-0.004***	-0.023***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Husband's age	0.003**	0.039***	0.004**	0.038***	0.004**	0.008**	0.004***	0.008***
	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)	(0.002)	(0.003)
Husband's age square	-0.000	-0.000***	-0.000	-0.000***	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ga-Dangme (Ref: Akan)	0.029	-0.043	0.009	-0.060**	0.017	-0.049*	-0.003	-0.072***
	(0.027)	(0.028)	(0.027)	(0.024)	(0.027)	(0.026)	(0.027)	(0.022)
Ewe	0.047**	-0.015	0.035	-0.024	0.030	-0.057**	0.018	-0.074***
	(0.024)	(0.022)	(0.024)	(0.023)	(0.024)	(0.023)	(0.024)	(0.021)
Guan	-0.096***	-0.063**	-0.104***	-0.074***	-0.094***	-0.076***	-0.103***	-0.083***
	(0.026)	(0.028)	(0.025)	(0.027)	(0.026)	(0.022)	(0.025)	(0.025)
Mole-Dagbani	-0.037**	-0.109***	-0.036**	-0.105***	-0.031*	-0.004	-0.029*	-0.002
	(0.017)	(0.016)	(0.018)	(0.018)	(0.017)	(0.017)	(0.017)	(0.018)
Grusi	-0.069**	-0.062**	-0.067**	-0.061**	-0.074**	-0.085***	-0.072**	-0.084***
	(0.030)	(0.028)	(0.030)	(0.029)	(0.029)	(0.024)	(0.030)	(0.029)
Gurma	-0.083***	-0.271***	-0.085***	-0.264***	-0.076***	-0.061***	-0.078***	-0.062***
	(0.021)	(0.022)	(0.020)	(0.025)	(0.020)	(0.023)	(0.020)	(0.019)
Other ethnic	-0.090***	-0.062*	-0.086***	-0.059*	-0.070**	0.004	-0.066**	0.011
	(0.032)	(0.032)	(0.032)	(0.033)	(0.032)	(0.028)	(0.032)	(0.035)
Basic education (Ref: None)	0.015	0.031**	0.004	0.040***	0.009	0.025**	0.002	0.038**
	(0.014)	(0.014)	(0.014)	(0.012)	(0.014)	(0.014)	(0.014)	(0.015)
Secondary education plus	0.062**	0.032**	0.041**	0.013	0.049*	0.026**	0.028**	0.049**
	(0.027)	(0.025)	(0.027)	(0.024)	(0.027)	(0.028)	(0.026)	(0.025)
Urban	0.259***	0.168***	0.264***	0.176***	0.247***	0.166***	0.251***	0.167***
	(0.017)	(0.016)	(0.017)	(0.015)	(0.016)	(0.015)	(0.016)	(0.014)
Union at work place	0.524***	0.508***	0.464***	0.450***	0.515***	0.528***	0.456***	0.468***
	(0.027)	(0.025)	(0.027)	(0.020)	(0.026)	(0.027)	(0.026)	(0.020)
Sector of employment	0.067***	0.312***	0.062***	0.295***	0.099***	0.293***	0.093***	0.297***
	(0.018)	(0.020)	(0.018)	(0.018)	(0.017)	(0.019)	(0.017)	(0.018)
Constant	0.886***	1.122***	0.892***	1.117***	1.115***	1.924***	1.118***	1.969***
	(0.046)	(0.080)	(0.046)	(0.079)	(0.049)	(0.082)	(0.048)	(0.075)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10489	10453	10489	10453	10489	10453	10489	10453
R-squared	0.150	--------	0.132	--------	0.171	--------	0.154	--------
Durbin-Wu-Hausman test	-------	0.001**	------	0.001***	-------	0.022***	------	0.023***
	-------	(0.0003)	------	(0.001)				

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

Table 7-2: Wife's hours of work and husband's wage across ethnic affiliation

Dependent variable Log husband's wage (Ghana cedi)	Akan	Ga-Dangme	Ewe	Guan	Mole-Dagbani	Grusi	Gurma	Other ethnic
Wife's paid hours	0.020***	0.021***	0.023***	0.011***	0.008***	0.011***	0.005*	0.013***
(Nominal)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.004)	(0.002)	(0.004)
Constant	0.513***	0.470***	0.452***	0.633***	0.663***	0.603***	0.652***	0.607***
	(0.021)	(0.048)	(0.046)	(0.037)	(0.029)	(0.073)	(0.068)	(0.068)
Wife's paid	0.019***	0.020***	0.022***	0.009***	0.008***	0.010***	0.005**	0.012***
hours (Real wage)	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)	(0.003)
Constant	0.508***	0.468***	0.434***	0.632***	0.651***	0.598***	0.622***	0.607***
	(0.022)	(0.060)	(0.047)	(0.042)	(0.028)	(0.067)	(0.069)	(0.052)
Wife's unpaid Hours	-0.020***	-0.020***	-0.016***	-0.008***	-0.006***	-0.006***	-0.004**	-0.013***
(Nominal wage)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.003)
Constant	1.710***	1.672***	1.547***	1.182***	1.095***	1.084***	0.925***	1.412***
	(0.050)	(0.099)	(0.071)	(0.103)	(0.042)	(0.092)	(0.062)	(0.149)
Wife's unpaid	-0.021***	-0.022***	-0.017***	-0.009***	-0.007***	-0.008***	-0.005***	-0.013***
hours(Real wage)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)
Constant	1.710***	1.678***	1.532***	1.168***	1.130***	1.112***	0.957***	1.410***
	(0.047)	(0.090)	(0.070)	(0.092)	(0.040)	(0.093)	(0.078)	(0.130)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4421	837	1253	486	2216	362	476	402

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

Table 7-3 depicts some interesting dynamics in terms of the effect of the husband's hours of work on the wife's wage. The models for labour supply show the same positive association between hours of work and wage as observed in the models for the husband's wage. The magnitude of the coefficients, however, is smaller than that revealed in the models for the husband's wage. To some extent, it can be inferred that these differences in effect reflect the entrenched male-female wage differential in developing countries. What is quite interesting is the direction of the association between the husband's hours of household production and the wife's wage.

Contrary to the results in the husband's wage equations (see Tables 7-1 and 7-2), there is a positive association between the two variables. In other words, an increase in the husband's hours of unpaid work is positively associated with the wife's hourly wage. The consistency of the results is reflected in the parsimonious analysis across the ethnic affiliation of the wife and the level of education of the respondents (results not reported). These results support the findings of a similar study by Song (2007) who concluded that the wife's wage has a significant, positive effect on her husband's hours of household production.

Based on these results, it can be concluded that the differences in spousal time allocation to household production and labour supply affect spousal wages between monogamous couples in Ghanaian households differently. In a developing country like Ghana, it is possible that the

combined effect of entrenched traditional values and rigidities in the labour market contributes to the observed negative association between the wife's wage and her husband's hours of work. The constraints created by norms of parenting, the notion of good mothering and ineffective institutional policies to achieve a more equitable gender division of labour might contribute to these findings.

In relation to the debate in the literature, the positive association between spousal hours of labour supply and wages lends support to the findings of Jacobsen and Rayack (1996) who observed a working spouse wage premium. Thus married men (wives) whose wives (husbands) are engaged in some economic activity earn higher wages than their counterparts who have non-working wives (husbands). The key explanations for the positive association could be: 1) the complementarity in the market production of the couples; 2) that men who are highly productive tend to marry women who are also highly productive in the labour market through assortative mating; and 3) that additional income from the working wife (husband) may allow the husband (wife) to pursue well-paying job opportunities.

Table 7-3: The effect of husband's hours of work on wife's wage

Dependent variable	**Models for hours of paid work**				**Models for hours of unpaid work**			
Log wife's wage	**Nominal wage**		**Real wage**		**Nominal wage**		**Real wage**	
(Ghana cedi)	**OLS**	**IV Tobit**	**OLS**	**IV Tobit**	**OLS**	**IV Tobit**	**OLS**	**IV Tobit**
Husband's hours	0.0003**	0.0115***	-0.0000	0.0004**	-0.0004***	0.0022***	0.0000	0.0012***
	(0.0001)	(0.0009)	(0.0000)	(0.0002)	(0.0001)	(0.0008)	(0.0000)	(0.0002)
Wife's age	0.0025***	0.0022*	0.0008***	0.0006***	0.0024***	0.0031***	0.0008***	0.0010***
	(0.0009)	(0.0012)	(0.0001)	(0.0001)	(0.0009)	(0.0009)	(0.0001)	(0.0001)
Wife's age square	-0.0000***	-0.0001***	-0.0000***	-0.0000**	-0.0000***	-0.0000***	-0.0000***	-0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Ga-Dangme (Ref:Akan)	0.0124	-0.0107	0.0019	0.0010	0.0127	0.0153	0.0018	0.0031
	(0.0154)	(0.0152)	(0.0027)	(0.0028)	(0.0154)	(0.0142)	(0.0027)	(0.0027)
Ewe	0.0153	0.0061	-0.0006	-0.0011	0.0150	0.0189	-0.0006	0.0010
	(0.0130)	(0.0137)	(0.0024)	(0.0022)	(0.0130)	(0.0142)	(0.0024)	(0.0024)
Guan	-0.0139	-0.0073	0.0015	0.0018	-0.0142	-0.0134	0.0015	0.0020
	(0.0142)	(0.0133)	(0.0055)	(0.0057)	(0.0142)	(0.0140)	(0.0055)	(0.0049)
Mole-Dagbani	0.0157*	0.0043	-0.0011	-0.0016	0.0163*	0.0144	-0.0011	-0.0021
	(0.0092)	(0.0085)	(0.0015)	(0.0016)	(0.0092)	(0.0091)	(0.0015)	(0.0015)
Grusi	-0.0084	0.0184	-0.0039**	-0.0027	-0.0084	-0.0128	-0.0038**	-0.0059***
	(0.0128)	(0.0125)	(0.0018)	(0.0017)	(0.0128)	(0.0116)	(0.0018)	(0.0019)
Gurma	-0.0085	-0.0351***	-0.0003	-0.0015	-0.0080	-0.0081	-0.0004	-0.0005
	(0.0075)	(0.0079)	(0.0019)	(0.0019)	(0.0075)	(0.0077)	(0.0019)	(0.0019)
Other ethnic	-0.0464***	-0.0381***	-0.0006	-0.0007	-0.0457***	-0.0496***	-0.0006	-0.0036
	(0.0098)	(0.0088)	(0.0035)	(0.0035)	(0.0098)	(0.0101)	(0.0035)	(0.0035)
Basic education	0.0142*	0.0057	0.0016	0.0013	0.0145**	0.0139*	0.0016	0.0014
(Ref: None)	(0.0073)	(0.0059)	(0.0017)	(0.0017)	(0.0073)	(0.0072)	(0.0017)	(0.0016)
Secondary	0.0156	0.0201	0.0019	0.0023	0.0155	0.0156	0.0020	0.0022
	(0.0150)	(0.0143)	(0.0037)	(0.0037)	(0.0150)	(0.0153)	(0.0037)	(0.0035)
Urban	0.0801***	0.0466***	-0.0012	-0.0027	0.0806***	0.0831***	-0.0013	-0.0003

Dependent variable	Models for hours of paid work				Models for hours of unpaid work			
Log wife's wage	Nominal wage		Real wage		Nominal wage		Real wage	
(Ghana cedi)	OLS	IV Tobit	OLS	IV Tobit	OLS	IV Tobit	OLS	IV Tobit
	(0.0085)	(0.0069)	(0.0018)	(0.0019)	(0.0085)	(0.0077)	(0.0018)	(0.0017)
Union at work place	0.1508***	0.1476***	0.0259***	0.0252***	0.1528***	0.1524***	0.0257***	0.0252***
	(0.0147)	(0.0134)	(0.0037)	(0.0035)	(0.0146)	(0.0120)	(0.0037)	(0.0039)
Sector	0.0753***	0.1407***	0.0101***	0.0128***	0.0729***	0.0785***	0.0104***	0.0129***
	(0.0092)	(0.0124)	(0.0019)	(0.0025)	(0.0091)	(0.0097)	(0.0019)	(0.0020)
Constant	0.6085***	0.2174***	0.6770***	0.6602***	0.6315***	0.5893***	0.6749***	0.6575***
	(0.0209)	(0.0467)	(0.0032)	(0.0082)	(0.0198)	(0.0239)	(0.0034)	(0.0049)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10489	10453	10489	10453	10489	10453	10489	10453
R-squared	0.0643	--------	0.0271	----------	0.0218	--------	0.0031	--------
Durbin-Wu-Hausman test	--------	-0.0002	---------	-0.0001**	--------	-0.0004***	--------	-0.0001**
	--------	(0.0002)	---------	(0.00003)	--------	(0.0002)	--------	(0.00003)

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

Table 7-4: Husband's hours of work and wife's wage across ethnic affiliation

Dependent variable Log wife's wage (Ghana cedi)	Akan	Ga-Dangme	Ewe	Guan	Mole-Dagbani	Grusi	Gurma	Other ethnic
Husband's paid hours	0.008***	0.007***	0.007***	0.007***	0.002**	0.002	-0.000	0.002
(Nominal wage)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
Constant	0.439***	0.495***	0.515***	0.465***	0.672***	0.659***	0.723***	0.634***
	(0.031)	(0.077)	(0.062)	(0.080)	(0.034)	(0.052)	(0.030)	(0.045)
Husband's paid hours	0.033***	0.029***	0.037***	0.018***	0.015***	0.014***	0.007**	0.025***
(Real wage)	(0.002)	(0.005)	(0.004)	(0.005)	(0.002)	(0.003)	(0.003)	(0.005)
Constant	-0.287***	-0.191	-0.425***	0.174	0.258***	0.356***	0.509***	-0.060
	(0.059)	(0.213)	(0.157)	(0.163)	(0.076)	(0.110)	(0.108)	(0.178)
Husband's unpaid	-0.006***	-0.005*	-0.003	-0.008	-0.005***	-0.006	0.000	-0.002
hours (nominal wage)	(0.001)	(0.003)	(0.003)	(0.005)	(0.001)	(0.004)	(0.001)	(0.002)
Constant	0.815***	0.819***	0.802***	0.802***	0.791***	0.787***	0.702***	0.736***
	(0.012)	(0.034)	(0.027)	(0.049)	(0.018)	(0.048)	(0.008)	(0.025)
Husband's unpaid	-0.030***	-0.028***	-0.023***	-0.012**	-0.023***	-0.021***	-0.015***	-0.018***
hours (Real wage)	(0.002)	(0.005)	(0.006)	(0.005)	(0.002)	(0.007)	(0.004)	(0.005)
Constant	1.220***	1.195***	1.170***	0.938***	1.085***	1.062***	0.921***	1.067***
	(0.025)	(0.056)	(0.053)	(0.056)	(0.028)	(0.097)	(0.053)	(0.076)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4421	837	1253	486	2216	362	476	402

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

In addition to the hours of paid and unpaid work, it appears that the ages of both the wife and the husband have non-linear relationships with the respective hourly wages. Thus the hourly wage first increases with an increase in the age of the respondent and then becomes negative after a certain age threshold. This observation corroborates the findings in the literature in developed countries where a relative maximum is observed. When ethnicity is included as a variable in the

models, the results show that, compared with the Akan ethnic group, the wage reduces for both husband and wife who are affiliated with the rest of the ethnic groups.

In the models for the husband's hours of paid work in Table 7-1, the results are particularly significant for the Guan, Mole-Dagbani, Grusi, Gurma and other minority ethnic groups. However, in the models for the wife's hours of paid work (see Table 7-3), the effects are not as strong as those in the models for the husband's hours of paid work. Only the Gurma and Other ethnic groups appear to be significant. The same weak effect of the wife's ethnic affiliation on her wage is observed in the models for hours of unpaid work. These results contradict the expectations that ethnic practices should affect women's employment and wages compared with those of men.

It is expected that higher education is associated with higher skill levels which will attract higher wages. This expected positive association is observed in this analysis, with the extent of the effect being higher for respondents who have completed at least secondary education than for those who have only completed some basic education. Moreover, the results are more significant in the models for the husband's hourly wage than for the hourly wage of the wife. This finding gives some idea of the gender inequality that exists in terms of access to the formal labour market and wages in Ghana, which is largely influenced by decisions regarding the division of labour between couples in the household. On average, men in Ghana have greater access to wage employment than women. In other words, women are more likely to be engaged in self-employment and informal market activities (Ghana Statistical Service, 2014d). This phenomenon is influenced by a number of factors, including but not limited to a lack of gender parity in education, especially at the higher level, and rigidities in labour market conditions which make it difficult for women to balance parenting with work.

Geographical location remains one of the important determinants of households' access to social services and engagement in economic activities. This factor consequently affects the time allocation decision and earnings of household members in general and couples in particular. In this analysis, it was found that couples in urban areas are likely to earn higher wages than their counterparts in rural areas. The results also depict an element of gender inequality as the average effects of urban residence (see Tables 7-1 and 7-3) are higher for husbands than for wives.

As indicated in the previous section and in the methodology, the availability of a union at the place of work and the employment sector determine the level of earnings of employees. Although the private-public sector wage difference lends itself to debate and is largely dependent on the economy in question, it is indisputable that union membership or the availability of a union in the workplace has a positive influence on the wage level of its members, compared with non-

members. In this analysis, a significant positive association was observed between these variables and the wages of both the husband and the wife.

In summary, this analysis has shown evidence of a working spouse wage premium between couples in Ghana. The results are significant in the models for both the husband and the wife, regardless of their ethnic affiliation or level of education. Another observation is that although the wife's hours of unpaid work are negatively associated with the husband's logged hourly wage, the husband's hours of unpaid work are positively associated with the wife's wage. This means that labour market policies such as paternity leave, which would encourage men's (husbands') active participation in household production, would go a long way in enhancing women's (wives') labour force participation and earnings. It is recommended that government and labour unions should step up efforts to expand the current five (5) working days of paternity leave covering the health services, education and mining sector workers (Otoo, Osei-Boateng, & Adjaye, 2009) to include all workers in the formal sector because it would indirectly improve women's wages in the household.

7.2.1 Cross-wage effects of spousal time allocation

This section begins with the presentation of, and a discussion on, the effect of the husband's logged hourly wage on the wife's weekly hours of labour supply (paid work) and household production or unpaid work. This is followed by a discussion on the effect of the wife's logged hourly wage on the husband's hours of work.

7.2.2 Effects of the husband's hourly wage on the wife's hours of work

The results in Table 7-5 show a non-linear relationship between the logged hourly wage of the husband and the wife's labour supply. Thus the cross-wage effect of the husband's logged hourly wage and the wife's weekly hours of paid work is first positive and then becomes negative after a certain wage threshold. The turning point (reported at the bottom of the output tables) shows that at wages below these turning points, a wife whose husband earns a higher wage spends fewer hours on paid work than a wife whose husband earns a comparatively lower wage.

Table 7-5: The husband's log hourly wage and the wife's hours of paid work

Dependent variable	Nominal wage (Ghana cedi)			Real wage (Ghana cedi)		
Wife's weekly hours of paid work	Tobit	IV Tobit	IV Tobit	Tobit	IV Tobit	IV Tobit
Husband's log hourly wage	2.466***	11.678***	11.606***	2.593***	9.106***	9.258***
	(0.926)	(1.653)	(1.817)	(0.978)	(1.538)	(1.935)
Husband's log	-0.314	-2.354***	-2.300***	-0.337	-1.248*	-1.236
hourly wage square	(0.204)	(0.673)	(0.718)	(0.213)	(0.660)	(0.758)
Log remittance	-0.028	-0.018	-0.026	-0.027	-0.011	-0.019
	(0.088)	(0.086)	(0.080)	(0.088)	(0.081)	(0.098)
Wife's age	1.538***	1.487***	1.489***	1.540***	1.493***	1.495***
	(0.084)	(0.087)	(0.096)	(0.084)	(0.083)	(0.084)
Wife's age square	-0.018***	-0.017***	-0.017***	-0.018***	-0.017***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ga-Dangme (Ref: Akan)	1.217*	1.123	1.100	1.250*	1.241*	1.214*
	(0.709)	(0.720)	(0.725)	(0.709)	(0.743)	(0.697)
Ewe	1.360**	1.003	1.042	1.380**	1.099*	1.134*
	(0.603)	(0.635)	(0.648)	(0.604)	(0.635)	(0.590)
Guan	-0.466	0.067	0.232	-0.447	0.069	0.267
	(0.889)	(0.850)	(0.911)	(0.889)	(0.914)	(0.905)
Mole-Dagbani	2.723***	2.876***	3.082***	2.722***	2.836***	3.060***
	(0.472)	(0.516)	(0.443)	(0.472)	(0.499)	(0.561)
Grusi	0.643	0.856	1.129	0.645	0.765	1.070
	(1.013)	(1.119)	(0.976)	(1.013)	(1.069)	(0.918)
Gurma	5.713***	6.309***	6.533***	5.714***	6.234***	6.485***
	(0.730)	(0.690)	(0.682)	(0.729)	(0.735)	(0.813)
Other ethnic	-0.126	0.197	0.388	-0.128	0.135	0.353
	(1.016)	(1.088)	(1.145)	(1.017)	(1.026)	(1.011)
Basic education(Ref: None)	1.549***	--------	1.114***	1.561***	--------	1.178***
	(0.381)	--------	(0.402)	(0.381)	--------	(0.362)
Secondary education plus	0.371	--------	-0.322	0.398	--------	-0.291
	(0.672)	--------	(0.662)	(0.672)	--------	(0.688)
Children under 5	-0.006	--------	-0.091**	-0.010	--------	-0.105***
	(0.035)	-------	(0.036)	(0.035)	-------	(0.039)
Urban	1.870***	-------	0.226	1.864***	-------	0.149
	(0.406)	-------	(0.438)	(0.407)	-------	(0.422)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10489	10453	10453	10489	10489	10453
Turning point in husband's log wage	3.984	2.485	2.524	3.809	3.644	3.734
Wald test of exogeneity (P-Values)	-------	0.159	0.148	------	0.162	0.157

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets.

The turning points in the Tobit models where the husband's hours of labour supply are treated as exogenous are relatively higher than those in the two-stage IV models which were corrected for the endogeneity of the husband's logged hourly wage (see Table 7-5). In monetary terms, the turning points in the Tobit and IV Tobit estimates for the nominal wage (first three columns) translate into approximately Gh₵54 and Gh₵12, respectively. Similarly, the turning points for real

wage (last three columns) translate into approximately Gh₵45, Gh₵38 and Gh₵42, respectively. The non-linear relationship observed in this analysis supports Song's (2007) assertion that with a linear specification the husband's wage in the wife's labour supply equation could be incorrect, especially when recent data are used.

In Table 7-6, the opposite of the non-linear relationship in the labour supply models (see Table 7-5) is observed. The cross-wage effect of the husband's logged hourly wage on the wife's weekly hours of unpaid work is first negative and then becomes positive after a certain wage threshold. The implication is that above the wage levels determined by the turning points, the wife will reduce her hours of labour supply and increase her hours of household production. This decision could partly be due to the effect of unfavourable labour market conditions that prevent women from combining labour supply with parenting. It could also be ascribed to the effect of the division of labour and specialisation hypothesis.

Regarding the control variables included in the models of the wife's hours of work, there is a similar, non-linear relationship between the wife's age and her hours of paid and unpaid work. The wife's hours increase with an increase in her age up to a certain point and then begin to decrease. In relation to household production, this result indicates that after a certain age threshold, adults delegate some household responsibilities such as cooking, washing and cleaning to the younger members of the household. In relation to the labour market, the results show a reduction in people's interest to supply labour after a certain age due to health conditions or the desire to enjoy more leisure time.

Other control variables such as the number of children under the age of five in the household, ethnic affiliation and geographical location of the wife have significant effects on her hours of work. Compared with a wife who belongs to the Akan ethnic group, her counterparts who are affiliated with the Mole-Dagbani, Gurma or Ga-Dangme ethnic group will spend more hours on paid work. With the same Akan ethnic group as a reference category, a wife from the Ga-Dangme, Ewe, Mole-Dagbani, Grusi or Gurma ethnic group will spend fewer hours on household production. A wife who lives in an urban area will spend significantly fewer hours on household production but more hours on paid work. Compared with a wife who has no education, a wife who has acquired a higher level of education will spend more hours on paid work and fewer hours on unpaid work. Of course, these results follow the *a priori* intuition since highly educated wives have greater bargaining power in the household and possess the required skills that will allow them to be gainfully employed.

Table 7-6: The husband's log hourly wage and the wife's hours of unpaid work

Dependent variable	Nominal wage (Ghana cedi)			Real wage (Ghana cedi)		
Wife's weekly hours of unpaid work	Tobit	IV Tobit	IV Tobit	Tobit	IV Tobit	IV Tobit
Husband's log hourly wage	-6.528***	-32.706***	-31.637***	-7.177***	-34.038***	-33.334***
	(0.627)	(1.751)	(1.705)	(0.592)	(1.801)	(2.123)
Husband's log hourly wage square	0.624***	7.897***	7.471***	0.760***	8.193***	7.748***
	(0.131)	(0.625)	(0.612)	(0.124)	(0.718)	(0.791)
Log remittance	0.055	0.053	0.038	0.054	0.031	0.013
	(0.084)	(0.084)	(0.085)	(0.084)	(0.080)	(0.076)
Wife's age	0.392***	0.528***	0.516***	0.387***	0.529***	0.518***
	(0.110)	(0.109)	(0.108)	(0.110)	(0.106)	(0.114)
Wife's age square	-0.009***	-0.011***	-0.011***	-0.009***	-0.011***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ga-Dangme (Ref: Akan)	-2.471***	-2.247***	-2.275***	-2.569***	-2.542***	-2.555***
	(0.762)	(0.829)	(0.742)	(0.763)	(0.764)	(0.742)
Ewe	-3.157***	-2.619***	-2.548***	-3.217***	-2.777***	-2.686***
	(0.594)	(0.631)	(0.578)	(0.595)	(0.662)	(0.477)
Guan	0.456	-1.374	-1.118	0.401	-1.621*	-1.446*
	(0.952)	(0.885)	(0.871)	(0.952)	(0.926)	(0.854)
Mole-Dagbani	-0.451	-1.300***	-1.172**	-0.447	-1.338***	-1.210***
	(0.497)	(0.496)	(0.494)	(0.497)	(0.476)	(0.418)
Grusi	-1.940*	-3.281***	-3.174***	-1.942*	-3.302***	-3.230***
	(1.028)	(0.994)	(1.004)	(1.027)	(0.952)	(1.006)
Gurma	-1.839**	-3.824***	-3.612***	-1.841**	-4.039***	-3.824***
	(0.824)	(0.767)	(0.803)	(0.824)	(0.768)	(0.839)
Other ethnic	3.102***	1.341	1.343	3.109***	1.362	1.310
	(1.139)	(1.107)	(1.029)	(1.138)	(1.061)	(1.074)
Basic education(Ref: None)	-2.242***	--------	-1.133***	-2.277***	--------	-1.118***
	(0.402)	--------	(0.435)	(0.402)	--------	(0.423)
Secondary education plus	-2.598***	--------	-1.116	-2.678***	--------	-1.035
	(0.698)	--------	(0.702)	(0.697)	--------	(0.704)
Children under 5	0.340***	--------	0.171***	0.329***	--------	0.109***
	(0.035)	-------	(0.040)	(0.035)	-------	(0.035)
Urban	-2.387***	-------	0.815*	-2.371***	-------	1.332***
	(0.424)	-------	(0.475)	(0.424)	-------	(0.422)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10489	10453	10453	10489	10453	10453
Turning point in husband's log wage	5.266	2.070	2.118	4.723	2.078	2.150
Wald test of exogeneity (P-value)	--------	0.231	0.245	--------	0.257	0.325

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets.

7.2.3 Effect of the wife's hourly wage on the husband's hours of work

In Tables 7-7 and 7-8, the same non-linear relationship between the husband's wage and the wife's hours of work can be observed. The results show that an increase in the wife's hourly wage significantly increases the husband's hours of paid work and reduces his hours of unpaid work.

However, at a certain wage threshold of the wife (determined by the turning points reported at the bottom of the tables), the husband's hours of paid work begin to decrease as his hours of unpaid work increase. The magnitude of the reduction in the hours of unpaid work due to an increase in the wage of the partner is greater for the wife than for the husband. However, the extent of the increase in hours of paid work due to a wage increase is greater for the husband than for the wife.

On average, an increase in the husband's hourly wage will reduce the wife's hours of unpaid work by no less than 32 hours per week. However, the reduction in the husband's hours of unpaid work due to an increase in the wife's hourly wage is within a range of 2 to 3 hours per week. On the contrary, the magnitude of the increase in the husband's hours of paid work due to an increase in the wife's hourly wage is within a range of 13 to 16 hours per week, and that of the wife is between 9 and 11 hours per week. These results reflect the unequal opportunities for men and women in the labour market which affect women's labour force participation and labour supply. This can also be ascribed to the effect of male dominance in household decision-making in a culturally conservative Ghanaian society, regardless of the economic status of the women concerned.

Table 7-7: The wife's log hourly wage and the husband's hours of paid work

Dependent variable	**Nominal wage (Ghana cedi)**			**Real wage (Ghana cedi)**		
Husband's weekly paid hours	**Tobit**	**IV Tobit**	**IV Tobit**	**Tobit**	**IV Tobit**	**IV Tobit**
Log wife's wage	3.298*	16.171***	16.399***	-11.026	12.898***	13.264***
	(1.685)	(2.110)	(2.241)	(7.614)	(1.811)	(2.373)
Log wife's wage square	-0.532	-3.291***	-3.268***	2.147	-1.996***	-2.000**
	(0.360)	(0.789)	(0.893)	(1.759)	(0.722)	(0.983)
Remittance	-0.238**	-0.226**	-0.230**	-0.240**	-0.215**	-0.220**
	(0.097)	(0.107)	(0.100)	(0.097)	(0.093)	(0.108)
Husband's age	0.140	0.092	0.096	0.149	0.103	0.105
	(0.140)	(0.123)	(0.122)	(0.141)	(0.119)	(0.135)
Husband's age square	-0.004**	-0.003**	-0.003**	-0.004**	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ga-Dangme (Ref: Akan)	1.651**	1.407*	1.395*	1.699**	1.575**	1.564**
	(0.754)	(0.741)	(0.784)	(0.755)	(0.780)	(0.756)
Ewe	0.667	0.092	0.107	0.697	0.229	0.248
	(0.634)	(0.569)	(0.644)	(0.634)	(0.650)	(0.582)
Guan	-0.338	0.677	0.774	-0.358	0.655	0.792
	(0.962)	(0.941)	(0.872)	(0.963)	(0.924)	(0.939)
Mole-Dagbani	1.613***	2.126***	2.223***	1.597***	2.051***	2.178***
	(0.526)	(0.588)	(0.474)	(0.526)	(0.451)	(0.521)
Grusi	-1.069	-0.291	-0.173	-1.120	-0.436	-0.272
	(1.155)	(1.142)	(1.125)	(1.156)	(1.185)	(1.294)
Gurma	2.935***	4.153***	4.233***	2.859***	4.018***	4.140***
	(0.770)	(0.817)	(0.737)	(0.770)	(0.714)	(0.774)
Other ethnic	-0.199	0.544	0.655	-0.243	0.444	0.586
	(1.085)	(0.975)	(0.959)	(1.084)	(1.116)	(1.068)

Dependent variable	Nominal wage (Ghana cedi)			Real wage (Ghana cedi)		
Husband's weekly paid hours	**Tobit**	**IV Tobit**	**IV Tobit**	**Tobit**	**IV Tobit**	**IV Tobit**
Basic education(Ref: None)	1.238***	-------	0.576	1.235***	-------	0.672*
	(0.410)	-------	(0.416)	(0.410)	-------	(0.372)
Secondary education plus	0.019	-------	1.165*	0.020	-------	1.084*
	(0.731)	-------	(0.663)	(0.732)	-------	(0.646)
Children under 5	0.057	-------	-0.071*	0.059	-------	-0.087**
	(0.037)	------	(0.040)	(0.037)	------	(0.038)
Urban	2.573***	-------	-0.198	2.720***	-------	-0.188
	(0.443)	-------	(0.463)	(0.439)	-------	(0.472)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10489	10453	10453	10489	10453	10453
Turning point in husband's log wage	3.113	2.458	2.509	-------	3.231	3.316
	--------	0.258	0.347	--------	0.287	0.362

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

Apart from wage, the analysis also included remittances to capture the effect of non-wage income on hours of work. In the models for the wife's hours of work (see Tables 7-5 and 7-6), remittances appear to be insignificant. However, in the models for the husband's hours of work (see Tables 7-7 and 7-8), an increase in remittances reduces hours of paid work but increases hours of unpaid work. These results are quite contrary to those where all household members aged 15 years and older are considered. They are also contrary to the findings of some of the earlier studies (Gronau, 1977; Song, 2007). However, the results are consistent with those of Skoufias (1993) although the variables used in this analysis as a proxy for non-wage income differ from those used by Skoufias (1993). While this study used remittance, Skoufias (1993) used "value of the family farm" and "value of home". This difference does not discount the validity of the conclusion that an increase in non-wage income has a greater effect on the husband's hours of work than on the wife's hours of work.

Similar to the estimates of the wife's hours of work, the results in Tables 7-7 and 7-8 show a non-linear relationship between the husband's age and his hours of work. Hours of work increase with the age of the husband and begin to reduce after a certain age level. These results confirm the consistency of the non-linear relationship across genders.

Across ethnic groups, the results show some interesting dynamics. Compared with a husband from the Akan ethnic group, a husband who is affiliated with the Ga-Dangme, Mole-Dagbani or Gurma ethnic group is likely to spend significantly more hours on paid work. Husbands who are affiliated with the Mole-Dagbani, Grusi and Other ethnic groups will spend more hours on unpaid work, but those from the Ga-Dangme and Ewe ethnic groups will spend fewer hours on household production. It can be inferred from these differential effects of ethnic affiliation on hours of work that ethnic practices and ethnic-related social norms largely shape intra-household decisions on

labour force participation, labour supply and household production. On the basis of these results, policies on gender equality in the household and in the labour market would give due cognizance to ethnic diversity and cultural practices that could affect the success of such policies.

In relation to education, the results show a positive but weak association between education and hours of paid work. Compared with a husband who has no education, his counterpart who has completed some basic education or at least secondary education spends little over an hour per week on paid work. The levels of significance are 1% and 10%, respectively. Although the estimates in the models for hours of unpaid work show the expected negative association, the results remain statistically insignificant. Compared with the estimates in the models for the wife's hours of work, one can conclude that education has a larger impact on women's hours of work than those of men. This is particularly the case when the analysis is restricted to couples where the interaction between the husband and wife is taken into account.

Apart from wage, remittance was included in the analysis to capture the effect of non-wage income on hours of work. In the models for the wife's hours of work (see Tables 7-5 and 7-6), remittance appears to be insignificant. However, in the models for the husband's hours of work (see Tables 7-7 and 7-8), an increase in remittance reduces hours of paid work but increases hours of unpaid work. These results are quite contrary to the ones found in chapter 6 where all household members aged 15 years and older are considered. They are also contrary to the findings of some of the earlier studies (Gronau, 1977; Song, 2007). However, the results are consistent with those of Skoufias (1993) although the variables used in this analysis as a proxy for non-wage income differs from what the author used. While the present study used remittance, Skoufias (1994) used "value of the family farm" and "value of home". These differences do not discount the validity of the conclusion that an increase in non-wage income has a higher effect on husband's hours of work than on those of the wife.

Table 7-8: The wife's log hourly wage and the husband's hours of unpaid work

Dependent variable	**Nominal wage (Ghana cedi)**			**Real wage (Ghana cedi)**		
Husband's weekly unpaid hours	**Tobit**	**IV Tobit**	**IV Tobit**	**Tobit**	**IV Tobit**	**IV Tobit**
Log wife's wage	-0.685**	-1.591**	-1.278*	-2.674	-3.082***	-2.832***
	(0.343)	(0.693)	(0.704)	(2.140)	(0.650)	(0.732)
Wife's wage square	0.107	0.260	0.211	0.665	0.776***	0.726***
	(0.072)	(0.250)	(0.240)	(0.538)	(0.248)	(0.262)
Remittance	-0.072**	-0.075**	-0.074**	-0.072**	-0.073***	-0.071**
	(0.030)	(0.030)	(0.029)	(0.030)	(0.028)	(0.028)
Husband's age	0.152***	0.146***	0.150***	0.152***	0.147***	0.151***
	(0.026)	(0.029)	(0.028)	(0.026)	(0.029)	(0.029)
Husband's age square	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ga-Dangme (Ref: Akan)	-0.530*	-0.481*	-0.497*	-0.528*	-0.500*	-0.511*

Dependent variable	Nominal wage (Ghana cedi)			Real wage (Ghana cedi)		
Husband's weekly unpaid hours	Tobit	IV Tobit	IV Tobit	Tobit	IV Tobit	IV Tobit
	(0.280)	(0.249)	(0.264)	(0.280)	(0.303)	(0.277)
Ewe	-0.679***	-0.684***	-0.686***	-0.681***	-0.678***	-0.674***
	(0.224)	(0.220)	(0.244)	(0.224)	(0.223)	(0.213)
Guan	-0.072	-0.270	-0.176	-0.068	-0.345	-0.256
	(0.342)	(0.346)	(0.313)	(0.342)	(0.383)	(0.331)
Mole-Dagbani	0.618***	0.500***	0.558***	0.617***	0.465***	0.533***
	(0.172)	(0.174)	(0.171)	(0.172)	(0.158)	(0.177)
Grusi	1.045**	0.885**	0.983**	1.047**	0.829*	0.933**
	(0.454)	(0.436)	(0.467)	(0.454)	(0.424)	(0.454)
Gurma	0.374	0.182	0.253	0.382	0.086	0.170
	(0.292)	(0.292)	(0.278)	(0.292)	(0.275)	(0.313)
Other ethnic	1.205**	1.081**	1.160**	1.219**	1.047**	1.123**
	(0.499)	(0.450)	(0.460)	(0.498)	(0.480)	(0.505)
Basic education(Ref: None)	0.143	-------	0.191	0.140	-------	0.231
	(0.151)	-------	(0.152)	(0.151)	-------	(0.146)
Secondary education	-0.111	-------	-0.018	-0.117	-------	0.031
	(0.252)	-------	(0.239)	(0.252)	-------	(0.239)
Children under 5	0.069***	-------	0.060***	0.070***	-------	0.050***
	(0.013)	------	(0.013)	(0.013)	------	(0.013)
Urban	-0.371**	-------	-0.161	-0.393**	-------	-0.034
	(0.156)	-------	(0.200)	(0.153)	-------	(0.210)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10489	10453	10453	10489	10453	10453
Turning point in husband's log wage	-------	--------	--------	--------	2.317	1.452
	--------	0.176	0.1925	--------	0.186	0.1988

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

As observed in the models for the wife's hours of work, the number of children under the age of five in the household reduces the husband's hours of labour supply but increases his hours of home production. Nonetheless, the extent of the effect is relatively higher for the wife than for the husband. This is not surprising as parental roles in the household require that women spend more hours on childcare than men. Across geographical locations, the estimates of the hours of labour supply (see Table 7) do not show any significant difference between husbands in the urban areas and those in the rural areas. However, a husband who resides in an urban area spends significantly fewer hours on household production than his counterparts in a rural area.

7.3 Conclusion

There is a substantial amount of literature on the notion of a working spousal wage penalty/premium, but there is limited evidence of this in developing countries where labour market rigidities and entrenched sociocultural norms largely shape intra-household decision-making in respect of household production and labour supply to the market. This study has helped to fill this research/evidence gap by examining the effect of spousal hours of market and home production

on each partner's hourly wage, as well as analysing the effect of spousal wage on each partner's hours of home and market production. Specifically, the stduy examined the joint determination of spousal wages and hours of work among monogamous couples in Ghana.

The estimates of the two-step IV Tobit showed elements of a working spouse wage premium regardless of the ethnic affiliation or level of education of the respondent. The wife's hours of paid (unpaid) work have positive (negative) effects on the husband's wage, but the husband's paid and unpaid hours increase the wife's wage. The most conspicuous observation was that the wife's hours of unpaid work are negatively associated with the husband's logged hourly wage but the husband's hours of unpaid work are positively associated with the wife's hourly wage. The analysis of the effect of wage on spousal hours of work also suggested complementarity in employment and household labour decisions between couples. The effects of the wages of both couples on each partner's hours of paid (unpaid) work were seen to be first positive (negative) and then negative (positive) after the attainment of certain wage thresholds due to potential assortative mating.

The results suggest that labour market policies such as paternity leave, which would encourage men's (husbands') active participation in household production, would go a long way in enhancing women's (wives') labour force participation and earnings. This thesis recommends that government and labour unions should step up their efforts to expand the coverage of the current five (5) working days' paternity leave that covers only health service, education and mining sector workers (Otoo et al., 2009) to include all workers in the formal sector as this would indirectly improve women's wages in the household. Furthermore, policies aimed at minimizing gender inequality in terms of opportunities in the labour market will play a critical role in ensuring a more equitable response of men's and women's hours of market production to changes in wage rates.

CHAPTER 8: POVERTY AND GENDER INEQUALITY IN TIME USE

8.1 Introduction

Both gender equality and poverty featured prominently in the MDGs and still remain critical issues of concern in the current SDGs. Understanding the relationship between inequality in time allocation in the household and poverty may contribute in achieving the SDGs. The second objective of this study examines some of the socio-economic factors that influence intra-household gender inequality in time allocation by paying particular attention to consumption and income poverty in the Ghanaian context. The hypothesis supporting this objective is that household poverty increases gender inequality in time spent on both unpaid work and total work. In poor households, time allocation among couples mostly works to the disadvantage of the wife. By virtue of socio-cultural norms, the wife (woman) ends up spending more time on unpaid work in addition to her time spent on paid work in the labour market because of the household's inability to afford time-saving equipment and alternative care services. As indicated earlier in the methodology section, two indicators are used to measure gender inequality in time use: 1) gender inequality in time spent on unpaid work, and 2) gender disparities in discretionary time or time spent on both paid and unpaid work. Based on each indicator, three sub-indicators are used namely, GPI and gender parity index

This chapter presents and discusses the results of the descriptive and econometric analyses. The presentation is disaggregated into three subsections. The first subsection covers a brief descriptive analysis of the distribution of the gender indicators across income and consumption poverty as well as the geographical location of respondents. The second subsection discusses the regression results of gender inequality in unpaid work in the household while the third subsection looks at the gender disparities in discretionary time (time spent on both paid and unpaid work). The discussion of each subsection is further disaggregated based on the measure or indicator (GPI and relative gap) of inequality used. It is important to note that a GPI value of 1 under either of the inequality indicators shows equality in time use between males and females whereas a value above 1 shows inequality against females. On the other hand, a value less of than 1 indicates inequality against males. With regard to the relative gap, this study concentrates on the absolute values of the difference between males and females. As a result, a value of 0 indicates equality between sexes but a value greater than 0 shows inequality against females.

8.2 Descriptive analysis

The descriptive analysis begins with the distribution of income and consumption poverty in Ghana for the 1998/99 (GLSS4), 2005/06 (GLSS5) and 2012/13 (GLSS6) survey periods. It can be

observed from Figure 8-1 that income poverty is relatively higher among Ghanaians than consumption poverty. In addition, consumption poverty is low among female-headed households but high among male-headed households. Concerning to income poverty, the contrary is observed as poverty appears to be low in male-headed households but high in female-headed households. In summary, consumption poverty is lower among women than men but women are more income poor than men. These observations support the argument in the Chapter 1 of this thesis that the presumed identity of income and consumption poverty may not necessarily hold in developing countries like Ghana due to the influence of inter and intra-household resource distribution which is also shaped by culture and social norms. Though focusing on consumption expenditure as a measure of poverty has some advantages related to accuracy and reliability of data, it masks some relevant information making it difficult to identify those who are really poor as far as income poverty is concerned.

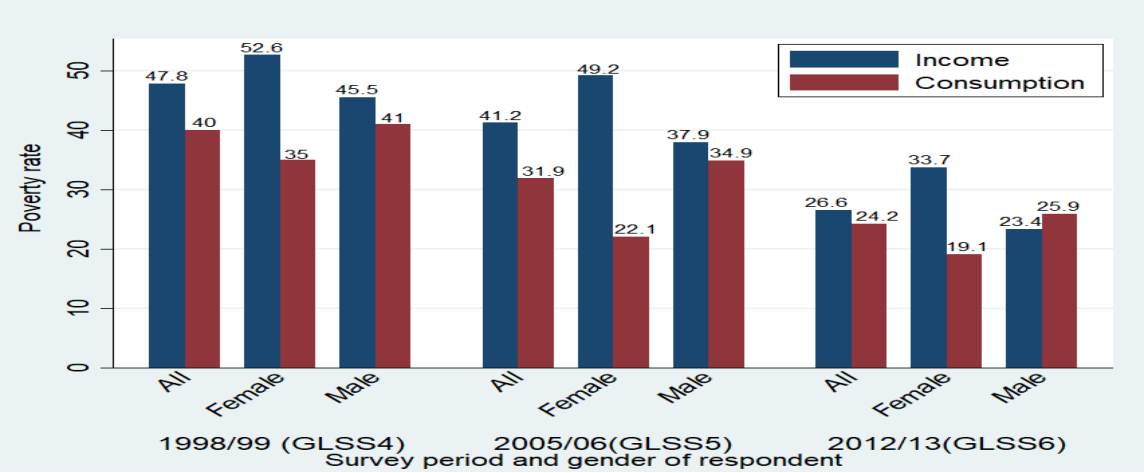

Figure 8-1: Income and consumption poverty trends (1998-2013)

Source: Prepared by the author using GLSS data sets

These results are not surprising because, in developing countries like Ghana, income poverty is relatively difficult to escape compared to consumption poverty. The estimated total household consumption expenditure, which is the basis for computing consumption poverty covers food, housing and other non-food items. It also includes imputations for consumption from sources other than market purchases such as consumption from the output of own production, rent from owner-occupied dwellings, and user values derived from durable consumer goods owned by the household. Since women who are mostly the low earners in the household are likely to spend a greater share of their income on food items that men, they are equally likely to appear to have lower consumption poverty. These results corroborate similar findings by Meyer and Sullivan (2009) who concluded than consumption poverty in the USA had fallen much faster than income poverty since 1980 for the elderly, but more slowly for married couples with children.

Observe from Figure 8-2 that changes in income and consumption poverty between 1998 and 2013 have not been uniform across survey periods and gender of the respondent. The Figure depicts that both income and consumption poverty have decreased between the 1998 and 2013. However, the decline in income poverty has been higher than that of consumption poverty. Across gender, the reduction in women's consumption poverty is higher than their income poverty. Between the 1998/99 and 2005/06 survey periods, the reduction in consumption poverty among females was higher than that of income poverty. While the opposite was observed between the 2005/06 and 2012/03 surveys periods, the huge reduction in consumption poverty between the 1998/99 and 2005/06 periods outweighs that of the 2005/06 and 2012/13 survey periods.

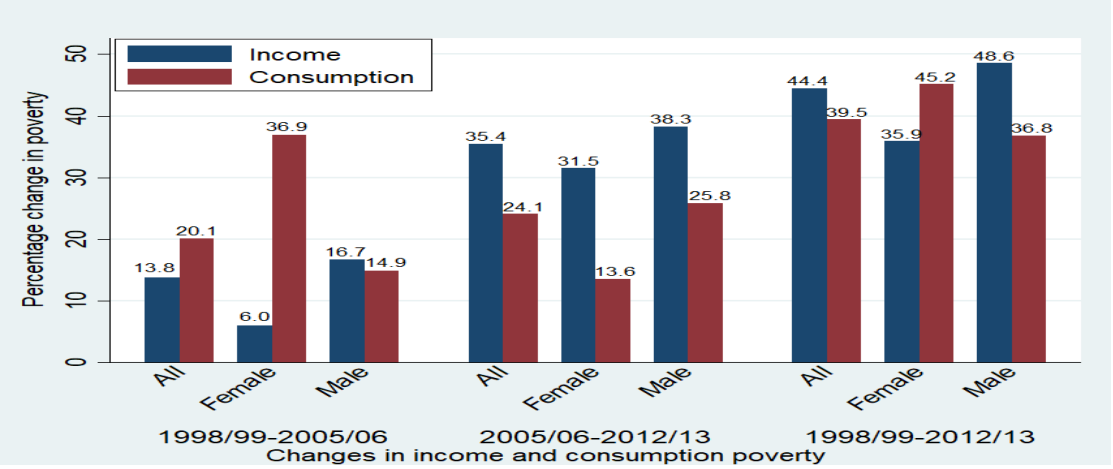

Figure 8-2: Changes in poverty across gender and survey

Source: Prepared by the author using GLSS data sets

The higher reduction in income poverty among females means that between 2005 and 2013, females were able to improve their engagement in economic activities and other sources of income which contributed to a higher reduction in their income poverty than their consumption poverty. From a policy perspective, such an improvement has both direct and indirect implications for their welfare. Several factors, including improvement in their education, and labour market regulations could explain such an improvement in their poverty conditions. Unlike females, males experienced consistency in the change of their poverty conditions. The reduction in income poverty among men has been higher than consumption poverty across all the survey periods.

The distribution of the inequalities in hours of work across income and consumption poverty status of households in Figure 8-3 shows that men spend more hours on paid work than women, while the inverse holds for unpaid hours of work. This contributes to a reduction in inequality in total hours of work. However, the magnitude of the difference in paid work is not enough to offset the difference in unpaid hours of work. Although inequality in hours of work has reduced slightly between the 1998 and 2013 survey periods, inequality in unpaid hours of work remain considerably higher than inequality in discretionary time (total hours of work). More so, inequality

in total hours of work has increased within both poor and non-poor households. This can be partly due to an increase in women's labour force participation and labour supply in addition to their relative dominance in household production. On average, both inequality in unpaid hours of work and inequality in total hours of work are higher in poor households than non-poor households. The results for consumption poverty (see Figure 8-4) follow a similar pattern as those of income poverty. Nonetheless, the extents of inequality are relatively lower among the income poor than the consumption poor.

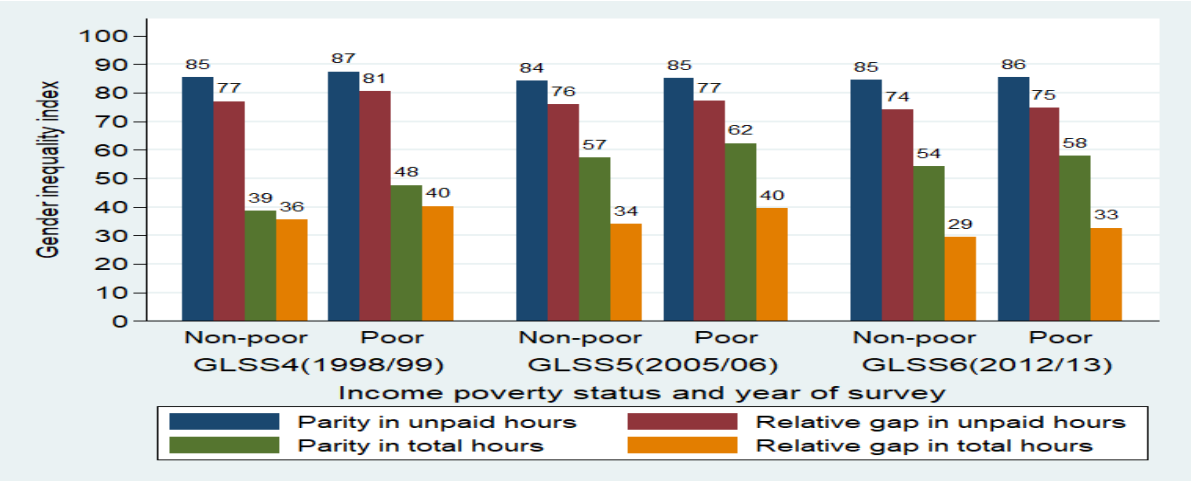

Figure 8-3: Inequality in time use across income poverty status and year of survey

Source: Prepared by author using GLSS data sets

A number of factors may account for the gender inequality trends revealed by the survey. As indicated in the preceding paragraph, across the indicators (disparity in discretionary time use), it is possible that an increase in the time spent by women on paid work has not been offset by a corresponding increase in the time spent by men on unpaid work in the household. It could also be because an increase in the time spent by men and women on paid work has not been matched by the same reduction in the time spent by both sexes on unpaid work, making women susceptible to the incidence of a 'second shift'.

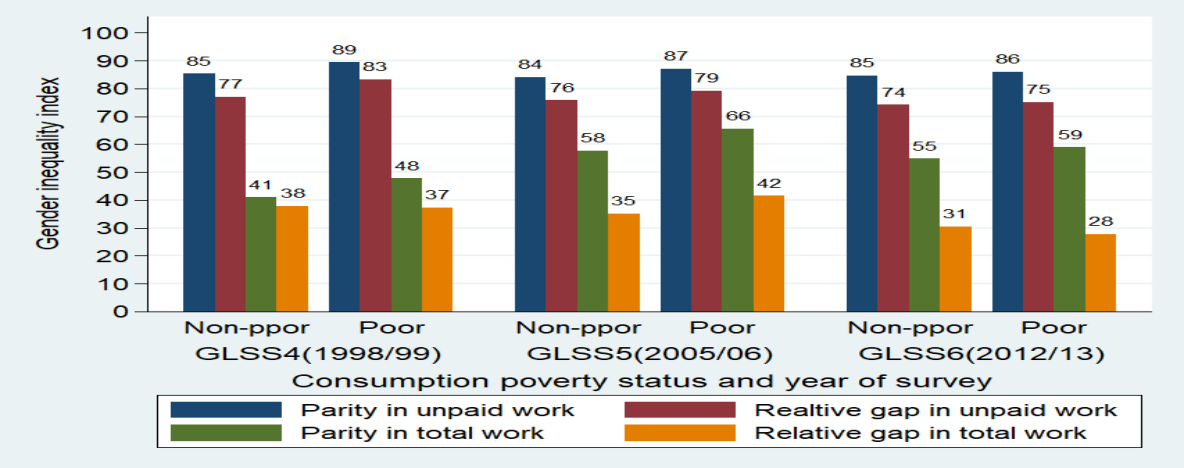

Figure 8-4: Inequality in time use by consumption poverty status and year of survey

Source: Prepared by author using GLSS data sets

Considering the place of residence of respondents, the results in Figure 8-5 show that generally, gender inequality is relatively higher among rural residents than among urban residents. Nonetheless, inequality in unpaid work has reduced slightly among rural residents but remains virtually unchanged among urban residents. Across geographical location (region of residence), the results in Figure 8-6 indicate that inequality in hours of work is low in the Greater Accra region but high in the three northern regions where income poverty remains coincidentally high. This suggests a positive association between poverty and gender inequality as observed in Figures 8-3 and 8-4.

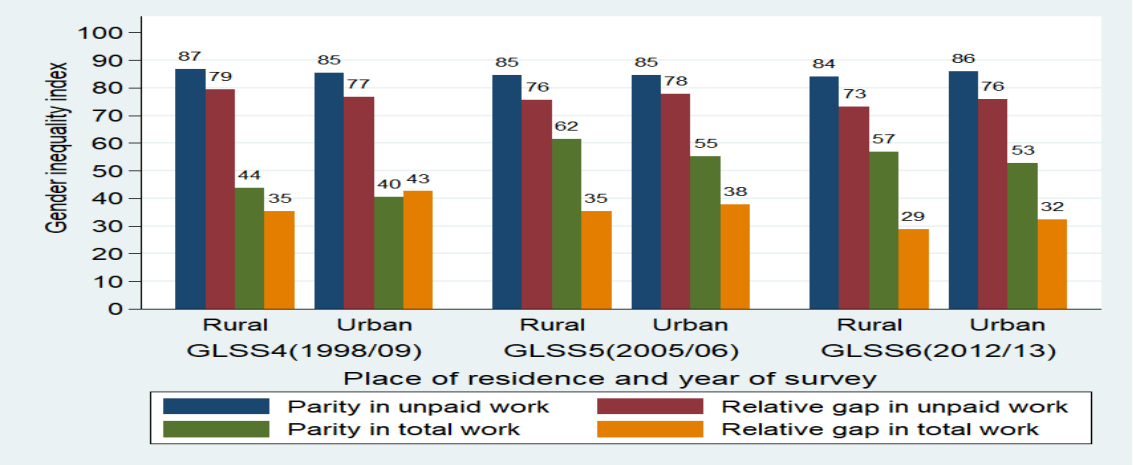

Figure 8-5: Inequality in time use by place of residence of respondents

Source: Prepared by author using GLSS data sets

An earlier study by Song (2007) shows that ethnicity/race significantly explains the differences in spousal time allocation in the household. Nonetheless, in the Ghanaian context, ethnic[36], cultural and agro-ecological diversity hampers concrete generalisation of the gender relations and their consequences for women's access to resources, decision making and socio-economic status (Baden et al., 1994). Validating these findings in this study (see Figure 8-7) reveals that gender inequality is low among the Ga-Dangme ethnic group but very high among the Mole-Dagbani, Grusi, Gurma, and Other minor ethnic groups. Incidentally, the Ga-Dangme ethnic group is concentrated in the Greater Accra region where inequality in hours of work is relatively lower compared to the rest of the regions. What is conspicuous from the results is that respondents in the three northern regions of Ghana are more likely to suffer a double incidence of poverty and inequality in time use. However, the direction of causality between the two variables remains unknown.

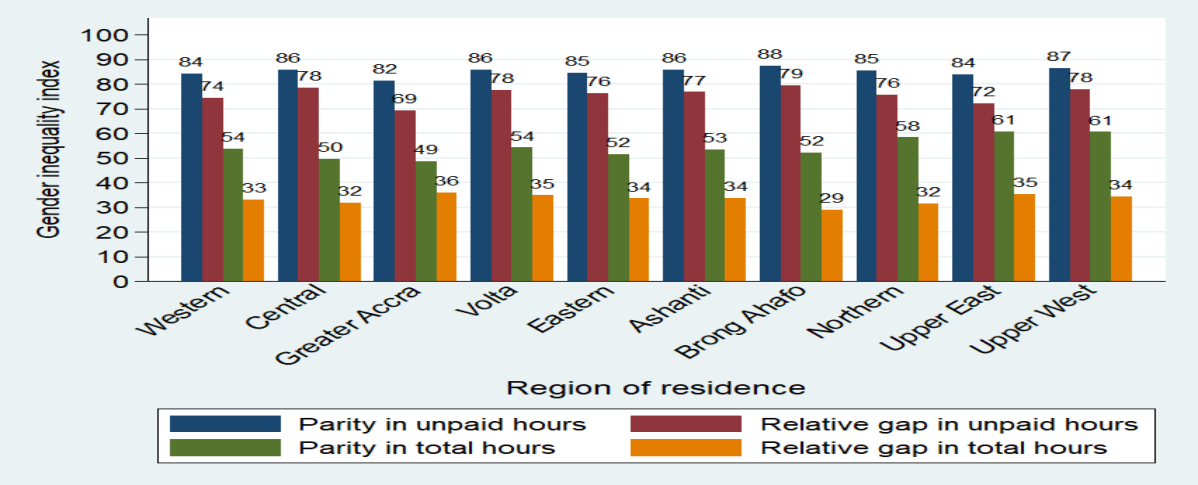

Figure 8-6: Inequality in time use across region of residence of respondents

Source: Prepared by author using GLSS data sets

Granted that poverty has a positive association with inequality in time use, it can be inferred that the high rate of poverty in the three northern regions of Ghana namely, the Northern region, Upper West and Upper East could be partly ascribed to the prevailing cultural norms which shapes intra-household resource allocation. Baden et al. (1994) have noted in their background paper on gender issues in Ghana that women in the three northern regions face higher labour burden due to a number of factors. These factors include the combined effects of harsh agro-climatic conditions, low output per capita, limited options beyond small-scale farming, less urbanisation

[36] Ethnicity is made up of eight categories, namely, Akan, Ga-Dangme, Ewe, Guan, Mole-Dagbani, Grusi and other ethnic groups. The category called 'other ethnic groups' consists of other minor groups, including foreigners. To avoid the possibility of a dummy variable trap, Ga-Dangme is considered to be the reference group.

and service provision in these regions. The authors stress that these factors combined with strongly patriarchal family structures, women's lack of influence in decision making, and a history of male outmigration which has tended to increase women's labour burden, limited their options even more.

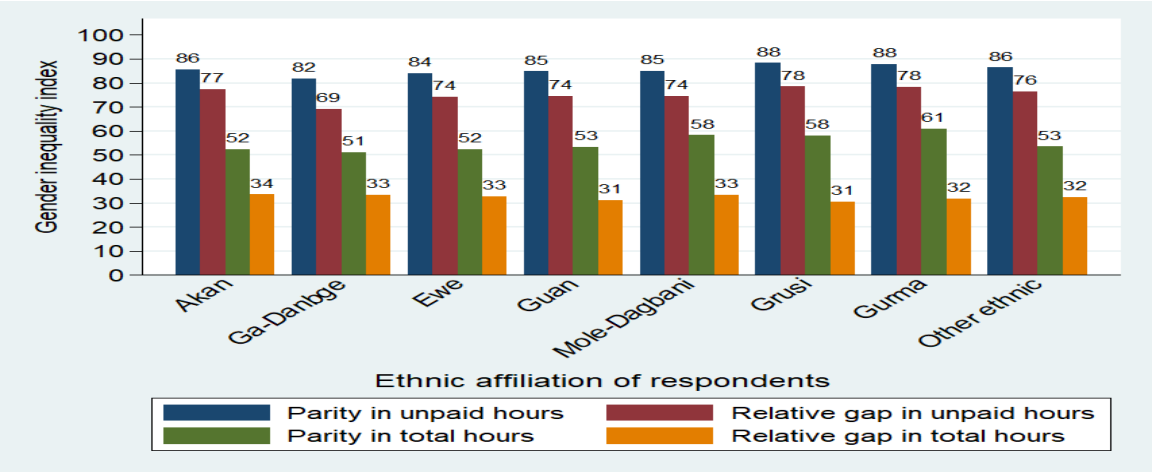

Figure 8-7: Inequality in time use across ethnic affiliation of respondents

Source: Prepared by author using GLSS data sets

Across the level of education of respondents, Figure 8-8 shows that inequality in unpaid hours of work is higher among respondents who have low level of education while inequality in total hours of work is higher among those who have completed at least some secondary education. One possible reason is that respondents who are educated may be more likely to be engaged in paid employment. As indicated in the previous paragraphs this observation can also be explained by the argument of unbalanced changes in hours of unpaid and paid work between sexes. This descriptive analysis suggests the need for particular attention to be paid to ethnicity, education, and geographical differences when addressing the issue of gender inequality in time use.

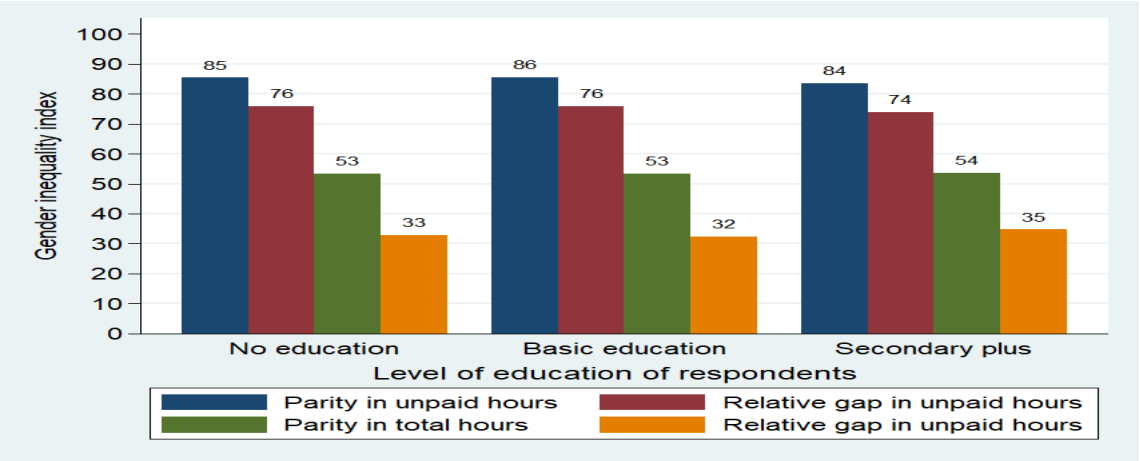

Figure 8-8: Inequality in time use across level of education of respondent

Source: Prepared by author using GLSS data sets

In summary, the descriptive analysis reveals that although in discretionary time has reduced significantly since the 1998/1999 survey period, there exists a gender gap in unpaid work in Ghanaian households. The inequality is more of an issue among the poor, rural residents and respondents in the three northern regions of Ghana where income and consumption poverty remain higher. The unequal changes in the two inequality indicators since 1998 suggest an element of the "second shift" syndrome among women. While the results suggest positive association gender inequality in time use and poverty, the extent of the associations between the two variables is unclear. The next subsection discusses the results of the regression analysis of this association.

8.3 Estimation results

As a first step to assess the reliability of the estimates and robustness of the models used in the analysis, the results of the post-estimation analysis are presented at the bottom of each output table. These results include the model specification and goodness of fit tests. The p-values of the specification test reported in Tables 8-4, 8-5, 8-6 and 8-7 show that the models are well specified and do not have any misspecification issues. On the basis of the reported P-values, this study fails to reject the null hypothesis that the Tobit model is correctly specified. In order to address any potential issues related to heteroscedasticity, robust is added to the estimation command to produce robust standard errors which are also reported in parenthesis in each table. In addition, the log likelihood values are reported at the bottom of the output tables.

8.3.1 Correlates of gender inequality in hours of unpaid work

Separate models were specified for income and consumption poverty to compare the relative effects of the two indicators on gender inequality in time use. To assess the differences in the

extent of the effects of poverty on gender inequality in time across the geographical location of respondents, separate models were specified for rural and urban residents. The results in Tables 8-5 indicate that although both income and consumption poverty increase gender inequality in unpaid work, the extent of the effects is significantly higher among couples in consumption-poor households than among those in income-poor households.

The extent of the effects of income and consumption poverty on the relative gap in time allocation to unpaid work is marginally higher than that of the effects on the gender parity in time spent on unpaid work. At the 1% level of significance, the results in Table 8-5 show that a woman who lives in an income-poor households face approximately 1.2% disparity and 1.6% relative gaps in unpaid hours of work. In Table 8-6, the corresponding effects of consumption poverty are insignificant, except for the dissimilarity in hours of unpaid work. The extent of the effects is half that of income poverty. The results suggest that women in poor households may spend more time on unpaid activities because they do not have the means to hire the services of others to perform such activities on their behalf. In most cases, women – by virtue of the stereotype that they are largely fit for household tasks- end up being disadvantaged, even if they have the same poverty status as men. The results also suggest that through the principle of circular causation, addressing gender inequality in time allocated to household tasks will have an important spill-over effect on gender equality in labour market outcomes.

There have been several studies on the relationship between poverty and gender differences in time use (Argyrous & Rahman, 2014; Beblo, 2001; Coltrane, 2000; Kizilirmak & Memis, 2009). However, none of these have computed gender inequality indicators as used in this current study. As a result, findings of this study may not be comparable to those in the literature since our measures of inequality differ from those used in earlier studies. Nonetheless, there are some similarities that permit us to juxtapose findings of this study with evidence drawn from the broader literature. The results support the few available pieces of evidence that poverty (either income or consumption, or other proxies such as infrastructure) widens gender inequality in time spent on unpaid work.

This consequently translates into inequality in labour market outcomes, such as gender gaps in labour force participation and quality of employment, and wage gaps due to the feedback effects between households and the labour market (Ferrant et al., 2014; Miller & Mulvey, 1998). The findings of this study support the argument of Razavi (2012) that facilitating part-time work and affirmative action programmes are important in addressing gender inequality in time use. However, more attention needs to be paid to structural unemployment and underemployment, extensive casualisation and informalisation of paid work, as well as gender-based wage gaps in

the context of rising income inequalities and a worsening functional income distribution which perpetuate women's confinement to unpaid household work.

In addition to poverty, household size is expected to influence gender inequality in time use for unpaid household work, depending on the gender and age composition of the household. For instance, in a household where there are more children under the age of five, adult women are likely to spend more time on child care, caring for the elderly, cleaning and cooking. These factors widen the gap between men and women in terms of time spent on unpaid work. Conversely, gender inequality in time spent on unpaid work is expected to be lower in households where the number of active adults exceeds that of children and elderly people. The results in Table 8-5 shows differential effects of household size on gender inequality in hours of unpaid work. It significantly increases gender disparity but reduces relative gaps in unpaid work.

Table 8-1: Income poverty and gender inequality in hours of unpaid work

Dependent variable	**GPI (%)**		**Relative gap (%)**	
Inequality in unpaid hours	**Income poverty**	**Consumption poverty**	**Income poverty**	**Consumption poverty**
Poor	1.200***	2.054***	1.672***	3.177***
	(0.371)	(0.522)	(0.500)	(0.704)
Child<5	0.679*	0.663*	0.604	0.581
	(0.360)	(0.360)	(0.486)	(0.485)
Ga-Dangme (Ref: Akan)	-1.951***	-1.943***	-5.537***	-5.527***
	(0.734)	(0.734)	(0.983)	(0.983)
Ewe	-1.840***	-1.801***	-4.168***	-4.118***
	(0.656)	(0.656)	(0.882)	(0.882)
Guan	-1.136	-1.218	-3.550***	-3.668***
	(0.871)	(0.870)	(1.170)	(1.169)
Mole-Dagbani	0.056	0.046	-1.360	-1.379
	(0.666)	(0.666)	(0.899)	(0.898)
Grusi	3.074***	2.756***	1.877	1.390
	(1.010)	(1.012)	(1.369)	(1.370)
Gurma	2.254**	2.255**	1.306	1.312
	(0.901)	(0.901)	(1.220)	(1.220)
Other ethnic	0.520	0.491	-0.840	-0.896
	(0.900)	(0.900)	(1.215)	(1.214)
Age	0.240***	0.225***	0.352***	0.330***
	(0.051)	(0.051)	(0.069)	(0.069)
Age square	-0.002***	-0.002***	-0.001*	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Basic education(Ref: None)	-0.196	-0.166	-0.188	-0.135
	(0.430)	(0.430)	(0.580)	(0.580)
Secondary plus	-2.169***	-2.120***	-1.467**	-1.375*

Dependent variable	GPI (%)		Relative gap (%)	
Inequality in unpaid hours	Income poverty	Consumption poverty	Income poverty	Consumption poverty
	(0.552)	(0.552)	(0.743)	(0.744)
Urban	2.857***	3.009***	4.235***	4.480***
	(0.384)	(0.388)	(0.518)	(0.523)
Household size	0.205**	0.156*	-0.238**	-0.313***
	(0.087)	(0.088)	(0.118)	(0.119)
Western(Greater Accra region)	3.164***	3.250***	5.347***	5.476***
	(0.764)	(0.764)	(1.021)	(1.021)
Central region	4.837***	4.950***	8.579***	8.731***
	(0.811)	(0.809)	(1.088)	(1.086)
Volta region	5.769***	5.915***	10.696***	10.887***
	(0.851)	(0.848)	(1.144)	(1.141)
Eastern region	3.706***	3.776***	7.586***	7.684***
	(0.727)	(0.727)	(0.974)	(0.973)
Ashanti region	4.517***	4.592***	6.762***	6.870***
	(0.734)	(0.734)	(0.981)	(0.981)
Brong-Ahafo region	5.918***	5.971***	10.672***	10.743***
	(0.809)	(0.808)	(1.086)	(1.085)
Northern region	4.077***	4.066***	7.599***	7.537***
	(0.890)	(0.889)	(1.193)	(1.191)
Upper East region	1.049	1.142	1.093	1.173
	(0.989)	(0.985)	(1.316)	(1.309)
Upper West region	3.693***	3.452***	7.467***	7.023***
	(1.016)	(1.022)	(1.363)	(1.370)
Survey year (dummies)	Yes	Yes	Yes	Yes
Observations	13678	13678	13678	13678
Pseudo R^2	0.292	0.297	0.282	0.294
Log likelihood	-59288.982	-59279.555	-63947.946	-63942.465
Specification test (_hatsq)	0.211	0.284	0.497	0.689

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by author using GLSS data sets

Aside from poverty and household size, the results further indicate that higher levels of education are associated with low level of both gender gaps and disparity in unpaid hours of work. The extent of the effect is significantly higher among respondents who have at least secondary education. This negative effect can be explained in two ways. Firstly, in households where both men and women have higher levels of education, there may be a relative balance in shared responsibilities because certain social norms that define some activities as strictly those performed by women are relaxed. Secondly, educated household heads are more likely to be gainfully employed and to have the means to hire the services of others to perform some unpaid activities that they may not be able to perform. Moreover, they can afford time-saving equipment

such as washing machines and microwaves ovens, which help to reduce the workload in the household and those activities that have to be performed by women. These findings support studies that show evidence of higher education and other forms of human capital development contributing to gender equality in both the household and in the labour market (Coltrane, 2000).

In most traditional homes in developing countries like Ghana, certain household tasks, such as fetching water, running errands and cleaning, are performed by children. Thus the workload that hitherto would have been performed by adult women is reduced. This, in turn, contributes to a reduction in the inequality between adult men and women in time spent on unpaid work. The results in Tables 8-5 confirms this observation that age has a nonlinear relationship with gender inequality in time spent on unpaid work. It can be deduced from the results that at a certain age, females face less inequality possibly due to support from children and other household members.

Consistent with intuition and empirical findings, the number of children under the age of five in a household is positively associated with gender inequality in time spent on unpaid work within the household. This means that an additional child younger than five years adds to the household responsibilities of women, causing gender inequality in unpaid time use between the husband and wife to widen. In spite of the availability and higher access to infrastructure and social services in the urban area than in the rural area, women in the urban area face significantly higher inequality hours of unpaid work. These results are consistent with the descriptive analysis in Figure 8-5. However, the estimates are significant in the models for the dissimilarity index but not in those for the GPI and the relative gap in hours of unpaid work.

The literature suggests that women's and men's opportunities and behaviours are largely determined by societal norms, including traditional gender roles and beliefs which are prevalent in the countries and communities in which they live, and ethnic affiliations (Ferrant et al., 2014). According to Jütting, Morrisson, Dayton-Johnson, and Drechsler* (2008), social institutions – such as formal and informal laws, and social norms and practices – help to shape the choices and behaviours of groups, communities and individuals. In order to account for these institutional effects on inequality in time use for unpaid work, ethnicity is included as a control variable in the models. In Ghana, the ethnic group with the largest population is the Akan. Using this group as the base category, the results indicate that inequality is low among women from the Ga-Dangme and Ewe ethnic groups but higher among women affiliated with the Grusi and Gurma ethnic groups. This observation corroborates the descriptive analysis in Figures 8-7 and 8-8. They also reflect the estimates across region. Compared to the Greater Accra region, a woman in any of the remaining nine regions face gender inequality in hours of unpaid work. The estimates are particularly high in the Volta, Brong Ahafo and the northern three regions.

The estimates of the sub-sample analysis among rural and urban residents in Table 8-6 indicate that women in poor households in the urban area face higher inequality in unpaid work than women in the rural area. This disaggregated analysis further shows more heterogeneity of the effect of ethnic affiliation on inequality across geographical location. While a woman from the Ga-Dangme, Ewe, Guan or Mole-Dagbani ethnic group in the rural area faces low inequality compared to her counterpart from the Akan ethnic group, a woman from the Mole-Dagbani or Grusi ethnic group in the urban area faces higher inequality. The positive effect of the regional dummies is observed for all the remaining nine regions in the rural area.

However, in the urban area, inequality is significantly lower in the Upper East region compared to the Greater Accra region. Irrespective of the inequality indicator, an increase in household size significantly increases inequality in unpaid hours of work in the rural area but reduces inequality in the urban area. This means that apart from the mediating effects of the gender and age composition of the household and the geographical location (which indirectly determines the employment status), the level of education of household member also influences the relationship between household size and inequality in time allocation.

Table 8-2: Poverty and gender inequality in unpaid work across geographical location

Dependent variable	**GPI (%)**				**Relative gap (%)**			
(Inequality in unpaid hours)	**Income poverty**		**Consumption poverty**		**Income poverty**		**Consumption poverty**	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Poor	0.891*	1.639**	1.450**	3.316**	1.299**	2.560***	2.400***	4.829**
	(0.458)	(0.640)	(0.569)	(1.465)	(0.613)	(0.873)	(0.761)	(1.997)
Child<5	0.651	0.656	0.649	0.613	0.490	0.846	0.487	0.781
	(0.459)	(0.581)	(0.459)	(0.581)	(0.614)	(0.792)	(0.614)	(0.792)
Ga-Dangme (Ref: Akan)	-2.392**	-1.139	-2.415**	-1.107	-7.464***	-2.856**	-7.506***	-2.803**
	(1.060)	(1.030)	(1.059)	(1.030)	(1.403)	(1.398)	(1.402)	(1.398)
Ewe	-2.062**	-1.612*	-2.026**	-1.595	-4.378***	-3.627***	-4.330***	-3.599***
	(0.892)	(0.978)	(0.891)	(0.978)	(1.190)	(1.326)	(1.189)	(1.326)
Guan	-1.901*	-0.695	-1.986*	-0.729	-4.757***	-2.765	-4.887***	-2.817
	(1.092)	(1.488)	(1.091)	(1.488)	(1.455)	(2.019)	(1.454)	(2.019)
Mole-Dagbani	-1.453*	3.537***	-1.481*	3.496***	-3.672***	3.833**	-3.725***	3.773**
	(0.864)	(1.093)	(0.864)	(1.093)	(1.155)	(1.496)	(1.155)	(1.497)
Grusi	1.940	3.903**	1.676	3.640*	-0.068	3.115	-0.497	2.726
	(1.221)	(1.953)	(1.224)	(1.956)	(1.639)	(2.675)	(1.642)	(2.678)
Gurma	1.326	1.611	1.320	1.585	0.406	-0.991	0.404	-1.019
	(1.079)	(1.790)	(1.079)	(1.791)	(1.449)	(2.438)	(1.449)	(2.439)
Other ethhnic	-1.050	2.044	-1.095	2.067	-3.211**	1.628	-3.300**	1.671
	(1.164)	(1.427)	(1.164)	(1.427)	(1.555)	(1.951)	(1.555)	(1.951)
Age	0.236***	0.234***	0.224***	0.221**	0.336***	0.353***	0.317***	0.334***
	(0.063)	(0.090)	(0.063)	(0.090)	(0.084)	(0.122)	(0.084)	(0.122)
Age square	-0.002***	-0.001	-0.002***	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Basic education (Ref: None)	-0.343	0.080	-0.329	0.080	-0.569	0.892	-0.541	0.885

Dependent variable	GPI (%)				Relative gap (%)			
(Inequality in unpaid hours)	Income poverty		Consumption poverty		Income poverty		Consumption poverty	
	(0.526)	(0.776)	(0.526)	(0.777)	(0.704)	(1.059)	(0.704)	(1.059)
Secondary plus	-2.242***	-2.265**	-2.137***	-2.328***	-1.800*	-1.140	-1.611	-1.249
	(0.760)	(0.891)	(0.762)	(0.890)	(1.014)	(1.213)	(1.017)	(1.212)
Household size	0.339***	-0.046	0.295***	-0.083	-0.133	-0.405*	-0.206	-0.459**
	(0.106)	(0.153)	(0.108)	(0.154)	(0.142)	(0.208)	(0.144)	(0.209)
Western (Ref: Greater Accra)	3.511**	4.569***	3.497**	4.682***	9.063***	6.815***	9.049***	6.993***
	(1.601)	(1.031)	(1.601)	(1.030)	(2.069)	(1.404)	(2.069)	(1.403)
Central region	6.075***	4.475***	6.099***	4.563***	13.643***	7.461***	13.673***	7.615***
	(1.639)	(1.113)	(1.639)	(1.111)	(2.126)	(1.518)	(2.126)	(1.516)
Volta region	7.963***	3.677***	8.000***	3.865***	16.833***	7.026***	16.869***	7.331***
	(1.603)	(1.283)	(1.602)	(1.278)	(2.082)	(1.751)	(2.080)	(1.746)
Eastern region	4.748***	3.906***	4.745***	3.919***	12.554***	7.184***	12.552***	7.219***
	(1.524)	(1.019)	(1.524)	(1.019)	(1.970)	(1.389)	(1.970)	(1.390)
Ashanti region	4.171***	6.171***	4.221***	6.120***	8.122***	10.560***	8.196***	10.481***
	(1.606)	(0.919)	(1.606)	(0.919)	(2.075)	(1.254)	(2.075)	(1.254)
Brong-Ahafo region	7.830***	4.693***	7.782***	4.820***	16.873***	7.935***	16.794***	8.137***
	(1.627)	(1.140)	(1.627)	(1.138)	(2.109)	(1.555)	(2.109)	(1.553)
Northern region	7.426***	-1.409	7.330***	-1.305	15.097***	0.009	14.900***	0.198
	(1.673)	(1.382)	(1.673)	(1.380)	(2.170)	(1.865)	(2.171)	(1.863)
Upper East region	3.950**	-2.804*	3.937**	-2.523	8.644***	-6.257***	8.569***	-5.806***
	(1.746)	(1.674)	(1.743)	(1.666)	(2.262)	(2.220)	(2.259)	(2.212)
Upper West region	6.225***	0.672	5.984***	0.750	14.268***	1.833	13.803***	1.968
	(1.759)	(1.858)	(1.765)	(1.857)	(2.288)	(2.516)	(2.295)	(2.516)
Survey years (dummies)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8500	5178	8500	5178	8500	5178	8500	5178
Pseudo R^2	0.130	0.230	0.216	0.370	0.352	0.262	0.202	0.262
Log likelihood	-36806.01	-22438.10	-36804.27	-22439.22	-39679.33	-24204.95	-39676.08	-24206.89
Specification test (_hatsq)	0.150	0.190	0.149	0.148	0.240	0.138	0.153	0.174

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by author using GLSS data sets

8.3.2 Correlates of gender inequality in discretionary time use

Comparing the estimates of inequality in total hours (discretionary time) in Table 8-7 with those of inequality in unpaid hours, income poverty has a higher effect on discretionary time while consumption poverty has a higher effect on inequality in unpaid hours of work. This suggests that income and consumption poverty may have different effects on inequality in hours of work depending on the type of inequality indicator. Observe further from Table 8-7 that at 1% level of significance, a woman in an income non-poor household faces approximately 3.8% disparity and 3% gap in total hours of work, *ceteris paribus*. These estimates are almost twice the corresponding estimates for the models of consumption poverty. These results are consistent across geographical location. They also suggests an element of a trade-off between specialisation and division of labour in the household and labour supply among couples.

Unlike the estimates of education in the models for gender inequality in unpaid work, higher levels of education increase gender differences in discretionary time use. These results suggests that women who have higher levels of education are more likely to be employed in the labour market. However, their hours spent on paid work add to their hours spent on unpaid work in the household, making them more susceptible to inequality in time use. Contrary to the inverted U-shape relationship between age inequality in hours of unpaid work, there is a nonlinear (U-shape) relationship between age and inequality in total hours of work (discretionary time). Age first has negative effect on hours of total work, but it becomes positive after a certain threshold. This could be explained by women's participation in the labour market which usually requires some level of experience which in turn is positively associated with age and level of education.

The direction of the association between urban residence and inequality in total hours of work varies by the type of indicator. Compared to a woman in the rural area, her counterpart in the urban area faces less disparity but a higher gap in total time. Although women in urban areas have greater access to time-saving resources, they also spend more time on paid work in the labour market due to the unreliable urban transport system. This high number of hours in the labour market compound the already high number of unpaid hours in the household, making women more susceptible to inequality in discretionary time use. This is particularly the case when the husband's time demand in the labour market does not allow him to support the wife in household production. Consistent with the a priori expectation, the number of children under the age of five increases gender inequality in discretionary time use. As observed form the estimates of inequality in unpaid hours, household size reduces inequality in discretionary time use.

Table 8-3: Correlates of inequality in gender discretionary time use

Dependent variable	**GPI (%)**		**Relative gap (%)**	
Inequality in total time	**Income poverty**	**Consumption poverty**	**Income poverty**	**Consumption poverty**
Poor	3.770***	1.984***	3.049***	0.964*
	(0.291)	(0.409)	(0.369)	(0.520)
Child<5	0.057	0.024	1.051***	1.073***
	(0.281)	(0.282)	(0.358)	(0.358)
Ga-Dangme (Ref: Akan)	0.168	0.219	-1.005	-0.960
	(0.574)	(0.575)	(0.724)	(0.725)
Ewe	-0.847*	-0.688	-1.471**	-1.339**
	(0.503)	(0.506)	(0.643)	(0.645)
Guan	0.458	0.235	-1.180	-1.352
	(0.686)	(0.684)	(0.858)	(0.856)
Mole-Dagbani	0.750	0.775	0.001	0.030
	(0.524)	(0.525)	(0.668)	(0.669)
Grusi	1.204	0.779	-2.135**	-2.375**
	(0.803)	(0.801)	(0.972)	(0.970)

Dependent variable	GPI (%)		Relative gap (%)	
Inequality in total time	Income poverty	Consumption poverty	Income poverty	Consumption poverty
Gurma	0.440	0.392	-0.409	-0.456
	(0.709)	(0.710)	(0.901)	(0.901)
Other ethnic	1.407*	1.556**	-1.212	-1.059
	(0.721)	(0.724)	(0.884)	(0.888)
Age	-0.506***	-0.524***	-0.196***	-0.208***
	(0.040)	(0.040)	(0.051)	(0.051)
Age square	0.005***	0.005***	0.005***	0.005***
	(0.000)	(0.000)	(0.001)	(0.001)
Basic education (Ref: None)	-0.167	-0.218	1.238***	1.174***
	(0.336)	(0.338)	(0.422)	(0.423)
Secondary plus	0.049	-0.136	3.013***	2.805***
	(0.433)	(0.433)	(0.559)	(0.559)
Urban	-1.741***	-1.731***	2.798***	2.732***
	(0.301)	(0.304)	(0.382)	(0.386)
Household size	0.007	-0.038	-0.430***	-0.451***
	(0.068)	(0.069)	(0.087)	(0.088)
Western(Ref: Greater Accra)	4.086***	4.174***	-0.159	-0.064
	(0.579)	(0.576)	(0.769)	(0.764)
Central region	-1.437**	-1.042*	-2.248***	-1.883**
	(0.571)	(0.569)	(0.796)	(0.793)
Volta region	4.231***	4.856***	0.847	1.426*
	(0.656)	(0.655)	(0.869)	(0.866)
Eastern region	1.648***	1.822***	-0.872	-0.703
	(0.536)	(0.534)	(0.728)	(0.724)
Ashanti region	2.572***	2.732***	-1.029	-0.868
	(0.545)	(0.542)	(0.733)	(0.729)
Brong-Ahafo region	0.862	1.049*	2.587***	2.395***
	(0.590)	(0.587)	(0.792)	(0.788)
Northern region	8.522***	9.142***	-0.924	-0.298
	(0.715)	(0.715)	(0.890)	(0.889)
Upper East region	6.436***	7.411***	-0.200	0.707
	(0.785)	(0.786)	(0.996)	(0.997)
Upper West region	6.450***	7.209***	0.145	1.016
	(0.807)	(0.815)	(1.027)	(1.038)
Survey year (dummies)	Yes	Yes	Yes	Yes
Observations	13860	13860	13860	13860
Pseudo R^2	0.025	0.024	0.067	0.061
Log likelihood	-59632.58	-59704.79	-65502.68	-65541.49
Specification test (_hatsq)	0.812	0.987	0.721	0.731

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by author using GLSS data sets

Comparing the estimates for inequality in hours of unpaid work and those of discretionary time use (hours of total work), it can be inferred that cultural norms, values, beliefs, and practices embedded in ethnicity have a greater influence on inequality in hours of unpaid work in the household than hours of paid work. These observations can be explained from two perspectives. Firstly, cultural practices in Ghana have a direct effect on production activities in the household and an indirect effect on labour supply. For instance, cooking, and caring for children and the elderly are some of the responsibilities inherent in ethnic values and practices. Secondly, men spend, on average, more hours on paid work while women spend more hours on unpaid work. As a result, men's higher number of hours spent on paid work offset women's hours spent on household production.

The estimates of the regional dummies indicate that a woman in the Volta, Eastern, Ashanti or any of the three northern regions faces more inequality in total hours of work than a woman in the greater Accra region. However, a woman in the Central region faces low inequality in discretionary time. The results of the within-group (urban and rural) analysis in Table 8-8 do not differ from those of the inequality in unpaid hours. The effect of ethnicity is more significant in the rural areas than in the urban areas. Relative gaps in discretionary time is lower among women from the Ga-Dangme, Ewe, Guan, Grusi or Other ethnic group in the rural area than among their Akan counterparts. It is evident from this analysis that the effect of poverty on inequality in hours of work largely depends on the poverty indicator (income or consumption), inequality indicator and geographical location of the household of the respondent.

Table 8-4: Determinants of gender inequality in discretionary time use

Dependent variable	GPI (%)				Relative gap (%)			
(Inequality in total hours)	Income poverty		Consumption poverty		Income poverty		Consumption poverty	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Poor	3.009***	4.729***	1.716***	2.202**	1.866***	5.375***	0.640	2.207
	(0.370)	(0.475)	(0.460)	(1.084)	(0.437)	(0.683)	(0.543)	(1.559)
Child<5	-0.047	-0.071	-0.073	-0.142	-1.100**	-1.097*	-1.117**	-1.175*
	(0.370)	(0.429)	(0.371)	(0.431)	(0.437)	(0.618)	(0.437)	(0.620)
Ga-Dangme (Ref: Akan)	0.184	0.313	0.200	0.423	-1.775*	-0.298	-1.753*	-0.168
	(0.855)	(0.762)	(0.857)	(0.766)	(0.996)	(1.091)	(0.997)	(1.096)
Ewe	-1.054	-0.476	-0.880	-0.403	-2.172***	-0.609	-2.058**	-0.527
	(0.709)	(0.707)	(0.711)	(0.711)	(0.840)	(1.025)	(0.842)	(1.029)
Guan	-0.151	1.424	-0.374	1.335	-2.345**	0.315	-2.472**	0.224
	(0.880)	(1.134)	(0.878)	(1.136)	(1.022)	(1.597)	(1.020)	(1.598)
Mole-Dagbani	0.177	1.398*	0.209	1.354	-0.988	1.615	-0.950	1.562
	(0.698)	(0.824)	(0.700)	(0.827)	(0.832)	(1.191)	(0.833)	(1.193)
Grusi	1.086	-0.200	0.681	-0.456	-3.274***	-0.685	-3.443***	-0.957
	(1.000)	(1.418)	(0.998)	(1.415)	(1.120)	(2.040)	(1.119)	(2.036)
Gurma	-0.058	1.327	-0.138	1.519	-0.941	-2.298	-0.999	-2.084
	(0.871)	(1.363)	(0.871)	(1.375)	(1.038)	(1.825)	(1.037)	(1.838)

Other ethnic	1.236	1.593	1.319	1.808*	-2.546**	0.498	-2.464**	0.753
	(0.959)	(1.087)	(0.962)	(1.097)	(1.083)	(1.530)	(1.086)	(1.541)
Age	-0.458***	-0.635***	-0.477***	-0.644***	-0.266***	-0.121	-0.276***	-0.132
	(0.050)	(0.066)	(0.051)	(0.067)	(0.059)	(0.095)	(0.060)	(0.095)
Age square	0.005***	0.007***	0.005***	0.007***	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Basic education (Ref: None)	-0.379	0.108	-0.415	-0.056	1.206**	1.438*	1.171**	1.243
	(0.424)	(0.570)	(0.425)	(0.576)	(0.498)	(0.809)	(0.498)	(0.814)
Secondary plus	-0.542	0.773	-0.598	0.360	3.160***	2.903***	3.065***	2.417**
	(0.611)	(0.660)	(0.613)	(0.663)	(0.751)	(0.944)	(0.753)	(0.946)
Household size	-0.032	0.081	-0.082	0.061	-0.336***	-0.646***	-0.354***	-0.663***
	(0.085)	(0.113)	(0.087)	(0.114)	(0.101)	(0.162)	(0.102)	(0.164)
Western (Ref: Greater Accra)	5.070***	4.194***	4.957***	4.524***	-0.024	1.302	-0.071	1.728
	(1.163)	(0.783)	(1.158)	(0.784)	(1.498)	(1.136)	(1.491)	(1.135)
Central region	-0.497	-1.255*	-0.326	-0.693	-1.239	-2.322**	-1.100	-1.617
	(1.158)	(0.755)	(1.154)	(0.760)	(1.523)	(1.167)	(1.517)	(1.171)
Volta region	6.393***	2.511***	6.750***	3.339***	3.135**	-0.992	3.420**	0.000
	(1.181)	(0.958)	(1.178)	(0.969)	(1.526)	(1.373)	(1.520)	(1.383)
Eastern region	2.792**	1.491**	2.781**	1.832**	0.789	-1.989*	0.797	-1.548
	(1.093)	(0.740)	(1.088)	(0.742)	(1.430)	(1.080)	(1.424)	(1.081)
Ashanti region	4.117***	2.141***	4.275***	2.028***	-0.745	0.243	-0.620	0.152
	(1.162)	(0.668)	(1.158)	(0.664)	(1.498)	(0.998)	(1.492)	(0.992)
Brong-Ahafo region	2.172*	0.699	2.141*	1.115	-1.600	-2.217*	-1.580	-1.700
	(1.167)	(0.811)	(1.162)	(0.814)	(1.511)	(1.196)	(1.504)	(1.197)
Northern region	10.043***	8.733***	10.385***	9.645***	1.255	-3.257**	1.583	-2.239
	(1.249)	(1.153)	(1.247)	(1.165)	(1.576)	(1.427)	(1.573)	(1.441)
Upper East region	9.957***	0.958	10.582***	2.202*	3.161*	-6.291***	3.662**	-4.906***
	(1.317)	(1.206)	(1.314)	(1.233)	(1.666)	(1.614)	(1.661)	(1.643)
Upper West region	9.193***	3.444**	9.687***	3.952***	2.709	-2.257	3.221*	-1.625
	(1.324)	(1.425)	(1.328)	(1.436)	(1.674)	(1.943)	(1.679)	(1.954)
Survey years (dummies)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8598	5262	8598	5262	8598	5262	8598	5262
Pseudo R^2	0.025	0.022	0.024	0.020	0.029	0.084	0.025	0.027
Log likelihood	-36843.75	-22731.95	-36869.93	-22780.16	-40298.95	-25124.93	-40307.61	-25159.22
Specification test (_hatsq)	0.415	0.164	0.587	0.695	0.211	0.296	0.212	0.298

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by author using GLSS data sets

8.4 Conclusion

This chapter examined the socio-economic correlates of gender inequality in hours of unpaid work and hours of total work (discretionary time use), taking both income and consumption poverty into consideration. The descriptive analysis revealed that although inequality in hours of work has reduced slightly between 1998 and 2013 survey periods, inequality in unpaid hours of work remain considerably higher than inequality in discretionary time (total hours of work). More so, inequality in total hours of work has increased within both poor and non-poor households. Inequality in hours of work is more of an issue among the poor and rural residents than the non-poor and urban

residents. It is also higher among women in the three northern regions (Northern, Upper East and Upper West) than among those in the rest of the country. This reflects higher inequality among women form ethnic groups in these three regions. The results showed elements of a 'second shift' among women, a situation in which an increase in time spent by women in paid work is not commensurate with an increase in time spent by men on household activities.

The regression estimates indicate that both income and consumption poverty have positive effects on inequality in hours of work. Nonetheless, the magnitude of the effect of consumption poverty on inequality in unpaid hours of work is higher than that of income poverty while the inverse holds for inequality in total hours of work. This suggests that income poverty may have higher effect on inequality in hours of work in the labours market than inequality in hours of household production. Aside from the two poverty indicators, other control variables that have a significant effects on gender inequality in time use are ethnic affiliation, age, education, and geographical location of respondents.

Given the feedback effects of time allocation between the household and the labour market, governments should design policies aimed at creating a conducive environment for job creation, which will help reduce poverty levels among Ghanaians. Policymakers should reconsider the traditional over-concentration on consumption poverty since it appears to be less relevant in explaining gender inequality in the household. Policies aimed at addressing intra-household inequality in time use and its effects on women's wellbeing should pay particular attention to the entrenched 'feminisation of poverty' and other factors that deepen the income poverty condition of women (in particular) in Ghanaian society.

Furthermore, ethnic practices and norms that impede women's efforts to autonomously determine how to allocate their time (both in the household and in the labour market) should be seriously addressed since changes in this regard would be a critical step towards the achievement of gender equality, an important theme in the SDGs.

CHAPTER 9: TIME POVERTY AND INCOME/CONSUMPTION POVERTY

9.1 Introduction

This chapter presents and discusses the results of the descriptive and regression analyses on the fifth objective. As a reminder, the fifth objective examines the relationship between time poverty and income/consumption poverty in Ghanaian households. The rationale behind this objective is to attempts to give an account of the socio-economic factors that influence time poverty status of individuals in households in Ghana. The chapter is divided into three main sections. The first section presents detailed descriptive analysis of the distribution of time poverty across the periods of survey, the ethnic affiliation of the respondents, and their level of education. It also looks at the differences in the distribution of time poverty among individuals in income poor and consumption poor households.

The second subsection delves deeper into the discussion of the regression estimates of the individual and household level characteristics that are associated with income poverty with particular attention to income and consumption poverty. It is important to indicate that separate regression models were specified for the effect of income poverty on time poverty as well as the effect of consumption poverty on time poverty. The essence of this approach is to make comparisons of the relative effects of the two poverty indicators on time poverty. The third subsection concludes the chapter with a synopsis of the main findings and policy recommendations necessary to shape government's policies on poverty and poverty targeting in Ghana.

9.2 Descriptive analysis

This section begins with the analysis of the changes in time poverty across the periods (1998/1999, 2005/2006 and 2012/2013) of the three surveys (GLSS4, GLSS5 and GLSS6). As depicted in Figure 9-1, the average time poverty among adults aged 15 years and older for the period 1998 to 20013 is approximately 19% reflecting a reduction of approximately 38%. It can be observed from the Figure that the reduction (approximately 25%) in time poverty between the 1998/1999 and 2005/2006 survey periods was higher than the reduction (approximately 18%) between the 2005/2006 and 2012/2013 survey periods. Even though the reduction between 2006 and 2013 has been lower than the reduction between 1999 and 2006. This continuous reduction in time poverty reflects some improvement in the economic conditions of Ghanaians.

The improvement could be partly ascribed to improved labour market policies and human capital development outcomes such as education and conditions of women in the labour market as recounted in the Ghana MDGs 2015 Report. For instance, the report shows that women's access

to wage employment in non-agricultural sectors rose from 25.4% in 2006 to 30.5% in 2013 (National Development Planning Commission, 2015). In addition, the target of halving the proportion of the population without access to safe water was achieved. These developments could contribute to reducing gender inequality in intra-household time allocation and time poverty, particularly among women.

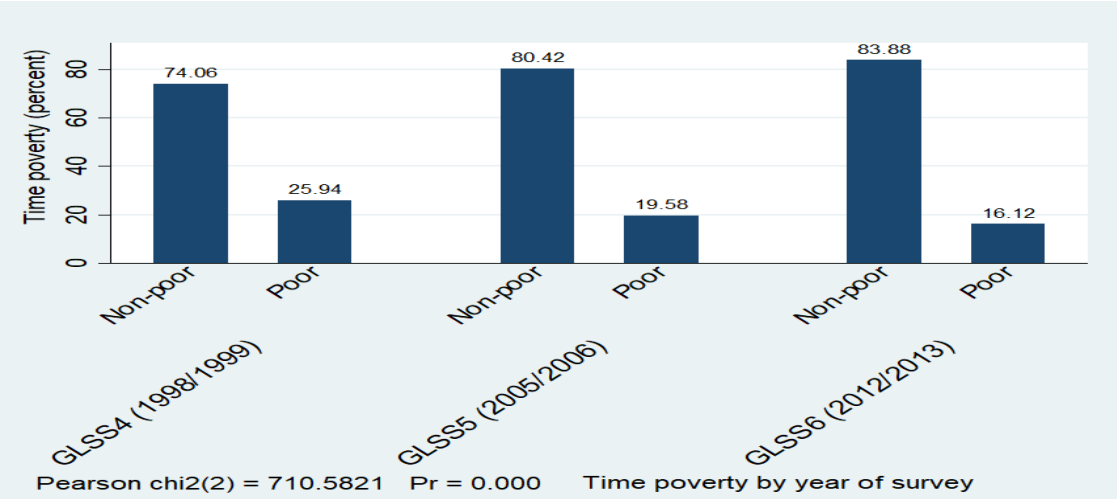

Figure 9-1: Trend of time poverty across periods of survey

Source: Prepared by the author using GLSS data sets.

Across gender of respondent, Figure 9-2 shows that the time poverty rate among females is twice the rate among males. This disproportionately higher rate of time poverty among females gives an idea of unequal gender distribution of labour in the household which is compounded by women's additional time spent on paid work in the labour market. It also illustrates the extent to which women face restricted time and greater disadvantage than men in responding to new economic incentives. The distribution across the geographical location of respondents (see Figure 9-2) shows that time poverty is relatively higher in urban areas than rural areas. Undoubtedly, urban residents have more access to infrastructure, time-saving equipment and social services such as quality schools and Day Care services for children. However, they face traffic congestion which is partly caused by urbanization and spatial expansion. This contributes to long daily and regular commuting times and high transport volumes between residential areas.

The 2012 National Household Transport Survey reports that walking remains the main mode of commuting across urban areas (50%), followed by "tro-tro" (shared mini buses – 20%), and shared taxis (12%). A recent study on the measurement of job accessibility within Accra and its relationship with labour outcomes finds that while most jobs can be reached by car within 60 minutes from any neighbourhood, only between 20% to 30% of formal jobs on average are accessible in the same timeframe by the more popular minibus (Chen, Jaupart, Moreno-Monroy, & Picarelli, 2017). The higher proportion of urban residents opting for walking as the major means

of commuting to workplaces translates into more unproductive time that makes urban resident more prone to time poverty than rural residents.

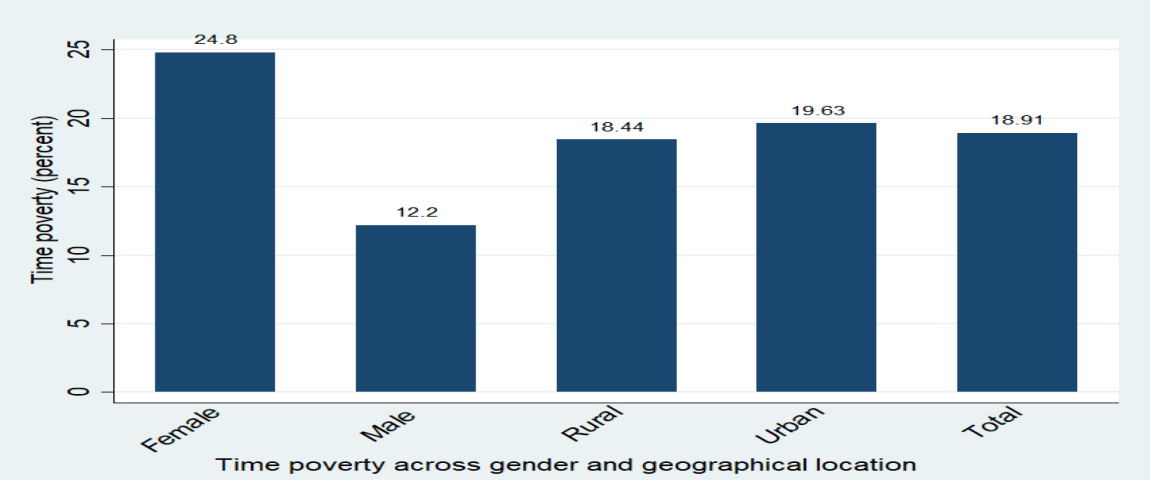

Figure 9-2: Distribution of time poverty across gender and geographical location

Source: Prepared by the author using GLSS data sets.

As indicated in earlier chapters of this thesis, the practices of different ethnic groups have implication for time use among males and females. This notion is explored in Figure 9-3, which shows that time poverty is relatively low among respondents from the Grusi and Ewe ethnic groups but high among members of the other minority ethnic groups, the Gurma, Mole-Dagbani, and Guan ethnic groups in Ghana. This result shows somewhat different distribution compared to the distribution of gender inequality in time use in Chapter 6 where the Ga-Dangme ethnic group appeared to have the lowest proportion. These differences in time poverty and gender inequality in time use illustrate how social norms differently affect time poverty and gender inequality in time use as separate social issues.

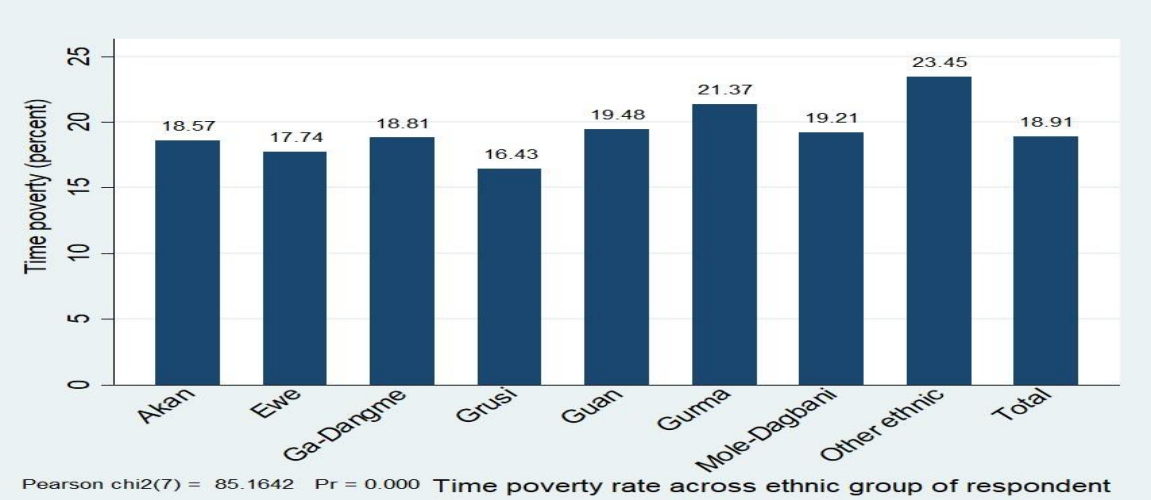

Figure 9-3: Distribution of time poverty across the ethnic affiliation of respondent

Source: Prepared by the author using GLSS data sets.

The distribution in Figure 9-4 illustrates that time poverty is negatively related to the level of education of respondents at 1% level of significance. Thus time poverty is high among individuals who have no education and those who have low levels of education. However, it is very low among those who have completed at least secondary education. Observe from the distribution that the rate of time poverty among respondents who have no education is a little over three times the rate among those who have completed at least secondary education. Although this descriptive analysis does not explain the underlying causes of this distribution and the extent of the effect of education on time poverty, the distribution can be largely explained from two perspectives.

Firstly, higher levels of education means higher prospects for engagement in income earning activities or employment. Engagement in economic activity can make one time poor or otherwise depending on several factors including the person's employment status, location of the place of work, availability of transport and ease of traffic, as a well as his/her level of experience. For instance, individuals who work in a city where there is well-connected transport system with low traffic and those who are highly skilled (an expected characteristic of higher levels of education) will respectively have lower commuting time and spend less time on work. Secondly, the higher prospect of employment opportunities associated with higher levels of education means individuals who have higher level of education will be able to afford the cost of hiring the service of others to perform some activities usually in the households which add to their spent on the labour market.

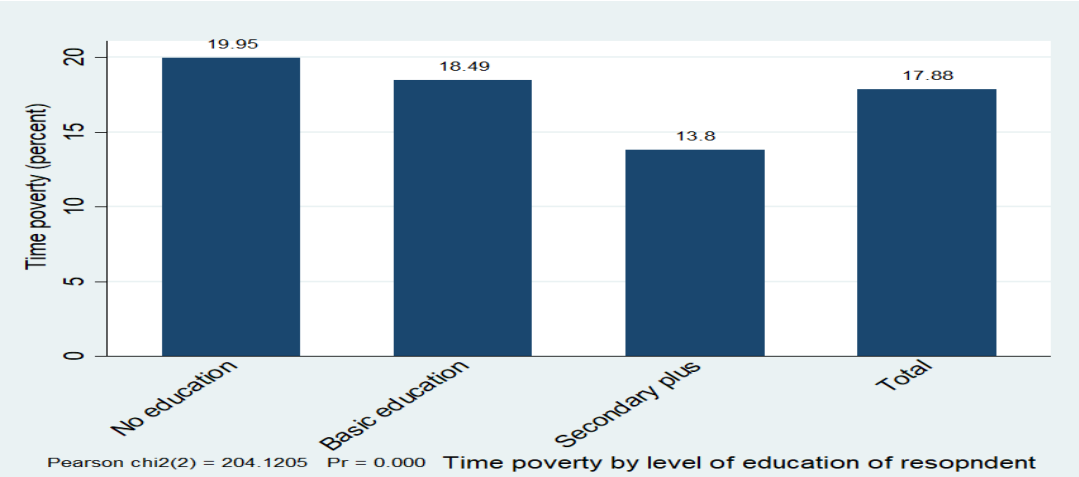

Figure 9-4: Time poverty across level of education of respondent[37]

[37] Note that in the regression analysis, education was categorised into literate and illiterate. The reason is that the test of the statistical difference in the extent of the effect of basic education and secondary plus categories was not significant. It is therefore statistically intuitive to combine the two categories into a single category.

Source: Prepared by the author using GLSS data sets.

Assuming that the two explanations are valid, then this distribution can be traced to the progress that Ghana made towards the achievement of the targets of the goal 2 of the erstwhile MDGs which sought to achieve universal primary education by 2015. Ghana exceeded the gross enrolment and completion target even though net enrolment remained a challenge. Ghana's gross enrolment reached 107% in 2013/2014 while net enrolment made slow progress from 88.5% in 2005/06 to 89.3% in 2013/14. The completion rate at primary level exceeded the target by 12.4% points (National Development Planning Commission, 2015).

In line with the objective of examining the relationship between income/consumption poverty, Figure 9-5 explores the distribution of respondents who are either time poor, income poor, both income and time poor or none of the above. Observe from the figure that the proportion of individuals who are only time poor is 64.22% while the proportion of those who are only income poor is 37.63%. In the same vein, the proportion of respondents who are both time poor and consumption poor is 35.78% whereas the proportion of those who are neither time poor nor income poor is a little over 60%. The results show that quite a large proportion of Ghanaians are both time and income poor. This gives some idea of a significantly positive association between income level and extent of time poverty which will be explored in the regression analysis in subsequent subsections.

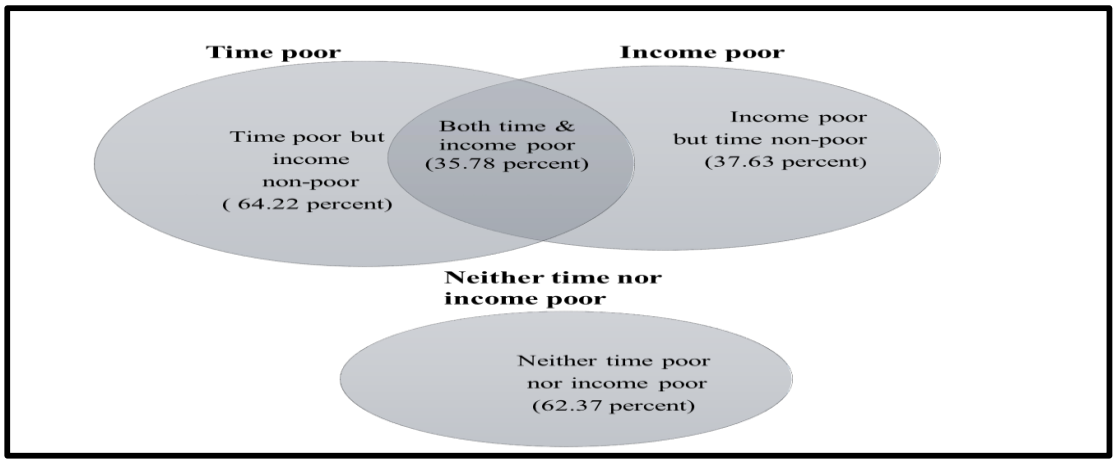

Figure 9-5: Distribution of time and income poverty

Source: Prepared by the author using GLSS data sets.

With respect to consumption poverty Figure 9-6 shows that the proportion of individuals who are only time poor increases to 83.06% while the proportion that are only consumption poor reduces by half, from 37.63% to 18.37%. Similarly, the proportion of respondents who are both time poor and consumption poor reduces by approximately 43% compared to the proportion that are both time poor and income poor. Conversely, the proportion who are neither time poor nor consumption

poor is higher than the proportion who are neither time poor nor income poor. The distributions in the two Figures suggest a stronger association between time poverty and income poverty than consumption poverty.

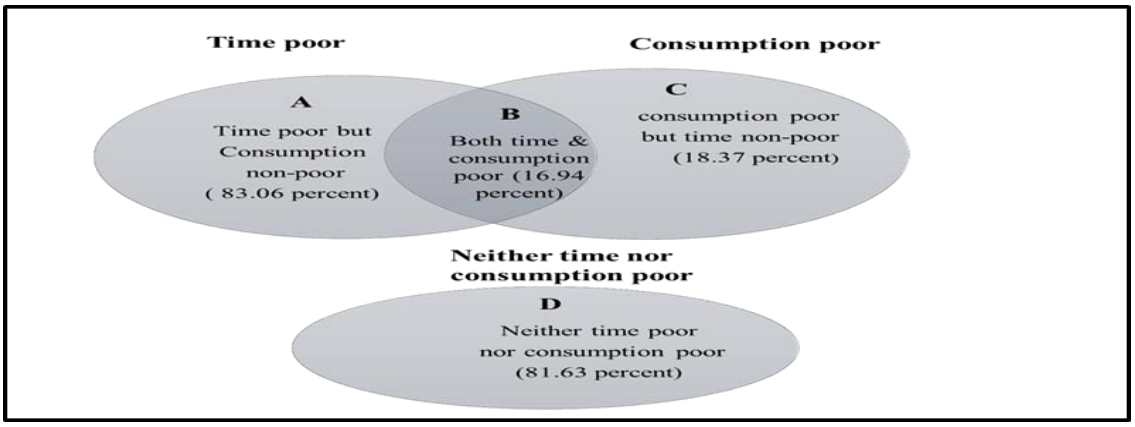

Figure 9-6: Distribution of time and consumption poverty

Source: Prepared by the author using GLSS data sets

In addition to the headcount poverty already discussed, this study explores the trends of the time poverty gap and severity of time across gender, geographical location, and ethnicity and education level of respondent. The results (presented in Appendix E) follow the same trend and distribution as the headcount poverty. Over the years, both time poverty gap and severity of time poverty have reduced considerably. Across gender and geographical location, both indicators are higher among females than males and among urban residents than rural residents. Although these descriptive analyses give some idea of the relationship between time poverty and income/consumption poverty and other socio-economic characteristics, the extent and direction of association remains unclear. These will be discussed in detail in the next section based on the estimates of parametric analyses.

9.3 The regression estimates

Having discussed the distribution of time poverty in relation to some of the characteristics and geographical location of respondent, this section discusses the regress estimates. The presentation and discussion follow the same pattern as chapter five and six. The first part discusses the effects of income and consumption poverty across gender and geographical location of respondent while the second part discusses the results of the other control variables based on the analyses of the models for male, female, rural and urban residents. The essence of this style of presentation is to allow for effective comparison of the gender and geographical dynamics of the effects of income and consumption poverty in Ghanaian households. It also allows for contextual analysis of the policy variables of interest (income and consumption poverty) in relation to socio-economic developments in Ghana especially over the past decade.

Before discussing the regression outputs, it is important to indicate that the results of the post estimation tests of the reliability and robustness of the estimates are reported at the bottom of each output table. The specification test and goodness of fit test require that the _hatsq and Pearson chi values are insignificant. As reported under Table 9-4 the values indicate that the models are well fit and that they do not suffer from misspecification. In the same vein, the Recursive Bivariate Probit, requires that the correlation coefficients between the bivariate outcomes of time poverty and income/consumption poverty are significant. The results reported at the bottom of the output Tables show that these correlation coefficients are significant at a minimum of 5% level. On the basis of these results, it is appropriate to estimate the bivariate probit models. The outcomes (time poverty and income/consumption poverty) are interrelated and cannot be estimated independently. In this case, the results from the separate probit models will not be identical to those from the bivariate probit model-hence the need for bivariate probit models.

One of the interests of this study is to assess both vertical (within group) and horizontal (across group) differences in the effect of income poverty and consumption poverty on time poverty. This study seeks to find out how the effects of income and consumption poverty on time poverty vary among males and female and between males and female. The second interest is to compare the relative effects of income poverty and consumption poverty in order to make recommendations that will shape policies that seek to address intra-household time poverty in Ghana. As a result, separate models were specified for male, female, rural and urban residents. Beginning the discussion with the results from the models of income and consumption poverty across gender, Tables 9-1 and 9-2 show that the estimates of both poverty indicators in the probit and Recursive Bivariate Probit models are negatively associated with time poverty. The results (see Table 9-1) show that at 1% level of significance, a person who is income poor is approximately 2.6% less likely to be time poor compared to a person who is income non-poor, *ceteris paribus*.

In the separate models for males and females, observe that at the same 1% level of significance, a male who is income poor is approximately 3.7% less likely to be time poor than his counterpart who is income non-poor. As far as the model for female is concerned, the effect is approximately 1.9%. The effect of consumption poverty on time poverty is approximately 3.1% at 5% level of significance. In the separate models, a male who is consumption poor is about 3.6% less likely to be time poor compared to his counterpart who is consumption non-poor. Regarding the model for female, the effect is exactly 3% at 1% level of significance. Although the results in Tables 9-1 and 9-2 show that the effects of both income and consumption poverty on time poverty are relatively higher for males than females, there are two distinct observations that need to be noted. In the models for male, the effect of income poverty (3.70%) on time poverty is slightly higher than the effect of consumption poverty (3.57%). This contrasts to the results in the models for female

where the effect of consumption poverty (3.0%) is higher than the effect if of income poverty which is approximately 1.9%.

Across geographical location of respondent, the results in Tables 9-3 and 9-4 show that consumption poverty has greater effect on time poverty than income poverty. It is also evident that both income and consumption poverty have more effect among rural residents than amongst urban residents. The magnitudes of the effects of income and consumption poverty on time poverty are higher among rural residents than among urban residents. Observe that at 1% level of significance, a consumption poor person in the rural area is approximately 3.5% less likely to be time poor compared to a person who is non-poor. This is slightly higher than the effect of income poverty which is 3.0% at the same 1% level of significance. In the urban area, the effects of consumption poverty and income are 3.44% and 2.97% respectively.

These results confirm the argument in the introduction of Chapter 1 that there is the need for policymakers to consider income in addition to consumption expenditure as more effective means of understanding the differential effects of income and consumption poverty on other aspects of inequality within households in Ghana. This will enhance proper targeting of policies that are aimed at reducing intra-household poverty and its consequential effects on inequalities in the country. In relation to the existing literature, these findings lend support to similar studies conducted by Hamermesh and Lee (2007) who found evidence of a potential trade-off between income poverty and time poverty among men and women in Australia (2001), Germany (2002), the USA (2003), and Korea (1999) using data from the TUS for the corresponding years. In the African setting, these findings corroborate similar observations made in studies conducted in South Africa and Lesotho where the authors observed that time poverty is more of a problem among the income non-poor than those who are income poor (Kizilirmak & Memis, 2009; Lawson, 2007).

Table 9-1: Estimates of income poverty across gender of respondent

Dependent variable	**Male**		**Female**		**Full sample**	
(Time poverty)	**Probit**	**Biprobit**	**Probit**	**Biprobit**	**Probit**	**Biprobit**
Income poor	-0.0267***	-0.0370***	-0.0281***	-0.0188***	-0.0279***	- 0.0257 ***
	(0.0038)	(0.0055)	(0.0044)	(0.0056)	(0.0029)	(0. 0038)
Age	0.016***	0.0158***	0.0236***	0.0219***	0.0194***	0. 00184***
	(0.0008)	(0.0007)	(0.0009)	(0.0007)	(0.0006)	(0.0005)
Age square	-0.0002***	-0.0002***	-0.0003***	-0.0003***	-0.0002***	-0.0002***
	(0.00001)	(0.00001)	(0.00001)	(0.00002)	(0.00001)	(0.0005)
Household size	-0.0071***	-0.0074***	-0.0074***	-0.0067***	-0.0073***	-0.0069***
	(0.0007)	(0.0007)	(0.0007)	(0.0017)	(0.0005)	(0.0005)

Dependent variable	Male		Female		Full sample	
(Time poverty)	Probit	Biprobit	Probit	Biprobit	Probit	Biprobit
Literate (Ref: Illiterate)	-0.0138***	-0.0150***	-0.0280***	-0.0254***	-0.0261***	-0.0247***
	(0.0044)	(0.0044)	(0.0048)	(0.0045)	(0.0033)	(0.0031)
Urban	0.0396***	0.0396***	0.0069	0.0071*	0.0236***	0.0225***
	(0.0037)	(0.0057)	(0.0045)	(0.0042)	(0.0030)	(0.0028)
Child under 5	0.0195***	0.0204***	0.0878***	0.0810***	0.0520***	0.0493***
	(0.004)	(0.0042)	(0.0045)	(0.0042)	(0.0030)	(0.0029)
Informal (Ref: Married)	0.0190***	0.0197***	-0.0219***	-0.0209***	-0.0031	-0.0030
	(0.0068)	(0.0070)	(0.0077)	(0.0073)	(0.0053)	(0.0051)
Single	-0.0247***	-0.0245***	-0.0891***	-0.0830***	-0.0652***	-0.0618***
	(0.0054)	(0.0052)	(0.0054)	(0.0048)	(0.0037)	(0.0033)
Ga-Dangme (Ref: Akan)	-0.0062	-0.0063	0.0011	-0.0010	-0.0027	-0.0026
	(0.0065)	(0.0066)	(0.0082)	(0.0076)	(0.0054)	(0.0051)
Ewe	0.0038	0.0049	-0.0019	-0.0025	0.0009	0.0008
	(0.0054)	(0.0056)	(0.0065)	(0.0061)	(0.0043)	(0.0041)
Guan	0.0055	0.0063	0.0250**	0.0225**	0.0151**	0.01432**
	(0.0084)	(0.0087)	(0.0102)	(0.0096)	(0.0067)	(0.0065)
Mole-Dagbani	0.0086*	0.0106**	0.0401***	0.0360***	0.0238***	0.0225***
	(0.0050)	(0.0052)	(0.0061)	(0.0058)	(0.0040)	(0.0039)
Grusi	-0.0001	0.0009	-0.0056	-0.0062	-0.0045	0.0044
	(0.0088)	(0.0091)	(0.0103)	(0.0094)	(0.0069)	(0.0065)
Gurma	0.0064	0.0075	0.0924***	0.0866***	0.0507***	0.0485***
	(0.0083)	(0.0085)	(0.0103)	(0.0100)	(0.0068)	(0.0066)
Other ethnic	0.0369***	0.0392***	0.0571***	0.0524***	0.0467***	0.0445***
	(0.0097)	(0.0099)	(0.0117)	(0.0110)	(0.0077)	(0.0074)
Female	-------	-------	------	------	0.1190***	0.1130***
	-------	--------	------	------	(0.0028)	(0.0030)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36484	36484	20348	20348	56832	56832
LR chi2(2)	1927.48	------	4862.54	------	8362.87	-------
Pseudo R2	0.0705	------	0.1033	------	0.1093	------
Specification test	0.2499	-------	0.1373	-------	0.2002	------
Goodness-of-fit test	0.3565	-------	0.4678	-------	0.1299	------
Rho(Wald test of rho=0)	------	0.4175**	------	0.3291**	------	0.3081**

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets.

These results suggest that the direction and extent of the effect of income or consumption poverty are largely dependent on the individual's engagement in economic activity in the labour market and prevailing social norms. For instance, in most households in developing countries like Ghana

where women face very entrenched sociocultural norms that require them to perform more household responsibilities in order to be considered “women”, they are more prone to be time poor even if they are non-income poor. This is because they add the time spent on household activities to the time spent in the labour market.

Apart from these policy variables, one of the control variables which appear to have a significant effect on time poverty is the age of the respondent. As discussed in Chapter 5 of this study, time use has a non-linear relationship with age. At a certain age level, individuals reduce their time spent on both the labour market and in the household. Within the household, adults either delegate some of their responsibilities to the young ones or hire the services of others depending on the income level of the household in question. This assertion is valid in the models for both male and female, rural and urban residents since the results indicate that the square of age (showing the quadratic relationship between age and time) is significant at the 1% level.

Consistently, household size shows significantly negative effects on time poverty across both gender and geographical location. The direction of the effect of household size on time use depends on both age and gender composition of the household. Within households where there are more adults, fewer children and aged people, time spent on unpaid household work such as care for the aged and children are low. On the other hand, a household in which there are more aged and pre-school children require more hours of the unpaid time of mostly women. This is peculiar to households in developing countries like Ghana where care services are limited and, if available, very expensive for low-income earners.

Table 9-2: Estimates of consumption poverty across gender of respondent

Dependent variable	**Male**		**Female**		**Full sample**	
(Time poverty)	**Probit**	**Biprobit**	**Probit**	**Biprobit**	**Probit**	**Biprobit**
Consumption poor	-0.0309***	-0.0357***	-0.0338***	-0.0300***	-0.0314***	-0.0310**
	(0.0054)	(0.0067)	(0.00595)	(0.0066)	(0.0040)	(0.0046)
Age	0.0156***	0.0158***	0.0236***	0.0219***	0.0195***	0.0184***
	(0.0008)	(0.0007)	(0.000879)	(0.0007)	(0.0006)	(0.0005)
Age square	-0.0002***	-0.0002***	-0.0003***	-0.0003***	-0.0002***	-0.0002***
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.000001)
Household size	-0.0062***	-0.0062***	-0.0063***	-0.0059***	-0.0062***	-0.0058***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0005)	(0.0005)
Literate (Ref: Illiterate)	-0.0149***	-0.0157***	-0.0286***	-0.0265***	-0.0268***	-0.0255***
	(0.0044)	(0.0045)	(0.0048)	(0.0045)	(0.0033)	(0.0031)
Urban	0.0387***	0.0389***	0.0057	0.0055	0.0227***	0.0214***
	(0.0037)	(0.0038)	(0.0045)	(0.0043)	(0.0030)	(0.0029)
Child under 5	0.0182***	0.0186**	0.0864***	0.0804***	0.0506***	0.0480***

Dependent variable	Male		Female		Full sample	
(Time poverty)	Probit	Biprobit	Probit	Biprobit	Probit	Biprobit
	(0.0041)	(0.0042)	(0.0045)	(0.0042)	(0.0030)	(0.0029)
Informal (Ref: Married)	0.0185***	0.0187	-0.0236***	-0.0221***	-0.0043	-0.0041**
	(0.0062)	(0.0070)	(0.0077)	(0.0073)	(0.0053)	(0.0051)
Single	-0.0251***	-0.0254***	-0.0906***	-0.0838***	-0.0664***	-0.0628***
	(0.0054)	(0.0052)	(0.0054)	(0.0048)	(0.0037)	(0.0033)
Ga-Dangme (Ref: Akan)	-0.0061	-0.0062	0.0010	-0.0010	-0.0028	-0.0027
	(0.0065)	(0.0067)	(0.0082)	(0.0076)	(0.0053)	(0.0051)
Ewe	0.0018	0.0019	-0.0035	-0.0033	-0.0008	-0.0008
	(0.0054)	(0.0055)	(0.0064)	(0.0060)	(0.0043)	(0.0041)
Guan	0.0060	0.0065	0.0244**	0.0226**	0.0148**	0.0142**
	(0.0084)	(0.0087)	(0.0102)	(0.0096)	(0.0067)	(0.0065)
Mole-Dagbani	0.0091*	0.0099*	0.0419***	0.0389***	0.0247***	0.0239***
	(0.0051)	(0.0052)	(0.0062)	(0.0096)	(0.0041)	(0.0040)
Grusi	0.0040	0.0051	-0.0010	-0.0013	-0.0005	-0.0001
	(0.0091)	(0.0094)	(0.0105)	(0.0097)	(0.0070)	(0.0066)
Gurma	0.0063	0.0067	0.0925***	0.0873***	0.0506***	0.0486***
	(0.00833)	(0.0085)	(0.0103)	(0.0100)	(0.0068)	(0.0066)
Other ethnic	0.0366***	0.0380***	0.0568***	0.0531***	0.0462***	0.0444***
	(0.00967)	(0.0099)	(0.0117)	(0.0110)	(0.0077)	(0.0074)
Female	--------	--------	-------	--------	0.1180***	0.0112***
	--------	--------	-------	--------	(0.0028)	(0.0027)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36484	36484	20348	20348	56832	56832
LR chi2(2)	1917.52	--------	4856.03	-------	8338.65	--------
Pseudo R2	0.0702	--------	0.1032	-------	0.1089	--------
Specification test	0.2737	--------	0.1417	------	0.2050	--------
Goodness-of-fit-test	0.3959	--------	0.2135	------	0.1339	--------
Rho(Wald test of rho=0)	-------	-0.1271***	--------	-0.0725***	-------	-0.2675***

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1[38]

Source: Prepared by the author using GLSS data sets.

In this analysis, education is represented by the level of literacy of the respondent. Consistent with intuition and the findings of some of the existing studies (Ribeiro & Marinho, 2012), a literate

[38] Note that the three dummy variables that take on the value 1 if a survey was conducted in a particular year and 0 otherwise were included in the analysis. As a reminder, the survey years are 1998/99 (GLSS4), 2005/6 (GLSS5) and 2012/13 GLSS6. In order to avoid a potential dummy variable trap, the year 1998/99 was kept as reference category.

respondent is less likely to be time poor compared to the illiterate. The effect is relatively higher for males than females and urban residents than their rural counterparts. People who have attained high levels of education have higher chances of being engaged in well-paid economic activities. Irrespective of their status and sectors of employment which could determine the number of hours that they spend on paid work, they stand higher chances of having the means of hiring the services of others to assist them in performing certain household activities. Moreover, they will be able to afford time-saving household equipment such as microwaves ovens, washing machines and blenders.

Considering geographical location as a variable in the individual models, it can be seen that a respondent in the urban area is approximately 22.5% more likely to be time poor than a person who resides in the rural area. The effect of income poverty is higher for males who reside in the rural area than their female counterparts. The models for consumption show that at 1% level of significance, a female who is consumption poor is about 3.89% more likely to be time poor than a female who is non-poor. Similarly, in the models for rural and urban areas (see Tables 9-3 and 9-4), the effects of both income and consumption poverty are as high as 13%. Consistent with the discussions in the section on the descriptive analysis, these results demonstrate the extent to which time poverty is a typical phenomenon among females in many developing countries.

The literature has consistently shown that the presence of a pre-school child in the household requires more time for parental care. Females are usually the ones who have to spend additional time on childcare. In this study, the presence of children under five years of age in the household has a positive association with time poverty. As far as income poverty is concerned, the effect is higher (8.1%) for females than males (2.04%). With respect to consumption poverty, the sizes of the effects are 8.04% for females and 1.86% for males. Across geographical location, the effects are higher for urban residents than rural residents. While the results across gender follow intuition, the results across geographical location require a contextual analysis. In the rural areas in developing countries, there is still an element of mechanical solidarity where social bond and cohesion among household members shape intra-household allocation of resources including time. In such communities, adult members of the household play a supportive role in child care and child upbringing. This is quite contrary to the situation in households in urban areas where organic solidarity and individualism dominate. Even though care services may be more available in the urban areas than in the rural areas, the cost may be higher in the former than the latter.

The dominance of organic solidarity[39] and a high cost of care services could partly contribute to the higher effect of the presence of a pre-school child in the urban than in the rural areas.

The evidence on the relationship between marital status and time poverty remains mixed in the literature. The extent and direction of effect depend on several factors including the type of data used and country-specific socio-economic characteristics. The results in Tables 9-1 and 9-2 show that compared to a respondent who is married, the one who is either single or in an informal relationship is less likely to be time poor. Observe from the results in both Table 9-1 and 9-2 that a male who is in an informal relationship is more likely to be time poor than his counterpart who is married. On the contrary, a female who is in an informal relationship is less likely to be time poor compared to her counterpart who is married. At 1% level of significance, a respondent who is single is less likely to be time poor compared to a respondent who is married.

[39] Detailed explanation and distinction between organic solidarity and mechanical solidarity can be found in the work of Beck (2015).

Table 9-3: Estimates of income poverty across geographical location

Dependent variable	Rural		Urban		Full sample	
(Time poverty)	Probit	Biprobit	Probit	Biprobit	Probit	Biprobit
Income poor	-0.0309***	-0.0303***	-0.0252***	-0.0297***	-0.0279***	-0.0259***
	(0.0036)	(0.0044)	(0.0050)	(0.0060)	(0.0029)	(0.0038)
Age	0.0153***	0.0142***	0.0262***	0.0283***	0.0119***	0.0184***
	(0.0007)	(0.0006)	(0.0010)	(0.0010)	(0.0006)	(0.0005)
Age square	-0.0002***	-0.0002***	-0.0003***	-0.0003***	-0.0002***	-0.0002***
	(0.00001)	(0.00001)	(0.00001)	(0.00002)	(0.0005)	(0.00001)
Household size	-0.0058***	-0.0054***	-0.0107***	-0.0116***	-0.0073***	-0.0069***
	(0.0006)	(0.0005)	(0.0010)	(0.0010)	(0.0005)	(0.0005)
Literate (Ref: Illiterate)	-0.0212***	-0.0198***	-0.0320***	-0.0348***	-0.0260***	-0.0247***
	(0.0039)	(0.0036)	(0.0058)	(0.0062)	(0.0033)	(0.0031)
Female	0.145***	0.1345***	0.0798***	0.0861***	0.1191***	0.1130***
	(0.0035)	(0.0034)	(0.0045)	(0.0048)	(0.0006)	(0.0027)
Child under 5	0.0443***	0.0411***	0.0640***	0.0691***	0.0520***	0.0493***
	(0.0038)	(0.0036)	(0.0050)	(0.0054)	(0.0030)	(0.0029)
Informal (Ref: Married)	-0.0093	-0.0085	0.0113	0.0120	-0.0031	-0.0030
	(0.0065)	(0.0061)	(0.0090)	(0.0095)	(0.0053)	(0.0051)
Single	-0.0719***	-0.0661***	-0.0497***	-0.0524***	-0.0652***	-0.0618***
	(0.0047)	(0.0041)	(0.0058)	(0.0059)	(0.0037)	(0.0033)
Ga-Dangme (Ref: Akan)	-0.0096	-0.0090	0.0024	0.0026	-0.0027	-0.0026
	(0.0078)	(0.0071)	(0.0075)	(0.0081)	(0.0054)	(0.0051)
Ewe	0.0006	0.0008	0.0029	0.0033	-0.0009	0.0008
	(0.0056)	(0.0052)	(0.0069)	(0.0075)	(0.0043)	(0.0041)
Guan	0.0011	0.0013	0.0483***	0.0523***	0.0151**	0.0143**
	(0.0080)	(0.0074)	(0.0124)	(0.0135)	(0.0067)	(0.0065)
Mole-Dagbani	0.0304***	0.0288***	0.0093	0.0102	0.0238***	0.0226***
	(0.0050)	(0.0048)	(0.0069)	(0.0074)	(0.0040)	(0.0039)
Grusi	-0.0046	-0.0040	0.0100	0.0109	-0.0045	-0.0044
	(0.0077)	(0.0071)	(0.0154)	(0.0169)	(0.0069)	(0.0065)
Gurma	0.0539***	0.051***	0.0138	0.0152	0.0507***	0.0485***
	(0.0074)	(0.0072)	(0.0164)	(0.0171)	(0.0077)	(0.0066)
Other ethnic	0.0658***	0.062***	0.0187	0.0204	0.0467***	0.0446***
	(0.0100)	(0.0094)	(0.0120)	(0.0130)	(0.0077)	(0.0074)
Urban	-------	-------	-------	--------	0.0236***	0.0225***
	-------	-------	-------	--------	(0.0030)	(0.0028)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23187	23187	33645	33645	56832	56832
LR chi2(2)	5613.71	-------	3176.43	--------	8362.87	--------

Dependent variable	Rural		Urban		Full sample	
(Time poverty)	Probit	Biprobit	Probit	Biprobit	Probit	Biprobit
Pseudo R2	0.1221	-------	0.1039	-------	0.1093	--------
Specification test	0.2699	-------	0.1310	--------	0.2002	-------
Goodness-of-fit-test	0.1739	-------	0.4700	--------	0.1299	-------
Rho(Wald test of rho=0)	-------	0.3066***	-------	0.3380**	--------	0.3080***

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

As mentioned on a number of occasions in this study, sociocultural norms and practices have many implications for intra-household time allocation. However, Living Standard Surveys hardly capture such norms and practices. In order to account for the influence of these factors, ethnic affiliation of the respondent was included in the analysis. Although migration, modernisation, urbanisation and other factors may have shaped the norms, believes and culture of almost all human races, the inclusion of ethnicity is relevant to provide some idea of the potential effects of norms and culture. In all, nine ethnic groups were captured in the dataset used for the analysis. Among the nine ethnic groups, the Akans constitute the majority of the ethnic groups in Ghana. As a result, Akan is kept as the reference category for the rest of the ethnic groups.

The results in the models for the full sample (see the last two columns of Tables 9-1, 9-2, 9-3 and 9-4) illustrate that four (Guan, Mole-Dagbani, Gurma and Other ethnic) out of the eight categories have significantly positive effects on time poverty. Although they are not significant two categories of the ethnic groups (Ewe and Grusi) show a negative relationship with time poverty. Compared to the Akan ethnic, a respondent from any of these ethnic groups is more likely to be time poor. The results of the separate models (see Table 9-1) show that at 5% level of significance, a female from the Guan ethnic group is approximately 2.3% more likely to be time poor. Similarly, the effect on females from Mole-Dagbani, Gurma and Other ethnic group are 3.6%, 8.66% and 5.24% respectively. In the model for male, significant results are obtained for respondents from the Mole-Dagbani and Other ethnic groups. The results in the female model in Table 9-2 show that the marginal effects for Guan, Mole-Dagbani, Gurma and Other ethnic groups are 2.26%, 3.89%, 8.73% and 5.31% respectively.

Across geographical location (see Table 9-3 and 9-4), similar results as those in the models for male and female are obtained. Compared to the results in the models across gender, there appear to be some differences in number of the ethnic groups and the level of significance across geographical location of respondents. For instance, across gender (see Tables 9-1 and 9-2), Mole-Dagbani is significant in the models for both male and female. However, in Table 9-3 and 9-4, it turns out to be significant only in the model for rural area. An ethnic group like the Gurma is significant in the female model but not significant in the male model. Across geographical

location, it appears to be significant in the model for rural area and not that of the urban area. Guan also is significant in the models for female and urban area but not in the model for male and rural area. These dynamics across geographical location reflect difference in the culture and norms of the various ethnic groups which indirectly shape intra-household time use and time poverty.

Table 9-4: Estimates of consumption poverty across geographical location

Dependent variable	Rural		Urban		Full sample	
(Time poverty)	Probit	Biprobit	Probit	Biprobit	Probit	Biprobit
Consumption poor	-0.0375***	-0.0351***	-0.0259**	-0.0344**	-0.0314***	-0.0315**
	(0.0044)	(0.0049)	(0.0110)	(0.0133)	(0.0040)	(0.0046)
Age	0.0153***	0.01416***	0.0262***	0.0253***	0.0195***	0.0184***
	(0.0007)	(0.0006)	(0.0010)	(0.0008)	(0.0006)	(0.0005)
Age square	-0.0002***	-0.0002***	-0.0003***	-0.0003***	-0.0002***	-0.0002***
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Household size	-0.0044***	-0.0041***	-0.0102***	-0.0097***	-0.0062***	-0.0059***
	(0.0006)	(0.0005)	(0.0010)	(0.0010)	(0.0005)	(0.0005)
Literate (Ref: Illiterate)	-0.0231***	-0.0214***	-0.0310***	-0.0305***	-0.0268***	-0.0256***
	(0.0040)	(0.0037)	(0.0058)	(0.0056)	(0.0033)	(0.0031)
Female	0.1440***	0.1331***	0.0791***	0.0761***	0.1180***	0.0112***
	(0.0035)	(0.0033)	(0.0045)	(0.0043)	(0.0028)	(0.0027)
Child under 5	0.0428***	0.0396***	0.0627***	0.0604***	0.0506***	0.0480***
	(0.0038)	(0.0036)	(0.0050)	(0.0048)	(0.0030)	(0.0029)
Informal (Ref: Married)	-0.0107*	-0.0099	0.0103	-0.0101	-0.0043	-0.0412
	(0.0065)	(0.0061)	(0.0090)	(0.0087)	(0.0053)	(0.0051)
Single	-0.0729***	-0.0671***	-0.0510***	-0.0489***	-0.0664***	-0.0628***
	(0.0047)	(0.0041)	(0.0058)	(0.0054)	(0.0037)	(0.0033)
Ga-Dangme (Ref: Akan)	-0.0096	-0.0089	0.0020	-0.0019	-0.0028	-0.0027
	(0.0078)	(0.0071)	(0.0075)	(0.0072)	(0.0053)	(0.0051)
Ewe	-0.0014	-0.0013	0.0019	0.0019	-0.0008	-0.0010
	(0.0055)	(0.0051)	(0.0069)	(0.0066)	(0.0043)	(0.0041)
Guan	0.0022	0.0021	0.0472***	0.0460***	0.0148**	0.0142**
	(0.0080)	(0.0074)	(0.0124)	(0.0122)	(0.0067)	(0.0065)
Mole-Dagbani	0.0335***	0.0315***	0.0085	-0.0085	0.0247***	0.0240***
	(0.0051)	(0.0073)	(0.0069)	(0.0066)	(0.0041)	(0.0040)
Grusi	0.0014	0.0014	0.0118	0.0121	-0.0005	-0.0002
	(0.0079)	(0.0073)	(0.0156)	(0.0153)	(0.0070)	(0.0067)
Gurma	0.0547***	0.0513***	0.0113	0.0112	0.0506***	0.0486***
	(0.0074)	(0.0072)	(0.0163)	(0.0152)	(0.0068)	(0.0066)
Other ethnic	0.0666***	0.0626***	0.0174	0.0173**	0.0462***	0.0445***

Dependent variable	Rural		Urban		Full sample	
(Time poverty)	Probit	Biprobit	Probit	Biprobit	Probit	Biprobit
	(0.0100)	(0.0094)	(0.0120)	(0.0116)	(0.0077)	(0.0074)
Urban	-------	-------	-------	-------	0.0227***	0.0213***
	-------	--------	-------	-------	(0.0030)	(0.0029)
Survey year (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36578	36578	20254	20254	56832	56832
LR chi2(2)	5619.58	--------	3156.72	-------	8338.65	--------
Pseudo R2	0.1223	--------	0.1033	-------	0.1089	--------
Specification test	0.2725	--------	0.2817	--------	0.2050	--------
Goodness of fit test	0.1766	--------	0.2607	--------	0.1339	-------
Rho(Wald test of rho=0)	--------	-0.0589***	-------	-0.0700***	-------	-0.0627***

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using GLSS data sets

The descriptive analysis (see Figure 9-1) revealed that time poverty has reduced over time. In an attempt to account for these changes in the regression analysis, this study includes dummy variables for the years in which the surveys were conducted. In order to avoid any potential dummy variable trap, the year for the fourth round of the survey (1998/99) is kept as the base category. Also, the results of the dummies have been deliberately represented with the response "Yes" in order to keep the output tables simple. Generally, the downward trend of time poverty overtime was reflected in the regression results in terms of direction and magnitude. The marginal effects of the dummy variables for the years 2005/6 and 2012/13 show significantly negative relationships with time poverty compared with the survey year 1998/9.

9.4 Conclusion

This chapter discussed the results of the descriptive and econometric analysis of objective five: the objective is to examine the effect of income and consumption poverty on intra-household time poverty among Ghanaians. A detailed discussion of the distribution and trend of time poverty measured in terms of headcount ratio, time poverty gap and severity of time poverty (squared poverty gap) shows that since the 1998/9 survey period, time poverty has markedly reduced. Nonetheless, it remains higher among females than males, a respondent who have low levels of education than those who have high level of education, as well as rural residents than urban residents. Across geographical location, time poverty is relatively lower among the Grusi and Ewe ethnic groups but higher among the Gurma and Other ethnic groups. What appears to be conspicuous from the discussion of the regression estimates is that both income and consumption poverty are negatively related to time poverty. In other words, time poverty is a typical

phenomenon among the rich who may be actively involved in economic activities that generate income. The results indicate a trade-off between time poverty and income/consumption poverty.

Consistent with the argument in the statement of the problem (see chapter one), females are more likely to be time poor than males. However, the within-group analysis shows that the effects of both income and consumption poverty are higher among males than among females. Thus comparison of the effect of income and consumption poverty among the same sex group is higher for males than females. Similarly, the effect is higher for rural residents than urban residents. Aside from these policy variables of interest, it appears that level of education (represented by literacy), the presence of children under five years of age, household size, age, ethnic affiliation and marital status have significant effects on the probability of a respondent being time poor. On the basis of these results, policies that aim at creating flexible work conditions should be pursued in order to address the potential trade-off between income/consumption poverty and time poverty among Ghanaians. The findings suggest adopting a holistic approach to deal with time poverty within Ghanaian households-one that emphasises gender differences as well as ethnic and geographical diversity.

CHAPTER 10: SYNTHESIS, CONCLUSION AND RECOMMENDATIONS

10.1 Introduction

There has been a growing body of literature on the interrelationships between trade, labour market outcomes, poverty and household production in developed countries, but the evidence in developing countries remains limited due to non-availability of data and methodological challenges. This study contributed to the literature by analysing the potential of trade as a tool for gender equality in the labour market from a developing country perspective. With due cognizance to gender and spatial differences, the study further examined the interrelationship between labour market and household production activities on one hand and the relationship between poverty and intra-household time allocation on the other hand.

These overarching objectives were structured into five specific objectives: 1) To assess the extent of effect of trade openness on the gender wage gap in Ghana; 2) to examine the gender and spatial differences in the effects of wage on intra-household allocation of time to paid and unpaid work activities in Ghana; 3) to analyse the simultaneous determination of spousal wage and time allocation to paid and unpaid work activities in Ghana; 4) to determine the effects of income/consumption poverty on gender disparities in intra-household allocation of time to paid and unpaid work activities in Ghana, and 4) to estimate the extent of the relationship between time poverty and income/consumption poverty in Ghana.

This chapter provides a brief overview of the thesis, synthesis of the main findings, conclusions and policy recommendations. The rest of the chapter is structured into the following order of subsections: Section 10.2 presents a summary of the study, followed by an outline of the main conclusions drawn from the empirical analysis in section 10.3, contributions of the thesis in section 10.4 and policy recommendations in section 10.5 The chapter ends with some limitations of the study and suggestions for future research in section 10.6.

10.2 Summary of the study

This study has been structured into ten chapters with each chapter subdivided into sections to reflect the detailed discussions of the issues under consideration. Chapter 1 provided a brief overview of the theoretical debate and attempted to identify the gaps in the empirical literature which make this study relevant and timely for policy formulation and implementation. The chapter outlined the objectives, research questions and the various chapters of the study. Chapter 2 provided a deeper insight into the theoretical debates and the diversity of the findings of the empirical literature. In this chapter, the reviewed theoretical literature that underpinned the empirical analysis were the neoclassical and endogenous growth theories of trade, the heterodox

firms' theory, the neoclassical theories of time allocation (unitary and collective models), and the model of time and income capability. The chapter also reviewed the empirical studies related to the objectives by taking into consideration the similarities and differences in the methodologies, data, main findings and geographical differences.

Chapter 3 explained the research design, data, models and empirical estimation techniques used in addressing the five empirical objectives. Data for the analysis come from three main sources. Export and import data for goods were extracted from the UN Trade Statistics Database. The export and import data for services were obtained from the ITC, UNCTAD and the WTO Trade in Service Database. The data on Gross Domestic Product and the household level data for the last three rounds of the GLSS (GLSS4, GLSS5 and GLSS6) were obtained from the Ghana Statistical Service.

This study followed a purely quantitative approach based on an independently pooled cross-sectional research design. In line with the objectives, four estimation techniques were employed. An augmented standard Mincerian type estimation approach was used to address the trade openness-gender wage gap relationship, while the Two-Stage IV Tobit estimation technique was employed in the analysis of the effect of wages on intra-household time allocation to paid and unpaid work. Respectively, the Tobit and Recursive Bivariate Probit estimation techniques were used in the analysis of the relationship between income/consumption poverty and gender inequality in time allocation, as well as income/consumption poverty and time poverty.

Building on the discussion of the data in chapter 3, chapter 4 discussed the pattern of time allocation to various household activities and labour supply in Ghana since the fourth round of the GLSS (GLSS4). The chapter ends with an explanation of the process involved in the aggregation of the time use variables into paid and unpaid hours of work and computation of the various indicators in the analysis. Whereas the subsequent five chapters discussed the results of the empirical analysis of the objectives, the final chapter summarised, concluded and provided recommendations for policy considerations. The chapter also provided a synopsis of the limitations of this study and the direction for future research.

10.3 Conclusion

The key findings from the analysis of the empirical objectives are the following:

The effects of trade openness on wages and gender wage gap vary by the type of wage and trade openness indicators. Trade openness significantly increases the wages of both males and females. However, the extent of the effect is relatively higher for males than for females. Similarly, real wage has relatively higher effects on the wages of males and females as well as the gender

wage gap than nominal; wage. Trade openness significantly narrows the gender wage gap but only among urban residents and not in the rural areas where the gap remains higher. The results highlight the heterogeneous effect of trade openness on the wages of males and females and the components of the wage gap and the need for policies that take into account such heterogeneities to ensure proper targeting and effectiveness in reducing the wage gap.

Females and rural residents spend more time on unpaid work than males and urban residents. The extent of a reduction in hours of unpaid work due to a unit increase in wage is higher among males than females but virtually the same across geographical locations. The wage effect of labour supply is higher for males and rural residents than females and urban residents. Also, real wage has higher effects on both labour supply and hours of unpaid work than nominal wage.

Restricting the analysis to only monogamous couples, the results show that there is an element of a working spouse wage premium (regardless of respondents' ethnic affiliation or education level) and complementarity in employment and household labour decisions between couples. Women often have fewer formal employment opportunities open to them and also shoulder a heavier unpaid work burden.

Gender inequality in hours of work is mainly an issue among the poor and rural residents than the non-poor and urban residents. The results further indicate that poverty is positively associated with inequality in hours of work. However, income poverty has a higher effect on inequality in total hours of work (discretionary time) while consumption poverty has a higher effect on inequality in unpaid hours of work. This suggests that the effects of income and consumption poverty on inequality in hours of work depend on the type of inequality indicator and other household conditions that shape division of labour in the household and time allocation to paid work among couples.

Although time poverty has fallen since the 1998/1999 survey period (GLSS4), it remains higher among females than males and higher among urban residents than rural residents. The estimates show that both income and consumption poverty are negatively associated with time poverty. In other words, the results confirm the trade-off hypothesis, but the effect is higher for income poverty than for consumption poverty.

10.4 Contributions of the study

On the basis of the objectives and conclusions from the empirical analysis, this thesis has contributed to the existing literature in three unique ways. It has added to the debate on the direct effects of trade on gender inequality in the labour market and its indirect effects on household production. More importantly, it has contributed to the method of computing trade openness

indicators at the household level based on the economic activity in which an individual is engaged. The thesis also contributed to the on-going discourse on the complex relationship between wage and time allocation from a developing country context where entrenched sociocultural practices that shape interactions among household members complicate this relationship.

The relationship between spousal wages and hours of work, including the phenomenon of a spousal premium or penalty, is well documented in the literature. Yet studies have mainly been conducted in developed countries. There is limited information on the situation in developing countries where labour market rigidities and cultural norms are factors in the division of labour between husbands and wives. This study has addressed the research gap by analysing spousal wages and hours of work among monogamous couples in Ghana.

The thesis has further contributed to the advancement of knowledge on how income/consumption poverty affects intra-household inequality in time allocation and time poverty. In this regard, this study has contributed to the conceptualisation of gender inequality by introducing two new indicators (female to male ratio of average time devoted to household activities as an indicator of gender gaps in unpaid work, and female to male ratio of total workload, an indicator of gender disparities in "discretionary" time) as measures of gender inequality in time use. The relevance of these indicators lies in the fact that they indirectly provide an idea of country-specific features; such as access to child-care facilities as well as social services and infrastructure which are essential to the wellbeing of mostly women.

10.5 Policy recommendations

Following the key findings from the empirical analysis, this study makes the following recommendations for policy consideration:

Ghana's Trade Ministry should collaborate with other allied ministries to design policies that will ensure further integration of the economy into global trade. Such policies should be linked with labour market policies that will improve the welfare of females who are engaged in economic activities such as the non-traditional export sectors which are experiencing higher integration into global trade. The government must pursue infrastructural policies that will enable rural residents to benefit from opportunities associated with further integration of Ghana's economy into global trade.

Government policies on wage regulation, employment or labour laws and other labour market reforms should be geared at minimising gender inequality in the labour market to ensure more equitable wage rates. Trade unions should focus on real wage rather than nominal wage in their negotiations with government and other employers on the conditions of service of their members

since real wage has higher effects on both household production and labour supply than nominal wage.

The Ministry of Employment and Labour Relations should collaborate with other allied bodies such as the Ghana Employers Association and trade unions and design labour market policies that will create flexible work conditions, in particular for women. Government and trade unions should step up efforts to expand the current five (5) working days Paternity Leave that covers health services, education and mining sector workers, to include all workers in the formal sector since it has the potential to indirectly improve women's wage in the household. The analysis has shown that an increase in the husband's hours of household production helps women to participate in the labour market and improve their wages.

Policymakers should not only concentrate on consumption poverty but they should also consider income poverty in formulating policies aimed at addressing intra-household gender inequality and women's wellbeing. Such policies should pay particular attention to the entrenched 'feminisation of poverty' and other factors that deepen income poverty among women in Ghana.

Cultural practices and norms that impede women's efforts to autonomously determine how to allocate their time (both in the household and in the labour market) should be seriously addressed since changes in this regard would be a critical step towards the achievement of gender equality, an important theme in the SDGs. Overall, this study highlights the importance of devising policies and altering entrenched cultural stereotypes that will help to reduce the inequality gap between men and women. This will provide more women the opportunity to better themselves and play a more productive role in the formal labour market.

10.6 Limitations and suggestions for future research

One of the gaps identified in the literature is the extent of similarities and/or differences in the effects of trade openness in policy and openness in practice on the gender wage gap. This study could not address this gap because of non-availability of tariff data for all the years in which the GLSS had been conducted. Future studies may consider addressing this knowledge gap by either gathering new data or using some innovative approach to link tariffs data to household level data.

The second limitation of the study is that the observations for export and import data on commodities that were not elsewhere defined were dropped. This contributed to some reduction in the observations for the computed trade openness indicators and the actual sample size for the analysis. While this did not affect the reliability of the estimates, it is important to highlight it for the consideration of future studies.

Finally, a well-structured TUS data in the form of a panel which follows the time allocation of individuals and households would have been ideal in addressing the objectives of this study. However, non-availability of this type of data necessitated the use of pooled cross-sectional data. Although this approach does not discount the robustness, validity and reliability of the findings, using data that follow the same households and individuals over time could have allowed for more individual and household-specific inferences to be made across time. Future studies may make more contributions to the literature by gathering panel time use data that better addresses the individual and household level heterogeneities across time.

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APPENDIX A: FIRST-STAGE ESTIMATES, CLASSIFICATION OF ECONOMIC ACTIVITIES AND LIST OF VARIABLES

Table A1: Probit model estimates for selection into wage employment

Dependent variable (Employment)	Male	Female	Rural	Urban	All
Urban	0.137***	0.089*			0.118***
	(0.036)	(0.052)			(0.029)
Age	0.254***	0.209***	0.203***	0.274***	0.243***
	(0.008)	(0.013)	(0.011)	(0.009)	(0.007)
Ages	-0.003***	-0.002***	-0.002***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Informal (Ref: Married)	0.271***	0.060	0.198**	0.136**	0.173***
	(0.067)	(0.083)	(0.079)	(0.064)	(0.049)
Single	-0.401***	0.231***	-0.115	-0.087	-0.090*
	(0.082)	(0.071)	(0.094)	(0.063)	(0.052)
Never married	-0.748***	-0.097	-0.665***	-0.407***	-0.500***
	(0.058)	(0.074)	(0.077)	(0.056)	(0.045)
Remittance	-0.039***	-0.025***	-0.018*	-0.042***	-0.034***
	(0.007)	(0.009)	(0.010)	(0.006)	(0.005)
Children<5	0.002	-0.001	0.005	-0.002	0.001
	(0.004)	(0.005)	(0.004)	(0.004)	(0.003)
Basic education (Ref: None)	0.060	0.129*	0.086	0.141**	0.118***
	(0.050)	(0.067)	(0.056)	(0.056)	(0.039)
Secondary plus	0.069	0.767***	0.420***	0.351***	0.354***
	(0.054)	(0.071)	(0.067)	(0.058)	(0.042)
Poor health	-0.089*	-0.022	0.006	-0.125***	-0.069*
	(0.046)	(0.059)	(0.056)	(0.047)	(0.036)
Ga-Dangme (Ref: Akan)	-0.080	-0.068	-0.299***	0.029	-0.059
	(0.057)	(0.078)	(0.100)	(0.052)	(0.045)
Ewe	0.029	-0.105	-0.040	0.001	-0.004
	(0.049)	(0.067)	(0.063)	(0.050)	(0.039)
Guan	-0.129	-0.097	-0.351***	0.078	-0.092
	(0.092)	(0.139)	(0.116)	(0.102)	(0.076)
Mole-Dagbani	-0.497***	-0.430***	-0.893***	-0.089	-0.452***
	(0.054)	(0.087)	(0.072)	(0.061)	(0.045)
Grusi	-0.445***	-0.174	-0.717***	-0.034	-0.337***
	(0.111)	(0.160)	(0.137)	(0.127)	(0.091)
Gurma	-0.487***	-0.105	-1.020***	0.172	-0.370***

Dependent variable (Employment)	Male	Female	Rural	Urban	All
	(0.141)	(0.198)	(0.193)	(0.158)	(0.115)
Other ethnic	0.028	-0.299*	-0.220	0.041	-0.043
	(0.095)	(0.167)	(0.141)	(0.098)	(0.080)
Female			-1.143***	-0.926***	-0.981***
			(0.055)	(0.037)	(0.031)
Constant	-4.635***	-5.387***	-3.772***	-5.337***	-4.739***
	(0.179)	(0.257)	(0.226)	(0.193)	(0.144)
Observations	10339	9092	8165	11266	19431

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

Table A2: Classification of the economic activities

No	Class	Description of the economic activity
1	0111-0170	Agriculture, hunting and related activities
2	0210-0240	Forestry, logging and related activities
3	0311-0322	Fishing, aquaculture and services related to fishing
4	0510-0990	Mining and quarrying
5	1010-3320	Manufacturing
6	3510-3900	Electricity, gas and water supply
7	5811-6399	Information and communication
8	6411-6630	Financial services (intermediation)
9	8411-8430	Public administration and defence, social security
10	4911-5320	Transport and storage
11	6810-8299	Real estate, professional administration and support services

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

Table A3: List of variables included in the analysis

Paid employees	Variable	Measurement	Description
19431	Wage	Continuous	Hourly wage received by respondent
19431	Topen	Continuous	A ratio of trade to GDP of the economic activity
19431	Urban	Binary	1. Urban; 0. Rural
19431	Age	Continuous	Years of age
19431	Edu	Categorical	1. None; 2. Basic; 3. Secondary school and above
19431	Firmsize	Continuous	Number of workers at respondents workplace
19431	Tenure	Continuous	The numbers years that respondents have been working
19431	Health	Binary	1 If respondent was either sick or injured; 0.otherwise)
19431	Skill	Categorical	1. Low; 2. Medium; 3.High
19431	Sector	Categorical	1. Agriculture; 2. Manufacturing; 3. Service
19431	Worked	Binary	1. Respondent worked in the last 7 days; 0. otherwise
19431	Urban	Binary	1. Urban; 0. Rural
19431	Age	Continuous	Years of age
19431	Agesq	Continuous	Square of years of age
19431	Mstatus	Categorical	1. Married; 2. Single; 3. Never married
19431	Remit	Continuous	Amount of remittance received by household
19431	ChildU5	Continuous	Number of children younger than 5 years in the household
19431	Edu	Categorical	1. None; 2. Basic; 3. Secondary school and above
19431	Health	Binary	1. If respondent was either sick or injured; 0.otherwise
19431	Ethnic	Categorical	1. Akan; 2. Ga-Dangme; 3.Ewe; 4.Guan; 5. Mole-Dagbani; 6.Grusi; 7.Gurma; 8 Other ethnic

Source: Prepared by the author using data from the Ghana Statistical Service and UN International Trade Statistics Database.

APPENDIX B: FIRST-STAGE ESTIMATES AND DESCRIPTIVE STATISTICS

Table B1: Observations for activities performed by individuals 15 years and older

Variable (Paid and unpaid work activities)		GLSS4 (1998/99)	GLSS5 (2005/06)	GLSS6 2012/13
No	**Unpaid work**	Obs.(N)	Obs.(N)	Obs. (N)
1	Collecting firewood	4137	21249	42517
2	Fetching water	6259	21107	42519
3	Ironing	3819	21296	42518
4	Taking care of children	4879	21184	42486
5	Cooking	7345	21141	42518
6	Running errands	5196	21228	42518
7	Shopping	5844	21251	42519
8	Washing	5524	-------	-------
9	Washing vehicle	134	-------	-------
10	Washing dishes and pots	------	21359	42517
11	Washing clothes	------	21346	42521
12	Sweeping	7296	-------	------
13	Disposing garbage	3886	------	------
14	Cleaning	-------	21223	42514
15	Others	7928	21216	-------
16	Taking care of elderly	------	21230	42495
17	Taking care of the sick	------	21339	42496
18	Helping children with school work	------	------	42480
19	Collecting food from garden	------	------	42494
Paid work				
1	Primary job	2595	14593	30973
2	Secondary job	2794	2537	4857
3	Third job	226	------	------
4	Fourth job	19	------	------

Source: Authors calculation based on data from GLSS 4, 5 and 6

Table B2: Variable measurement and definition

Variable	Measurement	Definition of variable
$Hours$	Continuous	The number of hours (paid and unpaid) worked per week
$lnwage$	Continuous	The natural log of hourly wage (both nominal and real wages)
$lnremit$	Continuous	The natural log of remittance (proxy for non-wage income)
Age	Continuous	The age of respondent
$Msatus$	Categorical	Marital status (Married=1, Informal relationship=2, Single=3)
RHH	Categorical	Relationship to household head (Head=1; Spouse=2; Child/Grandchild=3; Other relative=4; Servant/Adopted=5)
$Child$	Continuous	The number of children under five years of age in the household
$Urban$	Binary	Place of residence (Urban=1; Rural=0)
$Female$	Binary	Gender of respondent (Female=1; Male=0)
Edu	Categorical	Education level of respondent (None=1; Basic=2; Secondary plus=3)
Union	Binary	Availability of union at the work place (Union available=1; No union available=0)
Sector	Binary	Sector of employment of respondent (Public sector/ parastatal =1; Private=0)

Source: Authors calculation based on data from GLSS 4, 5 and 6

Table B3: Descriptive statistics of the variables included in the models

Variable	Models for hours spent on unpaid work					Models for hours spent on paid work				
name/description	Male	Female	Rural	Urban	All	Male	Female	Rural	Urban	All
Hours of work	51.56	56.96	60.85	45.21	54.42	52.78	50.31	51.34	51.72	51.48
Log nominal wage	0.26	0.16	0.10	0.37	0.21	0.26	0.14	0.08	0.40	0.20
Log real wage	0.13	0.02	0.03	0.21	0.07	0.06	0.03	0.02	0.28	0.09
Log remittance	1.25	1.29	1.14	1.46	1.27	1.18	1.24	1.10	1.41	1.21
Children under 5	1.45	1.38	1.57	1.17	1.41	1.47	1.33	1.48	1.25	1.39
No education	0.24	0.43	0.44	0.20	0.34	0.25	0.44	0.43	0.21	0.35
Basic education	0.53	0.45	0.48	0.51	0.49	0.54	0.45	0.49	0.51	0.49
Secondary pus	0.23	0.12	0.48	0.30	0.17	0.21	0.11	0.08	0.28	0.16
Age	37.23	38.73	39.13	36.43	38.02	39.52	40.64	40.99	38.60	40.11
Married	0.47	0.42	0.48	0.40	0.44	0.54	0.44	0.51	0.44	0.49
Informal	0.11	0.11	0.12	0.09	0.11	0.14	0.13	0.15	0.11	0.14
Single	0.42	0.47	0.40	0.51	0.45	0.32	0.42	0.34	0.44	0.38
Household head	0.71	0.37	0.52	0.55	0.53	0.88	0.49	0.65	0.72	0.67
Spouse	0.01	0.37	0.23	0.16	0.20	0.01	0.38	0.23	0.16	0.21
Child/Grand child	0.26	0.25	0.25	0.27	0.26	0.10	0.12	0.12	0.10	0.11
Other relative	0.01	0.02	0.10	0.02	0.01	0.01	0.01	0.00	0.01	0.01
Adopted/Servant	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sector	0.23	0.16	0.23	0.14	0.19	0.29	0.22	0.28	0.20	0.25
Union	0.15	0.06	0.07	0.15	0.10	0.16	0.08	0.07	0.20	0.12

Variable	Models for hours spent on unpaid work					Models for hours spent on paid work				
name/description	Male	Female	Rural	Urban	All	Male	Female	Rural	Urban	All
Gender/Female	-------	--------	0.52	0.54	0.53	-------	-------	0.52	0.53	0.53
Urban	0.40	0.42	-------	------	0.41	0.37	0.37	-------	-------	0.37
Observation (N)	17635	16666	19221	15080	34301	9870	8584	10764	7690	18454

Source: Authors calculation based on data from GLSS 4, 5 and 6

Table B4: Estimates of the first-stage regression

Variable	Nominal wage	Unpaid hours	Real wage	Paid hours
Log remittance	**------**	**0.4270*** **	**--------**	**-0.5160*** **
	-------	(0.0547)	-------	(0.0650)
Household size	0.0089**	5.719***	0.0057	1.4920***
	(0.004)	(0.0544)	(0.0039)	(0.0779)
Children under 5	0.0021	0.1160***	0.0031	0.0614
	(0.0025)	(0.0363)	(0.0023)	(0.0438)
Age	0.0313***	-0.1620***	0.0278***	0.1860***
	(0.0047)	(0.0502)	(0.0045)	(0.0606)
Age square	-0.0003***	0.0002	-0.0003***	-0.0021***
	(0.00001)	(0.0005)	(0.00001)	(0.0007)
Basic education (Ref: None)	0.0370	-2.6090***	0.0185	1.0300***
	(0.0306)	(0.3330)	(0.0289)	(0.3730)
Secondary school plus	0.427***	-4.2100***	0.3600***	1.9940***
	(0.0317)	(0.438)	(0.0299)	(0.5030)
Informal (Married)	-0.143***	-3.385***	-0.1350***	-0.4780
	(0.0275)	(0.5100)	(0.0260)	(0.4990)
Single	-0.155***	-7.433***	-0.1400***	-5.6000***
	(0.0249)	(0.431)	(0.0234)	(0.4420)
Spouse (Head)	0.338***	-1.653***	0.3160***	10.680***
	(0.0338)	(0.476)	(0.0318)	(0.517)
Child/Grand child	0.238***	3.6820***	0.2170***	14.150***
	(0.0349)	(0.526)	(0.0329)	(0.630)
Other relative	0.327***	3.488***	0.2960***	12.610***
	(0.0586)	(0.793)	(0.0552)	(1.178)
Adopted/Servant	0.443***	3.337**	0.4090***	16.2500***
	(0.111)	(1.600)	(0.1050)	(2.5920)
Urban	0.2210***	-7.9010***	0.1800***	0.2880
	(0.0183)	(0.2890)	(0.0173)	(0.3290)
Female	-0.1800***	2.602***	-0.1710***	-4.8400***
	(0.0234)	(0.3290)	(0.0221)	(0.3940)

Variable	Nominal wage	Unpaid hours	Real wage	Paid hours
Log remittance	**------**	**0.4270*** **	**-------**	**-0.5160*** **
Year 2005/6 (GLSS5)	0.948***	-12.5000***	0.2730***	2.6410***
	(0.0271)	(0.444)	(0.0255)	(0.4390)
Year (2012/13 (GLSS6)	2.172***	-28.6200***	2.1330***	3.5550***
	(0.0264)	(0.4440)	(0.0249)	(0.4400)
Union at work place	0.2370***	-------	0.2100***	---------
	(0.0209)	-------	(0.0197)	--------
Sector of employment	0.1520***	-------	0.1490***	--------
	(0.0203)	-------	(0.0192)	--------
Constant	-2.5460***	48.53***	-2.3420***	41.4900***
	(0.0999)	(1.257)	(0.0942)	(1.4090)
Observations (N)	18454	34301	18454	18454
R-squared	0.601	--------	0.687	--------

Source: Authors calculation based on data from GLSS 4, 5 and 6

APPENDIX C: DESCRIPTIVE STATISTICS OF KEY VARIABLES

Table C1: Descriptive statistics of the variables of interest

Variable	Obs.	Mean	Std. Dev.	Variable	Obs	Mean	Std. Dev.
Husband's wage (Nominal)	10948	3.21	23.89	Primary education(Ref: None)	10948	0.271	0.445
Wife's wage (Nominal)	10948	0.756	12.342	Basic education	10948	0.162	0.369
Husband's wage (Real)	10948	3.139	24.399	Secondary education plus	10948	0.080	0.271
Wife's wage (Real)	10948	0.032	0.903	Ga-Dangme (Ref: Akan)	10489	0.080	0.271
Remittance	10948	129.497	627.652	Ewe	10489	0.120	0.325
Husband's paid hours	10948	40.333	22.963	Guan	10489	0.046	0.210
Wife's paid hours	10948	30.224	24.247	Mole-Dagbani	10489	0.212	0.408
Husband's unpaid hours	10948	8.794	13.327	Grusi	10489	0.035	0.183
Wife's unpaid hours	10948	34.360	27.628	Gurma	10489	0.045	0.208
Husband's age	10948	43.869	13.807	Other ethnic	10489	0.040	0.196
Wife's age	10948	36.326	11.590	Union at work place	10948	0.170	0.375
Children under 5	10948	3.370	5.162	Sector of employment	10948	0.275	0.446
Urban (Ref: Rural)	10948	0.352	0.478				

Source: Authors calculation based on data from GLSS 4, 5 and 6

APPENDIX D: SUMMARY STATISTICS OF KEY VARIABLES

Table D1: Tobit estimates of poverty and gender gaps in unpaid working time

Variable	Unpaid hours		Total hours	
name/description	Obs.	Mean	Obs.	Mean
GPI	13678	85.0796	13860	54.0473
Relative gap	13678	75.6798	13860	33.3277
Income poverty	13678	0.3267	13860	0.3179
Consumption poverty	13678	0.2058	13860	0.2058
Age	13678	41.1590	13860	41.1590
Basic education.	13678	0.4080	13860	0.4138
Secondary education plus	13678	0.1035	13860	0.1192
Household size	13678	5.6258	13860	5.6847
Urban	13678	0.3745	13860	0.3896
Children under 5	13678	4.7188	13860	4.5093
Akan	13678	0.4207	13860	0.4444
Ewe	13678	0.1335	13860	0.1296
Guan	13678	0.0483	13860	0.0449
Mole-Dagbgani	13678	0.1977	13860	0.1886
Grusi	13678	0.0385	13860	0.0383
Gurma	13678	0.0437	13860	0.0452
Other ethnic group	13,678	0.0369	13860	0.0374
Survey year 1998/1999	13678	0.1889	13860	0.1889
Survey year 2008/2009	13678	0.2618	13860	0.2544
Survey year 2012/20013	13678	0.5478	13860	0.5730

Note: GPI and relative gap are in percentages

Source: Authors calculation based on data from GLSS 4, 5 and 6

APPENDIX E: STATISTICS OF INEQUALITY IN HOURS OF WORK

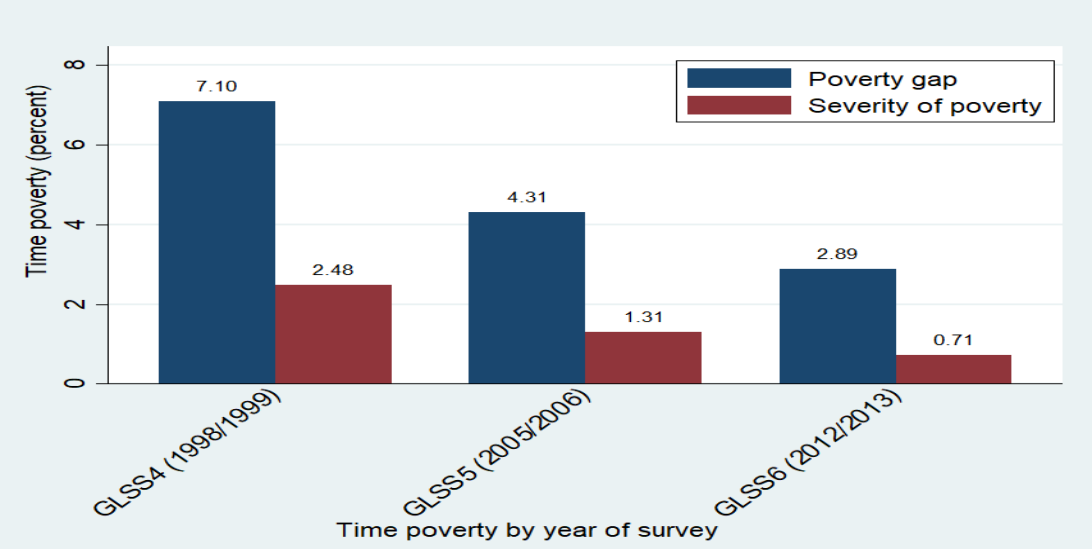

Figure E1: Gap and severity of time poverty across years of survey

Source: Prepared by the author using GLSS data sets

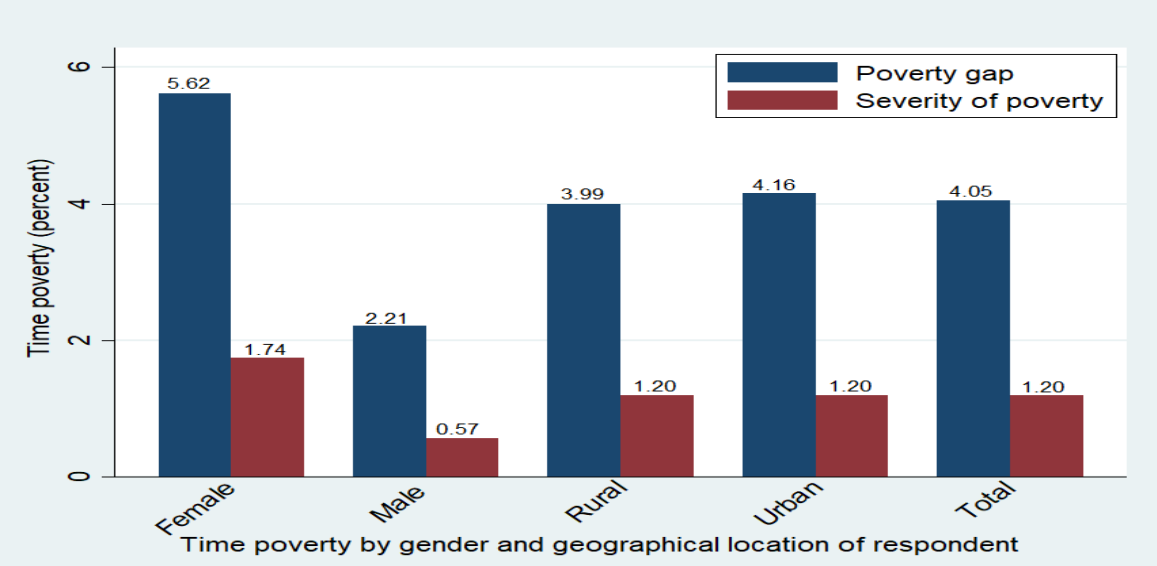

Figure E2: Gap and severity of time poverty across gender and geographical location

Source: Prepared by the author using GLSS data sets

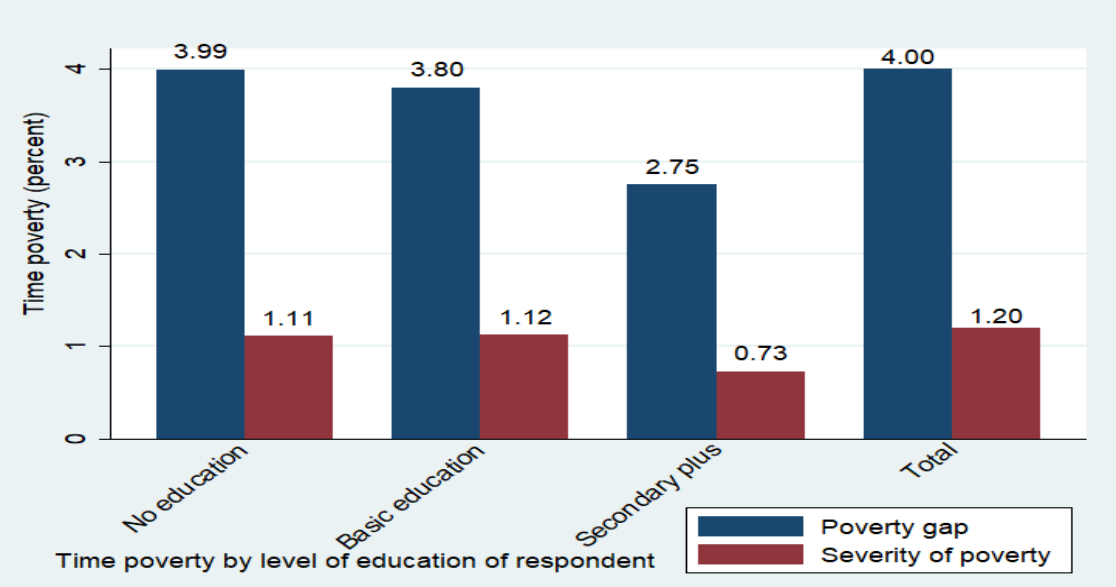

Figure E3: Gap and severity of time poverty across level of education

Source: Prepared by the author using GLSS data sets

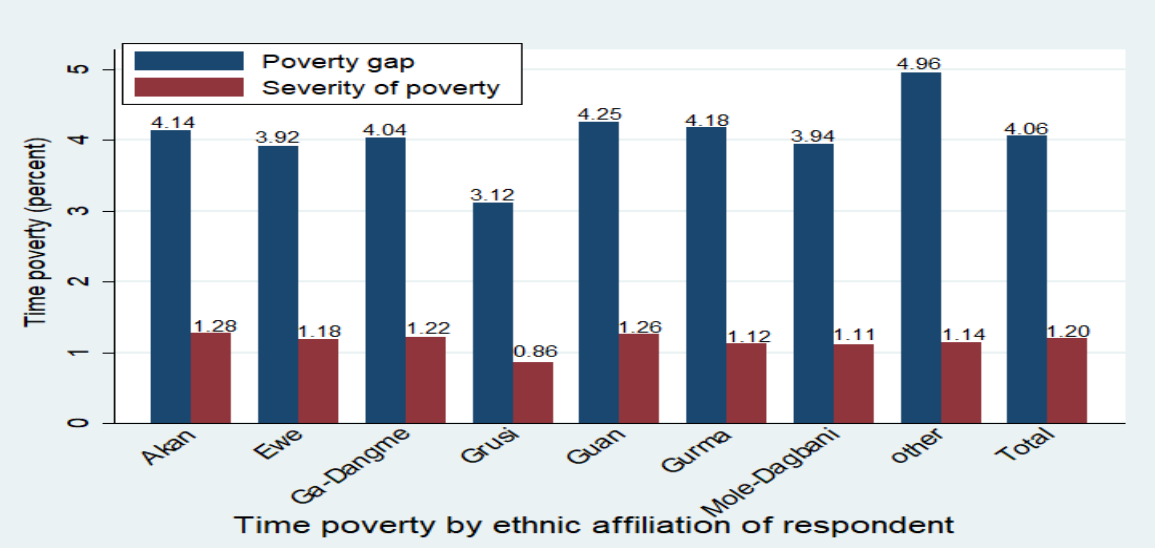

Figure E4: Gap and severity of time poverty across ethnic affiliation of respondent

Source: Prepared by the author using GLSS data sets