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GrOW Project

"Growth in West Africa: impacts of extractive industry on women's economic empowerment in Cote d'Ivoire & Ghana"

"Gender Differences in the extractives sector: Evidence from Ghana"

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Abstract

Gender differences in favor of men is quite strong in extractives in Ghana which has the effect of undermining economic empowerment of women against the backdrop of extractive driven growth of the Ghanaian economy. Ghana's economic growth has been quite strong over the last three decades and behind this successful growth story has been a remarkable performance of the extractive sector. The concern however has been the inclusiveness of the economic benefit from the extractive sector, particularly along gender lines. Essentially, inclusiveness of growth depends largely on the participation of all citizens in the growth process. Available statistics indicates that women participation in the extractive sector is very low to the extent that they constituted about 19% of total employment in extractives in 2010 declining to 18% in 2013. This has the implication for undermining women economic empowerment (WEE) in Ghana. The study thus seeks to examine the participation of women in Ghana's extractive activities found to be one of the key drivers of the country's growth and the quality of this participation in terms employment status and earnings relative to their male counterparts. The study further outlines constraints to female involvement in the extractive sectors and ascertain whether the gender differences smacks of discrimination. The study provides evidence to show lower participation of women in extractives such that those working in extractives are mostly engaged in elementary occupations and woefully underrepresented in professional and managerial jobs where earnings are high. Analysis of occupational segregation in extractives points to some degree of segregation along gender lines. There is existence of gender earnings gap in favor of men and this is attributed to differences in endowment particularly education. The findings also give indication of existence of discrimination against women in the extractive sector and identify barriers that impede women involvement in high-earning activities in the extractive sector. The study recommends measures to remove these barriers and improve on women education in science and engineering to increase their access and employment and earnings status in extractives in Ghana

Keywords: Gender Extractives Discrimination Segregation Empowerment

1. Introduction

After recovering from economic recession in 1984 on account of the Bretton Woods sponsored economic reform initiated at that time, Ghana's growth has been remarkably strong, averaging 5.5% between 1984 and 2016. The country recorded the highest growth 14% in 2011, making it one of the fastest growing economies globally in that year. Essentially, behind the country's successful growth story has been a remarkable performance of the extractive sector, which comprises mining, quarrying and oil extraction. Indeed, the highest economic growth of 14% ever recorded in country's history was largely aided by the commencement of commercial oil production in 2011. The extractive sector holds the highest annual average growth rate of 29.9% over 2007-2016 and constitutes the leading foreign exchange earner, accounting for about 56%[4] (44.2% from gold and 12.1% from oil) of total export earnings in 2016. The sector also contributes significantly to national revenue, accounting for 16.9% to national revenue in 2016. Even though the sector's contribution to direct employment is quite minimal due to the capital-intensive nature of operations, it is the sector with the fourth highest average basic hourly earnings in 2013 beside the provision of indirect jobs through upstream and downstream extractive activities.

The concern however has been the inclusiveness of the economic benefit from the extractive sector, particularly along gender lines. Essentially, inclusiveness of growth depends largely on the participation of all citizens in the growth process. Available statistics indicates that women participation in the extractive sector is very low to the extent that they constituted only 18% of total extractive employment in 2013[5]. This has implication for undermining women economic empowerment (WEE) in Ghana. Thus, even though economic growth can be seen as key to enhancing WEE, it depends on the source of the growth and how involved women are involved in the economic growth process.

Consequently, we seek to examine the participation of women in Ghana's extractive growth driven economy and the quality of this participation in terms employment status and earnings relative to their male counterparts. Specifically the study assesses

- the extent of women involvement in employment vis a vis men in the extractive sector;
- gender segregation of employment in the extractive sector;
- earnings differences between the two sexes in the extractive sector and the extent to which educational differences influence gender earnings differentials; and
- whether gender differences is characteristic of possible discrimination.

[4] Computed from Quarterly Digest of Statistics of the Bank of Ghana; www.bog.gov.gh
[5] Computed from the sixth round of the Ghana Living Standards Survey (GLSS VI) of 2012/13.

The study is structured into six sections starting with the introductory section that captures the background and objectives of the paper followed by literature review in section two. Section three overviews women involvement in extractive activities in Ghana followed by analysis of gender segregation of occupation in the extractive sector using segregation indices in section four. The paper delves into econometric analysis in section five to ascertain gender earning differences and the decomposition of the earnings gap into differences in endowment and parts observed to be as a result of discrimination. The paper highlights observations during the qualitative and quantitative filed survey in section six followed by conclusion and some policy thoughts in section seven.

2. The Literature review

2.1 The Role of Extractives in National Development

The contribution of the extractive sector to economic development is acknowledged in the development literature. Indeed, the World Bank Group supports extraction led development in low and middle income countries on the grounds that large scale industrial mining can contribute both directly and indirectly to poverty reduction (Weber-Fahr et al., 2001; Weber-Fahr, 2002). In Africa, Collier (2010) notes that natural resources can provide an exceptional opportunity for growth if properly managed. Similarly, the ICMM[6] (2013: 5) argues that extractive industries have important regional and local level effects by noting that mining regions in Chile, Ghana and Brazil have enjoyed stronger poverty reduction and social development than non-mining areas. Dashwood (2012), points out that, the potential poverty reduction effects of extractive companies are highlighted through their activities such as direct and indirect employment, local procurement, physical infrastructure and the provision of public goods including health care and education in addition to skills training through Corporate Social Responsibility (CSR) programmes.

Although extractive companies, industry associations, governments and other international development agencies present arguments that support the potential positive contributions of the extractive sector, scepticism still persists in the empirical literature. For critics, record of rent-seeking and corruption, pollution and mismanagement suggest new resource discoveries are unlikely to benefit the poor. Scholars of resource curse argue with some level of variation that resource rich nations generally experience economic and institutional underperformance due to a number of factors such as; greater exposer to economic shocks, currency overvaluation, corruption, lower levels of democratization, higher likelihood of armed conflict, and a consolidation of patriarchy (see Auty, 1994; Arezki and Van der Ploeg, 2011; Ross, 2012).

[6] International Council on Mining and Metals

The literature on extractive industries group activities within the sector into two broad categories: industrial mining (IM) and artisanal and small-scale mining (ASM). IM mode of exploitation is capital-intensive requiring a relatively small number of high-skilled and semi-skilled labour. ASM in contrast is labour-intensive with low technology and minimal capital. As noted by Banchirigah and Hilson (2010), ASM is generally poverty driven spurred by short-term returns or as part of long-term livelihood diversification strategy[7]. Thus extractive industries contribute to employment by creating jobs for the poor (ASM), particularly if job creation moves in tandem with capacity building in addition to the higher income potential of jobs in extractive sector relative to other livelihood options in mining communities. Also, it has been argued that job creation may have positive inter-generational effects as increased earnings can allow children of parents employed in extractive industries to attend school rather than engaging in household livelihood-supporting activities.

Several case studies on ASMs point to their employment generation effects with associated positive ramifications on livelihoods in general. For instance, a study by Hilson et al. (2013) on the Bole District of Northern Ghana found ASM enabled diversification of livelihoods of rural households in the village of Kui through wage earnings. Also, Fisher et al. (2009) in a similar study on Tanzania found the incidence of poverty to be low among individuals who work as artisanal miners than those in other occupations residing in the same vicinity. In Suriname for instance, self-employment within ASM areas is an effective means for women to gain independent income, though not to alleviate their poverty when accounting for negative long-term social and health impacts (see Heemskerk, 2003). Overall, Krishna (2004) concludes that non-agricultural sources of income, particularly mining income, are a very important source for households in rural India to escape poverty.

Despite the employment and income generation potential of ASM than IM, ASMs ability to sustainably improve the livelihoods of people in general and reduce poverty in particular is limited due to the overall marginalisation of activities of ASMs in the development agenda (Hilson and McQuilken, 2014). Consequently, there exists consensus in the literature for facilitating access to ASM sector. This requires a coordinated action by producing country governments, although it is cautioned that facilitation should not be equated to formalisation. Since formalisation itself presents a significant barrier to entry for the poor, particularly women.

Empirical evidence points to the poverty exacerbation effect of extractive industry activity, both at the national and regional levels through distribution of wealth and power. According to Ross (2007), mineral rents can generate both "horizontal" and "vertical"

[7] See also Siegel and Veiga (2010) and Maconachie (2011).

inequality. Horizontal inequality occurs when distribution of wealth is across administrative jurisdictions where governments in producing regions may refuse to share proceeds from extraction with other poorer jurisdictions. Vertical inequality on the other hand occurs when the distribution of wealth is amongst citizens. The link between IM and inequality is however not straight forward. It is explained through displaced labour from agricultural and manufacturing sectors that cannot be absorbed into other productive sectors. In periods of boom in extraction particularly, which further exacerbate existing unemployment and change income distribution mainly in favour of participants within the extractive sector where women are under-represented.

2.2 Women involvement in mining activities

Jenkins (2014) argues that the situation of women when it comes to mining activities is currently under-recognised and under-theorised but is essential in analysing the role of women in the mining sector in development. The study subsequently notes the need to recognise women as important actors in mining communities and the need to examine women participation in four key interconnected areas. This includes women as mineworkers (whether as ASMs or in industrial mining), the gendered impacts of mining, women's changing roles and identities in communities affected by mining, and finally gendered inequalities in relation to the benefits of mining.

Although historically, mining and miners have been associated with strongly male traits and identities, reality in recent times point to the fact that the situation is a lot more complex, with women participating in a wide range of mining and mining-related activities across the globe[8] (Lahiri-Dutt and Macintyre, 2006b). This notwithstanding, traditional gender stereotypes has largely contributed to the invisibility of women's work in the mines which makes women obscured and hidden in addition to the number of challenges and discrimination they face in the mining sector.

Investigation into women's involvement in mining requires that a distinction be made between ASM and IM although Moody (2007) highlights the fact that these two sectors do not exist in isolation due to existing connections and overlaps between the two[9]. In general, although data is sketchy and difficult to attain, as noted by Jenkins (2014), an earlier study by Hilson (2002) suggests that women could represent approximately one third of the ASM sector and even greater than men's involvement in several countries. For example in Mali and Zimbabwe, women constitute 50% of workers involved in small-scale mining whereas in the case of Burkina Faso and Ghana women's share is around 45% (Hentschel et al., 2002). Despite the large number of women involved in

[8] See also Lahiri-Dutt (2010).
[9] See also Hentschel et al. (2002); Chaloping-March (2006).

mining across the globe, historical antecedents continue to obscure their visibility in the sector.

Although it is evident, that women participate in almost every stage of mineral transportation and processing, women participation in underground mining is very minimal, perpetuated largely by cultural practices. Hoecke, (2006) particularly notes that in many countries women have been considered to bring bad luck if they enter the mine. Women miners are predominantly found in processing of minerals, which involves laborious and often hazardous manual task such as grinding, crushing, milling and sorting of rocks. In the processing of gold, women are mainly involved in concentrating gold, a process which uses extremely toxic materials, predominantly mercury (Hinton et al., 2003; and Lahiri- Dutt and Macintyre, 2006b). Typical examples here are observed in Burkina Faso and Mali, where women carry out about 90% of processing activities (Hinton et al., 2006). Overall, although these tasks are highly labour-intensive, they command the lowest economic returns. Other authors however, acknowledge that, women do undertake a range of activities in ASM including owning mines and mining equipment and acting as mineral dealers, although overall such roles appear to be less common (Heemskerk, 2003)[10].

Whiles the overall lack of recognition of women's involvement in mining is made in the context of ASM, it is equally important to consider women in large scale industrial mining where participation of women is observed to be limited. Across the world women's employment in extractive industry companies is low, and very rarely exceeds 10% of the workforce (Eftimie et al., 2009). This is believed to be due to stereotypical idea that mining is a man's job, ''Even where women have entered in small numbers to take advantage of the better rewards that are offered by many large mining projects, they tend to remain at the bottom of the company hierarchy'' (Lahiri-Dutt, 2010: 332). In this regard, rural communities in Peru for example, tend to be ill-equipped to apply for jobs in mining companies, since they generally have low levels of education and few qualifications (Ward and Strongman, 2011). Such under-representation of women in all facets of mining cuts across the entire mining sector regardless of location. For instance in the global South, women employed by mining companies are noted to be largely either in ancillary or administrative positions in addition to corporate social responsibility and public relations (see Chaloping-March, 2006; Lahiri-Dutt, 2006b). In other instances, working for a large mining company may require the individual to migrate. This is known to present significant barriers for women, particularly married women with children. Finally, Lahiri-Dutt (2011b) argues that laws supposedly designed to protect women workers (ILO laws on underground working for example) actually act to disadvantage women further, by pushing them into the least regulated and most

[10] See also Hinton et al. (2003); Caballero (2006); Van Hoecke (2006); and Werthmann (2009).

hazardous parts of the informal/illegal sector. The study however goes on to highlight existing contractions in the regulatory framework such that whilst underground mining is perceived to be too dangerous for women, head loading of 20 to 30 kilos to transport minerals (in this case, mica in East India) is apparently unproblematic (Lahiri-Dutt, 2008).

Specifically in Ghana, Armah et al. (2016) conducted a study on the Tarkwa Nsuaem and Prestea Huni Valley Districts in the southwest of the country, which is one of the oldest surface mining areas in Ghana. This area includes three of the country's largest surface mine concessions (i.e. Bogoso–Prestea, Tarkwa, and Damang). The study sought to find out the differences in the environment, health, safety and economic working conditions that prevail among male and female artisanal and small-scale gold miners who operate in the country. The study concluded that existing gender-specific disparities is critical to the discrimination in working conditions of the male and female artisanal and small-scale gold miners. Hilson (2001 and 2002) found women comprising approximately 15% of the legal small-scale metal mining labour force and about 50% in the illegal mining industry in Ghana. Additionally, the involvement of women in industrial minerals (e.g. clay, stone quarries, salt) is much greater, with the proportion of women in salt mining as high as 75%.

In conclusion, consensus in literature on women miners has been the lack of recognition of the status of women as mineworkers mainly due to the informal nature of their activities in ASM. Hentschel et al., (2002) and Hinton et al., (2003) among others emphasise the fact that women may sometimes not even receive an independent wage but instead be counted as part of their husband's wage. In other circumstances, their husbands may retain control of monies. For example Chaparro A´vila (2005) indicates that a large proportion of women working in the ASM sector are heads of household, for whom mining may be the only possible economic activity available. As a result, there is the need for further research to situate women's participation in mining, particularly in a developing country contest for further insights as to whether women participate in mining by choice or necessity for which reason their contribution is obscured and whether they are discriminated against in the sector.

3. An overview of women involvement in extractive activities in Ghana

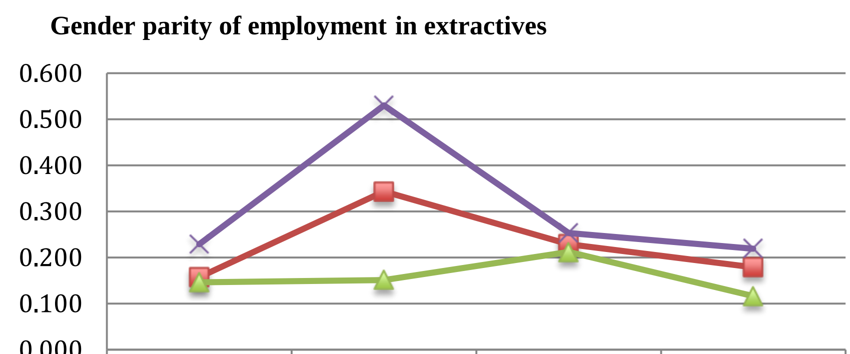
3.1 Women representation and composition in extractives

Employment is generally gendered in the extractive sector where women are involved in menial jobs particularly in ASM and transportation and ancillary occupations in the industrial mining setting. Available statistics indicate that mining, quarrying and oil contribute 1.6% to total employment in the country in 2013. There is significant variation by sex as 2.7% of men in employment are found in the extractives sector compared to

0.5% females yielding female-male representation ratio (or gender parity) of 0.18 (see Figure 1). The ratio worsened from 0.34 in 2006 to 0.18 in 2013 indicating declining female representation relative to males. Female representation is lower in the formal extractive sector than the informal sector with higher gender representation ratio in the formal than in the informal artisanal sector (see Figure 1).

Overall, women composition or share in extractive employment stood at 14.5% in 2003 and this increased to a little over a quarter in 2006 and subsequently nose-diving to 16.2% in 2013 (see Figure 2). Female composition is worse in the formal sector where earnings are better with well-defined working conditions, compared to the informal extractive sector. In the 2013, females accounted for 5.8% in the formal extractive sector compared to 21.1% in the informal sector. Thus, gender composition in the sector is clearly skewed in favour of men.

Figure 1: Female-male representation ratio in the extractives by institutional sector

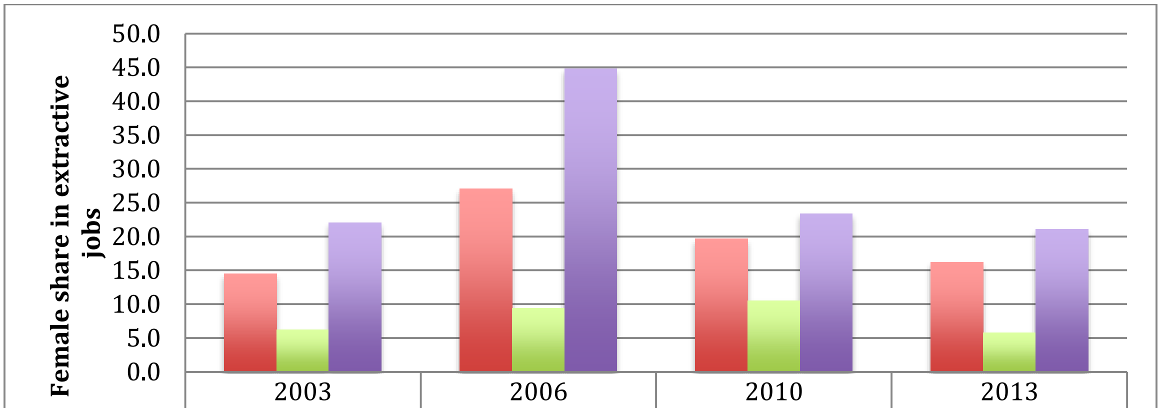


	2003	2006	2010	2013
Gender partity_All	0.157	0.343	0.229	0.179
Gender parity_Formal	0.146	0.151	0.212	0.116
Gender Parity_Informal	0.229	0.530	0.253	0.219

Source: *Computed from 2003 Core Welfare Indicators Questionnaire, 2010 Population and Housing Census and, GLSS V of 2005/06 and GLSS VI of 2012/13.*

In the extractives, women are often engaged at the lower echelon of the chain with lower earnings, less job security and generally vulnerable employment. Vulnerable employment is the type of employment that does not offer the worker stable and more secure earnings with high decent work deficit and associated with very low and unstable earnings. Much as the representation of women in the artisanal and small scale mining is higher compared to large scale mining, men are largely engaged in the small-scale mining itself while their female counterparts serve as laborers, providers of goods and services, and workers responsible for household chores. Some of the women in the artisanal and small-scale mining also operate as part-time workers and are relegated to secondary, labor-intensive processing activities, which expose them directly to dangerous substances such as mercury.

Figure 2: Female composition in in employment in the extractive sector.



	2003	2006	2010	2013
All	14.5	27.0	19.7	16.2
Formal	6.2	9.4	10.5	5.8
Informal	22.1	44.8	23.4	21.1

Source: *Computed from 2003 Core Welfare Indicators Questionnaire, 2010 Population and Housing Census and, GLSS V of 2005/06 and GLSS VI of 2012/13.*

Disaggregation of employment composition by major activities in extractives shows gender imbalance in extractive activities in Ghana. As Table 1 indicates, female composition is highest in quarrying (44.3%) where technology usage and education requirement is very low. Lowest female composition occurs in the petroleum and gas industry with women accounting for only 7.7%of total employment in the petroleum and gas industry. In mining activities, women account for 14.1% of total employment in mining with women composition better in gold mining than diamond and other mining activities.

Table 1: Gender composition in various extractive activities

Extractives	Male	Female	Total
Mining	**85.9**	**14.1**	**100.0**
Gold	85.6	14.4	100.0
Diamond & other mining	87.5	12.5	100.0
Quarrying	**55.7**	**44.3**	**100.0**
Petroleum & Gas	**92.3**	**7.7**	**100.0**

Source: *Computed from GLSS VI of 2012/13*

3.2 Gender dimension of job position and education in extractives

It has been argued that female under-representation in the extractive sector is because of gender role stereotypes that are perpetuated by culture in addition to their overall lack of education and skill required in the sector. Table 2 confirms the fact that women are less represented in high skilled extractive jobs, which are equally high earning jobs in the country. Men dominate all activities that require high expertise while women are predominantly found in elementary and other ancillary jobs, which do not require much skill or education to accomplish. Generally, women's responsibilities in mineral processing activities range from crushing, grinding, sieving, washing and panning, to amalgamation and amalgam decomposition in the case of gold mining (see Hilton et al., 2003). Less commonly, women are concession owners, mine operators, dealers and buying agents, and equipment owners.

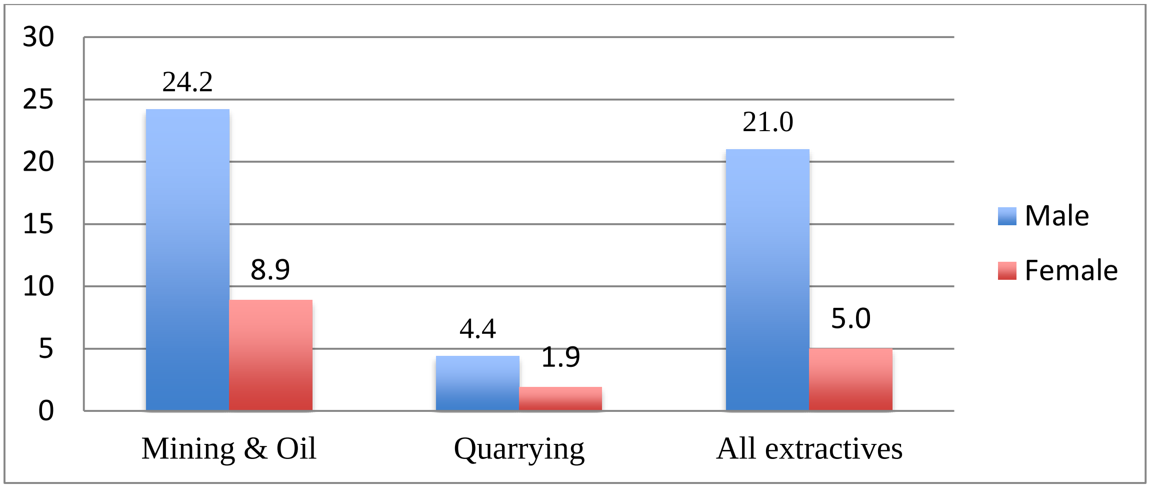
Table2: Job Positions in Extractive Sector 2013

Status on the Job	Mining & Petroleum		Quarrying		All extractives	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
High Skilled	11.4	8.9	4.4	0.0	9.9	4.0
Semi-skilled	3.2	2.2	0.0	1.8	2.6	3.0
Production	41.3	28.9	22.1	20.4	37.4	24.0
Elementary	41.6	60.0	70.6	72.2	47.6	66.0
Other	2.6	0.0	2.9	5.6	2.6	3.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: *Computed from GLSS VI of 2012/13*

Indeed, similar to the picture in Table 2, Figure 3 further highlights the fact that education and skills are the underlying contributory factors behind the inequality that exist in the extractive sector along gender lines. As shown in Figure 3, education of women in extractives is far lower than men, it is however worse in mining and petroleum extraction than quarrying. This largely explains the lower job status of women observed in Table 2.

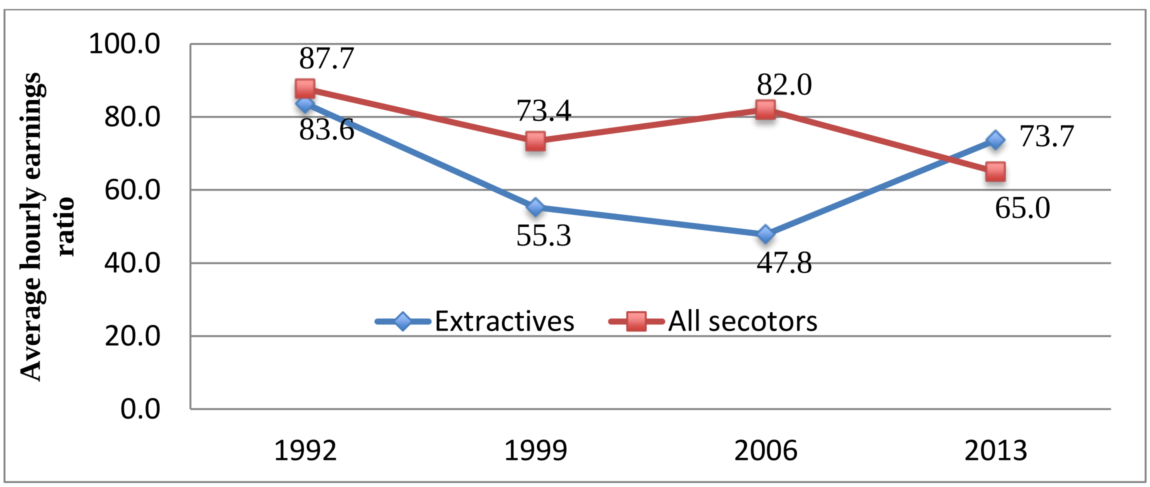
Figure 3: % of Male and Female with Secondary+ Education in Extractive Sector, 2013



Source: *Computed from GLSS VI of 2012/13*

Not surprisingly, women in the extractive sector on average earn less than their male counterparts. As depicted in Figure 4, the average female-to-male hourly earnings ratio in the extractive sector until 2013 was below that of all sectors in the country. Particularly prior to 2013, the declining ratio in general indicates the worsening earning of females relative to males. This highlights the uniqueness of the gendered nature of employment and earnings in the extractive sector. Clearly, although this will be subjected to further interrogation with a more rigorous empirical methodology, it is a signpost that although women are highly involved in working in the extractive sector, they generally receive less for their labour and thus benefit less than men from the direct economic benefits associated with the extractive sector.

Figure 4: Average Female-Male Hourly Earnings Ratio (%)



Source: *Computed from GLSS III of 1991/92, GLSS IV of 1998/99, GLSS V of 2005/06 and GLSS VI of 2012/13*

4. Gender segregation of occupation in extractives

Occupational segregation refers to the unbalanced distribution of the sexes across occupations in a manner inconsistent with their overall shares of employment, irrespective of the nature of job allocation (see Watts and Rich, 1992; and Jonung, 1982). Segregation concerns the tendency for men and women to be employed in different occupations from each other across the entire spectrum of occupations. The job status or occupation of women differs from that of men in extractives as it is in the entire labour market. Even though women are generally underrepresented in extractives, they are highly represented in elementary jobs such as cleaners, cooks, labourers, refuse workers etc. On the other hand they are highly underrepresented in high skilled and better-remunerated jobs such as managers, supervisors, engineers etc.

The extent and magnitude of gender differences in the distribution of occupation or jobs can appropriately be measured through the use indices of segregation. Various studies on segregation have used different indices to measure the extent of segregation in the labour market. The outcome of different measures of segregation is largely influenced by the choice of index. There is, however, no agreement about the best index in assessing the extent of segregation and as a result, index "wars" break out from time to time.[11] Essentially, none of the segregation indices have been proven to be absolutely perfect or without any flaws. As Hakim (1992) notes, the search for a single summary index has become counter-productive with no single index proving to be sufficient. The results of an analysis often depend less on the choice of index than on other methodological choices. In this study, we apply three key indices widely used in the literature to measure labour segregation and these are the Duncan index of dissimilarity (ID), Karmel Maclachlan index (KM), and the size-standardised index of dissimilarity (Ds). Each of the indices takes values ranging from 0 as minimum (when there is no difference between male and female occupational distribution) to a maximum of 1 (high gender occupational differences).

The Duncan's index proposed by Duncan and Duncan (1955) measures the absolute sum of the difference between the proportion of the female workers and the proportion of the male workers in each job or occupation. It indicates the proportion of males (or females) that would have to change occupations in order to maintain gender ratio of each occupation equal to the gender ratio of workers as a whole. The index is expressed as:

$$ID = \tfrac{1}{2}\sum_{i=1}^{n}\left|\frac{W_i}{W} - \frac{M_i}{M}\right| \qquad 0 \le ID \le 1 \qquad (1)$$

[11] See Gunderson, 1985; OECD, 1985; Reskin and Padavic, 1994)

where $\frac{Wi}{W}$ is the proportion of women in occupation *i* and $\frac{Mi}{M}$ represents the proportion of men in occupation *i*. The strength and uniqueness of the *ID* are based on its simplicity and widespread usage. However, one basic limitation of the index is that the value of *ID* is sensitive to changes in the occupational structure and sex composition of the workforce (Anker, 1998). Thus, any change in the occupational structure or a change in the sex composition of employment has effect on the value of the index.

The *KM* index was first proposed by Duncan (1965) and developed and advocated by Karmel and Maclachlan in 1988 (see Jones 1992). It is interpreted as the fraction of total employment that would have to relocate with replacement to achieve zero gender segregation, but maintains the occupational structure and the total overall gender shares of employment (Watts, 1994). The KM index is expressed as:

$$KM = \frac{1}{T}\sum_{i=1}^{n}\left|W_i - a\left(W_i - M_i\right)\right| \qquad 0<\mathrm{KM}<1 \qquad (2)$$

where W_i is the number of women in occupation or job *i*, M_i is the number of men in occupation *i*, *a* is the women share in total employment or workers, and *T* is the total number of workers under consideration.

The size-standardized dissimilarity index (*Ds*), proposed by Gibbs (1965) controls for the effect of occupational structure, using all occupations as if they were of the same size, computed over a fixed number of comparable occupational categories[12]. The index is expressed as:

$$D_s = \frac{1}{2}\sum_{i=1}^{n}\left|\frac{W_i/T_i}{\sum_{i=1}^{n} W_i/T_i} - \frac{M_i/T_i}{\sum_{i=1}^{n} M_i/T_i}\right| \qquad 0 \le ID \le 1 \qquad (3)$$

where W_i/T_i is the share of women in occupation *i* and M_i/T_i is the share of men in occupation *i*. The shape of the occupational distribution does not affect the index, since the index standardizes each of the *ith* occupation to the same size. By not allowing changes in the size of the occupations in time to affect the value of the index makes it immune to any occupational effects. Invariably, one notable favourable argument for this index is that the observation of male or female dominance is quite independent of the numbers in the occupation.

[12] See William (1979), Senyonov & Scott (1983); Charles and Grusky (1995)

Table 3 presents values of segregation index based on three different measures for occupations in extractives and the entire labour market. The results indicate that regardless of segregation measure used, occupational gender segregation is higher in extractives than the entire labour market. This implies that the extent to which women jobs differ from that of men is greater in extractives than what pertains in the entire labour market. According to Jahn et al (1947), segregation is found to be high if the index is above 0.6 and moderate if it ranges between 0.3 and 0.6. Segregation is judged to be low if the segregation index falls below 0.3. Applying this criterion suggests the extent of segregation in the extractive sector ranges between low and moderate. However, there is higher occupational segregation in the extractive sector than the entire labour market.

Table 3: Index occupational segregation of extractives and the entire labour market

Segregation index	2006		2013	
	Extractive employment	Total employment	Extractive employment	Total employment
Duncan dissimilarity index (ID)	0.414	0.183	0.258	0.212
Karmel and Maclachlan index (KM)	0.169	0.091	0.106	0.085
Size-standardized dissimilarity index (Ds	0.513	0.401	0.426	0.314

Source: *Computed by Authors from the GLSS V of 2005/06 and GLSS VI of 2012/13*

5. Econometrics Analysis – Gender earnings differentials

5.1 Model Specification

Wage or earnings differentials between two demographic groups have often been attributed to differences in human capital accumulation and labour market experience as well as types of jobs engaged in by the group. Empirical analyses in the past have adopted the human capital model as the theoretical basis for estimating earnings function (Mincer, 1974, Becker 1964). According to the human capital model of wage determination, human capital structure of workers, which is the stock of knowledge that contributes to worker's productivity, is a key determinant of their earnings structure. Essentially, the level of education and work experience are used as proxies for measuring human capital of workers. As shown in Figure 3, 21.0% of male workers compared to 5.0% of females in extractives have at least secondary school education.

(a) Earnings Regression Equation

We specify a model of monthly earnings to capture relevant human capital elements and other personal characteristics and labour market attributes as:

$$\ln E = \alpha f + x_i \beta_i + \varepsilon \qquad (4)$$

where *lnE* is the natural log of monthly earnings, *f* is female dummy (female 1: male 0) which is the variable of interest and α is regression coefficient of female dummy to capture the extent of gender differences in earnings; x_i is a vector of covariates such as age, marital status, education, location and type of job; and β_i is a vector of linear regression coefficients and ε_i is the random error of an unknown distribution that satisfy the assumption $\varepsilon_i \sim N(0, 1)$.

(b) Earnings decomposition

After assessing possible gender earning differences, we adopt earnings decomposition model to investigate the proportion of earning differences explained by differences in the covariates or observable characteristics (endowment) and the part attributable to discrimination. Using Oaxaca-Blinder decomposition approach (Oaxaca, 1973; Blinder, 1973), we specify gender earnings decomposition as:

$$\ln \bar{E}_i^m - \ln \bar{E}_i^w = \left(\bar{x}_i^m - \bar{x}_i^w\right)\beta_j^m + \left(\beta_j^m - \beta_j^w\right)\bar{x}_i^w \qquad (5)$$

where x_i is a vector of covariates, β_i denotes a vector of coefficients of (or returns to) these covariates. The superscripts *m* and *w* represent men and women respectively and subscript *i* represents observations of individual workers. The first term of the equation (5) reflects the differences in mean wage due to differences in observable or explained characteristics between men and women. It is based on estimates of what a woman would receive if she faced the men earnings structure. The second term represents the differences in the average wage due to the shift coefficient β i.e. the differential returns to the explained variables or observable characteristics between men and women. This is what is referred to in the literature as “wage remnant” and is used to measure the extent of wage discrimination.

5.2 Estimation strategy and Data Source

The main source of data for estimating equations (4) and (5) is the nationally representative labour force survey dataset conducted alongside the Ghana Living Standards Survey in 2012/13. The vector of covariates in the models comprises female dummy (female 1; male 0), age (measured in years), married dummy (married 1: unmarried 0), categorical education dummies (Basic, secondary, post secondary education with no education as reference dummy), urban dummy (urban 1; rural 0), and types of job (professional & managerial, plant & machine operators, elementary jobs, with clerical and other service jobs as reference dummy).

Table 4: Variable means and standard deviations of workers in extractives

Variables	Men			Women		
	Mean	Standard Deviation	N	Mean	Standard Deviation	N
Log of monthly earnings	6.260	1.033	257	5.590	0.950	62
Age	32.888	11.201	329	34.070	13.322	86
Married	0.660	0.475	329	0.686	0.487	86
Hours of work per week	48.658	19.989	329	42.013	18.221	86
Reference (no education)						
Basic education	0.508	0.501	329	0.372	0.486	86
Secondary education	0.140	0.347	329	0.000	0.000	86
Post-secondary education	0.085	0.279	329	0.058	0.235	86
Urban	0.389	0.488	329	0.233	0.425	86
Reference (clerical & service)						
Professional & technical jobs	0.106	0.309	329	0.047	0.212	86
Plant & machine operators	0.362	0.481	329	0.186	0.391	86
Elementary jobs	0.447	0.498	329	0.628	0.486	86

Source: *Estimated from GLSS VI of 2013*

The means and standard deviation of the covariates and the log of monthly earnings are reported in Table 4 to show that women constitute only 21% of extractive workers with lower mean of log of monthly earnings than men. About 66% of men in extractives compared to 69% of women are married while women are marginally older than men on average. Men reported higher mean hours of work per week than women and a higher proportion of men than women operate from urban areas. About 22.5% of men have at least secondary school education compared to 6% of women. In terms of type of job in extractives, most (62.8%) of the women compared to 44.7% are engaged in elementary occupations such as cleaning, cooking etc.

(a) Determinants of Earnings

We apply both ordinary least square (OLS) and quantile regression estimation techniques to equation (4) to investigate the determinants of earnings with female dummy as the variable of interest. The least squares method predicts estimates that approximate conditional mean of the response variable given certain values of the covariates whereas quantile regression estimates either the conditional median or other quantiles of the response variable. A key strength of quantile regression relative to least squares regression is that the quantile regression estimates are robust against outliers in the response measurements.

(b) Decomposition of earnings gap

Most of previous discrimination literature has employed OB mean decomposition approach in estimating gender wage gap. Key weaknesses of the OB estimator are that it can be inefficient if the assumption of normality is violated, and the estimates can be biased in the presence of outliers. In contrast, quantile regression originally proposed by Koenker and Bassett (1978) is more robust to non-normal errors and able to capture heterogeneous effects thus allowing for a richer characterisation of the data. We therefore apply quantile decomposition to equation (5) to nationally representative household survey of 2013.

(c) Selectivity bias

Mindful of possible selectivity bias due to non-random selection of individuals who work in extractives, we use Heckman two-stage correction method to correct potential selectivity bias. Essentially, men and women have different reasons for joining the labour force and different reasons for choosing to work in a particular sector. The method involves estimation of a model of probability of working in extractives using probit regression on participation to compute inverse mills ratio at the first stage. The inverse mills ratio is introduced into the earnings equation in stage two as one of the covariates to correct for potential selectivity bias. In correcting for possible bias in the quantile regression, we employ a semi-parametric estimator proposed by Buchinsky (1998) for selection correction in quantile regression. This procedure involves estimating a power series approximation of the selection term using the single-index method proposed by Ichimura (1993). This term is then included in the quantile regression to account for selection. In the estimation of the quantile regressions, we included a third degree of the inverse mills ratio to correct for potential selectivity bias.

5.3 Analysis of Empirical Results

(a) Determinants of Earnings

The mills ratio proved to be generally significant for the quantile regression results indicating the relevance of accounting for selectivity bias. The opposite is the case for the OLS regression results such that the mills ratio did not prove to be statistically significant (see appendix Table A) and thus rendering the correction of sample selection bias unnecessary. Nonetheless, we present both results with selection and without selection for comparison purpose. Overall, women in extractives earn less than their male counterparts based on the statistically significant coefficient of female dummy regardless of the estimation technique. The results of the least squares regression indicate that women earn 56.3% less on average than men without correcting for sample selection bias. This declines marginally to 54.9% after correcting for potential sample selection bias (see appendix Table A). The results of the quantile regression point in the same direction such that without correcting for sample selection bias, female workers earn 52.3% less than their male counterpart at 25th quantile and this increases to 59.2% at the median and declines to 55.1% at the 75th quantile (see appendix Table B). After correcting for sample selection bias, women workers are observed to earn 67.5% less than male workers at the 25th quantile and this worsens along the earnings distribution such that at the median and 75th quantile, women earn 81.2% and 91.8% respectively less than men.

Education and hours of work are two other factors that predict monthly earnings among extractive workers based on both the least squares and quantile regression techniques regardless of selection correction. An additional hour of work per week significantly predicts 0.7% increase in monthly earnings on average with or without correcting for potential sample selection bias (appendix Table A). From the quintile regression results, the cumulative predictive effect of hours of work on log monthly earnings is positive with or without selection correction at the three quintiles. Thus, additional hour of work triggers between 0.6% and 0.8% response to monthly earnings at the three-quintile levels. The returns to education of extractive workers is positive at all levels but statistically significant only for those with post secondary education with or without selection based on least squares regression results (Appendix Table A).

The results of the quantile regression with or without selection correction however indicate positive and statistically significant returns to all levels of education at the 75th percentile and the returns increases with the level of education. Indeed, post-secondary education offers 100% more returns at the 25th percentile and this declines to 99.2% and 95.6% at the median and the 75th percentile respectively without selection correction. After correcting for sample selection bias, returns to post secondary education for extractive workers reaches 137% above those with no formal education at the 25th percentile, declining to 98% at the median and rising to 110.6% at the 75th percentile (see appendix Table B).

The type of occupation or job is observed to predict monthly earnings of extractive workers along the earnings distribution with selection correction. Professional and managerial jobs earn the highest monthly relative to clerical and service jobs followed by plant and machine operation jobs with elementary jobs earning the least. Married workers are found to earn higher than unmarried ones at 25th and 75th percentile with selection correction while age has a cumulative positive predictive effect on monthly earnings at the median without selection correction (appendix Table B). Lower monthly earning is reported for extractive workers in urban areas than their rural counterparts at the 75th percentile with selection correction.

Separate regression results for males and females suggest that returns to education are positive but statistically significant generally for only men in extractives. In the least square regression results, while male workers with post secondary education earn 107.8% premium without selection correction and 117.1% with selection correction, returns to education of women are positive but not statistically significant (appendix Table A). From the quintile regression results (see Appendix Table C and D), the returns to post secondary education are positive and statistically significant for men at the three-quintile levels with or without selection correction. The returns to basic education are reported to be positive and statistically significant only at 25th percentile without selection correction and 25th and 75th quintile with selection correction. However, education doesn't seem to influence earnings of women in extractive to the extent that returns to education at all levels based on least squares or quintile regression results with or without selection correction are not statistically significant. Indeed, the only statistically significant predictors of women's earnings in extractives are type of job, age and location of work (urban) with selection correction and hours of work without selection correction and this is also through for men.

(b) Earnings gap decomposition

Table 5 reports results of the decomposition results without selection correction and results corrected for selection correction shown in Table 6. The Oaxaca-Blinder decomposition without selection shows positive earnings gap in favour of men with 28.4% attributable to differences in endowment but not statistically significant. Education constituted 13.1% of earnings differences in favour of men and found to be statistically significant. A statistically significant proportion of 71.6% is attributable to unexplained variation termed "wage remnant" which suggests discrimination. The selection-adjusted version of OB decomposition reduces the discrimination part of the earnings gap to 30.8% (Table 6).

The quantile decomposition results indicate that the earnings gap is negative and increases significantly from 25th quartile for both results with or without selection correction. Specifically, at the 25th quantile without selection correction, the average woman in extractives earns 14.1% $[(e^{-0.1519}-1) \times 100]$ less than an average man with similar characteristics. This jumps to 51.3% i.e. $[(e^{-0.7192}-1) \times 100]$ at 50th and 60.2% i.e. $[(e^{-0.9224}-1) \times 100]$ at 75th quantile. Without sample correction, earning differentials due to characteristics or endowment is negative at all the quantiles but not statistically significant (Table 5). This suggests that relative to an average man, the average woman is less "skillful", short of being statistically significant. Earning gaps due to the unexplained part are negative at all the three quantiles and largest at the 25th quantile and smallest at the 75th quantile. This suggests that discrimination against women is high at the lower income bracket and declines with income. Thus, discrimination against women constitutes 76.4% of gender earnings gap at the 25th quantile and this declines to 72.5% at the median and 69.6% at the 75th quartile.

Table 5: Decomposition of gender differences of earnings in the Extractives WITHOUT SELECTION CORRECTION

Differences & Source	Oaxaca-Blinder	Quantile		
		0.25	0.5	0.75
Difference	0.6696***	-0.1519***	-0.7192***	-0.9224***
Source				
Characteristics/Explained	0.1902	-0.0231	-0.1978	-0.2804
	(28.4%)	(23.6%)	(27.5%)	(30.4%)
Education	*0.088***	*-0.0147***	*-0.0884****	*-0.1337****
	(13.1%)	*(-9.7%)*	*(-12.3%)*	*(-14.5%)*
Coefficient/unexplained	0.4794**	-0.4917***	-0.5214***	-0.6420***
	(71.6%)	(76.4%)	(72.5%)	(69.6%)
No. of Observations				
Male	260	260	260	260
Female	73	73	73	73

***p<1% **p<5% *p<10%

Source: *Estimated from GLSS VI of 2013*

After correcting for sample selection, the quantile-earning gap increases marginally at the 25th and 50th quantile but declines at the 75th quartile (Table 6). Specifically, the average woman in the extractives earn 47.6% [($e^{-0.6474}$-1) ×100] less than average man with similar characteristics at the 25th quantile and this increases to 52.0% at the median and 57.3% at the 75th quantile. Earning differences due to characteristics or endowment are negative and statistically significant at the three quantiles but highest at the 75th quantile and lowest at the 25th quantile. Thus intuitively, the average woman is less endowed or “skillful” relative to an average man but the difference in endowment is greater at the 75th quantile and lower at the 25th quantile and at the median. Earning differences due to the unexplained part are negative and statistically significant at the median and the 75th quantile indicating discrimination against women at these two quantiles. Specifically, discrimination accounts for 21.7% of earnings differences at the median and this increases marginally to 24.6% at the 75th quantile (Table 6), suggesting greater discrimination against women in extractives at the 75th quantile than at the median. At the 25th quantile, earnings differences due to unexplained part is negative but not statistically significant. Generally, earnings discrimination against women prevails along the median and higher income brackets but no evidence at the lower level of income distribution with selection correction.

Table 6: Decomposition of gender differences of earnings in the Extractives WITH SELECTION CORRECTION

Differences & Source	Oaxaca-Blinder	Quantile		
		0.25	0.5	0.75
Overall Difference	0.6696***	-0.6474***	-0.7330***	-0.8507***
Source				
Explained/Characteristics	0.4634***	-0.5783***	-0.5742***	-0.6416***
	(69.2%)	(-89.33%)	(-78.34%)	(-75.42%)
Education	*0.0998****	*-0.1159***	*-0.1372***	*-0.1407* ***
	(14.9%)	*(-17.90%)*	*(-18.72%)*	*(-16.54%)*
Unexplained/Coefficient	0.2062**	-0.0691	-0.1588***	-0.2091***
	(30.8%)	(-10.67%)	(-21.66%)	(24.58%)
No. of Observations				
Male	260	260	260	260
Female	73	73	73	73

***p<1% **p<5% *p<10%

Source: *Estimated from GLSS VI of 2013*

Education contributes quite significantly to gender earnings differences without correcting for selectivity bias such that at the 25th quantile, education accounts for about 10% of gender earnings differences and increases with earnings. At the median, education contributes to 12.3% to earnings differences and this increases to 14.5% at the 75th quantile. At the mean based on OB decomposition, education accounts for 13.1% of gender earnings differences. The role of education in gender earnings differences becomes much more pronounced with selection correction. On average, education accounts for 14.9% of gender earnings differences in extractives. At the 25th quantile, education contributed 17.9% to gender differences in favour of men and this increases to 18.7% at the median and drops to 16.5% at the 75th quantile. This suggests that any effort to bridge education gap between men and women would narrow the gender earnings gap in extractives by between 10% and 19% at all levels of income without regard to selection correction.

6 Observations beyond the numbers.

In a quantitative filed survey and focus group discussion among workers in 12 companies (7 large scale and 5 registered small-scale companies) at its mining sites in Ghana in 2016 provide reasons behind limited women involvement in extractive activities in the country. The limited involvement of women in extractives is linked to a number of factors including cultural barriers, physical nature of the task, intimidating behavior of male workers and patriarchy practices at the mining site. Out of 85 male and 37 female workers that participated in the field survey and FCD, 35.9% of men and 47.0% of women find it dangerous for women to work in extractives. They argue that extractive activities particularly mining are tedious, physically demanding and dangerous and that most women are not able to withstand the working conditions. As many as 61.5% agrees that some tasks are physically demanding and must not be given to women and thus confirming the perception about masculinity of mining activity. They quote an adage "barima beko Tarkwa''[13] as a clear evidence of masculinity of mining activity resulting in the underrepresentation of women in mining activity. Indeed, 92.9% of workers who participated in the field survey indicates that men are preferred in the hiring process to women in extractives and thus contributing to underrepresentation of women in mining and by extension extractives in Ghana. Additionally, some discouraging comments about women involvement in mining, as "work for men" is also a major factor contributing to weak participation of women in extractives. Others argue that the "isolated" nature of mining sites (mostly out of town) tends to discourage particularly women from engaging in mining and that engagement in mining competes with time for family which women find it difficult to cope.

It also emerged from the field conversation that the few women involved in extractives are confined to areas that do not require exertion of physical force and also for cultural reasons. Participants linked occupation segregation in extractives along gender lines to the fact that women are often not allowed to get closer to the machine or the operating area. There is cultural belief that, a woman in her menstrual period getting closer to the operation area drives away the gold ore. At one of the focus group discussion with small scale miners, both men and women expressed their belief that if the women gets closer to the machine that digs for the gold, the mineral would get farther away from them. Therefore, the women are confined to elementary activities such as cooking and washing the rocks and sand after it has been brought from the ground.

The patriarchy and intimidating behavior of some men also prevent women from getting involved in some occupation such as actual mining activity in the extractive sector. Some women engaged in plant and machine operation complained about the intimidation from their male counterpart accusing them of crossing to their "territory" of occupation. Women who operate excavators or drive tipper truck are intimidated in the course of their work with the excuse that such activities are the preserve for men. According to some women argue that women should be encouraged to report intimidation and harassment by their male counterparts at work towards preventing them from accessing certain jobs to promote equal access of women and men in all occupations in extractives. Nonetheless, there are other mining activities that women would find it difficult to get involved due to their biological makeup. For instance, those activities that take workers closer to fire and

[13] Literary translates, as "a man would go to Tarkwa a mining town".

underground may not be good for women who are at the age range of 24-45 years where marriage and procreation is critical in their lives.

Education was singled out as one key contributor to the confinement of women in low-skilled and low earned occupations in the field survey. Indeed, lower education of women than men and women underrepresentation in science, technology, engineering and mathematics (STEM) were cited as largely explaining women underrepresentation in high-skilled occupation in extractives in Ghana. Others indicated that non-exposure of girls to prospects in mining related disciplines in school and cultural barriers that tend to perceive women as better in the kitchen are also to be blamed for lower representation at the top of the echelon of the job ladder in extractives. During the interview of workers of one of the large mineral firms, they explained that very few women are trained in mining engineering, geology drilling and blasting and plant and machine operations. Thus for women to access such jobs that pay better, it is important to encourage investment in education and skills development in these areas.

Lower education of women and their underrepresentation in STEM is one major contributor to earnings differences in favor of men in extractives confirming the findings from the econometric analysis. They also argue that some qualitative factors including cultural barriers, intimidating and patriarchy behavior of men among others that give rise to occupational segregation in the extractive sector largely underscore the gender earnings gap in favor of men that cannot be explained by worker endowment characteristics. The results of the field survey indicate that 80.3% finds men and women earn the same wages for similar job holdings. However, 49.4% claims major differences in roles assigned to male and female and differences in education explain differences in job status and earnings.

7. Conclusions and policy recommendations

Gender differences in favor of men is quite strong in extractives in Ghana which has the effect of undermining economic empowerment of women against the backdrop of extractive driven growth of the Ghanaian economy. Women participation in extractive activities, particularly mining is very low and those working in extractives are mostly engaged in elementary occupations and highly underrepresented in professional and managerial jobs where earnings are high. Analysis of occupational segregation in extractives points to some degree of segregation along gender lines. These observations are linked to a number of factors such as primitive cultural beliefs that that prevent women from certain extractive activities, the physical nature of the extractive jobs, intimidating behavior of male workers on the job and patriarchy practices at the mining site. Clearly, the patriarchy behavior of men in extractives that makes certain jobs in the sector a preserve of men and thus put up intimidating behavior at the work place cannot be ignored. Limited education of women relative to their male counterparts and underrepresentation of women is STEM also contribute to lower representation of women in extractives, particularly in low paying activities. The econometric analysis confirms the role of education in gender earnings differences in favor of men in extractives. The gender earnings differences attributable to discrimination against female extractive workers is accounted for by factors such as cultural barriers that prevent women from engaging core mining activities which are associated with higher earnings, intimidating and patriarchy behavior of men among others that give rise to occupational segregation in the extractive sector.

These observations call for policy address the barriers that impede women participation in extractives, particularly mining and promote their access to core extractive activities associated with higher earnings. The commitment of government to pursue polices that would bridge the gender education gap, particularly in STEM is likely to reduce gender earnings gap by between10% and 20% in extractives. Ghana has made considerable progress in addressing gender parity in enrollment, particularly at the pre-tertiary education level (National Development Planning Commission, 2015) but female enrolment is STEM continues to lag behind that of males. The promotion of science education for females at the secondary school level would get more girls into STEM including Geology and improve their access into core activities in extractives. Few women who pursued programs in STEM and managed to break into male dominated core extractive activities could serve as role models for young females in schools to address the negative perception that STEM education is the preserve of boys while humanities belong to girls. These measures coupled with public education against primitive cultural beliefs that tend to keep female mining workers away from core mining activities could reverse the confinement of women in elementary occupations. The harassment and intimidation of female mining workers by their male counterpart could be addressed through enforcement of regulation and code of ethics instituted within the firms. Indeed, all firms that participated in the field survey have sexual harassment policies and code of ethics but enforcement was identified to be weak. Thus enforcement of the mining firms' own code of ethics for workers and regulation of sexual harassment would minimize "hidden" intimidation against female mine workers.

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Appendix

Table A: Least Squares Earnings Regression Results

Covariates	Without correction			With Correction		
	All	Male	Female	All	Male	Female
Female	-0.563***	---	---	-0.549***	---	
Age	0.010*	0.009	-0.004	0.00003	0.044	-0.022
Married	0.154	0.228	0.218	0.472	-0.947	0.052
Hours of work	0.007***	0.005	0.013	0.007*	0.005	0.013
Basic education	0.185	0.206	-0.071	0.534	-0.669	1.163
Secondary education	0.259	0.303	---	0.408	0.326	---
Post secondary	1.004***	1.078***	-0.047	1.171**	0.765	0.396
Urban	-0.011	-0.059	0.130	0.279	-1.093	1.046
Prof & managerial jobs	0.133	0.184	0.151	0.159	0.122	0.368
Plant & machine opp.	0.101	0.158	-0.356	0.117	0.133	-0.120
Elementary jobs	-0.046	-0.012	-0.467	-0.030	-0.054	-0.364
Constant	5.282***	5.284***	5.727***	4.425***	8.678	3.758
Mills	---	---	---	1.605	-6.941	2.641
R^2	0.169	0.155	0.125	---	---	---
F or Wald Statistics	6.44***	4.140***	0.76	28.69***	0.88	1.89
Observations	319	257	62	319	309	82

***p<1%   **p<5%   *p<10%

Table B: Quantile Earnings Regression Results for ALL Extractive workers

Covariates	Without correction			With Correction		
	0.25	0.50	0.75	0.25	0.50	0.75
Female	-0.523***	-0.592***	-0.551***	-0.675***	-0.812***	-0.918***
Age	0.004	0.011**	0.007	0.0003	0.009	0.00004
Married	0.310*	0.122	0.153	0.418**	0.204	0.292**
Hours of work	0.008**	0.007**	0.007**	0.008*	0.006**	0.007**
Basic education	0.279	0.158	0.245*	0.323*	0.189	0.324**
Secondary education	0.241	0.260	0.327*	0.306	0.450**	0.442**
Post secondary	1.000***	0.992***	0.956**	1.370***	0.980***	1.106***
Urban	-0.149	0.045	0.029	-0.330	-0.210	-0.283**
Prof & managerial jobs	0.269	0.484**	0.067	2.569*	2.477***	3.758***
Plant & machine opp.	-0.156	0.326*	-0.079	2.362*	2.467***	3.705***
Elementary jobs	0.005	0.227	-0.226	-1.946**	-1.894***	-2.688***
Constant	4.803***	5.056***	5.933***	2.129	2.685***	1.837*
Mills	---	---	---	0.077*	0.078***	0.120***
Pseudo R^2	0.120	0.160	0.166	---	---	---
Observations	319	319	319	319	319	319

***p<1%   **p<5%   *p<10%

Table C: Quantile Earnings Regression Results for MALE Extractive workers

Covariates	Without correction			With Correction		
	0.25	0.50	0.75	0.25	0.50	0.75
Age	0.009	0.015**	0.010	-0.001	0.011*	0.002
Married	0.377*	0.050	0.141	0.512*	0.167	0.296*
Hours of work	0.009**	0.003	0.007**	0.008	0.003	0.006**
Basic education	0.414*	0.127	0.248	0.461*	0.126	0.275*
Secondary education	0.374	0.201	0.297	0.438	0.281	0.441**
Post secondary	1.155***	1.015***	1.050***	1.509***	1.060***	1.239***
Urban	-0.058	0.093	-0.016	-0.346	-0.379**	-0.266
Prof & managerial jobs	0.327	0.393	0.038	3.171	3.902***	3.356**
Plant & machine opp.	-0.003	0.332	-0.088	3.102	3.885***	3.305**
Elementary jobs	0.023	0.271	-0.269	2.409	2.752***	2.364***
Constant	4.346***	5.126***	5.899***	1.254	1.228	2.293
Mills	---	---	---	0.096	0.135***	0.108**
Pseudo R^2	0.091	0.121	0.132	---	---	---
Observations	257	257	257	257	257	257

***p<1% **p<5% *p<10%

Table D: Quantile Earnings Regression Results for FEMALE Extractive workers

Covariates	Without correction			With Correction		
	0.25	0.50	0.75	0.25	0.50	0.75
Age	-0.019	-0.008	-0.017	-0.025	-0.011	-0.041**
Married	0.064	-0.279	-0.110	-0.334	-0.352	-0.130
Hours of work	0.014	0.013*	0.011	0.012	0.011	0.007
Basic education	0.110	0.068	-0.101	-0.057	0.150	0.258
Post secondary	0.636	0.130	0.174	0.796	0.297	0.030
Urban	-0.440	0.054	0.187	-1.107*	-0.732*	-0.634
Prof & managerial jobs	-0.078	0.527	0.669	4.031	2.445*	6.408***
Plant & machine opp.	-0.546	-0.222	0.200	3.696	2.618	5.986***
Elementary jobs	-0.215	-0.210	0.189	2.127	2.562	5.106***
Constant	5.382	5.646***	6.042***	1.442	2.698	-0.237
Mills	---	---	---	0.113	0.082	0.191***
Pseudo R^2	0.117	0.118	0.160	---	---	---
Observations	62	62	62	62	62	62

***p<1% **p<5% *p<10%