GHANA SOCIAL SCIENCE JOURNAL

Volume 15, Number 2, December, 2018

School of Social Sciences,
University of Ghana, Legon

Ghana Social Science Journal

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YAMENS PRESS LTD.
0302 223222

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ISSN 0855-4730 *e*ISSN (online): 2590-9673

Ghana Social Science Journal
Volume 15, Number 2, December 2018

ISSN 0855-4730 *e*ISSN (online): 2590-9673

ISSN: 0855-4730
eISSN (2590-9673- ONLINE)

Published by the
School of Social Sciences, College of Humanities, University of Ghana, Post Office Box LG72, Legon, Accra, Ghana
Telephone Number: +233-302-500179
Electronic mail address: socsjournal@ug.edu.gh

Production editing of this issue was undertaken by James Dzisah.

Printed by Yamens Press Limited, Post Office Box AN6045, Accra, Ghana
Telephone Number: +233-302-223222/235036.
Electronic mail address: yamenspresslimited@gmail.com

Ghana Social Science Journal is indexed and abstracted in the *ProQuest* Periodicals Acquisition Databases, Ann Arbor, Michigan, United States. The Ghana Social Science Journal is visible on the Web of Science through the Thomson Reuters' *Emerging Sources Citation Index* (ESCI).

The Ghana Social Science Journal is accepted for indexing in African Journals online (AJOL).

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ARE THE POOR GETTING WORSE OFF? A DECOMPOSITION OF INEQUALITY IN UNDER-FIVE MALNUTRITION OVER TIME AND SPACE IN GHANA

Gordon Abekah-Nkrumah[1]

Abstract

The study used two rounds of Demographic and Health Survey data from Ghana (2003 and 2014) to estimate levels and changes in inequality in under-five malnutrition, and examine factors that explain levels and changes in inequality. The results suggest that though under-five malnutrition reduced by 24%, with household assets (household wealth) increasing by over 200% between 2003 and 2014, inequality in under-five malnutrition increased by 19.2%. Consistent with prior studies, the results also suggest that socioeconomic welfare, regional-related resource disparities, women and their partners' education, household size and access to and availability of health services are key factors explaining the levels and changes in under-five malnutrition inequality over time, both at the national and sub-national levels. The study suggests the need for policy on inclusive cross-sectoral interventions that can lead to fairer distribution of opportunities and consequently access to social services in other to reduce inequality in under-five malnutrition. In this regard, existing social protection programmes in Ghana that have implications for the nutrition of children (e.g. LEAP, School Feeding Programme, National Health Insurance) should be tweaked to target poorer households for the purposes of reducing inequality in under-five malnutrition.

Keywords: Under-five (U5) malnutrition, inequality, socio-economic welfare, resource disparities, ecological zones, social protection

[1]Senior Lecturer & International Relations Coordinator, Department of Public Administration and Health Services Management, University of Ghana Business School, Email: gabekah-nkrumah@ug.edu.gh

ISSN 0855-4730 *e*ISSN (online): 2590-9673

Introduction

Under-five (U5) malnutrition remains a major health policy priority in many developing countries, given its potential negative consequences on adult life. Early childhood malnutrition can cause severe unalterable cognitive and physical damage such as poor educational outcomes, limited capacity to work and for that matter earnings capacity (Levinson and Bassett, 2007; Pelletier et al., 1993; Pelletier et al., 1995). In addition, morbidity and mortality rates are higher in malnourished children, with about 45% of all U5 deaths globally, attributed to childhood malnutrition (De Onis et al., 2012; Levinson and Bassett, 2007). Given that malnutrition and poverty are correlated, it is argued that childhood malnutrition could indirectly, through poor cognitive development, increased health care cost and productivity losses, increase economic cost both at the individual, household and national level.

Even worrying is the fact that developing countries carry a higher burden of the global malnutrition problem. In 2014, low income and lower middle-income countries together accounted for less than 65% of children U5 globally, and yet were responsible for over 90% of children U5 with stunted growth (Unicef WHO and World Bank, 2015). Asia and Africa alone accounted for 57% and 37% respectively of children U5 who had stunted growth in 2014 (Unicef WHO and World Bank, 2015). Although U5 malnutrition prevalence is higher in Asia than in Africa, the rate of reduction is slowest in Africa (i.e. 24% in Africa compared to 47% in Asia between 1990 and 2014). Interestingly, there are a few countries in Africa such as Rwanda (56.8% in 1992 to 37.9% in 2015), Senegal (34.4% in 1992 to 19.4% in 2014), Ghana (41.2% in 1993 to 18.8% in 2014) and Ethiopia (66.9% in 1992 to 40.4% in 2014) that have recorded close to or more than 20 percentage points reduction in U5 malnutrition. As expected, performance such as these normally attracts media headlines and is often the subject of both academic and policy discussions. What is often missing in such discourse is the extent to which such improvements are fairly distributed across population sub-groups both at the national and sub-national levels.

ISSN 0855-4730 *e*ISSN (online): 2590-9673

The importance of emphasizing the issue of inequality is that average outcomes can mask existing challenges and, consequently, compromise gains in development outcomes (Ferreira and Ravallion, 2008; United Nations, 2010, 2011). In addition, the African continent within which these countries are located is suggested to be one of the world's most unequal regions (Ferreira and Ravallion, 2008; Okojie and Shimeles, 2006). For example, there is evidence that most Sub-Sahara African (SSA) countries have recorded improved child health outcomes (MDGs 4) over the last two decades. However, these improvements have not resulted in a reduction in inequality (United Nations, 2010, 2011).

Moreover, 2014 data from the World Development Indicators (WDI) and the UN WIDER inequality database suggest high levels of mean (0.43) and median (0.41) income inequality in Africa. Even more important is the fact that the income of the top 20% is more than 10 times that of those in the bottom 20%. The income inequality narrative above, is also corroborated by a recent study by the IMF that suggest that the implementation of Poverty Reduction Strategy Papers (PRSPs) in several SSA countries resulted in stronger growth and yet neither reduced the poverty headcount nor increased the incomes of the poorest quintiles (Sembene, 2015). Existing data on Ghana for example suggest that consumption-based inequality increased between 1992 and 2013, even though for the same period, growth increased and poverty dropped substantially (Cooke et al., 2016; Ghana Statistical Service, 2015).

The foregoing discussion suggests that improvements in development outcomes in several African countries may not necessarily mean that the poor have fairly benefited from such improvements. It is against this background that the current paper argues that tremendous improvements in U5 malnutrition in Ghana may not necessarily translate into a reduction in inequality in U5 malnutrition. Thus, the paper uses the Ghana Demographic and Health Survey (GDHS) Data to examine inequality of U5 malnutrition in Ghana over time and space. Specifically, the paper: (a) examine the level and changes in inequality in U5 malnutrition at the national and ecological zones level between 2003 and 2014; (b) examine factors responsible for both the level and changes in inequality in U5

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malnutrition at the national and ecological zones level between 2003 and 2014.

To the best of my knowledge, the current study is the first of its kind to examine the changes in mean levels and inequality in U5 malnutrition in Ghana post-2015 (i.e. end of the Millennium Development Goals-MDGs). Thus, the value of the current study lies in the fact that the results could constitute an evaluation of the effect of U5 malnutrition policies implemented between 2003 and 2014 (a period that coincide with the implementation of the MDGs) in Ghana. Given also that the study examines factors that account for changes in U5 malnutrition inequalities both at the national and ecological zone level, the results could be an important reference for policymakers, especially in designing policy interventions that ensures that improvement in U5 malnutrition is inclusive and fairly distributed.

It is also important to emphasise that at the core of Sustainable Development Goal (SDG) 1 (no poverty), 2 (zero hunger), 3 (good health and wellbeing) and 10 (reduced inequalities) is inclusiveness and fairness, especially in access to food and nutrition. Thus, information on changes in U5 malnutrition inequality and factors responsible for such changes at national and sub-national levels will not only improve our understanding of the subject, but will also improve the ability of policymakers to put in place appropriate policies and interventions.

Methods

The study uses two rounds (2003 and 2014) of the GDHS data. It is important to state that there is in existence, a 2008 DHS data set for Ghana. However, the decision to use the 2003 data is twofold. First, it allows enough time to ascertain changes. Secondly, the 2003 and 2014 data falls within the period for the implementation of the MDGs, making it possible to interpret the results as changes that occurred during the implementations of the MDGs. The GDHS data is collected via a nationally representative household survey conducted by the Ghana Statistical Service with technical assistance from OR/ICF Macro and ICF International Company (Ghana Statistical Service et al., 2003, 2014). The

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survey uses a nationally representative, stratified, probability sampling process. In the first stage, enumeration areas known as clusters were selected from the ten regions of Ghana using census information. In the second stage, households were randomly selected from the clusters. The survey interviews eligible women aged 15-49 from selected households. In addition, men aged 15-59, from a sub-sample of a second or a third of the selected households were interviewed. The survey also collected information on children aged between 0-59 months. Information collected by the DHS surveys relevant for the study includes; background characteristics of women and their husband/partners, use of reproductive health services, anthropometric measures of children U5, women and other information on household and community characteristics. Definition and measurement of the specific variables used are discussed in the next section.

Variable Definition and Measurement

It is common in the child health literature to measure the nutrition status of children U5 by their height for age z-score (HAZ). HAZ is calculated by comparing the height of a child in a chosen sample to the median height of another child but of the same sex and age from a reference population, divided by the standard deviation of the reference population. The reference population used in this paper is the WHO multi-growth study reference population (WHO Multicentre Growth Reference Study Group and de Onis, 2006). There are other anthropometric measures of U5 nutrition such as weight for height z-score (WHZ) and weight for age z-score (WAZ). The use of HAZ is on the basis that it captures long-term nutrition and is also correlated with poverty, making it an extremely important child health indicator in a country like Ghana, where U5 malnutrition and poverty constitute a key development challenge.

A standard approach in the child health literature, and recommended by WHO is to designate all children with HAZ, two or more standard deviations (-2SD) below the reference median as having stunted growth. Given that the current paper focuses on malnutrition in general and not just stunted growth, we assume that all children below the reference

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median are not growing as expected and therefore are predisposed to the risk of being malnourished. On this basis and consistent with prior authors (Van de Poel et al., 2007; Wagstaff et al., 2003), our measure of malnutrition is the negative of height for age z-score (Neghaz). To make for easy interpretation of the results, Neghaz is multiplied by negative one (-1) to convert all the negative figures into positive figures. In this way, a higher positive, will mean poor nutrition, with the reverse being true for lower positives.

Other Variables

In estimating the base U5 nutritional models, the study uses other independent variables at the *individual level*: child age, gender and size at birth, *household level*: parental education, mother's height, sex of head of household, number of children U5, number of elderly women in household, household wealth (asset index) and *community level*: type of residence, ecological zone of residence, non-self cluster proportion of households with pipe water and flush toilets, non-self cluster proportion of children with complete vaccination and non-self cluster proportion of women with skilled deliveries, to estimate the production function for U5 nutrition. For the purpose of this study, we have divided Ghana into four ecological zones normally used to capture variation in resource distribution geographically. They are the southern belt; made up of the Western, Central and Volta regions. Greater Accra region is a stand-alone ecological zone given that it houses the capital city and has a relatively large population. The third is the middle belt, made up of the Ashanti, Brong-Ahafo and Eastern regions and finally the northern belt made up of Upper West, Upper East and Northern region.

The use of these variables as controls is based on the fact that they are common in the child health literature and have also been used by Prior authors in Ghana (Lavy et al., 1996; Van de Poel et al., 2007), Cote d'lvoire (Sahn, 1994; Thomas et al., 1996), Senegal (Bassole, 2007), Malawi (Chirwa and Ngalawa, 2008), Kenya (Kabubo-Mariara et al., 2009), Mozambique (Sahn and Alderman, 1997) and cross-country SSA data (Fay et al., 2005; Smith et al., 2003). It is also important to emphasise that access to and availability of health services (mostly measured by

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variables such as distance from the nearest health facility, availability of transportation to health facility, health infrastructure etc.), constitute a key covariate in child health production functions such as the current case. Given however that none of these variables are available in the DHS data, we follow prior authors (Abekah-Nkrumah and Abor, 2016; Christiansen and Alderman, 2004; Kabubo-Mariara et al., 2009) and use the non-self cluster shares of healthcare utilisation and access to social infrastructure (access to pipe water, flush toilet, complete vaccination and skilled deliveries) as proxies for the availability and accessibility of health services. Details of all the variables used are captured in Table 1.

Estimating Inequality in Under-Five Malnutrition

Concentration curves are commonly used in the health literature to measure health related socioeconomic inequality (Kakwani, 1977; Kakwani et al., 1997; O'Donnell et al., 2007; Wagstaff et al., 1991). The concentration curve plots the cumulative proportion of a health variable accounted for by individuals in the population (i.e. on the y axis) and ranked by a living standard variable (i.e. on the x axis) from the poorest to the richest. If every individual irrespective of their living standard has the same level of the health variable, the concentration curve will lie everywhere on the line of equality (45-degree line). Where the curve lies everywhere above the line of equality, the health variable concerned is deemed to be concentrated among the poor. On the contrary, if the concentration curves lie everywhere below the line of equality, the health variable is deemed to be concentrated among the rich. The further the curve is above or below the line of equality, the more concentrated the health variable is among the poor or the rich (O'Donnell et al., 2008).

Although an important measure of inequality, concentration curves have inherent drawbacks, especially if one's aim is ascertaining the magnitude of inequality or comparing inequality across time or space as in the current paper. In line with other authors (Van de Poel et al., 2007; Wagstaff et al., 2003; Wagstaff and Watanabe, 2000), we used the concentration index, which is directly related to the concentration curve and defined as 2 times the area between the concentration curve and the line of equality. The concentration index lies between -1 and 1. A negative value is

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synonymous with the concentration curve lying above the line of equality and a positive value being the direct opposite. Unlike the concentration curve, the magnitude of inequality can easily be determined from the concentration index.

Assuming h is Neghaz of an U5 child i, the concentration index (CI) can be defined as in Equation 1 below.

$$CI = 1 - 2\int_0^1 CC_h(\mu \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where CC_h is the concentration curve for h. For individual level data, as in the current case, the concentration index can be calculated as in Equation 2.

$$CI = \frac{2}{N\mu}\sum_{i=1}^{N} w_i h_i r_i - 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where

$$\mu = \frac{1}{N}\sum_{i=1}^{N} w_i h_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

is the weighted mean of the health variable in the sample, N is the sample size, w_i is the sample weight, where the sum of w_i is equal to N and r_i is the fractional rank of the ith individual in the living standard distribution. Given that income or expenditure is not available in the DHS data, an assets index is used as the living standard measure. It is important though to acknowledge that asset indices have some weaknesses compared to income or expenditure data (see O'Donnell et al., 2008) and also sensitive to the concentration index (Lindelow, 2006). For weighted data, r_i can be defined as in Equation 4, where $w_0 = 0$

$$r_i = \frac{1}{N}\sum_{j=1}^{i-1} w_j + \frac{1}{2}w_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

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Decomposition of Inequality in U5 Malnutrition

It has been shown that the concentration index can be decomposed into contributions of the determinants of the health variable, where each contribution is the product of the sensitivity of the health variable in question with respect to the determinants of the health variable and the extent of socioeconomic inequality in the determinants of the health variable (Wagstaff et al., 2003). For a continuous health variable h, an additive linear regression model (Equation 5) can be used to estimate the determinants of h.

$$h = a + \Sigma_k \beta_k x_k + \varepsilon, \quad \text{..... (5)}$$

Where β_ε is a parameter for a vector of U5 malnutrition determinants x_k, with ε being the error term. The decomposition of the concentration index for h, CI, can be estimated using Equation 6.

$$CI = \sum k(\beta_k \bar{x}_k / \mu) CI_k + GCI_\varepsilon / \mu, \quad \text{..... (6)}$$

Where μ is the mean of h, $\bar{x}_k$ is the mean of x_k, CI_k being the concentration index for x_k and GCI_ε the generalised concentration index for the error term, ε. From Equation 6, CI can be said to be a weighted sum of the concentration indices of the determinants of h, where the weights for the determinants, x_k is the elasticity of h with respect to $x_k \left| \eta_k = \beta_k \frac{\bar{x}_k}{\mu} \right|$ The error term in Equation 6 is an estimate of the level of inequality in h not explained by systematic variation in the x_k by the living standard variable (asset index). From Equation 6, the contribution of each of the determinants of h, x_k can be computed via the product of the elasticity and CI of each of the determinants.

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Decomposition of Changes in inequality in U5 Malnutrition

Wagstaff et al., (2003) have shown that changes in inequality over time or across two cross-sectional datasets can be decomposed over the determinant of the health variable using the Oaxaca type decomposition approach (Oaxaca, 1973) as in equation 7 below, where *t* is time period (in this case 2003 and 2014) and Δ denotes first difference. The rest of the terms in Equation 7 have the same interpretation as in Equation 6. Thus, Equation 7 will be used to decompose changes in Inequality in U5 malnutrition (i.e. Neghaz) between 2003 and 2014 over the determinants of h.

$$\Delta C = \sum_k \eta_{kt}(C_{kt} - C_{kt-1}) + \sum_k C_{kt-1}(\eta_{kt} - \eta_{kt-1}) + \Delta(GC_{\varepsilon t}/\mu_t) \quad \ldots\ldots\ldots (7)$$

Descriptive Results

The descriptive results of the study are captured in Table 1 (univariate) and Table 2 (bivariate). In Table 1, the variables used are compared across the two periods (i.e. 2003 and 2014).

Table 1: Summary Statistics for the 2003 and 2014 GDHS Data Used

Variables	**2003 Survey**			**2003 Survey**		
	Obs.	**Mean**	**SD**	**Obs.**	**Mean**	**SD**
Negative of Height for Age	2,267	1.921	1.147	1,923	1.455	0.971
Child Age						
0 – 11 **(Reference)**	2,267	0.148	0.355	1,923	0.149	0.356
12 – 23	2,267	0.220	0.414	1,923	0.215	0.411
21 – 35	2,267	0.218	0.413	1,923	0.228	0.420
36 – 47	2,267	0.232	0.422	1,923	0.205	0.404
48 - 59	2,267	0.181	0.385	1,923	0.203	0.402

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Gender of Child						
Male Child **(Reference)**	2,267	0.523	0.500	1,923	0.533	0.499
Female Child	2,267	0.477	0.500	1,923	0.467	0.499
Child Size @ Birth						
Below Average **(Reference)**	2,267	0.183	0.386	1,923	0.173	0.378
Average and Above	2,267	0.714	0.452	1,923	0.676	0.468
Very large	2,267	0.103	0.304	1,923	0.151	0.358
Woman's Education Level						
No Education **(Reference)**	2,267	0.496	0.500	1,923	0.398	0.490
Primary	2,267	0.192	0.394	1,923	0.212	0.409
Secondary	2,267	0.302	0.459	1,923	0.367	0.482
Tertiary	2,267	0.010	0.098	1,923	0.023	0.151
Partner's Education						
No Education **(Reference)**	2,267	0.413	0.492	1,923	0.329	0.470
Primary	2,267	0.095	0.293	1,923	0.124	0.330
Secondary	2,267	0.445	0.497	1,923	0.472	0.499
Tertiary	2,267	0.047	0.212	1,923	0.074	0.262
Gender of Household Head						
Male **(Reference)**	2,267	0.794	0.405	1,923	0.804	0.397
Female	2,267	0.206	0.405	1,923	0.196	0.397
No. of Children U5	2,267	1.866	0.856	1,923	1.865	0.892
No. Elderly Women	2,267	1.372	0.707	1,923	1.331	0.700
Woman's Height	2,267	158.651	6.702	1,923	158.640	6.030

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Household Wealth	2,267	0.156	0.178	1,923	0.549	0.152
Ecological Zone						
Southern Belt **(Reference)**	2,267	0.228	0.420	1,923	0.293	0.455
Capital City	2,267	0.067	0.250	1,923	0.063	0.243
Middle Belt	2,267	0.363	0.481	1,923	0.288	0.453
Northern Belt	2,267	0.341	0.474	1,923	0.356	0.479
Area of Residence						
Urban Residence	2,267	0.243	0.429	1,923	0.367	0.482
Rural Residence	2,267	0.757	0.429	1,923	0.633	0.482
NSCP- Good Water	2,267	0.524	0.337	1,923	0.454	0.368
NSCP- Flush Toilet	2,267	0.039	0.137	1,923	0.106	0.213
NSCP- Complete Vaccination.	2,267	0.788	0.146	1,923	0.891	0.091
NSCP- Delivery Assistance	2,267	0.349	0.280	1,923	0.624	0.264

Source: Authors' calculations. NSCP is the non-self-cluster proportion of households with the respective items, example good water.

The average of Neghaz reduced by 24% from 1.921 in 2003 to 1.455 in 2014. The size of children at birth increased marginally for all categories, with the percentage of women with no education reducing by 20%. On the contrary, women with primary, secondary and tertiary education increased by 10.4%, 21.5% and 130% respectively. Also, partners with no education reduced by 20%, whiles those with primary, secondary and tertiary education increased by 30.5%, 6.1% and 57.4% respectively. Whiles male household headship increased marginally by 1.3%, that of females reduced by 4.9%. Between the two periods, household wealth increased by 251%. The percentage of study participants living in urban areas doubled, with rural dwellers reducing by 16.4%. Whereas the proportion of households in a cluster with good water (16.4%) reduced, those with flush toilets (13.4%), the proportion of children in a cluster with complete vaccination

ISSN 0855-4730 *e*ISSN (online): 2590-9673

and women in a cluster who had skilled professionals attending to them during child birth increased substantially.

Besides the univariate analysis, Table 2 shows bivariate relationships between Neghaz and selected individual and household characteristics. Consistent with the results in Table 1 above, the mean of Neghaz reduced (i.e. improved) in 2014 across all the individual and household level characteristics. Notwithstanding this, urban dwellers had poorer nutritional status (i.e. higher Neghaz) compared to those in rural areas for the two periods. Although the northern belt has the highest concentration of Neghaz compared to the other ecological zones, it nonetheless recorded the second highest reduction (24%) in Neghaz after the middle belt (32%).

Table 2: Cross Tabulation of Negative of Height for Age with Household and Individual Characteristics

Variables	**Mean of Negative of Height for Age**	
	2003	**2014**
Area of residence		
Urban	2.000	1.510
Rural	1.644	1.240
Ecological Zone		
Southern Belt	1.823	1.473
Capital City	1.376	1.100
Middle Belt	1.863	1.261
Northern belt	2.242	1.708
Wealth Quintiles		
Poorest	2.206	1.602
Poorer	1.981	1.662
Middle	1.848	1.310
Richer	1.709	1.219
Richest	1.384	1.002
Gender of Household Head		
Male	1.876	1.405
Female	1.900	1.393

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Woman's Educational Level		
No education	2.108	1.628
Primary	1.802	1.471
Secondary	1.717	1.243
Higher	1.150	0.849
Partner's Education Level		
No education	2.161	1.658
Primary	2.049	1.554
Secondary	1.737	1.306
Higher	1.441	1.061
Year of Survey	1.894	1.396

Source: Authors' calculations using data from the 2003 and 2014 Ghana DHS survey.

As expected, the poor have a higher concentration of children with Neghaz compared to the rich, as the mean of Neghaz reduces as one moves from the poorest quintile to the richest quintile in both periods. In 2003, children in male-headed households had lower Negahz compared to their counterparts in female headed households. The situation changed in 2014, with children being better off in female-headed households compared to male-headed households. The education of women and their partners proffer an advantage in terms of nutritional status, as the mean of Neghaz reduces as the education of women or their partners improves from no education to primary, secondary and higher education.

Inequality in Under-Five Malnutrition

Inequality in under-five malnutrition (Neghaz) is estimated for the two periods, first using the concentration curve and then the concentration index. Figure 1 suggests that inequality in Neghaz increased at the national level between the two periods, especially from the 30th decile.

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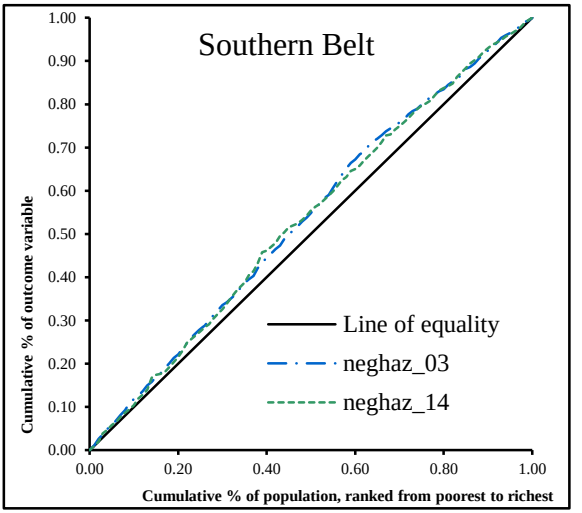
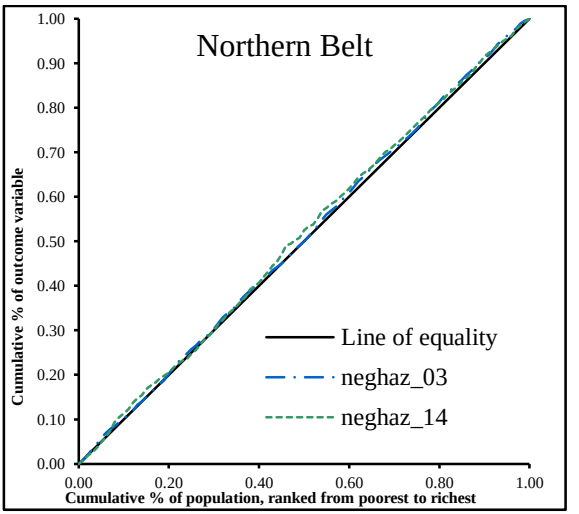
Figure 1: Concentration Curves for N National and Ecological Zones





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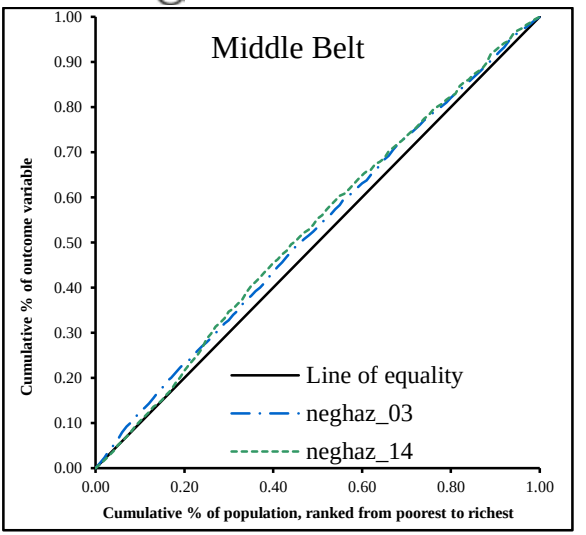

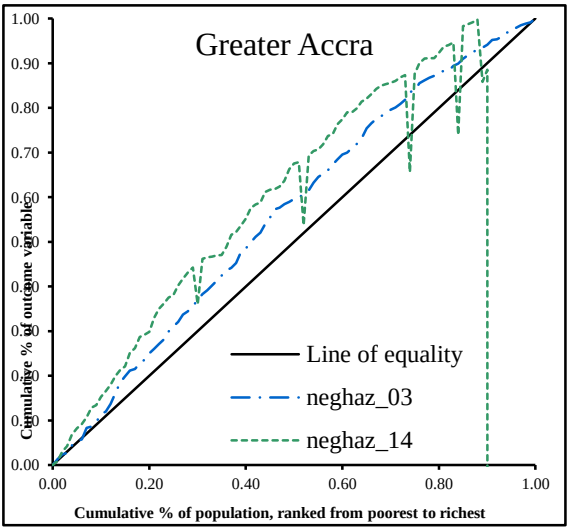

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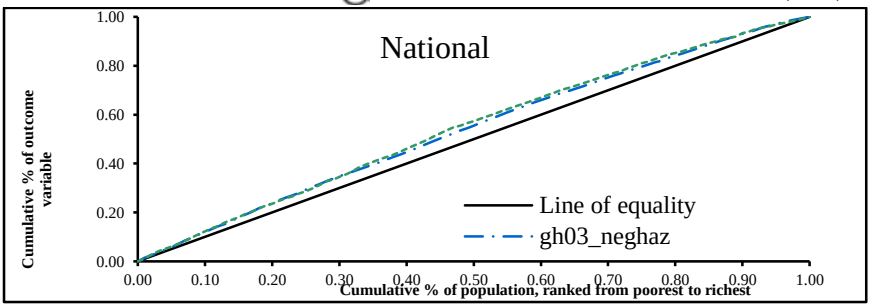

The increase as per the national level graph is confirmed by the concentration index in Table 3 (below), which suggest that inequality in Neghaz increased by 19.2% from -0.078 in 2003 to -0.093 in 2014. At the ecological zone level, the graphs for Greater Accra, the middle and northern belts suggest that inequality in Neghaz increased, with the gap, being highest in Greater Accra than the other ecological zones. The concentration curves for the southern belt are not as conspicuous as those for the other zones, even though it seems to suggest that inequality in Neghaz reduced between the two periods for the southern belt.

Table 3: Decomposition of Change in Inequality in Negative of Height for Age from 2003 to 2014

Variables	Decomposition 2003				Decomposition 2014				Decomposition Of Change	
	Elast.	CI	Cont.	C%	Elast.	CI	Cont.	C	Total	%
Child Age										
12 – 23	0.060	0.040	0.002	-3.1	0.052	-0.023	-0.001	1.3	-0.004	23.4
21 – 35	0.095	0.050	0.005	-6.1	0.088	0.073	0.006	-6.9	0.002	-10.4
36 – 47	0.072	-[illegible]1	-0.002	2.8	0.059	-0.071	-0.004	4.5	-0.002	12.7
48 - 59	0.048	0.010	0.000	-0.6	0.035	0.003	0.000	-0.1	0.000	2.5
Female Child	-0.056	-[illegible]0	0.001	-0.7	-0.032	-0.022	0.001	-0.8	0.000	-1.0
Child Size @ Birth										
Ave. and Above	-0.065	-[illegible]0	0.001	-1.6	-0.081	-0.002	0.000	-0.2	-0.001	7.3
Very large	-0.019	0.217	-0.004	5.4	-0.042	0.040	-0.002	1.8	0.002	-16.1
Woman's Educ.										
Primary	-0.015	0.054	-0.001	1.1	0.002	-0.047	0.000	0.1	0.001	-4.8
Secondary	-0.016	0.327	-0.005	6.7	-0.029	0.289	-0.008	9.1	-0.003	20.9
Tertiary	-0.002	0.682	-0.001	1.8	-0.002	0.895	-0.002	1.8	0.000	1.6
Partner's Educ.										
Primary	0.001	-[illegible]9	0.000	0.2	0.009	-0.190	-0.002	1.8	-0.002	9.9
Secondary	-0.017	0.214	-0.004	4.6	0.007	0.184	0.001	-1.3	0.005	-31.0
Tertiary	-0.002	0.579	-0.001	1.3	-0.006	0.604	-0.004	4.1	-0.003	18.2
Female HH	0.018	0.115	0.002	-2.6	0.018	0.106	0.002	-2.1	0.000	0.4

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No. of Children U5	**0.134**	**-58**	**-0.008**	**10.0**	**0.154**	**-0.064**	**-0.010**	**10.**	**-0.002**	**13.3**
No. Elderly women	**-0.075**	**-03**	**0.000**	**-0.2**	**-0.018**	**-0.058**	**0.001**	**-1.2**	**0.001**	**-5.7**
Woman's Height	**-2.319**	**0.001**	**-0.003**	**3.6**	**-3.175**	**0.000**	**0.000**	**0.1**	**0.003**	**-17.3**
Household Wealth	**-0.080**	**0.510**	**-0.041**	**52.2**	**-0.198**	**0.147**	**-0.029**	**31.**	**0.011**	**-74.0**
Ecological Zone Capital City	**-0.001**	**0.702**	**0.000**	**0.6**	**-0.023**	**0.625**	**-0.015**	**15.**	**-0.014**	**91.5**
Middle Belt	**0.010**	**0.119**	**0.001**	**-1.6**	**-0.042**	**0.107**	**-0.005**	**4.8**	**-0.006**	**37.0**
Northern Belt	**0.041**	**-75**	**-0.019**	**24.9**	**0.014**	**-0.623**	**-0.009**	**9.6**	**0.010**	**-67.1**
Rural Residence	**-0.014**	**-06**	**0.003**	**-4.4**	**-0.019**	**-0.330**	**0.006**	**-6.7**	**0.003**	**-17.8**
NSCP- Good Water	**-0.008**	**0.132**	**-0.001**	**1.3**	**0.034**	**0.278**	**0.009**	**-**	**0.010**	**-67.2**
NSCP- Flush Toilet	**0.000**	**0.799**	**0.000**	**-0.2**	**-0.030**	**0.596**	**-0.018**	**19.**	**-0.018**	**116.5**
NSCP- Comp Vacc.	**-0.226**	**0.000**	**0.000**	**-0.1**	**-0.187**	**-0.002**	**0.000**	**-0.4**	**0.000**	**-2.1**
NSCP- Deliv. Asst.	**-0.025**	**0.271**	**-0.007**	**8.8**	**-0.115**	**0.137**	**-0.016**	**17.**	**-0.009**	**58.1**
Residual			**0.003**	**-4.0**			**0.003**	**3.5**	**0.000**	**1.0**
Inequality (Total)			**-0.078**	**100.**			**-0.093**	**100**	**-0.015**	**100.0**

Source: Authors' Calculations. Note: *** is significant at p<0.01, ** is significant at p<0.05, * is significant at p<0.10. NSCP is the non-self-cluster proportion of households with the respective items, example good water. Note also that Elast. is Elasticity, CI is Concentration Index, Cont. is Contribution, C% is Contribution %

Given that in each of the four ecological zones, the concentration curve for 2014 crossed that of 2003 at several points in the distribution of Neghaz, the use of the concentration curves alone may not be adequate to ascertain changes in inequality in Neghaz between the two periods. Thus, we rely on the concentration index in Table 4, which suggest that with the exception of the southern belt, where inequality in Neghaz reduced by 5.8% (-0.069 in 2003 to -0.065 in 2014), it increased by 4.8% (-0.125 to -0.131) in Greater Accra, 20.4% (-0.049 to -0.059) in the middle belt and 162.5% (-0.008 to -0.021) in the northern belt. Notwithstanding the change, it is important to emphasise that the levels of inequality in U5 malnutrition was higher in Greater Accra followed by the southern, middle and finally the northern belt.

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Variables	Southern Belt				Capital City				Middle Belt				Northern Belt			
	2003 Cont.	2014 Cont.	Change Cont.	% Change	2003 Cont.	2014 Cont.	Change Cont.	% Change	2003 Cont.	2014 Cont.	Change Cont.	% Change	2003 Cont.	2014 Cont.	Change Cont.	% Change
Child Age																
12 – 23	0.004	-0.001	-0.005	51.8	0.002	0.000	-0.002	-3.3	0.002	-0.004	-0.006	29.8	0.002	0.002	0.001	3.1
21 – 35	0.000	-0.003	-0.003	31.2	0.000	0.017	0.018	24.7	0.009	0.008	0.000	1.7	0.002	0.007	0.005	19.3
36 – 47	-0.002	0.001	0.002	-23.3	0.004	-0.002	-0.006	-7.9	-0.005	-0.006	-0.001	6.8	-0.001	-0.008	-0.007	-25.0
48 - 59	-0.001	-0.001	0.000	-2.4	-0.001	0.001	0.001	1.6	-0.002	0.004	0.006	-28.4	0.003	0.000	-0.003	-11.4
Female Child	0.002	0.000	-0.001	11.8	-0.006	-0.004	0.002	2.1	0.000	0.000	-0.001	2.7	0.002	0.001	-0.002	-6.7
Child Size @ Birth																
Ave. and Above	0.000	0.000	0.000	0.0	-0.011	-0.003	0.008	10.6	-0.001	0.000	0.001	-5.5	-0.002	0.000	0.001	5.5
Very large	0.000	-0.003	-0.003	28.7	0.001	-0.005	-0.006	-8.8	0.000	0.001	0.001	-3.7	-0.001	-0.001	-0.001	-2.1
Woman's Educ.																
Primary	0.000	0.001	0.001	-8.4	-0.001	0.021	0.022	30.7	0.001	-0.004	-0.006	26.7	-0.001	0.000	0.001	3.4
Secondary	0.003	-0.004	-0.006	64.7	0.000	-0.017	-0.017	-23.4	-0.007	-0.002	0.005	-25.3	-0.003	-0.002	0.000	0.9
Tertiary	-0.003	-0.001	0.002	-23.4	-0.005	-0.008	-0.003	-4.3	-0.001	-0.003	-0.003	12.3	0.000	-0.002	-0.002	-6.5
Partner's Educ.																
Primary	0.003	-0.005	-0.008	86.6	-0.016	-0.048	-0.032	-44.6	-0.002	0.003	0.005	-24.9	0.000	0.002	0.002	8.7
Secondary	-0.004	0.002	0.006	-62.3	0.001	-0.005	-0.006	-8.5	0.001	-0.006	-0.007	34.1	-0.002	0.001	0.003	11.5
Tertiary	-0.006	-0.004	0.003	-28.7	0.001	0.046	0.046	63.8	0.000	-0.014	-0.014	68.8	0.004	0.004	0.000	-1.1
Female HH	-0.003	0.001	0.004	-43.3	-0.002	0.000	0.003	3.8	0.001	0.000	0.000	1.7	0.000	-0.001	-0.001	-4.7
No. of Children U5	-0.006	-0.009	-0.003	32.1	-0.014	-0.019	-0.005	-6.4	-0.005	-0.005	0.000	1.4	-0.001	0.000	0.001	3.0
No. Elderly women	-0.005	0.001	0.006	-63.2	0.000	0.001	0.001	1.3	-0.002	-0.001	0.001	-5.1	0.000	-0.001	-0.001	-4.8
Woman's Height	-0.002	-0.024	-0.022	222.8	-0.006	0.000	0.006	8.1	-0.008	0.002	0.010	-47.5	-0.005	-0.004	0.001	5.0
Household Wealth	-0.058	-0.029	0.029	-296.4	-0.073	-0.063	0.010	14.1	-0.029	-0.021	0.007	-35.9	-0.012	0.005	0.016	59.1
Rural Residence	-0.002	0.010	0.011	-114.8	0.033	0.016	-0.018	-24.9	0.009	-0.004	-0.013	61.6	0.008	-0.006	-0.014	-51.1
NSCP- Good Water	-0.001	-0.011	-0.010	103.1	-0.003	0.006	0.009	13.1	0.008	0.034	0.026	-125.2	-0.003	-0.006	-0.003	-9.5
NSCP- Flush Toilet	0.011	0.006	-0.006	57.6	-0.006	-0.036	-0.030	-41.7	-0.004	-0.014	-0.010	46.5	0.000	0.002	0.003	9.5
NSCP- Comp Vacc.	0.002	-0.001	-0.003	30.9	0.000	0.000	0.000	-0.4	-0.001	0.000	0.001	-7.1	-0.006	-0.005	0.001	4.4
NSCP- Deliv. Asst.	0.003	0.006	0.002	-23.4	-0.056	-0.023	0.033	46.2	-0.007	-0.025	-0.018	88.2	-0.014	-0.010	0.004	14.9
Residual	-0.005	0.001	-0.007	68.2	0.032	-0.007	0.039	54.1	-0.009	-0.003	-0.005	26.4	0.020	0.000	0.020	74.6
Inequality (Total)	**-0.069**	**-0.065**			**-0.125**	**-0.131**			**-0.049**	**-0.059**			**-0.008**	**-0.021**		

ISSN 0855-4730 *e*ISSN (online): 2590-9673

Decomposition of Change in Inequality in Under-Five Malnutrition

This section examines factors that explain the changes in U5 malnutrition inequality between 2003 and 2014. The columns labelled "Cont", and "C %" in Table 3 captures the contribution and contribution percentage of the independent variables to the level of inequality in Neghaz in 2003 and 2014. The last two columns of Table 3 capture the decomposition of changes in inequality between 2003 and 2014. A positive contribution percentage suggests the variable in question contributed to increasing inequality, with the reserve being true in the case of a negative contribution percentage. The results in Column 5 of Table 3 suggest that household wealth contributed about 52.2% to the level of inequality in 2003. In addition to household wealth, disparities in geography also accounts for about 24% of inequality in Neghaz. The education of women and their partners' together account for about 16% whiles the number of children under-five accounts for about 10% of the level of inequality in Neghaz in 2003. The variables capturing availability and accessibility to health services together contribute about 10% of the inequality in under-five malnutrition in 2003. The contribution of U5 malnutrition determinants to the total level of inequality in Neghaz in 2014 is not entirely different from 2003. Household wealth continues to be the largest contributor (31%) to inequality in U5 malnutrition in 2014. Compared to 2003, the contribution of household wealth to inequality in Neghaz dropped by approximately 40%. On the contrary, the contribution of women and partner's education (16%) stayed almost the same whiles the contribution of accessibility and availability of health services increased from 9.9% in 2003 to 25.8% in 2014.

The results in the last two columns of Table 3 capture the decomposition of changes in inequality in U5 malnutrition between 2003 and 2014. The results suggest that the variables capturing availability and accessibility to health facilities makes the biggest contribution (105%) to the change in U5 malnutrition inequality between the two periods. This is followed by household wealth, albeit that its contribution reduces the U5 malnutrition gap. Differences in ecological zones also explain about 61.4% of the

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period (2003 to 2014) change in inequality in U5 malnutrition. Also, women and partners education together explain about 14% of the inequality gap, with number of children U5 contributing 13.3%, women's height; -17.3% and differences in the age of children about 28%.

Beside the national level, the decomposition was also undertaken at the ecological zone level as in Table 4. As per the results, variables such as household wealth, education, availability and accessibility to health services and place of residence constituted major drivers of change in inequality in Neghaz between 2003 and 2014. In all the four ecological zones, the cumulative effect of education and availability and accessibility to health services widened the inequality gap, with the effect of education being lowest (13.7%) in Greater Accra and highest (91.7%) in the middle belt, whiles availability and accessibility to health services was lowest (2.3%) in the middle belt and highest (162%) in the southern belt. Household wealth increased the inequality gap in the northern belt (59.1%) and Greater Accra (14%). On the contrary, household wealth reduced the inequality gap both in the southern belt (296%) and middle belt (36%). The results also suggest that with the exception of the middle belt, rural residence had the effect of reducing the inequality gap in Neghaz in Greater Accra, southern and northern belts.

Discussion of Results

In this section, we discuss the results of the study as presented above. The descriptive results suggest that U5 malnutrition (i.e. Neghaz), reduced by about 24% between 2003 and 2014. This is comparable to the 16% reduction in U5 stunting between 2003 and 2014 as per the 2014 GDHS report (Ghana Statistical Service et al., 2014). It is important to emphasise that the 8% points difference between the estimated reduction in U5 malnutrition in this paper and that of the GDHS report is based on the fact that whiles the current paper uses all U5s who's HAZ is below the reference median, the GDHS report uses only U5s who's HAZ $\geq$ -2SD from the reference median. The reduction in U5 malnutrition in Ghana may be a reflection of improving economic opportunities in Ghana and its associated reduction in the levels of poverty. For example, the sixth round of the Ghana Living Standard Survey (GLSS) conducted in 2012/2013

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suggests that consumption related-poverty reduced by 27% from 51% in 1991 to 24% in 2013. The results in Table 1 also suggest that household wealth, a measure of welfare increased by about 251% between the two periods. Thus, it is not surprising that U5 malnutrition is reducing, given that improved income levels may mean improved capacity to afford appropriate nutrition for children, especially those U5.

There is consensus in the health economics literature (Bassole, 2007; Chirwa and Ngalawa, 2008; Kabubo-Mariara et al., 2009; Van de Poel et al., 2007) of the effect of education on child-related malnutrition. The results in Table 1 suggest that the percentage of women and their partners with no education reduced substantially between the two periods, whiles those with primary, secondary or tertiary education increased. In addition, the percentage reduction in the mean of Neghaz in Table 2 increases with the level of both the woman and partners education. Thus, it may be plausible that the reduction in U5 malnutrition may also reflect the general improvement in all levels of education.

The study results also reflect an increase in the proportion of respondents living in urban areas as well as those having access to health services. As is the case in several developing countries, Ghana is experiencing rapid urbanisation, as rural folks move to the city in search of jobs. For example, the World Bank estimates that the urban population in Ghana is growing at an annual rate of 3.5% in 2015. It is surprising to find that urban areas that are supposed to be associated with socioeconomic progress rather have higher levels of malnutrition compared to rural areas. This may be due to the fact that the growth of social infrastructure and economic opportunities may not be keeping pace with the rate of urbanisation, which is not uncommon in Ghana, and there by constraining the urban poor's access to opportunity and by extension access to better nutrition. In addition, urban women are more likely to be working mothers, who may have less time for child care compared to women in rural areas (Smith et al., 2003). This may explain the higher levels of U5 malnutrition in urban areas compared to rural areas. It is important also to note that current trends in rural urban migration in Ghana are unlikely to change, thereby

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adding extra pressure on existing infrastructure and further compromising the nutrition of U5s, especially in urban areas.

Consistent with earlier authors (Van de Poel et al., 2007; Wagstaff et al., 2003), the results suggest that there is inequality in U5 malnutrition to the disadvantage of the poor. Even more important is the fact that inequality in U5 malnutrition increased by 19.2% between 2003 and 2014, even though household wealth, which measures welfare increased by over 250%. Thus, the a priori suggestion that income growth in many developing countries has mostly not resulted in poor people either increasing their incomes or having better access to social services (Sembene, 2015), may be true for Ghana. Additionally, there is evidence in the existing literature, particularly Ghana and South Africa (Zere and McIntyre, 2003; Van de Poel et al., 2007) and also globally (O'Donnell et al., 2008) to suggest that averages such as the malnutrition rate mask distributional challenges and therefore inadequate in measuring progress. It is therefore not surprising that inequality in under-five malnutrition is increasing at a time that the rate of under-five malnutrition is reducing. The decomposition confirms the importance of welfare measures to addressing inequality in U5 malnutrition. From the results, household wealth tends to be the most important contributor to socioeconomic inequality in U5 malnutrition and the second most important variable explaining the change in U5 malnutrition inequality between 2003 and 2014.

Besides welfare, geographic disparities, availability and access to health services and women and partners education were other important contributors to the level and changes in U5 malnutrition inequality between 2003 and 2014. The possible reasons for the contribution of education to inequality in U5 malnutrition is the same as already discussed for the relationship between education and the mean levels of U5 malnutrition. In many developing countries such as Ghana, geography may capture resource inequities and therefore inequality in opportunity (Abekah-Nkrumah and Abor, 2016). For example, the fact that Greater Accra hosts both the political and economic capital of Ghana makes it a centre of great opportunity. For the same reason, it receives more migrant

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labour from other parts of Ghana than any other ecological zone, who often ends up not having access to the jobs they seek. Thus, Greater Accra represents a zone of extreme opportunity and deprivation. It is therefore not surprising that it has the highest level of Inequality in U5 malnutrition.

Surprisingly the results suggest that the northern belt, made up of the three poorest and two most unequal regions in Ghana, based on consumption estimates (Cooke et al., 2016; Ghana Statistical Service, 2015) has the lowest inequality in U5 malnutrition. This notwithstanding, the northern belt remains a volatile zone, given that it has the highest consumption based poverty and inequality, in addition to the fact that it experienced the largest increase (162%) in U5 malnutrition inequality between 2003 and 2014. There is however, a relatively low level of U5 malnutrition inequality in the middle belt compared to Greater Accra and the southern belt. The middle belt; made up of Ashanti, Eastern and Brong-Ahafo regions, have major commercial as well as cash crop producing centres. Thus, income distribution and therefore consumption is more likely to be fair compared to Greater Accra and the southern belt. Hence the relatively low levels of inequality in U5 malnutrition in the middle belt. Although the southern belt had the second largest inequality in U5 malnutrition after Greater Accra, the level dropped between the two periods. The reason for the drop is not directly apparent. It is however plausible that the "oil find" in the western region (i.e. one of the regions making up the southern belt) and associated spill over effect may be creating new economic opportunities and thereby improving the incomes of the poor.

Beside the level and changes in U5 malnutrition inequality both at the national and ecological zone level, the decomposition results reiterate the importance of household wealth/income, education, household size and access to health services in tackling socio-economic inequality in child health. Existing evidence in Ghana (Van de Poel et al., 2007), Vietnam (Wagstaff et al., 2003), Iran (Hosseinpoor et al., 2006) and South Africa (Ataguba et al., 2011; Nkonki et al., 2011; Zere and McIntyre, 2003) confirms the findings of the current study. The cross-cutting nature of the drivers of inequality in U5 malnutrition as per the results of the paper, implies the need to pursue policies that are cross-sectoral, inclusive and

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can ultimately lead to a fairer distribution of opportunities and access to social infrastructure such as healthcare services.

Conclusion

The paper sought to examine the level and changes in U5 malnutrition inequality in Ghana for two periods (2003 and 2014), as well as factors responsible for such changes. The overriding motivation for carrying out the study was that improvement in U5 malnutrition in a country such as Ghana may not necessarily mean fairer distribution. The results support existing studies and emphasises the fact that general improvements in consumption and reduction in U5 malnutrition both at the national and sub-national levels may not necessarily mean a systematic improvement in the incomes of the poor and for that matter access to adequate and appropriate nutrition. Thus, even though welfare measures such as income or assets may be increasing, inequality may be increasing as well, as per the results of the current study.

The study also emphasises the importance of other factors such education, access to and availability of health services, geographical location and household size in improving both average and inequality in U5 malnutrition. Although several authors have looked at the issue of under-five inequality both from the economics and public health literature, they have mostly focused on using data at a single point. Besides, most of these papers have focused on national level analysis. Thus, the current paper, by using data from two points, over a period of almost 20 years and coinciding with the implementation of the MDGs makes a very important contribution to the Ghanaian and global literature alike. First, the finding that inequality in under-five malnutrition is increasing at a time when the rate of under-five malnutrition is reducing is instructive. Secondly, the variation in the distribution and incidence of under-five malnutrition across time constitute essential information for policy makers as they develop interventions to achieve the health-related SDGs.

The findings of the study suggest that policy makers should not only be interested in average outcomes but also the distribution of outcomes in the target population. There is also the need for cross-sectoral collaboration

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in health policy/interventions development and implementation approaches that are inclusive and can ultimately lead to fairer distribution of opportunities and consequently access to social services needed to reduce inequalities in U5 malnutrition.

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ISSN 0855-4730 *e*ISSN (online): 2590-9673

BANK EROSION AND OTHER CHANNEL PROCESSES OF A TROPICAL FOREST RIVER BASIN IN GHANA

John Manyimadin Kusimi[1]

Abstract

Bank erosion is one of the major sources of fluvial sediments. However, very little is known about the bank erosion rates, channel processes and volume of eroded sediments of tropical rivers. The study, therefore, assessed the annual bank erosion of a tropical river in Ghana using the erosion pin method from which estimates of annual sediment detached into the fluvial sediment system was determined. The underlying channel, fluvial, sub-aerial processes and soil characteristics influencing channel stability were investigated and discussed. There is a spatial variability in river channel processes; very active channel and bank erosion and deposition of fluvial materials along channel walls. Bank erosion is low at certain reaches of the rivers and channel deposition occurs at the inner bends of meander loops. Large volumes of bank sediments were delivered from the more eroding banks. Channel geometry, discharge/fluvial hydraulics or processes and bank materials are the major driving forces influencing bank erosion and deposition of river channels. Longer timescale of erosion pin measurements involving greater number of sites are required to get a better understanding of bank erosion rates and the fluvial sediment budget of tropical rivers.

Keywords: Bank erosion; Erosion pin; Channel processes; Pra river; Soil texture; Sub-aerial processes, Tropical river.

[1] Senior Lecturer, Dept. of Geography & Resource Development, University of Ghana, Legon. Email: jmkusimi@ug.edu.gh

ISSN 0855-4730 *e*ISSN (online): 2590-9673

Introduction

Fluvial erosion is defined as the removal of bank material by the action of hydraulic forces. Although it generally occurs in combination with weathering processes that prepare bank sediments for erosion by enhancing their erodibility (Hooke, 1980; Thorne, 1982; Lawler, 1993; Prosser et al., 2000; Couper and Maddock, 2001). In general, fluvial-erosion rates depend on the near-bank flow intensity and physical characteristics (i.e., the erodibility) of the bank material (Rinaldi and Derby, 2008).

Bank retreat is an integrated product of three interacting processes; weathering and weakening, fluvial erosion, and mass failure (Couper and Maddock, 2001; Darbey et al., 2007; Rinaldi and Derby, 2008). Bank erosion is a key process in fluvial dynamics, affecting a wide range of physical, ecological, and socio-economic issues in the fluvial environment (Darbey et al., 2007; Rinaldi and Derby, 2008). Problems of bank erosion include turbidity which degrades stream water quality (e.g., Bertrand, 2010; Bull, 1997; Eaton et al., 2004; Hayes, 2004), stream sedimentation and siltation, nutrient, and contaminant enrichment (e.g., Reneau et al., 2004; Trimble, 1997), loss of riparian agricultural lands, and damage to infrastructure (e.g., bridge crossings, pipes) (e.g., Amiri-Tokaldany et al., 2003; Bertrand, 2010; Couper and Maddock, 2001; Trimble, 1997); changes in channel planform and cross section (Atkinson et al., 2003). Bank erosion also plays a very important role in river channel dynamics and meander development (Church and Slaymaker, 1989). Channels are widened; meander loops are severed to form ox-bow lakes and large volumes of sediments can be entrained into channels due to bank erosion and bank failure of river valleys. River banks have been shown to act as key sediment sources and sinks; in many different types and sizes of drainage basins and can supply over 50% of catchment sediment output (Church and Slaymaker, 1989; Lawler et al., 1999; Trimble, 1997). With such a significant fraction of material within the alluvial sediment system derived from river banks, it is evident that knowledge of the rates, patterns, and controls on bank-erosion events that release sediment to river systems is a pre-requisite for a complete understanding of the fluvial sediment transport regime (Rinaldi and Derby, 2008).

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There is growing research in bank erosion. For instance, research has focus on the role of riparian vegetation (e.g., Abernethy and Rutherfurd, 1998; Horton et al., 2017; Simon and Collison, 2002) and bank hydrology (e.g. Rinaldi and Casagli, 1999; Casagli et al., 1999; Rinaldi et al., 2004) as key controlling influences on bank stability, bank erosion and fluvial entrainment; mass failure and bank stability, bank erosion measurements (Lawler 1997; Lawler, 2005b; Billi, 2008; Bertrand, 2010). The role of weathering as a significant agent of erosion has also started to be recognised (e.g., Lawler, 1993; Prosser et al., 2000; Couper and Maddock, 2001). A number of studies have found that bank erosion rate is strongly related to the grain size of the sediments (e.g. Nanson and Hickin, 1986) and the percentage of silt and clay in the banks (e.g. Couper 2003; Hooke, 1979). And in recent times, studies have focussed on modelling of river-bank erosion and mass failures (e.g. Darby et al., 2007; Rinaldi and Derby, 2008), modelling of channel width adjustment and migration (e.g. Abernethy and Rutherfurd, 2000; Bartley et al., 2008).

Stream bank erosion rate studies have been undertaken using conventional, manual and field monitoring methods, and these involve erosion pins, cross section resurveys or terrestrial photogrammetry (Bartley et al., 2008; Lawler, 2005; Billi, 2008; Bertrand, 2010). New techniques available to estimate fluvial erosion rates or the erodibility parameters are the jet testing device (Thoman & Niezgoda, 2008), the LIDAR technology and Airborne Laser Scanning (Korpela et al., 2009; Pizzuto et al., 2010; Thoma et al., 2005), and the Photo-electronic Erosion Pin (PEEP) (Bartley et al., 2008; Bertrand, 2010; Lawler, 2005; Lawler et al., 1997).

Estimation of riparian land loss is not widely studied and very little of these studies have been done on tropical rivers where large storms which can produce very destructive flash floods that can cause massive bank erosion and sediment loads. The higher precipitation, sediment loads, and frequencies of bankfull discharge combined with greater vegetation resilience and faster chemical weathering rates of the humid tropical climate regime may produce different force-resistance relationships that may result in channel morphologies distinct from those in temperate

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regions (Alvarez, 2005). This is because humid tropical river basins are among the highest runoff basins regardless of basin area because intense convective rainfall is the hallmark of the climatic regime (Latrubessea et al., 2005; Syvitski et al., 2014). Also, bedrock and bank materials susceptible to erosion by these rivers and streams may be strongly and deeply weathered by biochemical weathering processes owing to the hot humid conditions and availability of humic and fulvic acids from plant litter (Syvitski et al., 2014). Consequently, tropical rivers may carry a disproportionate amount of sediment load to the world's oceans, both in particulate and dissolved forms (Latrubessea et al., 2005; Milliman and Farnsworth, 2011) from active channel and surface erosion. Knowledge on the volume of bank erosion of tropical rivers is still limited. Hence in this study an attempt was made to assess the annual bank erosion of a tropical river and its downstream variability using the erosion pin method from which annual volume of sediment detached into the fluvial sediment system was calculated. The underlying channel, fluvial, sub-aerial processes and soil characteristics influencing channel stability were also investigated.

Background of the Study Area

The study was undertaken in selected sites in the Pra River Basin; a tropical forest catchment. The basin is located in south central Ghana with the following geographical coordinates; latitudes 5º00ˡN and 7º15ˡN and longitudes 0º03ˡW and 2º80ˡW (Fig.1). The basin is made of four sub-catchments; Pra, Ofin, Oda, Anum and Birim Rivers which drain from the Mampong-Kwahu and Atewa Mountain Ranges (Kusimi et al., 2014). The drainage basin area is 23,188 km^2 with a mean annual discharge of 214 m^3s^{-1} (Akrasi & Ansa-Asare, 2008). The basin is generally of low relief characterised by undulating topography with an average elevation of about 450 m above sea level (Kusimi et al., 2014).

The main soil type of the catchment is forest ochrosols which are alkaline. The forest ochrosols can be correlated to acrisols/alisols/lixisols/nitisols/ferralsols and plinthosols of the World Reference Base 1998 system (Adjei-Gyapong & Asiamah, 2002). The soils are weathered from the Tarkwaian and Birrimian geological

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formations composing of sandstones, granites and metamorphosed rocks such as phyllites and schists. The soils are clayey and not well leached; hence have the capacity to retain more moisture and are very cohesive (Dickson & Benneh, 1995).

The climate of the basin is the tropical wet semi-equitorial climatic system which is characterized by two rainfall maxima, the first season being April – July and the second rainy season is from September – November. The rains are brought by the moist south- west monsoons with high annual rainfall amounts of between 125 and 200 cm. The rainy season could be characterised by high flows which can cause bank erosion at certain sections of the river channel. Dry seasons are well marked and span from November to March. Temperatures are high throughout the year with the highest mean monthly temperature being 30° C occurring between March and April and the lowest is about 26° C in August (Dickson and Benneh, 1995).

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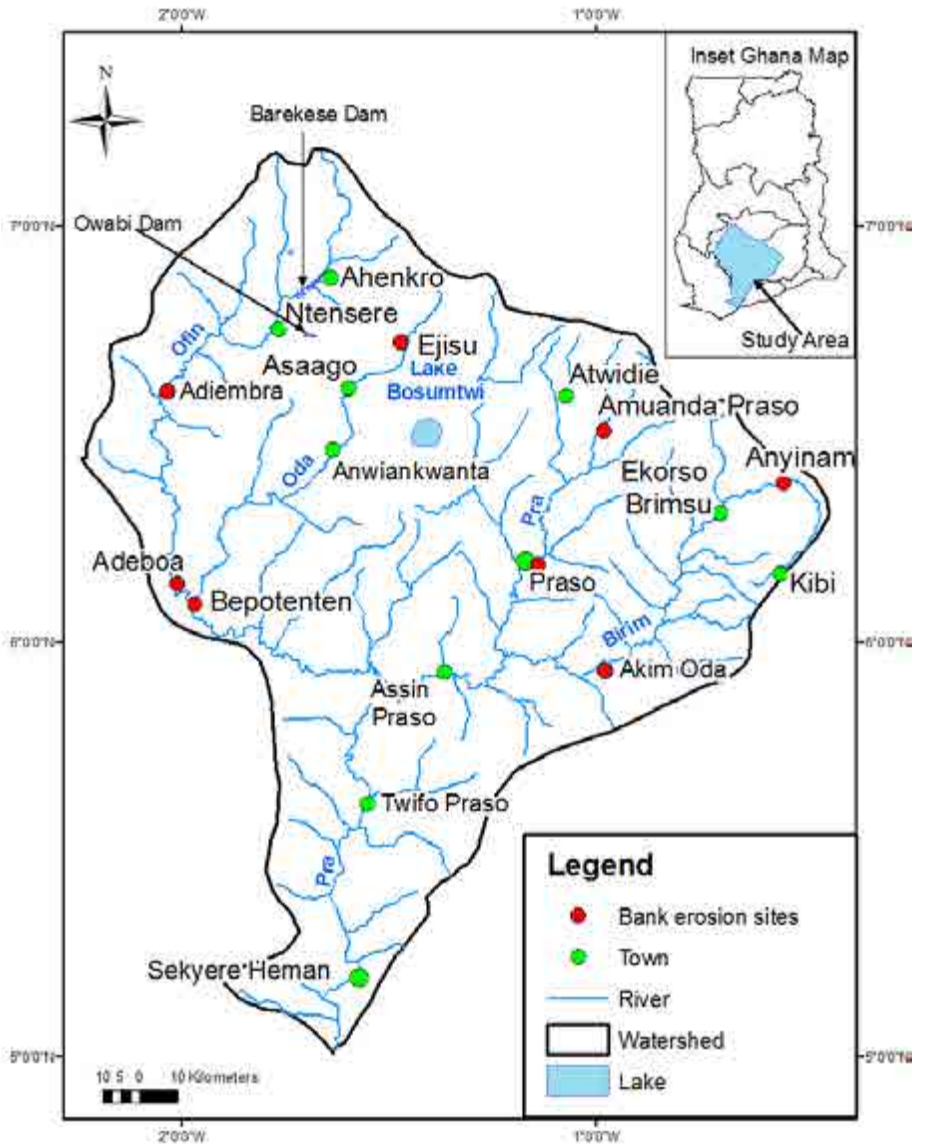

Fig.1: Pra River Basin showing sites (Map composer: John Kusimi)

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The Pra Basin is covered by the moist semi-deciduous forest vegetation which consists of trees, lianas, climbers and shrubs/bushes which protect the soil from erosion by rain drops and run-off. Many corridors of the channels are covered by the shrubs which protects bank erosion (Dickson & Benneh, 1995). Major human activities include agriculture, logging and mining due to its rich economic tree species, rich mineral ore deposits and conducive environment for farming. The basin contains most of the large cocoa growing areas in the Eastern, Ashanti, and Central regions. Tree cash crop cultivation other than cocoa is mainly oil palm. Food cropping is increasingly becoming more commercialized especially around the medium and large settlements and along the major road arteries (Water Resources Commission [WRC], 2011).

Materials and Methods

Bank erosion was assessed using erosion pin approach (e.g. Bertrand, 2010; Billi, 2008; Lawler et al., 1997; Schoonover et al., 2007) at 8 locations along the sub-basins, two locations on each river; one location in the upper course and the second in the middle course to determine spatial variability of bank erosion downstream. However, the downstream pins of Ofin and Oda Rivers at Adeboa and Bepotenten (Fig.1) were removed as a result of alluvial mining along the rivers by illegal small scale miners and new pins could not be inserted as flow had peaked. Hence data could only be recorded of 6 locations namely; Anyinam and Akim Oda on the Birim River, Amuanda Praso and Praso on the Pra River, Ejisu (Oda River), and Adiembra on the Ofin River (Fig.1). Pins were installed at both banks in all locations except at Akim Oda. Though both banks at Akim Oda were susceptible to erosion, it was quiet risky to insert pins at the right bank as it was inaccessible; cliffy bank face and deep channel at the time of pin insertion, hence only the left bank was monitored. Thus, pins were inserted at 11 sites for monitoring.

Galvanized steel rods of 6 mm thick and 45 cm long were inserted into channel walls and their levels of exposure measured with a ruler (Fig. 2). Depending on the depth of the bank face, pins were installed at each bank face at a horizontal and vertical grid intervals ranging from 0.5 - 1 m (Tables 1-6). Number of pins installed at a bank also depended on its

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surface area. Number of pins installed ranged from 6 – 12 at each bank and surface area of pin insertion is between 4.9 – 12 m^2 (Tables 1-6). Pins were pressed into the soil or lightly tapped with a hammer until 5 cm of the pin remained exposed. Pins were identified at cross sections with bench marks and numbered sequentially in downstream direction. The first pin in each cross section was placed on the bank toe approximately 3 cm above base flow water surface elevation and the last pin was placed below bankfull of the stream channel. This elevation was chosen to allow pin measurement during normal flow conditions. Pins were inserted in March in the dry season when flows were low and monitored during low flows for one year. Pins were reset to the 5 cm after monitoring visits (e.g. Bartley et al., 2008; Lawler, 1993; Staley et al., 2006). The first measurement was taken in August/September of the same year at sites where it was possible and in March the following year when flows were low.

Fig. 2: Erosion Pin at the bank of the Birim River at Akim Oda (Photo by John Kusimi)

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The level of exposure of the rod is an indication of the extent of bank erosion. Soil surface disturbance was minimized as much as possible while placing pins and when measurements were being taken. Reaches that were chosen for the bank erosion measurements were based on reconnaissance survey to identify areas of active channel erosion (Bertrand, 2010). Also, channel reaches undisturbed by human activities and artificial structures; as much as possible, were chosen to avoid impact of human activities on bank retreat (Lawler et al., 1997; Schoonover et al., 2007).

The volume of eroded sediment from bank erosion into the river sediment transport was estimated by multiplying mean erosion depth and surface area using equation (1) (Tables 1-6), (Ghimire et al., 2013): Volume = length × width × mean erosion depth.....(1). To determine the susceptibility of bank sediments to erosion, bank sediment samples were collected at each site and dry sieving was done to determine the grain sizes and the percent silt-clay and sand of bank sediments (Bartley et al., 2008). The number of data points for the study appear to be too small because it is a tropical forest river basin hence most parts of the river corridor was inaccessible unless through settlements. The author also lacked a boat to cruise over the streams to identify erosion sites and install pins. Channels were also very wide and deep hence most places were unsafe to installed pins without a boat.

Results and Discussion

Tables 1 – 6 show results of the annual rate of bank erosion (+) and deposition (-) as well as volume of eroded bank sediments from erosion pin measurements. Significant channel erosion was recorded at Akim Oda (Birim River), Ejisu (Oda River) and Adiembra (Ofin River) whiles at Anyinam (Birim River), Amuanda Praso and Praso both on the Pra River, bank erosion was low.

The left river bank at Anyinam was characterized by low bank erosion whiles deposition occurred at the right bank. For the left bank, two erosion pins never receded and the maximum annual mean erosion recorded was about 4 cm whiles deposition was very high at the right side, with alluvial deposits of between 2 – 65 cm (Table 1). Mean erosion depth was 1.3 cm

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producing about 33,800 cm^3 of bank materials into the river channel. Akim Oda however experienced very active bank erosion characterized by bank failure (Table 2). There was serious undercutting at the basal area leading to cantilever bank failure at Akim Oda. All erosion pins receded with the lowest eroded pin recession almost 4 cm and the highest about 20 cm of exposure. On the Birim River, mean annual bank erosion increased downstream from 1.3 cm at Anyinam to 9.9 cm at Akim Oda leading to an increase in the volume of eroded bank sediments from 33,800 cm^3 to 594,000 cm^3 (Tables 1 and 2).

Table 1: Annual bank erosion or deposition rates at Anyinam

				Length of exposure/deposition of pins/cm ("+" erosion and "-" deposition)				
River	Station	Bank	Bank Location	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
Birim	Anyinam	Left	Top	0.0	0.0	0.5	3	1
		Left	Bottom	1.0	0.5	2.0	1.5	3.7
		Right	Top	Deposition of sediments of depth between 2 – 17cm				
		Right	Bottom	Deposition of sediments of depth between 20 – 65cm				
Mean annual bank erosion (cm)				1.3				
Volume of eroded sediments (cm^3)				33,800				

Gridded interval: Horizontal (1 m), Vertical (0.65 m)
Source: Field survey

Table 2: Annual bank erosion or deposition rates at Akim Oda

				Length of exposure/deposition of pins/cm ("+" erosion and "-" deposition)			
River	Station	Bank	Bank Location	Pin 1	Pin 2	Pin 3	Pin 4
Birim	Akim Oda	Left	Top	12	4	17	Bank failure
		Left	Middle	3.3	20	4.5	buried
		Left	Bottom	10.5	8	buried	buried
Mean annual bank erosion (cm)				9.9			
Volume of eroded sediments (cm^3)				594,000			

Gridded interval: 1 m by 1 m
Source: Field survey

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One attribution for an increase in bank erosion downstream is owing to increasing flow/discharge downstream resulting in bank wearing and weakening, bank collapse by flood waters, especially at bankfull stage. Lawler et al. (1997; 1999) observed that, in the upper reaches of the river, where stream power is relatively weak, sub-aerial processes may dominate but from mid-basin downstream the optimum combination of water surface slope, channel cross- section geometry and discharge is obtained, hence available stream energy is likely to peak resulting in the dominance of stream entrainment processes such as bank wearing and mass failure of channel banks. In the upper reaches of river basins, stream power is low because of low discharges, despite steep bed slopes, thus limiting the available energy for fluid entrainment of bank materials and banks are also too small to be susceptible to mass failure (Lawler et al., 1997; Lawler et al., 1999) (Fig. 3). This promotes channel bed incision with low bank erosion characterised by step-pools and bars in the dry season (Fig. 3).

Fig. 3: River bed channels in the upper course of the Pra River at Amuanda Praso – Bars and steep pools (Photo by John Kusimi)

Monitored channel banks of the main Pra River were also characterized by both erosion and deposition (Tables 3 and 4). At Amuanda Praso, the right bank was more erodible than the left bank, whereas at Praso it was the vice versa. Mean annual bank erosion at Amuanda Praso 3.9 cm (Tables 3) was almost twice the bank wearing at Praso (2.3 cm) (Table 4).

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Bank toe erosion at both stations was greater than towards the bankfull stage. On the Pra River bank erosion decreased downstream by 1.6 cm between Amuanda Praso and Praso resulting in the amount of eroded bank sediments into the fluvial transport system to decrease from 156,000cm^3 at Amuanda Praso (Tables 3) to 37,260 cm^3 at Praso (Table 4).

Table 3: Annual bank erosion or deposition rates at Amuanda Praso

				Length of exposure/deposition of pins/cm ("+" erosion and "-" deposition)		
River	Station	Bank	Bank Location	Pin 1	Pin 2	Pin 3
Pra	Amuanda Praso	Right	Top	5.8	1.5	3
		Right	Middle	3	1	5
		Right	Bottom	5.5	4	6.4
		Left	Top	buried (-)	buried (-)	buried (-)
		Left	Middle	buried (-)	buried (-)	2.5
		Left	Bottom	6	6	5.5
Mean annual right bank erosion (cm)				3.9		
Volume of eroded sediments (cm^3)				156,000		

Gridded interval: 1 m by 1 m
Source: Field survey

Table 4: Annual bank erosion or deposition rates at Praso

				Length of exposure of pins/cm ("+" erosion and "-" Deposition)		
River	Station	Bank	Bank Location	Pin 1	Pin 2	Pin 3
Pra	Brenase	Right	Top	0	0.5	buried (-)
		Right	Bottom	buried(-)	buried (-)	Buried (-)
		Left	Top	1.2	2.0	2.9
		Left	Bottom	2.2	3.0	2.7
Mean annual left bank erosion (cm)				2.3 cm		
Volume of eroded sediments (cm^3)				37,260		

Gridded interval: 0.9 m by 0.9 m
Source: Field survey

Just like Anyinam, the river channel at Ejisu on the Oda River was experiencing both erosion and accretion with mean annual bank erosion

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almost 11 cm (Table 5). The lowest eroded pin was just above 2 cm and the highest eroded point was above 26 cm. The opposite bank was however undergoing sediment deposition. Volume of eroded bank sediments was 630,000cm^3. Unlike the other river channels, both banks of the Ofin River at Adiembra were subjected to bank erosion and the annual mean erosion at both right and left banks was above 2 and 8 cm respectively (Table 6). Volume of eroded sediments at right bank was 94,400 cm^3 whiles the left bank eroded bank sediment was calculated to be 122,550 cm^3.

In a nutshell, the retreat magnitudes observed in this study are lower than rates such as 8.3 – 44 cm obtained by Lawer et al. (1999) on Swale-Ouse system, northern England. These values are also lower than the global average, and lower than expected for a tropical river system, particularly when compared with other tropical rivers such as the Luangwa River in Zambia, where erosion was as high as 33 m yr^{-1} (Bartley et al., 2008; Gilvear et al., 2000).

Table 5: Annual bank erosion or deposition rates at Ejisu

				Length of exposure of pins/cm ("+" erosion and "-" Deposition)			
River	Station	Bank	Bank Location	Pin 1	Pin 2	Pin 3	Pin 4
Oda	Ejesu	Right	Top	3	3.2	7.8	26.7
		Right	Middle	2.4	4.3	7.9	6.2
		Right	Bottom	2.1	26.3	25.3	10.7
		Left	Top	Buried	Buried	Buried	
		Left	Middle	Buried	Buried	Buried	
		Left	Bottom	Buried	Buried	Buried	
Mean annual right bank erosion (cm)				10.5			
Volume of eroded sediments (cm^3)				630,000			

Gridded interval: 1 m by 1 m

Source: Field survey

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Table 6: Annual bank erosion or deposition rates at Adiembra

				Length of exposure of pins/cm ("+" erosion and "-" Deposition)			
River	Station	Bank	Bank Location	Pin 1	Pin 2	Pin 3	Pin 4
Offin	Adiembra	Right	Top	1	4.7	4.6	
		Right	Middle	1.2	1.6	3.9	
		Right	Bottom	1.1	1.3	1.8	
		Left	Top	3.3	3.8	3.1	9.5
		Left	Middle	3.4	3.6	3.3	24.7
		Left	Bottom	4.5	5.9	7.8	25.1
Mean annual right bank erosion (cm)				2.36			
Volume of eroded sediments at right bank (cm^3)				94,400			
Mean annual left bank erosion (cm)				8.17			
Volume of eroded sediments at left bank (cm^3)				122,550			

Grid interval: right bank (1m by 1 m), left bank (Horizontal = 1 m, Vertical = 0.5 m)

Source: Field survey

Generally, outer banks of meanders were characterized by pronounced erosion and there was deposition at the inner banks. For instance at Anyinam the left bank was an outer bank of a meander and it was experiencing bank erosion whiles at the right bank (inner bank) deposition was occurring. Deposited sediments ranged 2 – 65 cm thick (Table 1) with the depth of deposited materials increasing from the top of the bank towards bank toe. Similarly at Ejisu erosion was prevalent at the right side (outer bank) whiles deposition was dominant at the left bank (inner bank) (Table 5). Meander bend migration has been explained by water being directed towards the outer bank by centrifugal forces and super-elevation of water levels. This results in the potential for erosion on the outer bank and the transportation of eroded sediment towards the inner bank (Gilvear et al., 2000).

Bank erosion was also observed to increase towards bank toe except at Akim Oda where mean erosion of the top pins was 11cm as compared to 9.3cm at the bottom. The lowest difference between top and bottom pins erosion was 0.6cm at Praso whiles the highest value was 5.9cm at Ejisu (Tables 4 and 5). Bank toe incision is due to continuous flow within that

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section of the channel throughout the year resulting in bank undercutting which causes bank failures. Bank toe undercutting during the falling stage of the hydrograph results in the removal of bank material and banks collapse into the river channel (Kusimi, 2017). Characteristics of tropical rivers, river channels are flooded by tropical monsoon rains especially at the peak of the rainy season and receding flood waters become very erosive. This is because tropical rivers exhibit variable discharges, high discharges during the rainy season and a period of low flow when rainfall decreases (Latrubesse et al, 2005; Syvitski et al., 2014).

According to Bertrand (2010) and Lawler et al. (1999) bank toe erosion is triggered by shear stress exerted by the flow, which can lead to bank undercutting near the toe or mid-section region. This undercutting over-steepens the bank height making the bank more susceptible to mass failure and slumping (Lawler et al., 1999). Findings of this study agrees with Lawler et al. (1999), that bank retreat is the integrated product of three interacting processes (i.e. weathering and weakening, fluvial erosion and mass-wasting), with mass failures and fluvial erosion typically dominating in the middle to lower portions of a drainage basin. This reinforces the point that fluvial erosion and mass failures are both significant contributors to the total volume of fluvial sediment transport as observed by Luppi et al. (2009) along the Cecina River (Central Italy).

Steep banks were also subjected to cantilever bank failure due to undercutting and bank toe erosion whiles on gentle slopes erosion is by soil creep and this resulted in sediment deposition at the base of channels burying erosion pins. Bank incision was also pronounced along outer banks of meander loops than straight channels. Buried pins due to either bank failure or deposition could not be measured and insertion of new pins was not possible in the unconsolidated sediments. The vandalization of sites by illegal small scale alluvial gold miners downstream of the Oda and Ofin Rivers at Bepotenten and Adeboa respectively prevented the downstream variability trend assessment in bank erosion along these rivers. However, field observation showed bank erosion to be widespread in the middle course of the tributaries due to increase in discharge resulting in particle detachment and large-scale mass failure of channel banks as a

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result of processes earlier discussed [Fig. 4(a) & 4(b)]. At Asaago [Fig. 4(a)] and Ejisu active bank toe erosion is pronounced leading to under-cutting of bank profiles causing cantilever failures.

Fig. 4(a): Evidence of cantilever bank failure along the bank of the Oda River at Asaago – Kumasi (Photo by John Kusimi)

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Fig. 4(b): Evidence of cantilever bank failure along the bank of the Birim River at Akim – Oda (Photo by John Kusimi)

From the grain size analyses, most bank sediments were of coarser particle sizes (sand), thus diameter greater than 0.1 mm (Table 7). The lowest sand content (43.3%) was found at Akim Oda whiles the highest (80.8%) was recorded at Amuanda Praso. Silt-clay content ranged between 7.7% at Praso and 19.8% at Adiembra. Thus Adiembra left bank had the finest grain sizes whiles Amuanda Praso had the coarsest grain particles of bank sediments.

Table 7: Texture of bank sediments, rates of erosion and types of riparian vegetation

Location	Silt-clay (%)	Sand (%)	Bank erosion	Vegetative cover
Anyinam (left)	11.2	70.6	1.3	Trees & Shrubs
Amuanda Praso (right)	13.8	80.8	3.9	Trees
Akim Oda (left)	15.2	43.3	9.9	Trees
Praso	7.7	77.8	2.3	Trees & Shrubs
Adiembra (right)	18.8	79	2.4	Trees & Shrubs
Adiembra (left)	19.8	67.1	8.2	Trees & Shrubs
Ejesu (right)	12.2	76	10.5	Grass

Source: Field survey

Aside from the shear stress of flows and the morphology of the river channel (bank geometry), soil particle sizes and the type and nature of riparian vegetation strongly influenced the degree of bank erosion. High cohesive forces of finer particles particularly silt-clay made certain banks a bit resistant to erosion as compared to the coarser zones. For instance, at Ejisu due to high sand content (76%) bank erosion and bank failure were

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very pronounced resulting in accelerated bank erosion along this section of the bank owing to the non-cohesiveness of sand. Though, channel walls at Adiembra were being eroded, due to the high silt-clay content (18 – 20%), the rate of erosion on the average (1.3 cm) was low as a result of the strong cohesive bonds of the silt-clay soils, hence the channel walls were less susceptible to bank wearing. This is because cohesive materials resist erosion by a complex set of characteristics related to the existence of electro-chemical bonds between individual particles (Simon & Collison, 2001). According to Couper (2003) and Abidin et al. (2017), the relative composition of soil particle sizes and particularly, the silt–clay content of the soil have long been recognised to influence fluvial erosion and mass failures and the resistance of a bank to both processes tends to increase with increasing silt–clay content.

Dense fibrous root network created by trees along the banks effectively held soil particles against bank collapse whereas banks covered by grasses were more susceptible to bank erosion and slumping. In some instances there were soil over-hangs along well vegetated banks; that is, large soil peds were completely suspended by roots [e.g. Akim Oda, see Fig. 4(b)]. On the other hand, at Ejisu and Asaago [Fig. 4(a)] along the Oda River which was covered by grass, the banks were prone to cantilever bank failure in the rainy season when flow was at bankfull. According to Simon & Collison (2002), vegetation increases bank stability by intercepting rainfall that would otherwise have infiltrated into the bank, and by extracting soil moisture for transpiration. These processes enhance shear strength by reducing positive pore-water pressure and encouraging the development of matric suction (Simon & Collison, 2002).

An increase in soil moisture content decreases the magnitude of inter-particle forces within the material and reduces the resistance of the bank face to fluvial shear forces (Couper, 2003). Alternatively, low moisture contents can also weaken the soil (Couper, 2003). On drying, volumetric shrinkage of a cohesive soil mass results in the formation of a 'ped fabric', with blocks of soil separated by desiccation cracks (Thorne & Lewin, 1979; Thorne & Osman, 1988; Dietrich & Gallinatti, 1991). These cracks act as planes of weakness within the soil mass and cohesion within peds

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is greater than that between them (Thorne, 1990) so retreat tends to occur by peds detaching from the intact bank face. The study sites are however, located within the same climatic zone (wet semi-equitorial), with no significant difference in temperature, rainfall amounts and the duration of the dry season, hence the erosional processes observed in this study cannot be explained by the climatic elements. The mean annual rainfall is between 125 and 200 cm and a temperature range of 26 - 30°C. The dry spell within the climatic zone is 5 months from November to March (Dickson & Benneh, 1995).

Aside from the injection of bank sediments into the river channel resulting in high sediment yield of the rivers (Kusimi, 2017; Kusimi et al., 2014) which have implications on water resource management, the bank retreat was uprooting cocoa trees of cocoa farms along some banks. Some of the affected farms are located at Anyinam, Bepotenten and Ekorso Brimsu (Fig.1). This has serious implications on the productivity of the crop and the national economy as cocoa is one of the mainstays of the Ghanaian economy. The agricultural sector is said to be a major contributor to Ghana's economy, contributing about 45 percent to the country's Gross Domestic Products [GDP], with cocoa alone producing almost 25% of this total amount (Amamoo, 2016). It is Ghana's second leading foreign exchange earner yielding $2.7 billion in 2015 and the sector directly and indirectly employs about 2 million people (Gakpo, 2012; Myjoyonline, 2017). Cocoa farms are mostly affected because cocoa is a perennial crop with a productive period of between 3 – 25years; hence bank erosion catches up with the farms in zones of very active channel and bank erosion.

Conclusion

Results of the study show river channel dynamics; active channel and bank erosion within the three major tributaries of the Pra Basin namely, the Birim River, Oda River and the Ofin River and deposition of fluvial materials along channel walls. Bank erosion is low at certain reaches and deposition is occurring within the inner bends of meander loops. Large volumes of bank sediments were delivered into the river channel from the eroding banks. Channel geometry, discharge/fluvial hydraulics, riparian vegetation and bank materials are the most likely driving forces

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influencing channel and bank dynamics of the catchment. There was however insufficient data to ascertain the downstream spatial variability of bank erosion as this was only demonstrated along one river. Consequently; there is the need for longer timescale monitoring of bank erosion of tropical rivers to better understand the contribution of bank sediments to the sediment budgets of tropical rivers in order to facilitate the modelling of sediment yields of tropical rivers. Similar studies are needed to assess the impact of bank erosion on cocoa production.

Acknowledgement

This project was partially funded by the University of Ghana under the Faculty Development Grant.

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ISSN 0855-4730 *e*ISSN (online): 2590-9673

REMITTANCE FLOW TO HOUSEHOLDS OF INTERNAL MIGRANTS IN EKUMFI DISTRICT OF THE CENTRAL REGION, GHANA

Standhope Anamoa-Pokoo[1] & Delali Margaret Badasu[2]

Abstract

Migration has continued to receive increasing attention in development planning and practice over the past two or three decades and has attained a global recognition as it is included in the Sustainable Development Goals (SDGs), the global framework for development. Remittances has been considered as a highly likelihood outcome of migration and as an important element of the migration-development nexus. Remittance transfer has also been of significant importance to the economic well-being of migrant workers, their households, and their sending communities as well as their countries of origin. However, the discourse on migration and research has largely focused on international transfers to the neglect of flows within countries from internal migrants even though some evidence suggest that the volume of remittances from internal migrants is probably higher than those from international migrants. The present study examined the flow of remittances to households in one of Ghana's most deprived areas in the rather more developed southern part of the country. It seeks to fill the gap in knowledge about remittance flows to the area and southern Ghana for that matter. A mixed research method was employed for the study. A total of 377 households with an absent internal migrant were selected for the quantitative component of the study. In-depth interview was the main qualitative research technique used. The findings indicate that remittances have been sent to the households through formal and informal channels, mostly on monthly and quarterly basis. The in-kind remittances (mostly food stuff) are sent mostly through

[1] PhD Student, Russian State Social University. Email: standhopemail@gmail.com.
[2] Senior Lecturer, Regional Institute for Population Studies, University of Ghana. Email: delalibadasu@yahoo.com/dbadasu@ug.edu.gh

ISSN 0855-4730 *e*ISSN (online): 2590-9673

informal channels by bus, relative, friend or given by the migrants when on visit. The majority of the cash flows were through formal channels and are less than GH₵100 sent mostly on monthly or quarterly basis. The relatively low amount of remittances sent is attributed to the low skilled or low educational qualification of the migrants and the consequent low income earning activities they engage in at their destination areas. But a large percentage of the households also receive between GH₵300 to GH₵499 on quarterly or yearly basis while some receive GH₵500 occasionally. The remittance flows contribute to the wellbeing of the households of the migrants at their origin just as transfers from international sources do.

Keywords: remittance flow, internal migrants, households, sustainable development goals,

Introduction

Migration has received increasing interest at various levels over the past few decades. At the global level, its inclusion in the Sustainable Development Goals (SDGs), the framework for development for all members of the United Nations, is an indication of the importance attached to migration in development planning and practice. Regarding remittances, Target 10c of the SDGs is specifically on the cost of remittance transfers and is indicated as follows: 'By 2030, reduce to less than three per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than five per cent'.

Indeed, an activity that is almost always associated with migration is the sending of remittances. Clearly however, from the indicators of development, remittance is conceptually not necessarily linked to migration, but, it is seen as a highly likelihood outcome of migration (Boakye-Yiadom and Oduro, 2014). Remittance transfers also represent one of the key issues in development discourse today and is known to be important and stable source of income, not only in the developing world, but also in many transition economies (Mckenzie and Sasin, 2007; World Bank, 2008). Similarly, the World Bank (2006) indicates that the

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significant importance of remittances to the economic well-being of migrant workers, their households, and their sending communities is an undeniable fact. According to Baah-Boateng and Akyeampong (2012) the importance of remittances is categorized into macro and micro levels.

At the macro level, remittances serve as a source of foreign exchange earner, as these incomes exceed total official aid directed to the developing world by donor nations and alleviate poverty by accelerating national growth (International Organisation for Migration [IOM], 2015; United Nations on Conference and Trade-UNCTAD, 2010). Remittances are also generally considered as sources of foreign exchange **(**Adams, Cuecuecha and Page, 2008).

Also, at the micro level, remittances serve as a source of income for families and households, subsidises household consumption and contribute to educational and health expenditure of households. It also helps families to withstand budget shocks, bridges the income inequality gap between households, and has a declining effect on poverty (Baah-Boateng and Akyeampong, 2012).

Additionally, several other studies have observed the pragmatic role that remittances play in poor migrant households at their origin (Mazzucato, Van den Boom and Nsowah-Nuamah, 2008; Yang and Martınez, 2006). For instance Trager (2005) explains that remittances support everyday expenses in migrant households. It also covers the cost of daily living and the purchase of consumer goods in households (Cohen and Rodriguez, 2005; Newell, 2005). Again, remittances create new opportunities and provide the avenue for investments to migrant households (Van Doorn, 2004). Moreover, Cohen (2011) sees remittance practices as the outcomes of cultural traditions and social practices.

However, scholars like Krane (1973) and Rhodes (1977) hold dissenting and pessimistic views that, remittances play no role in aiding household livelihoods as well as the development of developing economies. Precisely, Ratha (2013) declares that, remittances could pose negative economic, social and cultural implications to the countries of origin. These

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views provide the unusual controversies on the relationship between migration and development. But such allusions may be refuted.

Most studies on migrants' remittance flow in Ghana have focused mainly on international remittances with much emphasis on econometric analysis of the flows (Baah-Boateng and Acheampong, 2012; Adams et al., 2008; Kanu & Ozurumba, 2013; Quartey, 2006) and the effects at the macro economy level of the country (Owiafe, 2008) to the neglect of large volumes of remittance transfers that take place within the national borders (Torvike, 2012). Such remittances from internal migrants reduce poverty in mostly rural households; and the families that produce these internal migrants, on the average, are poorer than those from which international migrants originate (Castaldo, Deshingkar, and McKay, 2012; Mckay and Deshingker, 2014).

Moreover, there is a dearth of research on internal remittances in Ghana (Adaawen and Owusu, 2013). Also, Mazzucato et al. (2008) and Quartey (2006) explain that there is scanty official data on internal remittances in Ghana. Meanwhile, the volume of internal migrants in the country is far higher than that of nationals who are resident abroad (Ghana Statistical Service [GSS], 2013). Castaldo et al. (2012) and Deshingkar (2006) note that internal remitters constitute a larger proportion of all remitters in Ghana and such remitters are more likely to have impact on the poor and less educated and hence have implications for poverty reduction goals. It has been noted that increasingly, migrants have the potential to improve standards of living as well as impact the institutions that shape local economies and the environment both in their destination and origin (Awumbila et al., 2011; IOM, 2015).

With these observations, Quartey (2006) and Torvike (2012) affirm the assertion that the relationship between migrant remittances and household welfare in Ghana has not been empirically and comprehensively investigated. This forms the focus of the study from which data for this paper is taken. The objectives of the paper are two-fold: to identify the types and channels of remittance flow to households of absent internal migrants and examine the factors associated with the receipt of

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remittances by the internal migrants' households at their origin in the Ekumfi District of the Central Region of Ghana.

Conceptual Considerations

Remittances are generally defined as the portion of the earnings of migrants (international and internal) sent from their destination to their families, other persons and communities at their place of origin (Addison, 2004). Three types of remittances have been identified: financial, food or goods and social remittances such as skills (Primavera, 2005). For this study, remittances refer to money (cash flows) and other material items such as food stuffs that are sent by migrants to their households at their origin.

A household is defined as a person or a group of persons (relatives and non-relatives) who live together in the same house or compound and share the same house-keeping arrangements (Ghana Statistical Service, 2014). Therefore, in this study, migrant households refer to the domestic units of members of migrant family that live together along with non-relatives such as house helps at the origin of the migrant and who receive remittances from the migrants.

Types and channels of remittances

Remittances (cash as well as goods) are sent through formal and informal channels to households and other recipients at the origin of migrants. Formal remittance channels include bank and non-banking institutions such as post offices and money transfer companies (MTCs) (Teye et al., 2017; Pieke, Van Hear and Lindley, 2007; Freund and Spatafora, 2008). Informal channels on the other hand include non-financial channels such as hand-carry by the migrants themselves, personal courier services and 'ethnic stores' as well as transfers disguised as gifts and bill payments (Brown, 2006) as well as delivery by friends and bus.

The findings of some studies have shown that increase in transaction cost has led to the decline in the use of formal channels of remittance transfer (Freund & Spatafora, 2008; Orozco, 2006). For instance in Latin America Orozco (2006) explains that a 10 percent charge in transaction cost of

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remitting money through formal channels led to a decline in the use of formal channels at the advantage of informal channels. In the sub-Saharan African situation, a study by Freund and Spatafora (2008) indicates that 45-65% increase in remittance tranfers largely pass through the informal channels.

Other preliminary works in Ghana suggest that the level of informal remittances also varies by type of migrant, that is, internal or international migrant (Adams, 2007). A household survey in Ghana by Adams (2007) and GSS (2008) found that only 1 percent and or less than 5 percent of remittances are received through formal channels such as banking systems, Western Union and post offices. A more recent study by Baah-Boateng and Acheampong (2012) indicates that about 53% of remittances received by households in Ghana from abroad came through Money Transfer Agencies. The emergence of mobile money transfer services across Ghana has facilitated and enhanced cash transfer within, into and out of the country. The use of mobile money has made it relatively easier and convenient for international migrants to send money home regularly as transfers have become fast and secured (Adaawen and Owusu, 2013). Transfers by internal migrants have also benefitted from mobile money services. However, informal means of remittance flow remain high in Ghana in spite of the proliferation of Money Transfer Agencies.

Determinants of the receipt of remittances

Most studies on remittance transfer have been on international transfers. A plethora of literature has examined the various determinants of remittance transfer at the international level. A common trend within the literature indicates that factors that can be classified into two categories: micro and macro determinants (Rapoport and Docquier, 2003). According to Bayezid (2012), the main micro determinants of remittances are the characteristics of migrants such as occupation, income and education status of the migrants as well as the socioeconomic situation relative to their families' in the home country. The macro determinants of remittance transfer on the hand include wages in the host countries, inflation, exchange rates, and economic conditions in both home and destination countries. Regarding internal migrants, income and other earnings

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(including farm produce) at the destination contribute to the ability of migrants to remit.

Regarding the microeconomic factors, the emphasis is usually laid on an individual migrant's motivation to remit. Migrants remit to their households on two instances: individual reasons and family arrangements (Bayezid, 2012). Under the individual reasons, the general motivation to remit highlights the altruistic motive (Lucas and Stark, 1985), the self-interest motive, and the implicit family contract or loan (for the travel) repayment (Alleyne and Francis, 2003) and the implicit family contract as co-insurance (Soalimano, 2003). The family arrangements on the other hand include exchange motives, insurance and investment for the future.

Several other factors are associated with receipt of remittance from both international and internal migrants by households such as age and sex of household head (McDonald and Valenzuela, 2012; Walewski, 2009; De Voretz and Vadean, 2008; Germenji et al., 2001). Age of migrants (Osili, 2007) and the length of stay at the destination (Adaawen and Owusu, 2013; Bayezid 2012; Lerch, Dahinden and Wanner, 2006; Siddiqi, 2004; Lucas, 2004; Solimano, 2003).

Furthermore, occupation of migrants in nexus with the level of education and level of income trigger the sending of remittances to households (Adaawen and Owusu, 2013; OECD, 2006). Low skilled migrants are often faced with forced labour, low wages, poor working conditions, as well as absence of social protection and other forms of exploitation (International Labour Organization-ILO, 2004). For these reasons, some migrants, do not remit because they have not had the opportunity to find employment that would allow them to earn enough to be able to remit (Ackah & Medvedev, 2010; Adaawen and Owusu, 2013).

Another key factor that is considered to influence the sending of remittances to households is the social ties or networks that exist between migrants and his origin families, according to Levitt (2001). The relationship of migrants with their head of household at their origin, among other factors, also influence the remittance sent to the household.

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Theoretical Considerations

New Economics of Labour Migration

This study employs the New Economics of Labour Migration (NELM) for its theoretical underpinning (De Haan et al., 2000) with respect to the decision making aspect of the migration process that can be linked to the remitting behaviour of the migrants. It also refers to the social exchange theory to explain the migration outcomes, specifically the transfer of remittances to the households at the origin (Luke, 2010).

The NELM was primarily propounded by Oded Stark (1978, 1991). It emerged in the late 1980s and early 1990s. According to Stark (1982), this approach to analysis of labour migration considers households or families as the principal agents in migration decision-making. It views migration as a strategy by the household or family to minimize, avert and share risks behaviours and also maximize income. Simply, the NELM considers migration as a livelihood survival strategy than an end in itself. Precisely, this theory places the behaviour of individual migrants within a wider societal context and considers the household rather than the individual as the decision-making unit (Stark, 1982). Skeldon (1997) and Meagher (2001) note that the NELM theory shares similar views with the household strategy or the livelihood approaches. The household strategy approach propounds that people act collectively not only to maximize expected income, but also to adopt a strategy for sustenance and minimize risks for the members of the kinship unit (Skeldon, 1997; Meagher, 2001). This is done by diversifying household sources of livelihood such as the receipt of remittances from migrants (Stark, 1991; Tacoli, 2002).

Another salient feature of the NELM approach is that, it lays emphasis particularly on the importance of remittances to households (Stark, 1982). Remittances aid family strategies to minimize the dangers of income inconsistencies and also guarantee a constant supply of income (remittances), particularly in times of risk (Stark & Levhari, 1982). Building on these ideas, De Haan (1999) explains that, remittances serve as a manifestation and viability of migrant households to share both the rewards and costs of migration. Therefore, the strength of the NELM

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theory is that it sees the family as the principal agent in migration decision making and recognises the importance of remittance transfers by migrants to their households for improving household livelihoods (Ellis, 2000; De Haas, 2008).

Nevertheless, the NELM and livelihood approach have been criticized for several reasons. De Haas (2008) argues that the household approach of NELM has the danger of potential reification of the household, when it is seen as a unit with clear and unanimous will, plans, strategies and aims. Additionally, Carling (2005) and Rodenburg (1997) have criticized the NELM's view of family as something homogeneous, monolithic and something of an altruistic unit. The NELM approach overlooks the intra-household differentiation of age, gender, and class as well. It also fails to see other bonds of the migrant such as friends and community. Furthermore, it denies any agency of individual household members because the theory ignores the possibility of revolt against the will of powerful and influential household members and therefore no possibility of migrating without consent or having a remitting behaviour that does not fit into the expectations of the household.

Moreover, Lindley (2006) argues that there is no direct link between the strategies and plans behind migration and consequences of migration. For example, the NELM approach attempts to establish a direct relationship between the motives behind migration and the act of remitting. Lindley has pointed out that this relationship is not as simple as assumed. Empirical evidence demonstrates that often the person migrating may not remit due to political or economic crisis in the receiving area or even due to the weakening of family ties. Migrants often get assimilated into the cultural and political environment of the receiving areas.

Taylor (1999) has also pointed out that the NELM and livelihood approaches are plagued by a certain disciplinary chauvinism. For example, these approaches have a rejectionist approach towards qualitative analysis and contend that quantitative analysis is the only credible form of analysis. This over-emphasis on quantitative techniques leaves little room for theoretical development; and due to this the NELM-livelihood approach

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falls prey to a certain kind of objectivism. Lastly, the NELM and livelihood approaches have been criticized for being over-optimistic about the role of migration in development in the sending areas as a result of migrants' transfer of remittances.

However, the NELM has particular focus on the role of remittances in migration outcome and explains labour migration through the flow of remittances that serves as a livelihood strategy pursued by social groups such as migrants' households, hence, the quest for migrants' family at origin areas to maximize income and minimize income inconsistencies through migration. Therefore, remittance transfer to households is integral to migration, according to the NELM.

This study has employed qualitative research techniques to collect data and other types of information to examine the subject under investigation. The results indicate that it is possible to use both quantitative and qualitative research techniques even when the NELM is the theoretical approach of a study on remittances.

Methods

The Study Area

The Ekumfi District is one of the twenty administrative districts in the Central Region of Ghana. (See Figure 1). It was established by a Legislative Instrument (L.I. 2170, 2012). It was carved out of the erstwhile Mfantseman Municipality as a result of its rapidly growing population that hampered its administration. As a means of ensuring effective administration and holistic development, Ekumfi became a district in June, 2012 with Essarkyir as its capital. It occupies a total land area of 276.65 square kilometres or 0.12 percent of Ghana's land area and is the fifth smallest among the twenty districts in the Central Region. The District has eight area councils namely, Essarkyir, Ebiram, Ekrawfo, Otuam, Narkwa, Eyisam, Srafa and Asaafa, which allow for grassroots administration. The District has one constituency which is the Ekumfi Constituency and 26 electoral areas.

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The population of Ekumfi District, according to the 2010 Population and Housing Census, is 52,231, representing 2.4 percent of the region's total population. Males constitute 24,102 (46 percent) and females represent 28,129 (54 percent) of the total population of the district. About ninety percent (89.4%) of the population dwell in rural areas. Farming, fishing and salt mining are the largest economic activities in the district. Pineapple production is the main farming activity in the district. Fishing and salt mining are activities are carried out along the coastal areas.

Figure 1 Geographical map of Ekumfi District

Source: Department of Geography and Regional Planning, (2016)

Research Design

The study used mixed research method design. This is because the mixed method design enabled the researcher to combine quantitative and qualitative research techniques, methods, approaches, concepts and language to explain and explore identifiable problems as well as make predictions at different levels of the study (Cresswell, 2003). Specifically, the study employed the embedded type of mixed method where the

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qualitative method supplements the quantitative methods in the data analysis (Blaikie, 2009).

Sample Size and Sampling Procedure

The sample size for migrant households that receive remittances was arrived at using both probability and non-probability sampling techniques. The selection of respondents in the district was done using the multi-stage sampling procedure, a technique that is recommended by Blaikie (2009) for surveys of households.

First of all, the researcher selected eight communities as the sampling frame from the twenty (20) largest communities, as provided by the list of enumeration areas (EAs) from the 2010 Population and Housing Census for Ekumfi District (GSS, 2012). The researcher used the simple random sampling (that is, the lottery method) to select eight (8) communities for the study. The researcher wrote the names of all the twenty (20) communities on a sheet of paper, folded them up, placed them in a bowl and mixed them up thoroughly. Afterwards, the researcher randomly handpicked the papers from the bowls until the first eight (8) communities for the study were selected. This ensured that all the selected twenty (20) largest communities had equal opportunity of being selected.

In the second place, a two-staged stratified sample design as well as the screening/inclusion criteria survey was used. It was carried out in the district to ascertain the distribution, spread and concentration of migrant households that receive remittances in the district. This is because migrant households that receive remittances were spread all over the district; the screening survey helped the researcher to identify which communities had migrant households that receive remittances. So, at the first stage, migrants were considered as the major criteria for stratifying households into migrant households and non-migrant households. This was done by seeking information about the presence and concentration of these migrant and non-migrant households from key informants who were mostly chiefs, opinion leaders and assemblymen of various communities. In every community, a key informant was located. These key informants answered some questions pertaining to migration and could indicate whether

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migrants were present in a particular household or not. At the second stage, remittances served as the major criteria for stratifying migrant households into households that receive remittances and households that do not receive remittances.

After the stratified sampling was done**,** the researcher used purposive sampling to identify the respondents. The reasons for using purposive sampling, was to get or locate respondents who have received remittances during the three years preceding the data collection. This reason supports Walter's (2010) definition of purposive sampling as selecting a sample in a systematic or purposive way based on what the researcher knows about the target population and the purpose of the study.

Using the purposive sampling technique throughout the selected communities, a total sample size of 377 was reached as shown in Table 1. That is, with the help of Krejcie and Morgan's formula for sample size determination, the researcher used the assumed target population of each community to derive the respective sample size for each community. For example, according to Krejcie and Morgan (1970), the efficient method or formula for determining the sample size needed to be representative of a given population is as follows:

$S = X^2 NP (1- P) \div d^2 (N -1) + X^2 P (1- P)$ where,

S = required sample size;

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (X=1.96). So, ($X^2 = 1.96 \times 1.96 = 3.841$);

N = the population size (100);

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size);

d = the degree of accuracy expressed as a proportion (d=0.05, so, $d^2 = 0.05 \times 0.05 = 0.0025$)

Statistically, using Otuam as an example:

$S = X^2 NP (1- P) \div d^2 (N -1) + X^2 P (1- P)$.

$S = 3.8416 \times 100 \times 0.50(1-0.50) \div 0.0025(100-1) + 3.8416 \times 0.50 (1-0.50)$

S= 80

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Table 1 ***Assumed Target Population and Sample Size***

Selected Communities	Assumed target population (Based on Screener/inclusion criteria survey	Sample size
Otuam	100	80
Narkwa	100	80
Essarkyir	65	56
Eyisam	65	56
Asaafa	45	40
Ekrawfo	40	36
Ekumpoano	20	19
Immuna	10	10
Total	445	377

Source: Field work, January 2016

Data collection instruments

A questionnaire was used for the quantitative data collection. It had both open-ended and close-ended questions. It was structured into four modules (A, B, C and D). Module A elicited responses on issues regarding socio-demographic characteristics of the migrant households. Module B was on the channels of remittance flows to migrant households. Module C focused on the factors that influence the receipt of remittances while Module D was on how heads of migrant households at the origin spend remittances on social expenditures. The focus of this paper is on Module C.

The qualitative aspect of the study included in-depth interviews. By using the interview guide, it offered the interviewer the opportunity to be closer to the respondents while gathering meanings and interpretations of the issues examined (Sarantakos, 2005). It was targeted at opinion leaders that receive remittances in the eight selected communities of the study area.

Data analysis procedures

The data obtained from the questionnaires were edited, coded and processed using the Statistical Product and Service Solutions (SPSS) software version 21. The data were summarised and further described or explained using a combination of univariate (frequency tables) and

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bivariate (cross- tabulation The cross-tabulations were used to depict association between the nature of remittances, the channels and frequency of remittance flow to households. However, the data generated from the interviews were recorded, organized and processed manually by the researcher to bring out the key themes and trends for easy interpretation.

Ethical considerations

The instruments for the data collection were submitted to the University of Cape Coast Ethical Review Board for scrutiny of the instruments to ensure accuracy of the instruments. The ethical clearance also ensured that the respondents/participants in the study know the risks involved and any benefits from the study that may accrue to them. Also, the researcher identified himself with a student identity card and an introduction letter from the institution of affiliation (Department of Sociology and Anthropology, University of Cape Coast) in order to get informed consent of the respondents.

The researcher applied the code of ethics in research when undertaking this study. Participants were first informed about the research objectives, the type of questions and the sensitivity of the questions. In situations where in-depth interviews were recorded, the respondents' approval was first sought before the process began. Similarly, respondents were encouraged to skip questions they felt uncomfortable with when asked. They were not forced to participate in the study; their free consent was solicited. Their anonymity was ensured. Information gathered from the participants was kept in privacy and for the purposes of the study alone. Authors cited in the work were properly acknowledged to avoid plagiarism.

Results

The results of the study are presented in three sections. The first is on the socio-demographic characteristics of the migrants which have implications for their ability to remit their households at their origin. The second and third parts are respectively on the flow of the remittances and their determinants.

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Socio-demographic characteristics of the migrants

The heads of households provided information on the socio-demographic characteristics of the migrants. It was assumed that they know the migrants before they migrated and have contact with them as they receive remittances from them.

Age-Sex Characteristics of the Migrants

The age distribution of the migrants as can be seen from Table 2 indicates that the majority (65.5 percent) of the migrants are 39 years or younger. Approximately two-thirds (65.5 percent) of them are aged 20 to 39 years. These are young workers who are capable of earning income and sending remittances to their households. The rest who were within the age range of 40 to 59 years can also be gainfully employed and employed and earn income.

The males form the majority (more than 6 out of every 10) of the migrants as has been observed in other studies on internal migrants in Ghana such as Tanle's (2010) and Yendaw's (2013). The male migrants are most likely not able to work without any challenges to their economic activities from reproductive activities as may be the case for the females. A comment on the sex distribution of migrants from the district shows that it is expected that more males than females will be migrating from the district:

> More men migrate more than females because men are deemed as breadwinners of the family. So as a man, you must find a good strategy of providing for your families and such strategy is migration. (Female, 62 years, Opinion leader).

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Table 2 Age-Sex Characteristics of the Migrants

Variables	Number	%
Age		
20-29	106	28.1
30-39	141	37.4
40-49	84	22.3
50-59	46	12.2
Sex		
Male	235	62.3
Female	142	37.7

Source: Field work, January 2016

The migration of the youth from the district has however left mostly old people in the communities and to their disapproval of the migration of the young people from the communities. This is explained by some of the household heads:

> At my age, I don't think I am economically active. The youthful ones, mostly at the age of 18 years and above migrate to urban areas. The situation is very alarming to the extent that, sometimes the youngest persons you could find in this community are 50 year old men or women. (Male, 50 years old, Assembly man)

> The youth of today want quick money. When the youth complete JHS say at age 15 years, 16years, 17years and 18 years, they think the best way to make money is to travel to urban areas. But, that isn't the truth. Rome wasn't built in a day. You can stay in this village and engage in farming, fishing or trade activities, and still be successful in life. (Male, 55 years, opinion leader)

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Relationships between Migrants and Household Heads

Table 3 shows the relationships of the migrants to the household heads. A little more than half (51 percent) of the migrants are sons and daughters of the household heads as can be seen from Table 3. The remaining are relatives of the household heads: brothers, sisters, husbands or fathers. The relationship between the migrants and the heads of households in this study is generally close. One of the household heads noted: *"I have four children (that is, three sons and a daughter) who have all migrated from this community. Three of my sons have migrated to Accra while my daughter has migrated to Tarkwa".* (Female, 62 years, Opinion leader)

The findings of other studies such as Teye et al.'s (2017) in Ghana and Arif's (2009) in Pakistan also indicate that remittances are sent mostly to close relatives. Transfer of remittances to such close relations should be expected then.

Table 3 Relationships between Migrants and Household Heads

Migrant's relationship with HH heads	Number	%
Son	110	29.2
Daughter	82	21.8
Husband/Father	45	11.9
Brother	80	21.2
Sister	60	15.9
Total	377	100.0

Source: Field work, January 2016

Educational status of the Migrants

The level of education of the migrants, as can be seen from Table 4, shows that the majority (71.1 percent) have attained primary, JHS/JSS or SHS/SSS education. Only 6.6 percent of migrants had obtained post-secondary education. More than a fifth (22.3 percent) of the migrants have no formal education. The majority of the migrants may be limited to low skill employment and earn low income so that remittance transfers may be small in amount.

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Explanations on the educational background of the migrants were provided by household heads. According to them, there is a high rate of low educational attainment among migrants from Ekumfi District. Poverty and cultural factors are also associated with the situation, as indicated by two Assembly women:

> Illiteracy is very high in this community due to the fact that the youth of today, prefer the quest for quick money to education. A situation, I hugely put the blames on the doorsteps of most family heads. Because most families are uneducated, they think attaining primary, JHS or SHS education is enough for life. (Male, 55 years, Assembly man).

> The truth to the high level of illiteracy among migrants is poverty. Nowadays, even primary and secondary education is costly, how much more tertiary education like universities, polytechnics and training colleges. The economic situation don't permits most families to fulfil their obligations of educating their wards to the tertiary level. (Female, 35 years, Assembly woman)

Table 4 Level of education of the migrants

Level of education	Number	%
No formal	84	22.3
Primary	98	26.0
JHS/JSS	105	27.9
SHS/SSS/Voc/Tech	65	17.2
Post Sec. Certificate	25	6.6
Total	377	100.0

Source: Field work, January 2016

JHS- Junior High School; JSS- Junior Secondary School
SHS- Senior High School; SSS- Senior Secondary School

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Occupation and Economic Activities of the Migrants

As can be seen on Table 5, the migrants employed as traders/sellers (35.5 percent) are the highest, followed by fishermen (23.9 percent). Approximately, 40 percent of migrants were fishermen or farmers respectively. The Migrants who were employed as technician/mechanics were less than a tenth (8.5 percent). Also, about 7.4% of the migrant were unemployed. The rest (16.7 percent) are migrants that engages in several categories of occupations or economic activities that are classified as 'other' and that includes drivers, teachers, nurses, mobile bankers and security personnel.

Apart from the technicians and mechanics, the vast majority of the migrants are engaged in economic activities that require low skills. This is explained by the low levels of educational status attained by the majority of them as discussed in the previous section. Explaining the occupations or economic activities of migrants provided by household heads revealed that:

> We don't produce good and quality migrant; so how do we expect that migrants from this community engage in white colour jobs elsewhere? I tell you, some of the migrants cannot even write their own names. So, the best job for migrant is to find work as food traders, shop assistants, food hawkers, head-loaders and labourers which are not lucrative employment as compared to a banker or an engineer". (Male, 68 years old, Assembly man)

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Table 5 Occupation and Economic Activities of the Migrants

Economic activity/Occupation	Number	%
Trader/Seller	134	35.5
Fisherman	90	23.9
Farmer	30	8.0
Technician/Mechanic	32	8.5
No work/Unemployed	28	7.4
Others	63	16.7
Total	377	100.0

Source: Field work, January 2016

Types and channels of remittances transferred to migrant households

Table 6 shows the nature of remittances and the channels through which the migrant households receive them. As can be seen from Table 6, some migrant households receive remittances in a form of cash only; others receive both cash and non-cash or in-kind items. The goods or in-kind remittances received by migrant households are diverse and include food, clothing, medicine and school items as well as, electronic appliances, items for business and agricultural inputs.

The remittances are transferred through both formal channels (for example, banks and mobile money transfer services or institutions) and informal channels (bus, friends or family members own delivery by migrants) just as is reported for transfers from international migrants.

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Table 6: *Relationships between Nature of Remittances and Channels of Remittances*

Nature of remittances	Types of channel of remittance flow: 1. Formal channels of remittance flow				Total	
	Bank		Mobile money			
	N	%	N	%	N	%
Cash (% in formal)	5	3.0	162	97.0	167	100.0
Cash and non-cash (% in formal)	6	13.0	40	87.0	46	100.0
Total	11	5.2	202	94.8	213	100.0

	2. Informal channels of remittance flow						Total	
	STC/Bus		Friends/ Family members		Own delivery by migrants			
	N	%	N	%	N	%	N	%
Cash (%in informal)	8	11.0	47	64.4	18	24.7	73	100.0
Cash and Non-cash (% in informal)	29	25.0	67	57.8	20	17.2	116	100.0
Total	37	19.6	114	60.3	38	20.1	189	100.0

Source: Field work, January 2016

A total of 213 migrant households received remittances through formal channel. Ninety-seven percent received cash through mobile money services and 3 percent through banks. Ninety percent and 13 percent respectively of the migrant households received both cash and other non-cash items through mobile money and banks. Overall, more than 9 out of every 10 (94.8 percent) of the migrant households received cash remittances through mobile money services.

On the other hand, a total of 189 migrant households received remittances through informal channels. Specifically, the highest percentages of the

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households received cash remittances through friends (64.4 percent) and delivery by the migrants themselves (24.7 percent). The rest (11.0 percent) received cash through bus service. Some of the households received cash and non-cash items through bus (25.0 percent), friends/family/relatives (57.8 percent) and through own delivery by the migrants themselves (17.2 percent). However, about 60.3 percent of the migrant households received cash and non-cash remittances through friends/family/ relatives.

Some recipients gave their views about what they receive and the desire to receive more cash than in-kind remittances:

> I receive remittances from two of my sons. The elder son has migrated to Half-Assini and mostly I receive both fish and money from him, through friends who visit our village on a regular basis. I receive money, yam, plantain and rice from my younger son who is in Kumasi through bus. Even though, the cash component of my remittances receipt is small, the food items (fish, yam, plantain and cassava) are more than enough for my upkeep. I sometimes give some to my neighbours. (Male, 50 years old, Assembly man).

> My daughter is particularly concerned about what I eat. In most cases, I receive money, clothes, stationery, bread and other food beverages from her. Look, at my age I don't need much of those food beverages; I wish I receive more money from her. (Male, 70 years old, Opinion leader).
> In a poor district like Ekumfi, the remittances, no matter how small their value, can meet the basic needs of the households particularly food. Sharing food items with neighbours is an indication that the remittances contribute to the needs of other households too.

The migrant households received remittances through both formal and informal channels. The majority of them received cash remittances through formal channels. This situation is attributable to the current proliferation of mobile Money Transfer Companies in Ghana. Other

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studies have also indicated that, in Ghana, more than half of cash remittances received by migrant households come through Money Transfer Agencies (Baah-Boateng and Akyeampong, 2012). Earlier household surveys conducted in Ghana by Adams (2007) and GSS (2008) respectively found that only 1 percent and less than 5 percent of remittances are received through formal channels such as the banking institutions, Western Union and post offices. Formal channels of remittance transfer are receiving more patronized in recent times.

Meanwhile, most of the migrant households who received in-kind remittances got them through informal channels such as friends or family members. This corroborates Maphosa's (2009) study which indicates that in-kind remittance transfers contribute to the high use of informal channel operators. The households that received the in-kind remittances got them through either someone or by the sender himself or herself as also indicated in other studies by Adams (2007) and Baah-Boateng and Akyeampong (2012).

Amount of cash and frequency of flow of remittances

The amount of cash sent to migrant households and the frequency is shown on Table 8. The amount of cash flow is categorised into six ranges, starting from less than GH₵100 (Hundred Ghana Cedis) to GH₵500 and over. The frequencies of remittance receipt are monthly, quarterly, yearly and occasionally.

Out of the 377 households that received remittances, 57.8 percent (218) of them received less than GH₵100 monthly, quarterly, yearly or occasionally. Awumbila et al.'s (2015) study on internal migration also indicates that the majority of migrant households received less than GH₵ 100 cash remittances within the last 12 months prior to their research. Those who received GH₵100- 199 constitute 28.3 percent while the rest 13.9 percent) received GH₵200 and above. Only 1.3 percent (5) of the 377 households received GH₵500 and above. With respect to frequency of remittance receipts, most of the households received remittances on quarterly basis. Those receiving GH₵500 and over recorded the highest percentage of 80 percent followed by those who received GH₵400 to 499

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while those who received GH₵300- 399 recorded the highest percentage (45.5 percent) for transfers sent quarterly. At least 18 percent of all the amounts were sent on monthly basis to the households.

The views of some individuals at in-depth interviews indicate that the preferred frequency and amount of receipt of remittances vary from person to person:

> Yes, I receive cash from my children but to me the periods in which I receive such money matters to me a lot. I have grown old and weak because of ill-health and I am no longer productive. So, if I receive GH₵ 100 on quarterly basis, is it enough? I don't think so. The money must flow even on a daily basis. (Male, 60 years old, Opinion leader).

> Oh! My daughter does better. I receive not less than GH₵ 200 from her any time she pays us visit. The frequency of such visit is solely on occasional and yearly basis. But, must it be so? I prefer to receive a meagre amount of money on a monthly basis rather than on occasional or yearly basis. (Male, 67 years old, Opinion leader).

Table 8 Amount of Cash Received and frequency of Flow

Amount of remittance flow to HH	Frequency of remittance flow to HH								Total	
	Monthly		Quarterly		Yearly		Occasionally			
	N	%	N	%	N	%	N	%	N	%
Less than GH₵ 100	41	18.8	90	41.3	48	22.0	39	17.9	218	100.0
GH₵ 100-199	19	17.8	48	44.9	16	15.0	24	22.4	107	100.0
GH₵200-299	9	32.1	11	39.3	3	10.7	5	17.9	28	100.0
GH₵ 300-399	2	18.2	5	45.5	2	18.2	2	18.2	11	100.0

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GH₵ 400-499	3	37.5	3	37.5	0	0	2	25.0	8	100.0
GH ₵500 and Above	0	0	0	0	1	20.0	4	80.0	5	100.0
Total	74	19.6	157	41.6	70	18.6	76	20.2	377	100.0

Source: Field work, January 2016

Conclusions and Recommendations

The migrant households received remittances through both formal and informal channels. The majority of the migrant households receive more cash remittances through formal channels while large percentages of in-kind items are sent through informal channels such as friends or family members. The remittances received by the migrant households are cash transfers and in-kind items such as cassava, bread, yam, rice and fish. The majority of the migrant households receive less than GH₵ 100 cash remittances on quarterly basis. The amount of cash remittances received by migrant households is pittance, that is, most migrant households receive less than GH₵ 100 on quarterly basis and this normally passed through formal channels like mobile money. This situation is attributed to the low skill or low educational qualification of the migrants and the consequent low income earning activities they engage in at their destination areas. However, the remittance flows contribute to the wellbeing of the households of the migrants at their origin just as transfers from international sources do.

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ISSN 0855-4730 *e*ISSN (online): 2590-9673

WATER, SANITATION AND HYGIENE PRACTICES AMONG SELECTED PUBLIC BASIC SCHOOLS IN SOUTHERN GHANA

Charles Yaw Okyere[1] and Evita Hanie Pangaribowo[2]

Abstract

In this paper, we analyzed water, sanitation and hygiene (WASH) practices, and food supply systems of public basic schools in the Ga South municipal and Shai-Osudoku district of the Greater Accra region of Ghana. Data collected through structured interviews and observations from 48 public basic schools are analyzed using descriptive statistics. We also investigated the concentration of *Escherichia coli* (*E. coli)* and health risks in water sources in a sample of the public basic schools using Aquagenx's Compartment Bag Test (CBT). We found that majority of the public basic schools have access to WASH facilities and food supply; however, their quality is poor. Specifically, we identified inadequate hand washing facilities, poor microbial quality of water, littering of school compound with plastic waste, vending sites for foods and drinks located on dusty grounds, fairly low registration for vending permit or health certificate by food sellers, and inadequate food safety mechanisms. We conclude that there is a need to address WASH and food supply challenges through "software" and "hardware" interventions in order to ensure effective academic work in public basic schools in the Greater Accra region of Ghana.

Keywords: Water, Sanitation and Hygiene; Microbial Water Quality; Pathogenic Transmission Pathways; Food Supply System; Public Basic Schools.

[1] Corresponding author, Department of Agricultural Economics and Agribusiness, University of Ghana, Legon. Email: okyerecharles@gmail.com.

[2] Gadjah Mada University, Indonesia. Formerly at Center for Development Research (ZEF), University of Bonn, Germany. Contact: evita.pangaribowo@gmail.com, evitahp@ugm.ac.id

ISSN 0855-4730 *e*ISSN (online): 2590-9673

Introduction

In many developing countries including Ghana the use of poor WASH facilities, for example, consumption of unsafe water in both inside and outside one's home is widespread (Bain *et al*., 2014). This presents a serious health risk to many individuals including school children and teachers. For instance, advocates for improved WASH environment in schools highlight benefits such as decreased illnesses, better academic performance, decreased absenteeism, among others (UNICEF, 2012). Improved WASH environment is essential in improving teaching and learning in basic schools and therefore important in developing the needed human capital for the economic and social transformation of any country.

There are interlinkages between the use of WASH facilities inside and outside homes on the welfare of individuals and households. For instance, it is possible that the benefits accrued from using improved WASH facilities in homes could be eroded by the use of unimproved WASH facilities outside the household settings. Schools are known as the 'heart of the communities' where children spend a significant part of their time. In Ghana, children in public basic schools[3] attend school from Monday to Friday up to six hours each day.

Public schools are an essential component of the various institutions mandated for human capital formation. Therefore, shortfalls in their WASH facilities could have long lasting implications on school children and teachers. The wellbeing of school children will be most affected in terms of poor WASH environment in basic schools primarily due to their tender age. A study by Samwel and Gabizon (2009) showed that poor latrines are major health risks to school children during school hours. Onyango-Ouma and Gerba (2011) found that adults and school children in rural Kenya consume poor quality water away-from-home. Tan *et al*., (2013) reported of unhygienic and other deficiencies in food handling in primary schools in Malaysia. This makes our study essential in analyzing the water, sanitation and hygiene practices, and food supply systems aside from the usual household level.

[3] Hereafter public schools

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Furthermore, most discussions on WASH have centered on households and to some extent communities, with little attention given to other institutions including basic schools. Stakeholders in the education sector of Ghana consider the provision of improved WASH facilities in public schools as one of their responsibilities. For instance, the Ghana Education Service (GES) under the "WASH in Schools (WinS)" program aimed at expanding health, water, sanitation and hygiene systems in basic schools. The program had an ambitious goal of "100% of basic education schools having hygiene systems and sanitation by 2015, and 75% of schools having access to potable water." Activities under the WinS program were coordinated by the School Health Education Program (SHEP) Unit (GES, 2012). However, as to whether the targets in the program were met remains to be seen. In addition, there is few published empirical work concerning WASH practices and food supply systems in public schools in Ghana.

The study makes several important contributions to the literature of WASH in basic schools in Ghana and elsewhere. First, it is based on primary data with respondents largely being School Health Education Program (SHEP) coordinators-the key personnel in charge of health and sanitation in public schools in Ghana. Second, the study addresses the channels of pathogenic transmission encountered by students and teachers during school periods. School children and teachers face several disease-causing pathogens during school periods. These pathways include school characteristics (for instance uncemented floors, leaking roofs, etc.), water supply, sanitation services and hygiene practices. Third, we analyze food supply system, especially the conditions under which foods and drinks are sold to students and teachers. This is an important pathogenic transmission pathway confronted by students and teachers. It is also an area of concern as in case of severe malfunctioning it will affect the quality of foods and drinks, which could have long-lasting consequences on the wellbeing of students and teachers. Fourth, we analyze the level of *E. coli* (an indicator of fecal contamination) and the associated health risks in water sources in public schools using an on-field test kit.

The study aimed at achieving the following objectives: (1) measure public basic school water, sanitation and hygiene (WASH) coverage levels to

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assist in designing improved WASH strategies, (2) identify food supply systems at the public basic school levels, and (3) analyze the microbial quality of water sources and associated health risks. Having a sound understanding of WASH facilities and food supply systems, this study ultimately presents strategies in improving WASH practices and food supply systems in public schools in the Greater Accra region of Ghana

We found that public schools have access to WASH and food supply infrastructures; but, they are of poor quality. In addition, there is uneven access to WASH facilities in the public schools in the study sites. The results suggest that "proactive" measures are needed in addressing the WASH practices and food supply systems in public schools since it represents a critical period of childhood development.

Materials and Methods

Study Area, Sampling and Sample Description

The study was conducted in the Ga South municipal and Shai-Osudoku district of the Greater Accra region, Ghana. The two districts were selected on the basis of the presence of multipurpose water systems, urban-rural representation, and areas selected for a randomized controlled study on informational interventions on WASH with school children and adult household members. The Ga South Municipal with its capital at Weija, is one of the urban districts in the Greater Accra region of Ghana (Ga South Municipal Assembly (GSMA) (2012)), while the Shai-Osudoku district with its capital at Dodowa is a rural district (Shai-Osudoku District Assembly (SODA) (2013)). In the two districts, public schools in six school circuits (i.e. administrative unit of public schools) were targeted for the study. The survey yielded interviews with 48 public schools, which represent the study sample[4]. The study received written authorization from

[4] The public basic schools were selected on the basis of school management in terms of single or a common headmaster or head teacher, under a common stream and located on the same compound. A public basic school comprising of both primary and JHS with different head teachers or headmasters were treated as two separate public basic schools. In practical terms most of the public basic schools with two streams and different head teachers or headmasters consider themselves as separate entities since the level of authority or school management is usually considered to be different.

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the two district education offices by November 2013. Structured interviews took place at the convenience of the respondents in order not to distract school activities (i.e. teaching and learning).

Questionnaire Design and Survey Execution

The study used both qualitative and qualitative approaches. A questionnaire was designed to solicit information on water, sanitation and hygiene practices at the public schools. Improved WASH practices and food supply systems in public schools will lead to optimal benefits in terms of teaching and learning. In order to obtain comparable data with previous studies, the study used standard questions on WASH from the WHO/UNICEF Joint Monitoring Program (JMP) survey for Water and Sanitation. The questionnaire consisted of nine sections, including demographic information of respondents, school characteristics, safe water source and use, state of sanitation facilities, disease and health profile, hygiene training and practice, hygiene index, and interviewer's observations.

Training sessions using the designed questionnaire were conducted for hired field enumerators in the first week of December 2013. The training exercise involved going through all the sections of the questionnaire. The questionnaire was reviewed after the completion of the training sessions to include suggestions from field enumerators. In addition, the review was done to achieve uniform understanding of the components of the study instruments by the hired field enumerators.

Questionnaire administration by hired field enumerators was based on face-to-face interviews with respondents during the second and third week of December 2013. The data collection exercise was carried-out by two teams consisting of three interviewers each for the two districts. The completed questionnaires were checked for consistency of codes and responses. The data entry was completed in April 2014 using CsPro software which was designed by hired assistants. Data entry was supervised to ensure that the quality of data was not compromised. For the

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final analysis, the data was exported from CsPro to STATA format. We analyzed the data using descriptive statistics (i.e. frequency analysis) and rely on STATA version 14.0 computer package (STATA Corp. 2015).

Water Sampling and Analysis

In April-May 2014, water samples were collected from 15 public schools selected to participate in cluster randomized evaluation design on the impacts of water quality testing and information on WASH behaviors and health outcomes. 30 water samples were analyzed using CBT. In each public basic school, water samples from multiple sources including stored water were collected. Water sampling was based on protocols from previous studies and varies depending on the type of water source. 100mL of each water sample was collected and were analyzed based on the protocol provided by Acquagenx. The collected water samples were analyzed during the same day of collection. We summarize below how the CBT works: the growth medium was added to the collected samples and shake/stir until the medium dissolves. After about 30 minutes, the solution was then filled into the compartment bag. The compartment bag and its content was then stored at room temperature for about 48 hours. The colour changes in the compartment bag were then used to estimate the level of *E. coli*. After reading the results, chlorine tablets were added to the samples and then safely discharged into a pit.

Results

Socio-economic Characteristics of Public Schools

The 48 public schools had a total student population of 13,608; comprising of 51.19 percent of boys and 48.81 percent of girls. On average there are more boys than girls in the public schools. The average boys' population was about 145 whilst that of girls was 138. The average student population was approximately 284. Using frequency analysis, the respondents were on average about 33 years of age, largely females (54.2%), predominantly with diploma certificate, and about 35 percent being SHEP coordinators. In most cases, the respondents had being in their positions for about 0-3 years (results not reported here). Table 1 shows that the majority (two-thirds) of the public schools were public non-religious (i.e. public schools with no religious affiliation). With regard to type of institution, about

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47.92 percent of the public schools had both primary (grade 1-6) and junior high school (JHS) (grade 7-9), followed by only primary school (33.33%) and only JHS (18.75%).

Most of the public schools (68.75%) held all their classes in indoor classrooms, with 31.25 percent of the public schools using other outdoor classrooms including sheds and pavilions. About 46.81 percent of the public schools had some leaking classrooms, with the majority of the public schools using classrooms which did not have leaking roofs. The public schools had an average of 12.25 teachers, comprising of average male teachers of 6.6 whilst that of female teachers was 5.65.

About 71 percent of the public schools in the survey had electricity as the main source of lighting while only one public school used solar energy. Unfortunately, about 27 percent of the public schools had no access to electricity. In terms of access to information and communication technology (ICT), about 41 percent respondents reported that the public schools had computers but only 4 percent had internet connection. Although some teachers may have personal computers and other sources of internet, access to school-based computers and use of internet is very low.

Table 1: Socio-economic characteristics of public schools based on frequency analysis

Category	Characteristic, N = 48	Sample Description
School religiosity	Public religious	33.33%
	Public non-religious	66.67%
School type	Primary only (Grade 1-6)	33.33%
	JHS only (Grade 7-9)	18.75%
	Both Primary and JHS (Grade 1-9)	47.92%
All classes are held in indoor classroom	Yes	68.75%
	No	31.25%
Some of the classrooms leak	Yes	46.81%
	No	53.19%
Boys/males pupil population	Range	33-317

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	Mean	145.13
Girls/females pupil population (Number)	Range	29-327
	Mean	138.38
Overall pupil population (Number)	Range	67-631
	Mean	283.5
Number of male teachers	Range	1-14
	Mean	6.60
Number of female teachers	Range	0-21
	Mean	5.65
Total number of teachers	Range	6-22
	Mean	12.25
Main source of lighting	Electricity	70.83%
	Solar energy	2.08%
	No light	27.08%
Computer	Yes	41.67%
	No	58.33%
Internet	Yes	4.17%
	No	95.83%

Source: Public School WASH Survey (December 2013).

Water Supply System

Following the Joint Monitoring Program (JMP) classifications, water supply in the public schools were categorized into improved and unimproved. Table 2 presents the main source of drinking water for the public schools. The majority of the public schools (74.48%) relied on improved water sources based on JMP classifications with borehole as the main source of drinking water (46.81%). About 19.15 percent of the public schools relied on sachet/bottled water. Nevertheless, around 6 percent of the public schools used unimproved drinking water sources, of which 2 percent of them used water from dugout/pong/lake/dam/canal.

In addition to the primary drinking water sources, around 71 percent of the public schools in the sample had secondary drinking water sources (results not reported here). Secondary drinking water were mainly improved water sources; borehole/pump/tube well (38.24%), pipe in the neighborhood of the public schools, and rain water/spring (both at 14.71%), sachet/bottled water (11.76%), and inside standpipe (2.94%). For secondary drinking

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water sources, around 12 percent of the public schools used unimproved water sources. As the proportion of public schools using unimproved secondary drinking water sources is double of those using unimproved primary drinking water sources, it is likely that the public schools used unimproved sources of drinking water as an alternative source in times of scarcity. This is not uncommon in developing countries where many schools lack access to only improved drinking water sources, or when such facilities are presents, they are lacking in both quality and quantity.

Table 2 also shows that around 77 percent of the public schools relied on improved general purpose water sources. Borehole/pump/tube well is the most widely used water source for general purposes by the public schools (40%). Pipe in the neighborhood (18.75%) of the public schools represent the second most widely used water source for general purposes, followed by river/stream (16.67%). The water sources least used by public schools as main general purpose water were water truck/tanker service and protected well (both at 2.08%).

Around 66.67 percent of the public schools had secondary source of water for general purposes (results not reported here). Most of the public schools (74.37%) used improved water sources as their secondary source of general purpose water. Borehole/pump/tube well represented the most widely used secondary water source for general purposes by the public schools (40.63%), followed by rain water/spring (21.88%), river/stream (15.63%), with inside standpipe and public standpipe being the least used secondary water source for general purposes (both at 3.13%).

Table 2: Primary sources of water for public schools

Source of water	Improved and unimproved status based on JMP classification	Frequency	Percentage
Main source of drinking water			
Inside standpipe	Improved	4	8.51
Pipe in the neighborhood	Improved	5	10.64
Public standpipe	Improved	2	4.26
Borehole/Pump/Tube well	Improved	22	46.81
Rain water/spring	Improved	2	4.26

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Sachet/bottled water	Improved/Unimproved**	9	19.15
River/Stream	Unimproved	2	4.26
Dugout/Pong/lake/dam/ canal	Unimproved	1	2.13
Total	**------**	**47**	**100**
Main source of general purpose water			
Inside standpipe	Improved	3	6.25
Protected well	Improved	1	2.08
Pipe in the neighborhood	Improved	9	18.75
Public standpipe	Improved	2	4.17
Borehole/Pump/Tube well	Improved	19	39.58
Rain water/spring	Improved	3	6.25
River/Stream	Unimproved	8	16.67
Dugout/Pong/lake/dam/ canal	Unimproved	2	4.17
Water truck / tanker service	Unimproved	1	2.08
Total	**------**	**48**	**100**

Source: Public School WASH Survey (December 2013). ***Based on JMP classification sachet and bottled water are classified as improved only when public basic school rely on other improved source of water for general purposes such as cooking, washing, and cleaning, among others (WHO and UNICEF, 2006).*

Water Collection, Transport and Handling Techniques

On the location of drinking water supply, about 20.83 percent of the public schools had main drinking water supply on their compound while about 41.67 percent of the public schools spent between one to ten minutes in collecting water from sources (Table 3). Furthermore, 10.42 percent of the public schools spent between 11 to 20 minutes in obtaining water from sources. Lastly, between 21 to 30 minutes are spent by 12.5 percent of the public schools in obtaining water supply from sources.

Compared to the location of drinking water supply, fewer public schools had their main general purpose water supply located on the school premises (12.5% versus 20.83%). In terms of water collection time, 45.83 percent of the public schools spent up to ten minutes in travelling to and returning from main general purpose water supply, while 14.58 percent of the public schools took between 11 to 20 minutes to obtain water for general purpose. About 12.5 percent of the public schools reported

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spending between 21 to 30 minutes to obtain main general purpose water from sources (Table 3). Gender is an important issue in the access to drinking water in many developing countries including Ghana. Previous studies show water collection is one of household chores predominantly performed by female household members. As school children's ability to learn might be associated with adequate water supply at school, time spent collecting water by school girls might contribute to unequal learning opportunities. Hence, water supply infrastructure investment in public schools could enhance learning opportunities.

Apart from the lack of water supply infrastructure, it is evident that improved water transport and storage containers have impact on microbial quality of water (Günther and Schipper 2013). Table 3 also presents equipment used in fetching/collecting water for main drinking and general purpose. The results indicate that majority of public schools rely on buckets for collecting main drinking water (76.09%) and for main general purpose water (74.47%). Only a small proportion (2.17%) of the public schools did not collect water for drinking purposes, thus solely relying on sachet/bottled water. About 4.26 percent of the public schools did not fetch/collect water for general purposes.

Table 3: Water collection, transport and handling techniques in the public schools

Category	Characteristic, N = 48	Sample Description
Time taken to get water and come back (number of minutes)		
Main drinking-water	Water on premises	20.83%
	1-10	41.67%
	11-20	10.42%
	21-30	12.50%
	Missing	14.58%
Main general purpose-water	Water on premises	12.50%
	1-10	45.83%
	11-20	14.58%
	21-30	12.50%
	Missing	14.58%
Water transport containers (multiple responses possible)		
Type of container	**Drinking**	**General purpose**
Vessels/Pots	4.35%	4.26%

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Buckets	76.09%	74.47%
Storage/rubber container	6.52%	6.38%
Pans/Basins	23.91%	25.53%
No water collection	2.17%	4.26%
Other	6.52%	4.26%

Source: Public School WASH Survey (December 2013).

Perceptions of Water Supply, Quality and Treatment in Public Schools

The study also elicited responses on problems with main drinking and general purpose water sources (results are not reported here for brevity purposes). In the case of drinking water sources, 23.4 percent of the public schools reported of having no problem with the water supply. About 25.53 percent of the public schools reported that the water source is dirty. The rest of the respondents reported problems of salinity (21.28%), irregularity (36.17%), distance (12.77%), and dried sources (10.64%) as some of the challenges with water supply. Other problems (31.91%) were related to water quality (particularly, odor and taste) and the cost of water supply. While irregular supply was seen as the major problem with drinking water supply at public schools, the most commonly reported problem by the respondents in the case of general purpose water was that the water sources are dirty (34.78%). Additional problems associated with general purpose water in public schools include water quality related issues including the odor and taste, among others (30.43%); irregular water supply (23.91%); and long distance (10.87%). About 17.4 percent of the public schools reported of not having any problem with their general purpose water supply.

Respondents were asked about their perceptions on water quality and treatment. About 52.1 percent of the respondents reported that they were satisfied with water quality. However, only 10.42 percent of the public schools did treat their water to make it safer for drinking. About 25 percent and 16.67 percent of the public schools, respectively, paid regular bills for their main drinking and main general purpose water supply.

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Microbial Water Quality Analysis

Table 4 shows the *E. coli* concentrations in multiple water sources in 15 public schools. The mean most probable number (MPN) of *E. coli* in 100 mL of water samples was 66.75. The health risk classifications were based on 2011 WHO guidelines on drinking water quality which was used by Aquagenx in categorizing the health risk of 100 mL water samples based on the MPN value. The results revealed that 66.7 percent of sampled public schools' water sources could be classified as unsafe or very high risk. About 26.7 percent of the water sources of public schools in the study area were safe with the remaining 6.7 percent of the sampled water sources being of intermediate risk or probably safe.

The mean MPN of *E. coli* in stored water was 47.15. About 40 percent of the stored water of public schools could be classified as unsafe or very high risk. About 26.7 percent of stored water in the public schools were safe, while 20 percent of the sampled stored water were of intermediate risk or probably safe, and about 13.3 percent of the stored water being of high risk or probably unsafe. The stored water quality was slightly better than that of point of source (POS), as the stored water included sachet water and other improved water sources. The water sources for the public schools, included dug out/canal, river/stream, etc. which have been shown by previous studies to contain higher levels of *E. coli.*

Table 4: *E. coli* concentrations in water samples in public schools

Water quality and health risk parameters	**Mean**	**S.D**
Point of Source (POS) (N=15)		
E. coli MPN (CFU/100 mL)	66.75	48.68
Low risk/safe (E. coli MPN=0)	0.267	0.458
Intermediate risk/probably safe (*E. coli* MPN =1-10)	0.067	0.258
High risk/probably unsafe (*E. coli* MPN >11-100)	0.000	0.000
Very high risk/Unsafe (*E. coli* MPN >100)	0.667	0.488
Stored water (N=15)		
E. coli MPN (CFU/100 mL)	47.15	47.33
Low risk/safe (*E. coli* MPN=0)	0.267	0.458

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Intermediate risk/probably safe (*E. coli* MPN =1-10)	0.200	0.414
High risk/probably unsafe (*E. coli* MPN >11-100)	0.133	0.352
Very high risk/Unsafe (*E. coli* MPN >100)	0.400	0.507

Source: Water sample analysis (April-May 2014).

Sanitation and Hygiene Practices

Urinal and its Quality in Public Schools

Table 5a presents the availability of urinal and its quality in public schools. Around 93.75 percent of the public schools (%) owned urinal, while 91.11 percent of the public schools had separate urinals for boys and girls. About 55.6 percent of the public schools had separate urinals for teachers and pupils. The results suggest the urinals provided privacy for school children and teachers based on their gender. The most widely used cleansing agent for the urinals was soap/detergent (71.1%), followed by broom or hardware only (55.56%), others (28.89%) such as locally made detergent called "Akasha", and nothing (17.78%). Based on interviewer's observations, the study assessed the conditions of the urinals in public schools and the results are reported in the last panel of Table 5a. Most of the urinals in the public schools could be classified as in good shape with minor damages (36.36%), followed by those in moderate shape (29.55%), poor shape (15.91%), and very bad shape (11.36%), with those in excellent shape being 6.82 percent.

Table 5a: Availability of urinal and its quality in public schools

Category	Characteristic	Frequency	Percentage	Observations (N)
Presence of urinal	Yes	45	93.75	48
	No	3	6.25	
Separate urinal for boys and girls	Yes	41	91.11	45
	No	4	8.89	
Separate urinal for teachers	Yes	25	55.56	45
	No	20	44.44	
Cleansing agent used to clean the	Nothing	8	17.78	45

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urinal (multiple response)				
	Soap / Detergent	32	71.11	
	Ash	2	4.44	
	Broom or Hardware only	25	55.56	
	Other	13	28.89	
Condition of the urinal (interviewer's observations)	In excellent repair, no sign of wear	3	6.82	44
	In good shape, some minor wear-and-tear or damage	16	36.36	
	In moderate condition, some damage and moderate wear-and-tear	13	29.55	
	In poor shape, much damage	7	15.91	
	In very bad shape	5	11.36	

Source: Public School WASH Survey (December 2013).

Latrine and its Quality in Public Schools

Table 5b presents availability of latrine and its quality in the public schools. The majority of the public schools (87.5%) relied on ventilated improved pits (VIP), followed by pit latrine (4.17%), with 8.33 percent having no toilet facility, therefore using open fields and bushes. Out of the 44 public schools using latrines, 95.45 percent had their own latrine. The number of latrine seats ranged from two to 12, with mean toilet seats of 7.21. This is highly inadequate due to a large number of pupils enrolled in the public schools. With most of the communities having no decent public/community toilets, most of the pupils will have to rely on open fields and bushes as means of defecation.

About 85.4 percent of the public schools had separate toilet/latrine for boys and girls while two-thirds of the public schools had separate toilet/latrine for teachers and pupils. As it was the case of the urinals, the

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toilets/latrines provided privacy based on gender of pupils and teachers. Cleansing agents usually used in cleaning school toilet/latrine included detergent/soap (88.64%), broom/hardware (54.55%), and others (31.82%) including locally manufactured detergent called "Akasha". Based on interviewer's observations, we assessed the condition of school latrine/toilet. Most of the toilet/latrine facilities in the public schools could be classified as clean and neat (69.05%), followed by dirty toilet with or without flies (16.67%) and those with stinking odor (7.14%).

Table 5b: Availability of toilet and its quality in the public schools

Category	Characteristic	Frequency	Percentage (%)	Observations (N)
Type of toilet/latrine	Pit latrine	2	4.17	48
	KVIP	42	87.50	
	No toilet facility (bush, etc.)	4	8.33	
School owns a latrine/toilet	Yes	42	95.45	44
	No	2	4.55	
Number of toilet seats	Range	2-12	-	42
	Mean	7.21	-	
Separate latrine/toilet for boys and girls	Yes	35	85.37	41
	No	6	14.63	
Separate latrine for teachers and pupils	Yes	28	66.67	42
	No	14	33.33	
Cleansing agent used to clean the latrine	Nothing	4	9.09	44
	Soap / Detergent	39	88.64	
	Ash	4	9.09	
	Broom or hardware	24	54.55	
	Other	14	31.82	

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Condition of latrine	Toilet is neat and clean	29	69.05	42
	Dirty toilet with or without flies	7	16.67	
	Stinking odor	3	7.14	
	Other	1	2.38	
	Missing	2	4.76	

Source: Public School WASH Survey (December 2013).

Solid and Liquid Waste Disposal in Public Schools

We also analyzed waste management in public schools (results are not reported here). In the case of solid waste disposal, most of the public schools (79.17%) practiced burning, followed by own garbage pit or heap (10.42%) and burying (6.25%). The least solid waste disposal techniques used by the public schools included public damp or garbage center, and dumped elsewhere/vacant land/property (both at 2.08%). Disposal of liquid waste in the public schools was done by throwing them on the school's compound (81.25%), followed by thrown onto the street outside school compound (14.58%), with the least liquid waste disposal techniques been disposed through drainage into a pit (soak away), and thrown into gutter (both at 2.08%).

Hygiene Promotion and Training

Table 6 presents hygiene training and practices in the public schools in the study sites. Most of the public schools (79.17%) reported of students ever receiving information on WASH, waste management and health apart from the usual classroom lessons. In addition, about 83.33 percent of the public schools reported of teachers ever receiving information on WASH, waste management and health. Furthermore, only 18.6 percent of the public schools had WATSAN committees who are in-charge of WASH related issues.

About 37.5 percent of the public schools had adequate hand washing provisions including hand washing bowls, soap/detergent and napkins with the remaining 62.5 percent lacking proper hand washing facilities. About 37.78 percent of the public schools had soap closer to latrine. The survey data shows that 40 percent of the public basic had "enough" water

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closer to the latrine for hand-washing purposes. Latrines in the public schools were far from water sources. About 83.33 percent of the public schools have latrines more than 10 yards away from water sources. About 70 percent of the public schools had water sources situated on higher grounds than the latrines, thereby preventing seepage of fecal matter into water sources. Most of the public schools (68.89%) had their compounds and school latrine located at least ten meters apart. Furthermore, public schools' compounds were mainly clean and neat.

Table 6: Hygiene Training and Practices in Public Schools

Category	Characteristic	Frequency	Percentage	Observations (N)
Students/pupils ever received any information on water, sanitation, waste management or health aside the usual classroom teachings	Yes	38	79.17	48
	No	10	20.83	
Teachers ever received any information on water, sanitation, waste management or health (hygiene training)	Yes	40	83.33	48
	No	8	16.67	
Presence of WATSAN committee in the school	Yes	8	18.60	43
	No	35	81.40	
Adequate hand washing provisions available	Yes	18	37.50	48
	No	30	62.50	
Soap available near or inside latrine	Yes	17	37.78	45
	No	28	62.22	

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Enough water near latrine	Yes	18	40.00	45
	No	27	60.00	
Distance between latrine and water source is more than 10 yards	Yes	35	83.33	42
	No	7	16.67	
Water source is situated at a higher level than latrine	Yes	28	70.00	40
	No	12	30.00	
School compound/courtyard is neat and clean	Yes	46	95.83	48
	No	2	4.17	
Distance between latrine and school compound is more than 10 meters	Yes	31	68.89	45
	No	14	31.11	

Source: Public School WASH Survey (December 2013).

State of WASH Facilities in Public Schools

We also illustrate the state of WASH facilities in the public schools based on interviewer's observations (Table 7). Most of the public schools (64.58%) stored drinking water in covered containers whilst the remaining 35.42 percent of the public schools did not store water at the time of the survey. The following characteristics describe the surrounding of some of the water collection points in the public schools: most of the water collection points of the public schools were clean (87.5%), having platform raised above the ground (62.5%) and also having drain facility (39.58%). About 50 percent of the public schools had plastic waste littered on the school compound while 12.5 percent of the public schools had either human or animal excreta disposed on the school compound. None of the public schools had stagnant water on the compound; this was mainly due to the fact that the survey was conducted in December 2013 which was the beginning of the dry season.

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We also assessed the quality of latrine/toilet facility of public schools and in case of those not having latrine we assessed that of the community. Table 7 also shows that the pit condition of latrines of the public schools ranged from good (58.7%) to average (30.43%) and bad (6.52%). The structure of the toilets/latrines of the public schools was generally good (67.39%), with average constituting about 26.09 percent and bad (2.17%). Closet condition was generally average (56.52%), followed by good (32.61%), with public schools with bad closet condition being about 6.52 percent. The floor of the latrines was generally good (50%), followed by average (41.3%) and bad being 4.35 percent. Cleanliness of the toilet or latrine facilities in terms of closet, floor and surroundings was generally of average quality, followed by good and then bad.

Table 7: Conditions of WASH Facilities in Public schools

Category	Item	Frequency	Percentage (%)	Characteristic (N)
Water supply				
Drinking water storage	Water not stored	17	35.42	48
	Stored in covered container	31	64.58	
Drinking water collection points				
Cleanliness	Yes	42	87.50	48
	No	6	12.50	
Platform	Yes	30	62.50	48
	No	18	37.50	
Drain facility	Yes	19	39.58	48
	No	29	60.42	
Environment of school compound				
Plastic waste	Yes	24	50.00	48
	No	24	50.00	
Human/animal excreta	Yes	6	12.50	48
	No	42	87.50	
Stagnant water	Yes	-	-	48
	No	48	100	
Latrine/Toilet Functionality				
Pit condition	Good	27	58.70	46
	Average	14	30.43	

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	Bad	3	6.52	
	Not applicable	2	4.35	
Structure	Good	31	67.39	46
	Average	12	26.09	
	Bad	1	2.17	
	Not applicable	2	4.35	
Closet condition	Good	15	32.61	46
	Average	26	56.52	
	Bad	3	6.52	
	Not applicable	2	4.35	
Floor	Good	23	50.00	46
	Average	19	41.30	
	Bad	2	4.35	
	Not applicable	2	4.35	
Cleanliness				
Closet	Good	7	15.22	46
	Average	33	71.74	
	Bad	4	8.70	
	Not applicable	2	4.35	
Floor	Good	14	30.43	46
	Average	25	54.35	
	Bad	5	10.87	
	Not applicable	2	4.35	
Surroundings	Good	17	36.96	46
	Average	19	41.30	
	Bad	8	17.39	
	Not applicable	2	4.35	

Source: Public School WASH Survey (December 2013).

Food Supply System

We also discuss the food supply system in the public schools. Table 8 shows the availability of canteen, street food vendors and the working environment under which foods and drinks are sold to students and teachers during school hours. Only one of the public schools had formal school-based canteen system. About 75 percent of the public schools had street food vendors outside or within school premises of which only two (representing 5.56%) of public schools had some of the foods sold being prepared on the vending sites. Most of the sellers prepared the foods from their homes. Therefore, poor water, sanitation and hygiene practices in the vendors' homes could affect the quality of foods and drinks sold to

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students and teachers. Most of the food sellers sold on dedicated venting sites (88.57%) in the public schools.

Regulating food sellers is essential in complying with proper water, sanitation and hygiene practices. About 72.2 percent of the public schools had all food vendors registered with the school or other public institutions. About 16.7 percent of the public schools had some of the food vendors registered with the school or other public institutions with about 11.11 percent of the public schools having none of the food vendors registered with the school or other public institutions. Obtaining health certificate or vending permit is necessary to reduce the transmission of infectious diseases from food sellers to students and teachers. About 48.57 percent of the public schools reported of all food vendors or caterers having vending permit or health certificate. In about one-third of the public schools, some of the food vendors or caterers had vending permit or health certificate. In the case of about 20 percent of the public schools, the food vendors or caterers had no vending permit or health certificate.

The environment/surrounding of the canteen or vending sites was assessed using interviewer's observations. These vending sites or "markets" are usually located on dusty grounds making it easy for food contamination. The following characteristics describe the vending sites and canteens of public schools: presence of puddle water (13.89%), presence of food pests including flies (52.78%), presence of stray animals (55.56%), vending sites/canteen located on dusty grounds (58.33%), and some of the food vendors (27.78%) used glass boxes to protect the foods and/or drinks being sold. About 54.17 percent of the public schools had temporary or roaming food sellers who come or stay around the compound of the schools to attract consumers (both teachers and students). About 12.5 percent of the public schools had contracted food sellers who rotate on a daily basis to sell foods to students and teachers.

Table 8: Canteen, Food Vendors and their Working Environment in Public Schools

Category	Characteristic	Frequency	Percentage	Observations (N)
Canteen within the school premises	Yes	1	2.13	47

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	No	46	97.87	
Presence of street food vendors outside and/or within school premises	Yes	36	75.00	48
	No	12	25.00	
Food is prepared on the spot	Yes	2	5.56	36
	No	34	94.44	
Vending site	On a dedicated market site with other vendors	31	88.57	35
	Pavement	3	8.57	
	Other	1	2.86	
Caterers and/or food vendors registered with the school or other organizations	Yes all	26	72.22	36
	Yes some	6	16.67	
	No	4	11.11	
Caterers and/or food vendors have vending permit or health certificate	Yes all	17	48.57	35
	Yes some	11	31.43	
	No	7	20.00	
Environment of canteen or vending sites				
Presence of puddle water, etc.	Yes	5	13.89	36
	No	31	86.11	
Presence of food pests (flies, etc.)	Yes	19	52.78	36
	No	17	47.22	
Presence of stray animals	Yes	20	55.56	36
	No	16	44.44	
Vending site/canteen located on dusty street	Yes	21	58.33	36
	No	15	41.67	
Use of glass boxes to protect the food	Yes	10	27.78	36
	No	26	72.22	
Presence of temporary or roaming food sellers outside and/or within the school premises	Yes	26	54.17	48
	No	22	45.83	
Food sold to students/teachers by	Yes	6	12.50	48

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school contracted food sellers on different days			
	No	42	87.50

Source: Public School WASH Survey (December 2013).

Strategies to Achieve Safe Water Supply

Inadequate provision of water supply facilities undermines progress in the delivery of safe water to teachers and students. Public schools need investments and regular maintenance of water supply infrastructures. In addition, most of the public schools lack equipment for transporting, storing and fetching water. Provision of covered containers for transport and storage, cups, among others will go a long way in addressing deficiencies in providing safe water to students and teachers during school hours. Parents/guardians should provide their children with water containers during school hours. It is highly recommended that public schools should test and also treat water since most of the public schools had at least one unimproved water source. Education on water management, handling, storage and transportation is essential to improve the quality of water available to students and teachers during school hours. Based on deficiencies in water supply and storage, ensuring that school children use only safe water could prove too difficult a task to achieve in the short to medium term in most of the public schools. Furthermore, complete non-use of unimproved water sources in the short to medium term is virtually out of reach of most public schools. Therefore, we recommend a blend between "hardware" and "software" interventions in addressing inadequate water supply in public schools.

Strategies to Achieve Improved Sanitation and Hygiene Practices

In the short to medium term, there is a need to supply basic sanitation facilities including toiletries. Adequate hand washing provisions should be made available in all public schools. In the long term, there is the need for expansion of the existing toilet facilities since the student population outweighs the number of toilet seats. We observed that most of the toilet facilities were not disable and child friendly (especially children below seven years). The existing maintenance system seemed to be effective in

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ensuring the cleanliness of the toilet/latrine facilities and these have to be strengthened.

Regular hygiene training as part of teaching and learning among students and teachers is also recommended. This should be complimented with practical lessons on hygiene practices using WASH charts. Regular courses, seminars and/or workshops for SHEP coordinators will enhance hygiene practices in the public schools. SHEP coordinators should be adequately resourced to undertake hygiene education in the public schools.

Strategies to Achieve Improved Food Supply System

In the long term, provision of enclosed canteens should be a priority. We recommend that construction of school buildings should include canteens or vending sites. Therefore, construction of school buildings without essential facilities such as canteens should be discouraged. The current practice of students and teachers in many public schools eating under trees, classrooms, and uncompleted buildings/pavilions/sheds should be stopped. Rigorous campaign and education is needed in many public schools on food hygiene, especially among food sellers. Training programs and workshops should be organized for food vendors in order to improve their knowledge, perception, awareness and attitudes on food safety practices. Strict compliance to regulations on food safety should be adhered to through registration of food vendors both for vending permit or health certificate. Regular health screening of food vendors should be encouraged to avoid spreading of infectious diseases. Other studies are needed to ascertain the quality of foods and drinks sold to students and teachers in the public schools.

Conclusion

Using a survey conducted in public schools in two districts in the Greater Accra region of Ghana, we assessed the WASH facilities and food supply systems. We also analyzed the microbial quality of water sources in the public schools using on-field water test kit. The structured interviews with school authorities and interviewer's observations provided quick insights in assessing and understanding the WASH practices and food supply

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systems of public schools in the study sites. The results obtained are expected to generate the needed attention in the delivery of adequate WASH facilities and food supply systems in the public schools. Results show several deficiencies in the provision of WASH facilities and food supply systems in the public schools. The study shows that there is uneven access to WASH facilities in public schools in the Greater Accra region of Ghana. While some progress has been made in the delivery of improved WASH facilities in public schools, many aspects of WASH particularly those related to quality are limited or below standard. For instance, none of the public schools used water closet (WC). Students and teachers encounter several fecal pathogenic pathways during school hours which have to be addressed through "hardware" interventions (for instance WASH infrastructures) and "software" interventions (through education and training). These results are important in providing useful inputs for the need to improve the WASH facilities and food supply systems of the public schools, although a comprehensive study using a larger sample and also a national survey would be required to address the general WASH situations and food supply systems in the public schools in Ghana. An expansion of the study to include private basic schools will generate additional insights.

Acknowledgements

We are grateful to the respondents from the public schools in the two districts that participated in the study. We thank the entire survey team including field data collectors, data entry format designers and data entry assistants for their hard work. This study received funding from Bills and Melinda Gates Foundation and Dr. Hermann Eiselen Doctoral Program of the Foundation Fiat Panis. We disclose that the research design, implementation of the study and writing of the paper remains the sole work of the authors with no influence or whatsoever from the funders. This study together with the broader project on water testing experiment (AG-WATSAN Project) had ethical clearance certificate from the review boards of Center for Development Research (ZEF) of the University of Bonn, Germany and Noguchi Memorial Institute for Medical Research (NMIMR) of the University of Ghana, Legon.

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ISSN 0855-4730 *e*ISSN (online): 2590-9673

CLIMATE CHANGE AND CHANGING PRODUCTIVE ACTIVITIES IN GHANA: A GENDERED PERSPECTIVE

Emmanuel A. Codjoe[1] & Hellen A. Seshie-Nasser[2]

Abstract

There is consensus on the adverse consequences of climate change on the world economy, particularly on countries that are vulnerable to rising sea-levels. Nevertheless, another area of concern in recent years is the impact on the poor in developing countries, especially on women. This paper explores the gender dimensions of climate change on economic activities in Ghana. In specific terms, it examines the link between climate change and changes in economic activities from agriculture to services. We use data from several rounds of the Ghana Living Standards Surveys (GLSS) to explore the extent to which changing patterns of economic activities are linked to climate change. We find possible linkages between climate change and changing economic activities. In general, we find that there has been a gradual decline in the proportion of women, and men, engaged in agricultural activities, with a corresponding increase in the proportion of women and men engaged in some service sector activities.

Keywords: climate change; gender; employment vulnerabilities; economic activities.

Introduction

In recent years, following several decades of debate, there is now an emerging consensus that the world's climate is undergoing perceptible changes; what is now appropriately termed *climate change*. Despite the sceptics' assertion that there is little evidence of climate change, the

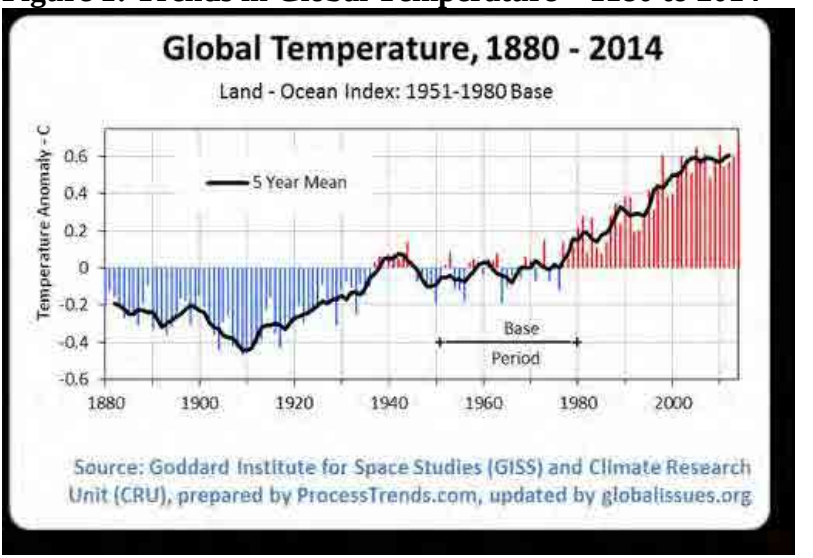
[1] Corresponding Author, Department of Economics, University of Ghana. Email: ecodjoe@staff.ug.edu.gh

[2] Department of Economics, University of Ghana. Email: haseshie@ug.edu.gh

ISSN 0855-4730 *e*ISSN (online): 2590-9673

majority of climate scientists are of the view that the world's climate is undergoing significant changes that require action on several fronts, notably the political, economic, social as well as internationally through various multilateral institutions. In the meantime, as the urgency of the situation has grown, the varied effects of climate change on many developing countries, especially those in Sub Saharan Africa (SSA) have become paramount. Indeed, as noted by the Intergovernmental Panel on Climate Change (2007), the expected rise in temperatures over the next half century will be in the range of 2 – 3 ^{0}C. Notably, the decade and half into the new millennium has been the warmest since records were compiled from the late nineteenth century (IPCC, 2013). To buttress the point, data on climate temperatures showed that 2016 was the hottest year on record, with the two preceding years also registering record-breaking temperatures (Schmidt and Arndt, 2017). Evidently, against the backdrop of these three record-breaking hottest years since records began over 150 years ago, there is no doubt that the world is getting warmer, as depicted in Figure 1.

Figure 1: Trends in Global Temperature – 1180 to 2014



Because of rising temperatures, it has been projected that the effect, in terms of extreme temperature events, will be more intense, more frequent

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and last longer (Meehl *et al*., 2007). This clearly has long-term socio-economic impacts on vulnerable groups in the developing world, particularly in Africa. For instance, Nabalamba *et al*. (2011) observes that the SSA region is home to the most susceptible populations of the world because of the sensitivity and fragility of its natural environment as well as the high dependence of environment-based livelihoods, such as agriculture. Consequently, in many SSA countries, the potential consequence of climate change is now better appreciated among academics and policy makers. This has generated a significant amount of studies on the impact of climate change. In Ghana, these studies have focused on the impact of climate change, especially on agriculture (Abubakari and Abubakari, 2015; Mawunya and Adiku, 2013; MacCarthy et al., 2013; Olesen et al., 2013; Adiku, 2013; Asafu-Adjaye, 2013; Codjoe and Owusu, 2011). The focus on agriculture stems from the important role agriculture plays in the socio-economic life of many Ghanaians.

The relevance of agriculture to the economic development of Ghana cannot be overemphasised. This is particularly the case in areas, such as employment (especially of women), household incomes, raw materials for industry, and export revenues. Despite its importance to the Ghanaian economy, agriculture in large parts is heavily dependent on nature; most land-based agricultural activities have been described as rain-fed. And it is precisely these characteristics of Ghanaian agriculture that makes it very susceptible to climate change. Indeed, there is general acceptance that the increased prevalence of weather-related incidents, which are linked to climate change, will adversely impact on several economic activities, especially those related to agriculture. Besides, as noted by the UN Women Watch (2009), the adverse effects of these weather-related events can also be felt in other areas, such as human health, human settlements, migration patterns, energy, transport and industry. Further, the United Nations Framework Convention on Climate Change (UNFCCC) has also noted that the effects of climate change, which manifest in the form of drought, floods, extreme weather events and reduced food and water security, affect both women and men. Besides, the UNFPA (2009) shows that women, especially in poorer countries, are more vulnerable to the impacts of climate change.

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Clearly, this raises the gender dimensions of climate change, particularly related to the various economic activities in which women are more likely to be engaged. It is against this background that this paper seeks to explore the impact of climate change on changing productive activities from a gendered perspective. Specifically, this paper explores the relation between climate change and women's economic activities. The purpose is to attempt to draw a link between climate change and the movement away from sectors that are severely affected by climate change, such as agriculture, to other sectors of the economy, notably, services. This paper is outside the scope of studies on adaptation induced by climate change as well as those related to livelihood diversification, which relates to non-farm income generating activities by households. By exploring another dimension of the consequences of climate change on households' economic activities, we hope it adds to the literature on the effects of climate change in developing countries. Moreover, we bring out policy conclusions regarding the choices and options that can be explored to address the challenge of climate change and its impact on women in Ghana. This is especially relevant given that there is evidence of increased participation of women in economic activities across the various sectors of the economy.

Why Women and Climate Change?

Climate change has impacts on the welfare of rural households, most of whom are engaged in agriculture. In the Ghanaian context, Duncan (2004) argues that women play the most important roles in the food chain, and are engaged in activities that begin with farm production, through marketing to intra-household distribution. As Duncan notes, women play lead roles in tasks directly linked farm activities, such as shelling of grains, storage, processing and marketing. While it is clear the important role played by women in agriculture in Ghana, there is recognition of the important dimensions of climate change that is related to gender, and especially women.

Also, there is consensus, in the literature, that climate change affects women and men differently, with women usually being worse affected than men (UN Women Watch, 2009; Nielsen & Reenberg, 2010a;

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Nabalamba *et al.*, 2011; Dankelman, 2012, Dankelman and Davidson, 2010). As argued by Gara (2016), climate change is not gender neutral; men and women are affected differently because of their roles and responsibilities in society. Furthermore, because climate change impacts various groups differently, several coping strategies emerge. In the case of women, some of the coping strategies include increased participation in economic activities where women hitherto were rarely involved (Nielsen & Reenberg, 2010a). However, Dankelman (2012) argues that not all women are the same; there are significant differences among women in terms of age, socio-economic status, educational backgrounds, etc., hence the effects on women is also not uniform.

Consequently, we cannot expect uniformity in the strategies adopted by women across communities; those at the utmost risk will be women with low socio-economic status. More generally, however, human adaptation to climate change is a heterogeneous process influenced by more than economic and technological development. The literature points to factors such as class, gender and culture as important characteristics in adaptation strategies (Nielsen and Reenberg, 2010b). Further, there are differences in the adaptation strategies in respect of the economic participation of both men and women. Consequently, some authors on gender and climate change, such as Djoudi & Brockhaus (2011) emphasize the need to focus attention on social and economic differentiation to avoid a generalized victimization discourse.

Undoubtedly, it is usually the poorest – the United Nations reports that nearly 70 per cent of the world's poor are women – that are most vulnerable in these circumstances. Dankelman (2012) for example notes that in the case of the women, the poorest usually slip further into poverty when they lose their livelihoods, with the result that inequality and marginalisation increase further. It is for these reasons, among others, that the UN and its agencies – the IPCC as well as other international development agencies – have endeavoured to incorporate gender-related issues in the discussions on climate change as well as socio-economic development in general.

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Climate Change, Changing Economic Activities and Gender: A Brief Review of the Literature

Much of the literature on climate change and economic activities has focused on livelihood diversification that is, the diversification of incomes to include non-farm activities. Our emphasis is on changing economic activities, which involves entirely abandoning agricultural activities in favour of non-agricultural activities. As previously noted, the gender dimensions of climate change arise from the fact that the effects of climate change are varied across the different socio-economic groups in any country. As Skinner (2011) argues, the need to lay emphasis on the gender dimensions of climate change emanate from the different experiences of women and men. This is because economic constraints as well as cultural norms that inhibit women's access to paid employment, mean their livelihoods are particularly dependent on climate-sensitive sectors, such as subsistence agriculture or water collection.

Further, due to gender inequalities in the distribution of assets and opportunities, the choices of women do become severely constrained in the face of climate change. Glazebrook (2011) indicated that climate change adds to the hardship of women in addition to its link with the feminization of poverty and environmental degradation. Consequently, Pearse (2017) argues that incorporating gender analysis aids in our understanding of vulnerability and climate change impacts. In the case of developing countries, particularly those within the tropics, the effects of climate change are massive especially on livelihoods and human settlements. These effects on livelihoods and settlements affect the poor and women, the most. Nonetheless, these effects and vulnerabilities emanating from climate-induced events are intensified because of differences in gender. For instance, Tanny et al. (2017) find that women were twice as vulnerable as men to climate-induced vulnerabilities in Northern Bangladesh.

It is worth highlighting the existence of studies that have examined local adaptation strategies to climatic changes (Azumah et al., 2017; Chaudhury et al., 2017; Boansi et al., 2017; Nielsen & Reenberg 2010a, 2010b). These

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studies emphasise the various measures taken by farmers and villagers to mitigate the consequences of climate-induced events. However, adaptation studies do not highlight other mechanisms that farmers can choose to address these vulnerabilities associated with climate change. For, it has been observed that farmers can choose to migrate and thereby engage in different economic activities. Van der Geest (2011) for example finds that migration of farmers from the north of Ghana to the south was to a large extent environmentally-induced.

In an earlier study on Ghana, Van der Geest et al. (2010) find evidence of the link between north-south migration and cocoa frontier settlement and the environment, although with regard to migration to the capital, Accra, environmental factors do not appear to play a major role. In such circumstances, migration offers household members an opportunity to invest and/or engage in new economic activities. Indeed, the link between migration and climate change has been noted by Black et al. (2011), who present new insights into the relationship existing between the two phenomena.

Clearly, what this points to is the influence of climatic conditions in altering the economic activities of households, especially those in areas where the nature of economic activities is intrinsically linked to the climate. For example, Nielsen & Reenberg (2010a) find that most women in Biidi 2 village, who were once only rarely engaged in commercial activities, had to resort to small-scale commerce to augment falling household incomes partly due to climate change in the area. Though factors other than climatic ones contribute to the changes in livelihood activities, some of the changes are seen to be primarily due to climatic variations because of the spatial pre-disposition of the group of people concerned. Consequently, the type of livelihood diversification that households opt for is influenced by several factors.

In another study, Nielsen & Reenberg (2010b) examine livelihood diversification in the face of the most recent of recurrent droughts in the Sahel of Northern Burkina Faso. The study reveals how culture acts as a major barrier to embracing the engagement of women in economic

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activities, among other successful livelihood strategies: a group studied abandoned pastoralism in order to engage in other livelihood activities and mainly rain-fed agriculture. Low crop yield combined with intensive demand for labour resulted in some households giving up rain-fed agriculture altogether, with these farmers noting that farm activities were no longer worth the effort. As a result, the economic landscape of these communities changed completely, with other economic activities becoming the dominant form of livelihood.

Other coping strategies have led to the *feminization* of some economic activities traditionally considered men-only activity, such as livestock keeping (Djoudi & Brockhaus, 2011). As a result, it was observed that the workloads of women have increased because of gendered coping strategies. For example, Djoudi and Brockhaus (2011) find that traditionally male activities, such as small ruminant herding have been added to the workload of women. They also find a defeminization of some agricultural activities following a change in land holding systems. Women then adopt new economic activities, such as charcoal production based on newly emerged forest resources. However, for women the new adaptation strategies do not come without obstacles. Several factors, including lack of decision making power, unclear access to natural resources, lack of knowledge and financial resources, and limited market opportunities have hindered the adoption of new coping strategies.

Undoubtedly, the inclusion of the gender dimensions to the climate change debates and discussions has broadened the scope for interventions on the effects of climate change beyond the social, political and economic. But as the UNDP (2013b) observes, not enough is known about the connection between gender roles and climate change adaptation, despite efforts to understand and reduce vulnerability of the poor to the effects of long-term climate change. Indeed, the poor, usually marginalised as well, are also incapable of militating against the worst effects on livelihoods and settlements arising from climate change.

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Climate Change in Ghana

This section presents a brief discussion of the evidence of climate change occurring in Ghana. To begin, we note that the IPCC (2007a; 2007b) defines climate change as "any long-term change in the statistical distribution of weather patterns, whether in terms of changes in average conditions (more/less rainfall, higher/lower temperatures), or in the distribution of events around the average (extreme weather events such as floods or droughts)." However, increasingly, the term has become associated with any change in climatic conditions over time, especially weather-related events that seem to be out of the ordinary. Nonetheless, the drastic consequences of climate change for countries in the tropics as well as small island states have meant that for countries, such as Ghana it has become evident that the possible effects of climate change cannot be ignored.

In the case of Ghana, several studies provide evidence – mainly variability in temperature and rainfall – that point to climate change occurring. Adu-Prah et al., (2017) for example present information that establishes strong evidence of climate change across the various agro-ecological zones. Sagoe (2006) also provides earlier evidence of several scenario experiments carried out for the ecological zones in Ghana to determine whether climate change was occurring. The experiments used rainfall data, rain days, and minimum and maximum temperatures for the period 1960 to 1990 which incorporated a 10-year average solar radiation data to estimate climate scenarios for the periods 2020, 2050 and 2080. These scenarios indicated an increase in both the minimum and maximum temperatures for Ghana across all the agro-ecological zones. Furthermore, whilst rainfall patterns varied across the agro-ecological zones, the analyses showed a decline in rainfall for the three scenarios created for all the zones. For instance, in the rain forest zones the reduction in rainfall was highest, with the lowest reduction of rainfall in the Guinea Savanna Zone.

Further evidence of climate change is provided by Kankam-Yeboah *et al.* (2010) based on a study by the Water Research Institute (WRI) of the Council for Scientific and Industrial Research (CSIR), and the EPA. The

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evidence shows that there is a 1°C increase in temperature over a 30-year period from the historical records, increased evaporation, decreased and highly variable rainfall pattern, and frequent and pronounced drought spells. Further, and as noted earlier, average annual temperatures have been rising steadily in the agro-ecological zones, and this is projected to continue into the future. The effects of the rising temperatures include the drying up of some rivers in the dry season which were hitherto perennial rivers, more intensive rainfall events, flooding, and unpredictable weather, especially late start of the rainfall season and/or shorter rainy season.

In summary, the evidence on Ghana suggests that the physical effects of climate change are manifested in a steady increase in mean temperatures, variations in rainfall patterns across the various agro-ecological zones, and freak weather events, such as floods as well as pronounced spells of drought. These manifestations of climate change will have devastating consequences on property, lives and livelihoods across many parts of the country. Moreover, for those economic activities that are closely linked to the weather, particularly agriculture, the effects are more dramatic because the consequences are far-reaching.

Climate Change, Agriculture and Gender in Ghana

As pointed out earlier, the agricultural sector plays an important role in the Ghanaian economy. For over 60 years of independence, the agricultural sector represented the largest share of gross domestic product (GDP), although in the last few years this has declined as the share of services in GDP has risen dramatically. Despite this, it remains an important source of foreign exchange through exports, tax revenues, contributes to industry in terms of raw materials, and a major source of employment with a least 60 percent of the population engaged in agriculture-related activities. According to the 2010 Population and Housing Census the agricultural sector employs nearly 57 percent of female-headed households in the rural areas compared with nearly 73 percent for male-headed households. Further, the 2010 census report also indicates that over 60 percent of the female population is economically active, even though the proportion of males exceeds females (see Table 1). Whilst this pattern is not surprising, because of the nature of the Ghanaian socio-cultural landscape, relatively

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high representation of females in the labour force points to the need for a gendered perspective of the economic consequences of climate change..

Table 1: Percentage distribution of population aged 15 years and above by sex, and activity status: 1984, 2000 and 2010

	Economically Active		**Economically Not Active**	
Year	**Male (%)**	**Female (%)**	**Male (%)**	**Female (%)**
1984	83.5	81.6	16.5	18.4
2000	76.7	72.7	23.3	27.3
2010	72.8	69.6	27.2	30.4

Source: GSS (2013)

Also, of crucial importance in respect of climate change and agriculture in Ghana is the threat to livelihoods resulting from erratic weather patterns. As argued by Jones and Thornton (2003), the impacts of climate change on agriculture may significantly complicate the existing developmental challenges faced by developing countries, notably in Africa. Hence, with growing evidence of the increased variability of rainfall in Ghana over the last decade or so, there exists imminent vulnerability to rain-fed agriculture and this is very likely to affect adversely the livelihoods of farmers in rural areas, many of whom are poor. Also, with Ghana's agricultural sector characterised by the absence of large-scale irrigation – the majority of agricultural production rely on rainfall – the detrimental impact of climate change on the sector is likely to be greater compared to other sectors of the economy. For example, Jones and Thornton (*ibid*) have showed that maize yields in Africa and Latin America are likely to reduce by 10 percent on average as a result of climate change. This will potentially result in declining incomes for smallholder farming households, increase the incidence of food insecurity and thwart efforts at poverty alleviation.

Additionally, the evidence from several rounds of the GLSS indicates that farmers engaged in food crop production many of whom are poor, are also women. Indeed, as shown in Table 2, there is a high share of women

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engaged in agricultural activities in Ghana. Duncan (2004) for instance argues that women account for over 70 percent of food production, which underscores their role as important players in the food chain; from farm production, marketing and intra-household distribution of food. However, despite the important role played by women in agricultural activities they are usually the worse affected by adverse weather conditions on agriculture. This is so because women usually have only little decision-making power or control over inputs and outputs within society, and this especially so in rural areas (UNDP, 2013a).

Methodology

To explore the links between climate change and the gender dimensions of changing economic activities in Ghana, the paper uses descriptive analysis of trends from existing data and draws inferences from observed patterns. Thus, the paper relies on secondary data as well as evidence from other studies to present a gendered perspective on the relationship between climate change and changing economic activities. Moreover, because it is descriptive we are unable to draw any casual relationships. The data used for the descriptive analysis are pooled from three rounds of the Ghana Living Standards Survey (GLSS); these are the fourth, fifth and sixth rounds that were conducted in the years 1998/1999, 2005/2006 and 2012/2013. It is a nationally representative survey conducted in all the ten administrative regions of Ghana. Data for the analysis are extracted for men and women aged 18 years and above, and who are actively engaged in any economic activity. The economic activities are classified using ISIC 4 code, especially for the 4th and 5th rounds of the GLSS. The data are grouped into the various sectors using the ISIC 4 code. Additionally, information from the 2010 Population and Housing census report is used to complement our analysis.

Climate Change and Changing Economic Activities in Ghana: A Gendered Perspective

We have earlier established that based on several scenarios undertaken by the EPA there is evidence to suggest the presence of climate change in Ghana. Moreover, we have also indicated that for economic activities,

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such as agriculture that are heavily dependent on the climate, any changes in the weather will have adverse consequences on productivity and livelihoods. For example, Alexander *et al.* (2011) note that ten African countries ranked most vulnerable to climate change are also heavily dependent on agricultural activities. Besides, where women account for over 40 percent of the agricultural workforce, in cases where agriculture is rain-fed and dependent on low technology the livelihoods of women farmers are threatened. The situation is made worse when they are also confronted with a fragile environment and poor geographical circumstances. Clearly, therefore, the gendered perspective in respect of climate change and changing economic activities arises in situations where women find themselves in significant numbers in relation to men engaged in any number of economic activities.

The evidence from several rounds of the GLSS as well as the 2010 population census shows that there is increased participation in the workforce by both women and men. Table 2 reports the incidence of men and women in various economic activities using data from the GLSS. There is clear evidence that point to the role played by women in the agricultural sector. Nevertheless, because women usually have less access to land because of customary practices as well as to other factors of production compared to men they are most likely to be poor and thus most affected by any incidence of climate change. And as Duncan (2004) notes, although there has been a decline in national poverty rates over the last two decades, food crop farmers in general have experienced less than proportionate share in poverty reduction in Ghana. Additionally, as predominant food crop growers, women farmers constitute the poorest among the poor, which is further worsened by the existing differentials in rural, urban and regional development.

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Table 2: Incidence of Men and Women in the Various Economic Activities

	1998/1999		2005/2006		2012/2013	
Type of Economic Activity	Male %	Female %	Male %	Female %	Male %	Female %
Agriculture	53.60	55.65	65.19	56.32	66.14	56.75
Mining	0.75	0.03	0.89	0.26	1.78	0.48
Manufacturing/Processing	6.73	8.32	7.67	12.92	4.91	9.06
Construction/Repair	3.17	0.18	3.73	0.20	5.04	0.26
Utility	0.20	0.03	0.32	0.06	0.26	0.06
Social/Personal Services	7.55	4.65	7.61	6.91	6.34	7.03
Trade	4.21	23.65	7.03	19.61	7.19	20.24
Transport/communication	2.81	0.29	4.61	0.35	4.92	0.28
Hospitality	0.27	5.35	1.17	3.03	1.27	4.63
Business/Finance/Real estate	3.68	1.85	1.79	0.34	2.13	1.19
Source: Authors' calculation from GLSS 4, 5, 6						

Nevertheless, we can think of other choices that women directly or indirectly affected by climate change might opt for. These options can also be regarded in the broad sense as coping strategies. One important coping strategy will involve switching entirely from one economic activity to another. This will involve abandoning an economic activity that is most affected by climate change to that which is least affected. As observed by Nielsen & Reenberg (2010a) one of the prominent coping strategies adopted involve a move away from farm to off-farm economic activities. As an example, women in developing countries largely resort to small-scale commerce.

The situation in Ghana in respect of women and their vulnerability is not dissimilar. Firstly, data from the Ghana Statistical Service (GSS) for the period 1960 to 2010 indicate that the proportion of women in the total

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population has increased over that period. Based on census data from 1960 to 2010, there is clear evidence of the increased proportion of women relative to men in Ghana's population. For example, in 1960 the sex ratio, which measures the proportion of males per 100 females, was 100.2, declining to 98.5 for 1970, 97.3 for 1984, rising slightly to 97.9 in 2000, and then falling again to 95.2 in 2010. Secondly, in rural areas where agriculture is the predominant economic activity, evidence from the Ghana Living Standards Survey round 5 (GLSS5), shows that for persons over 25 years of age, the proportion of women exceeds that of men. Given the higher proportion of women in the entire population as well as in the rural working-age population, it is undoubtedly the case that the direct and indirect impact of climate change on productive activities is likely to affect women the most.

But as we noted in the literature, in the face of changing climatic conditions and its adverse effects on agriculture, households engage in livelihood diversification. For the poorest women, Rodenberg (2009) observes that they are unable to diversify cultivation in the face of climate change because they are limited to mainly household tasks, such as fetching water and fuel wood, cooking and limited farm activities. In contrast to the fortunes of the poorest women, those women who play important roles in the family and community are best placed to adapt to changing environmental realities (Nabalamba et al. 2011). Indeed, Petrie (2011) argues that such women play a leading role in coping with changing circumstances better than men, and also better at exploring opportunities that enable them cope.

Typically, in most rural households in Ghana women are predominantly responsible for household food production and other activities related to the management of the household. But, because of climate change these activities both in the household as well as on the farm are likely to become increasingly difficult. And with very little alternatives as well as limited knowledge on coping strategies, there is the likelihood that households severely affected by climate change will move away from agriculture to other economic activities.

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Our central argument is that given the threat to agricultural livelihoods arising from climate change, households will explore other economic activities that offer better income prospects. We have also witnessed a sustained increase the size of the economy in the last decade as well as the rapid expansion of the services sector. It is worth noting that in the last few years, the services sector's contribution to the GDP has approximated about 50 percent on average. Consequently, we expect that women moving away from agricultural activities will gravitate towards the types of economic activities characteristic of the services sector. Indeed, evidence suggests an increase in the share of women engaged in other non-agricultural related activities. More generally, there has been growth in services activities, such as telecommunications, retail trade, transportation, and financial services. The growth in these sub-sectors serve as pull factors which serve as pull factors for both men and women. And, for women and men who are not highly educated but find themselves engaged in low productivity, low wage and climate change affected agricultural activities, one option will be to diversify into low skill services activity, such as trading/commerce, transportation and to some extent social/personal services.

However, given the nature of some service sector activities, we expect to find some differentiation in the types of economic activities engaged in by women and men. Hence, we expect to find more men than women engaged in transportation, whilst the reverse is expected to be the case in trade (retail trade/commerce). In Table 2 we find that the proportion of men engaged in transportation is higher compared to women, whilst the reverse is the case with regard to trade (retail trade/commerce). As noted earlier, because of the limitation of data, we are unable to provide a better picture of the diversification activities by households within agriculture. Nonetheless, we also observe that in recent years there has been increased participation of women in the social and personal services sector, including hairdressing, tailoring, nursing, and other personal services. Arguably, some of these activities do require a significant level of skill, suggesting that men and women engaged in nursing and social/personal services are unlikely to have moved out of agriculture.

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Another important gender dimension arising from livelihood diversification activities relates to vulnerability. Where men and women diversify away from agriculture because of the loss of income resulting from climate-induced effects, the expectation is that they find themselves in other economic activities that provide better incomes. However, it is usually the case that because of their low skill levels they navigate towards other forms of economic activities, which though providing a level of income higher than agricultural wages is nonetheless not highly paid. Thus, some women and men find themselves in vulnerable employment. We define vulnerable employment as low-paid self-employment, engaged in unpaid work or contributing to family work. These types of employment are characterised by the lack of formal contracts and income security.

Table 3 reports employment status for men and women based on data from the three rounds of the GLSS. We find a higher proportion of women engaged in non-agriculture self-employment without employee, non-agriculture contributing worker, and agriculture contributing worker. By engaging in these forms of employment, women are thus constrained further in their decision-making ability and deprived of the necessary financial resources to escape the from the poverty trap. Thus, another feature worth highlighting in respect of the gendered dimension to changing economic activities arising from climate change is that livelihood diversification may only result in women and men moving from one vulnerable activity to another.

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Table 3: Patterns in Employment status by Gender

	1998/1999		2005/2006		2012/2013	
Employment status	**Male %**	**Female %**	**Male %**	**Female %**	**Male %**	**Female %**
A paid employee	20.88	5.78	22.14	7.57	19.34	8.38
Non agric Self w/ employees	1.70	1.47	2.37	2.22	2.85	2.90
Non agric Self w/o employees	14.36	34.11	10.09	29.26	8.37	23.78
Non agric contributing family worker	0.96	2.65	0.73	2.52	2.94	5.56
Agric Self-employed w/ employees	49.67	31.66	1.84	0.69	2.11	0.80
Agric Self-employed w/o emplyees	n.a.	n.a.	39.81	20.52	30.81	18.32
Agric contributing family worker	12.19	24.28	20.57	35.25	29.41	36.67
Domestic employee	n.a.	n.a.	0.09	0.18	0.15	0.16
Casual workers	n.a.	n.a.	n.a	1.71	2.17	0.95
Apprentice	n.a.	n.a.	2.20	0.07	1.74	2.40
Other	0.23	0.05	0.15	n.a.	0.11	0.08
Source: Authors' calculation from GLSS 4, 5, 6						

Limitations of the Study

This study would have benefited immensely from quality household level data – both quantitative and qualitative – on the various strategies used by households engaged in agriculture in the face of changing climatic conditions. This would have substantially enriched our analysis and discussion on the changing nature of economic activities arising out of adaptation mechanism by men and women. Besides, without a complete set of disaggregated data of the different economic activities undertaken by both men and women in the various sectors of the Ghanaian economy, we are limited in our ability to explain fully the link between climate change and changes in economic activities for both men and women. Despite these shortcomings, the available data permit us to draw some

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conclusions on the changing pattern of economic activities arising from climate change from a gendered perspective.

Conclusions and Policy Implications

This paper sought to explore the gender dimensions of changing economic activities arising from climate change in Ghana. To achieve this objective, the paper uses descriptive analysis of trends from existing data and draws inferences from observed patterns. There is evidence of climate change occurring in Ghana as manifested in the variation of temperature and rainfall patterns across several agro-ecological zones. We are also aware that agriculture is highly dependent on nature, such that agricultural productivity and incomes are susceptible to the natural environment. Consequently, environment-based livelihoods are sensitive to climate-induced factors. Therefore, in the presence of climate change it is without doubt household members, especially in rural areas will find ways to mitigate the adverse consequences on their incomes. We have argued that among the various options available is the decision to move away from agriculture to other sectors.

Using several rounds of the GLSS, we find evidence of declining rates of participation by both women and men in agriculture and increased rates of participation in other sectors of the economy. Women are more likely to find themselves engaged in trade compared to men, whilst men are more likely to find themselves in transportation. Although we emphasis the link between climate change and changing economic activities, we also recognise that other factors are at play in this mix and cannot therefore be ignored. Nevertheless, this paper argues that climate change is a major factor in these observed changes because of the agrarian nature of the Ghanaian economy, and the known effects of changing climatic conditions on agricultural productivity and environment-based livelihoods.

An important dimension that arises from this finding is that of vulnerability. Where climate change impacts on agriculture, the vulnerabilities of households in terms of diminished incomes and threats to livelihoods increase. Moreover, it appears that where there is a change in economic activities away from agriculture to services, we observe that

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both men and women are engaged in activities that are associated with income vulnerabilities too. This is particularly so where the nature of employment is informal. Informal employment, which is the major form of employment, is characterised by income insecurity and no long-term job security.

This raises important implications for national economic policy making. Considering the effects of climate change on agricultural activities, national economic policy-making must incorporate policies that are targeted at mitigating the adverse effects of climate change, expand the range of adaptation and livelihood diversification mechanisms available to households mitigation, as well as specific interventions to address the vulnerabilities that are faced by both women and men who gravitate towards informal employment, self-employment, and poorly remunerated activities in the services and manufacturing sectors.

A final implication from this paper is the need for a comprehensive set of data – quantitative and qualitative – on the various adaptation and livelihood diversification activities by various households in response to climate change. Additionally, there is need to collect and document, data on threats to livelihoods and the nature of vulnerabilities faced by households that that will be affected or have been affected by climate change to better understand the processes involved as well as help develop better strategies to address the challenge from one economic activity to another because of the effects of climate change.

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SOCIO-CULTURAL INTERPRETATIONS OF BREAST CANCER AMONG FEMALE PATIENTS AT THE CAPE COAST TEACHING HOSPITAL, GHANA

Nana Afia Karikari[1] & William Boateng[2]

Abstract

Breast cancer is considered a global public health problem. Due to late presentation of breast cancer to hospital for diagnosis, many women especially in sub- Saharan Africa die out of the disease. The causes of this delay are numerous. The focus of this study was to explore the socio-cultural interpretations breast cancer patients attribute to the disease, and how these interpretations informed their health seeking behaviours. Qualitative research design informed the orientation of the study. In-depth interviews were conducted to elicit information from twenty-five study participants. The study was underpinned by the Social Constructionism Theory. It was revealed that interpretations were linked with the disease and did not only determine the time patients reported to the hospital but also permeated their entire health seeking behaviours. Those who believed that the illness was a spiritual condition were much more inclined to seek spiritual help from deities and vice versa. The study recommended that clinicians should encourage breast cancer survivors to form groups, so that they can better explain and share their experiences with other women and debunk all misconceptions surrounding the illness.

Keywords: Breast Cancer, Socio-cultural, Interpretations, Treatment choices, Patients.

[1] Department of Sociology and Anthropology Faculty of Social Sciences College of Humanities and Legal Studies University of Cape Coast, Cape Coast. Email: ephia2015@gmail.com

[2] Department of Sociology and Anthropology Faculty of Social Sciences College of Humanities and Legal Studies University of Cape Coast, Cape Coast. Email: wboateng@ucc.edu.gh

ISSN 0855-4730 *e*ISSN (online): 2590-9673

Introduction

Breast cancer is one of the most aggressive and highly destructive cancers among women (Sarfo et al., 2013). It is a disease that has its affected population from urban and rural, wealthy and poor, old and young. That is, the disease is not restricted to one's culture, ethnic affiliation, race, social status or creed. As Kawar (2012) intimated, in spite of improved medical diagnostic skills and scientific breakthrough, cancer of the breast continues to be one of the leading causes of cancer deaths among women worldwide. Global estimates according to Patel-Kerai, Harcourt, Rumsey and Nagvi (2015), suggest that on an annual basis, there are more than 1,050,000 reported new cases of breast cancer. Schmauss, Machens and Harder (2016), also revealed that in 2012, breast cancer was both the most common cancer and the leading cause of cancer-related deaths with 1.7 million new diagnoses and 521,900 deaths.

It is pertinent to mention that geographically, there is variation in terms of incidence and mortality as high income countries often record high incidence rate but low mortality (80 percent survival rate for at least 5 years); whereas the opposite is true for low income countries, especially in Africa (Banning, Hafeez, Hassan, Faisal and Zafar 2009). They added that more than two-thirds of all breast cancer mortalities occur in Africa. This high degree of mortality rate is due to late diagnosis, and lack of modern cancer equipment (Segni, Tadesse, Amdemichael & Demissie, 2016).

Late presentation of the disease for diagnosis is the most common cause of poor survival rate in Africa especially in sub-Saharan region. It is purported by Ohene-Yeboah, Adofo and Akpaloo (2013) that in sub-Saharan Africa, 90 percent of breast cancer patients delay in seeking medical help and as a result the disease easily advances to its optimal state, that is either stage III or IV. This situation demands the most resource intensive treatment, where even optimal western therapy may offer minimal survival benefits for patients.

Ghana is not exempted from the problem of breast cancer. It is recorded as one of the leading causes of cancer deaths among women in Ghana. The

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Ghana Cancer Plan (2012) reported that it forms 15 percent of all cancers and 40 percent of all female cancers. Jemal, Bray, Center, Ferlay, Ward and Forman (2011) added that about 2,000 breast cancer cases and 1,137 related deaths are recorded annually among Ghanaian women. The study further indicated that the five-year survival rate is below 50 percent, with a relatively greater proportion of the disease being reported in women below the age of 50 years (Ohene-Yeboah & Agyei, 2012). The incidence-mortality ratio of the disease is 0.68 (Ohene-Yeboah et al., 2013). Clegg-Lamptey, Dakubo and Attobra (2009) further added that most patients that is 50 percent to70 percent, present the illness at advanced stages of III and IV after first noticing a change in their breasts. These statistics on the disease raise eyebrow and cannot be swept under the carpet. The question therefore is what are the factors promoting late reporting of the disease for diagnosis in Ghana?

The tendency of women to seek early medical treatment or not, is mostly influenced by their socio-cultural beliefs. Socio-cultural beliefs provide the medium through which people frame their attitudes toward health and illness. Helman (2000) asserted that women's understanding and explanations of cancer are socio-culturally patterned and have the tendencies to inform their interpretations of what the disease is. As such, the interpretations women give to the illness have been identified as significantly playing a role in their decisions regarding breast cancer diagnosis and treatment. It is against this background that this study explored the varied socio-cultural interpretations of breast cancer Ghanaian women attach to the illness and how these interpretations influenced their health seeking behaviours.

Available literature on the experiences of women suffering from breast cancer in Africa and Ghana in particular, is limited. Many accounts of breast cancer largely represent experiences of women in Western cultures. Consequently, it would be inappropriate to generalize these findings in the Ghanaian setting, particularly as the healthcare systems, culture and lifestyles are not entirely comparable. A study of this nature is therefore vital to provide a contextual picture of the phenomenon and add to scholarship on breast cancer. Although, breast cancer is commonly

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occurring in Ghana, there is however, poor knowledge and understanding of the phenomenon. Therefore, this study is expected to contribute to our understanding of breast cancer from a socio-cultural perspective.

Theoretical Underpinning

The study is informed by Berger and Luckman's Social Constructionism (1967). The tenet of the theory is that reality is socially constructed and it is seen as an ongoing, dynamic process. The theory posits that most social interactions involve some acceptance of what reality is. It essentially embraces the ideology that knowledge, beliefs and perceptions are interpretive nets woven by individuals and groups in a particular society through interaction. Thus, individuals' realities are shaped through the experiences and the interactions with others. This makes each person's reality unique.

In relation to health and illness, social constructionism focuses on the way people make sense of their bodies and body disturbances through socially constructed ideas and beliefs. Therefore, the theory suggests that interpretations of illness are socially constructed. Social forces like the shared norms, ideologies, beliefs and interpretations shape the understanding and actions of people towards health, illness and healing. That is to say, these forces shape peoples' understanding of the disease, the experiences of the illness, decision regarding treatment and the outcome of the problem. The theory is therefore relevant to this study because it gives the opportunity to acknowledge the diverse attributions and interpretations people/patients attach to breast cancer within their social contexts.

Putting the theory in the perspective of interpretations that patients may attach to breast cancer, it can be argued that, the interpretations, beliefs, understanding and experiences of the illness are often inextricably tied to the social attributions. Patients' realities about the illness especially the causes, treatment, often stem from broader social perceptions about breast cancer and interactions with significant and general others. It is worth noting that patients' choices of care are not based solely on medical criteria, but on other factors such as the perceived interpretations. For

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example, if the perceived cause of the illness is attributed to spiritual, the health seeking behaviour of the patient most likely would be from a spiritual perspective.

In conclusion, what patients hear, know and understand, are the perceived realities from their environment, which they decipher to inform their judgments and interpretations of the disease, with corresponding health seeking behaviours.

Methodology

This study adopted the qualitative research design. Bryman (2012) indicated this approach attempts to capture human experiences in their entirety, as it gives dynamic and holistic picture of these experiences. This design was found to be most suitable for this study because it postulates that social phenomena can be understood through interpretations of individuals' subjective experiences. Taking into consideration the research objective which sought to explore patients' interpretations of breast cancer, the qualitative approach was considered an effective strategy in attaining the objective by capturing patients' unique experiences.

The study setting was Cape Coast Teaching Hospital. It was the first of a series of regional hospitals established by the Ministry of Health. The hospital started full operation on 12th August 1998. It is a referral hospital with 400 bed capacity and provides specialist services including the following: Obstetrics and Gynaecology, Surgery, Orthopedics, Medicine, Child Health, Pathology, Ear Nose Throat (ENT), Endoscopy, Neurosurgery, Intensive Care Unit, Psychiatry, Dentistry, Eye unit and so on. The hospital has a Breast Cancer Clinic which receives patients from all over the country. It is staff with a team of surgeons, radiation oncologists and nurses.

All females diagnosed with breast cancer and who were undergoing treatment at the hospital from the period of 3rd April to 15th May, 2017, was the targeted population for the study. Convenient and purposive sampling techniques were used in selecting twenty patients. In addition to

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the twenty patients, five clinicians were purposively selected. These five clinicians worked closely with the breast cancer patients. Thus, they were found to be appropriate to give rich and valuable information regarding their experiences with patients during diagnosis and treatment. They included two doctors and three nurses at the consulting room and the Female Surgical Ward. In-depth interview guide was the data collection instrument found most suitable for this study. In-depth interview provided participants the opportunity to describe their experiences as patients living with breast cancer. As Bryman (2012) espoused, in an in-depth interview, the interviewer is interested in the context and content of the interview, thus this approach allows much more space for interviewees to answer on their own terms than structured interviews. Pretest was done to ascertain the efficacy of the instrument and address any ambiguities. The consent of participants was sought before the start of any interview. Participants were informed about the study's objective. Participation was fully voluntary as they gave oral consent based on an understanding of what the study is about, how the results will be used and the fact that participants could withdraw from it at any time. Furthermore, given the sensitive nature of the study, confidentiality was strictly adhered to.

Participants' actual names and any other identifiable characteristics were delinked from the data thus they were encouraged to use pseudonyms to protect their identities. The data was collected over a period of four weeks with each interview session lasting for an average of forty minutes. A digital audio recorder was used to record interviews. Transcripts were read to participants to confirm their narratives. This was done to ensure participant validation. Themes were developed manually using Braun and Clarke (2006) thematic analysis approach. The approach has six phases namely, familiarising with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes and lastly producing the write up from the data.

Findings and Discussion

Demographic characteristics of patients

The patients in this study came from varying age, marital, education and ethnic groups. Three out of the twenty participants were within the age

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bracket of 21-30 years, four participants were within the age group of 31-40 years, eight participants were within the age cohort of 41-50 years, four participants were within the age range of 51-60 years and one participant was above 61 years. It is evident from the data that the majority of the patients fall within the 41-50 age cohort. Though it is unclear why the majority of the participants fell within that age group, it is pertinent to mention that, this finding is akin to Ohene-Yeboah's and Agyei's (2012) study where most of the study participants fell within the same age bracket. Although the literature suggests that breast cancer mostly affects women at their post-menopausal age, the age distribution of breast cancer patients in this study however shows that women in their premenopausal and menopausal periods were more affected by the disease. Figures for the 21-30; 31-40; and 41-50 age categories cumulatively constituted 19 out of 20 patients. It could be implied that breast cancer is no longer "a disease for the old" as women as young as twenty years are being diagnosed with it. It is imperative therefore to investigate further, the possible reasons for this outcome.The study established that majority of the patients (thirteen) were married, two were single, two were divorced, and three were widowed.

On the subject of formal education, nine patients out of the twenty had no formal education, two were primary school leavers, three were Middle School Leaving Certificate holders, two had Junior High School Certificate, two others were graduates from Vocational Institutions, one was a Senior High School graduate and lastly one had a Diploma Certificate. In the case of occupation, five of the patients were into the retail business. The rest were into farming, teaching, and bakery among others. Most of the patients (twelve) were Christians. Christianity in this study encompasses all the various denominations found in the religion. Muslims were the next populous group with four in number. One patient was a believer in the African Traditional religion, one Hindu, and two others who belonged to none of the faiths. For ethnicity, most of the patients (eleven) were Akans with few from other ethnic groups. Akans are the predominant ethnic group in Ghana, concentrated at the southern sector of the country. Taking the location of Cape Coast Teaching Hospital into consideration, there is a higher chance of getting more Akans. With regards to the location of patients, eight were from the urban areas, whiles

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seven were from the peri-urban areas with five from the rural areas. For stage of the disease, patients presented advanced stages of the illness to hospital. Eleven patients were undergoing chemotherapy treatment while nine had either undergone mastectomy or were about to undergo surgery which are the advance stages of the treatment protocol.

The Life world of the Breast Cancer Patients

It is important to consider the socio-cultural background of patients if we are to understand fully how they view and understand their illness. Breast cancer patients in this study were not homogenous. Their experiences varied in terms of geographical location. As Helman (2000) stated, the socio-cultural environment of individuals creates unique patterns of beliefs that inform their attitudes towards prevention and treatment of disease. The socio-cultural environment of patients provided them with a way of assimilating the interpretations of the illness through socialization.

The location of patients had a close link with the time they reported the disease to the hospital. This is because the community an individual lives in has a role on how information flows, the sort of information that is circulated, the meaning and interpretation people in that community attach to the information, the kind of social interaction and power relations. Regarding the time patients reported to the hospital, they indicated that the sort of information they received from their community either prompted them to go to hospital early or otherwise. For those in a collectivistic community where there are expressive ties between people (as typical of rural areas) patients more often than not, delayed in going to hospital. This is because in such communities there is often an easy flow of information/interaction, thus patients were afraid to seek treatment for the fear of their health status getting into the public domain. They concealed the illness until it got out of hand, before seeking medical help. Women from the rural and peri-urban areas (small closely knitted communities) intimated that women who had breast cancer in their communities died, and they were labelled as witches who had done evil and that the disease was their punishment. It will therefore be disastrous if they let people know about their condition for fear of stigmatization so they delayed in seeking medical help. For example, 50 year old Mama Lucy indicated:

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> This disease is bad. When people get to know that you have it they spread all sort of falsehood. Let me tell you, there was this beautiful lady in my vicinity. She had the disease and people gave her all sorts of names. Some called her a witch who tried to kill someone and the person she was trying to kill prayed and that is the result of her action. Others said she is promiscuous. When I had the disease I was very afraid to tell people. Even my family it took a while before I told them, because I did not know how they will behave towards me. So myself together with my daughter were applying herbs secretly on the breast till my sister from Accra came and advised me to go to the hospital in Cape Coast instead and non will know about it.

Other patients stated that women in their communities who had breast cancer and went to the hospital had their breasts removed and died. Therefore, going to the hospital meant that they will suffer the same fate hence the delay. For example, Salah, 45 years old indicated:

> Oooh I did not come early to the hospital because I feared that if I come the doctors will ask me to go for surgery and I might die. People in my community say if you have breast cancer and they remove your breast you will never be the same and you will die. I believed it initially because two women in my community who had the disease and went to the hospital for surgery died. I came to the hospital only after I got to know that those women died because the disease had reached a bad state, I mean their breasts were decaying. So I said to myself that I have to rush to the hospital before I get to their state and die.

Some of the urbanized patients also reported late, the point of divergence; however was that they did not have the problem of their health status getting into the public domain. Their delays were multiplicities of factors such seeing the lump and other signs and symptoms as non-life threating, self-treatment, misconceptions about the disease among others.

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Socio-cultural Interpretations Attached to Breast Cancer

In the advent of an illness, people look for explanations. Meanings attributed to an illness vary considerably over time and across social groups. Illness is an incomprehensible event and as Currer and Stacey (1993) argued, it always give rise to questioning and interpretation because, it is often sought in a way which goes further than medical explanations. Weitz (2013) also indicated that people typically seek explanations for why illness occurs and why it strikes some rather than others. Weitz further added that most of these explanations would then define the illness as being deserved punishment for sinful behaviour or blame the individual for their own illness. These given interpretations persist because people find them useful and convincing. They reinforce existing social arrangements and help justify the tendency to accept, reject, mistreat or simply ignore those who have an illness.

Patients in this study gave varied interpretations to the illness. Majority indicated that the disease is caused by supernatural forces. They stated the following: "For me it is spiritual. How can you be given treatment and your hair falls out, your nails get discoloured? [side effects of chemotherapy] this is not so with other diseases" (Mansah, 45 years).

> The disease is caused by witches. They use our breasts for rituals. That is why when you get the disease you die within a short period because they have already killed you in the spiritual realm. So it is a matter of time for it to be manifested in the physical (Sarah, 29 years)

Some women also interpreted their diagnosis in relation to "karma" (what goes round comes around). They were of the view that the disease was a punishment, as such women who have breast cancer have to endure the illness to make amends for bad deeds from their past lives (the belief of supernatural sanction). Some of such beliefs were:

> For me I sometimes believe that this disease is as a result of something I did in the past and now am suffering for it. I cannot really come up with one but sometimes I reflect and I suspect my past has a role. You know when you are

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> young you do so many things that you regret. I always pray to God to heal me because the load is heavy for me to bear. [sighs and sobs gently] (Mama Lucy, 50 years)

In addition, one patient interpreted the disease as a test of faith in God and everything that is happening in her life is for a purpose. "I believe I had this disease for a reason. It is to test my faith in the Lord. I always talk about faith and having hope in God. Therefore, this is to test if I can practice what I preach and stand the test of time so for me my faith is in God" (Comfort, 50 years). Although several of the patients gave a spiritual interpretation to the illness, others indicated that breast cancer is just a medical condition like any other disease. They argued:

> Oooh for me I don't regard it as spiritual. It is medical. I think as you grow you are susceptible to a lot of sicknesses and breast cancer is one. You know things change within your system (Juliet, 30 years).

> It is a medical condition. I don't believe this is a spiritual disease. It is a disease that is becoming common and I think it is a purely medical condition (Sophia, 31 years).

Few of the patients had mixed interpretations to the disease, for example Vim Mama; 55 years expressed the following view:

> Generally when you talk to people they say it is a spiritual disease, some say it is caused by sleeping with different men, and some are of the view that women who keep money in their braziers get the disease. So these are some of the things people say and I think they are right".

When asked about the interpretations patients attribute to breast cancer, a senior doctor intimated:

> It is interesting the kind of interpretations patients attribute to breast cancer. Most of the patients that we receive in this hospital attribute the disease to spiritual causes. Some say their rivals cursed them with the disease; others are of the

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> view that because they are not spiritual [prayerful in this sense] Devil or malevolent spirits have inflicted them with the disease. There are few who regard the disease as medical or caused by other factors other than spiritual. Breast cancer is not a spiritual disease; it is a purely medical condition so I do not understand where people get these interpretations that it is spiritual. How can a witch cause your cells to outgrow? Well let me leave that to the pastors, maybe they can tell me more about that possibility [sighs deeply and laughs]. (Doctor E.M)

From, the above narrations, socio-cultural interpretations given to the illness ranged from medical reasons, supernatural attributions, poor personal hygiene to promiscuity. Although very few of the patients acknowledged that the disease was medical, most of the patients saw the disease as being caused by spiritual forces. This attribution by the women could be explained by de-Graft et al, (2010) assertion that most Ghanaians are oblivious of the causes of some chronic/terminal diseases like breast cancer, epilepsy, asthma. They believe that they are caused by supernatural forces and as such address them as spiritual/ demonic condition, which is beyond the scope of orthodox medical services. Due to the supernatural explanation given to cancer in some cases and the perceived belief that is beyond orthodox treatment, most women were adamant to seek early treatment. In addition, Banning et al., (2009), Hwang et al., (2015) and Post (2014) all argued that the perceived interpretations of breast cancer, which mostly are misconceptions, frame women's attitudes towards health and often create barriers for prompt diagnosis and treatment of the illness.

Socio-cultural Interpretations and Health Seeking Behaviours of Patients

In a medically pluralistic society like Ghana, people suffering from ailment have a number of ways of seeking treatment. As Twumasi (2005) indicated, the treatment of sick people is not the exclusive rights of scientific medical practitioners (orthodox treatment) but also the prophets, mallams, traditional healers among others. The preference of one choice

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over the others is greatly influenced by the meanings and interpretations people attach to the illness. The interpretations an individual give to an event are largely derived from the experiences and the interactions with others in a given socio-cultural context. These social constructs shape the realities of an individual.

Finding from this study showed that interpretations given to breast cancer influenced the type of treatment sought. Thus those who perceived the disease to be unnatural were adamant in seeking medical help but rather resorted to other treatments like herbal or spiritual treatment or both (alternative treatment), and vice versa. For patients in this study, orthodox medicine and alternative medicine offered different solutions to their problems. Therefore, the choice of one over the other or both was informed by what they believed to be the ultimate cause of the illness.

Patients who believed in medical causes indicated that breast cancer is caused by malfunctioning of their organs, unhealthy lifestyle, and other pathological reasons. Below are some of the expressed views:

> I see this sickness as common because I know four people who are also suffering from this condition. So I see this as an ordinary disease, I don't think it is spiritual". That is why I have been coming to the hospital for treatment. I take the medication prescribed by my health workers and I don't miss my chemotherapy sessions (Juliet, 30 years).

> I believe this is a purely medical condition. I think it is the food we eat. You know it may also be as a result of our lifestyle during our youthful days. I hate to attribute things to the supernatural." I have been coming to the hospital right from the day I was diagnosed with the illness; I do not try other treatments (Aunty Sam, 42 years).

Patients who regarded the illness as spiritual were not homogenous in their accounts of why they were patronizing orthodox treatment. Some sought dual treatment, for others it was about potency of treatment and lastly advice from family. The main trends are discussed below. For patients

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who sought dual treatment, the illness was no longer a matter of biological or pathological explanations but there was a need to understand the illness beyond the tenets of medicine. They conceded that they sought dual treatment (orthodox and alternative) because to them, things do not just happen in the vacuum and the knowledge of an illness goes beyond the physical interpretations that the medical service can give. Hence, there was the need to seek further explanations to the illness probably to find out "why this happened to me" and "who is responsible for my predicament". Below are some sentiments expressed by some patients:

> I had two dreams. In the first dream, I saw myself eating. In the second one I saw myself eating again and I felt a sharp pain in my right breast. A month later, I felt a lump close to my armpit. After some months when I went to the hospital, the doctor told me I have breast cancer. Is this normal? It is strange. I dreamt eating and had pains in my right breast, after some months the doctor tells me I have breast cancer. Surprisingly not in the left but the right breast, I dreamt about. Although I come to the hospital, there is this man who says he is a herbalist whom I go to. He told me my case is purely spiritual. He even gave me a clue as to the person responsible for my condition (Vero, 32 years).

> You see nothing happens for no reason. All the physical occurrences have already happened in the spiritual. So it is important that in anything you seek spiritual guidance. Well going to the hospital is not bad, but you still need guidance. As for me, in addition to the medication given to me by the doctors, I seek spiritual help from my religious leaders and I also take herbal medicine (Rukky, 44 years).

The narratives of Vero and Rukky resonates with the argument made by (Arevian et al., 2011; Meneses & Yarbro, 2007) that people often associate breast cancer with spiritual causes and these spiritual causal ideologies inform their engagements with alternative healing systems. For some of

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the patients they came to the hospital after realising they were not getting better from the alternative treatment they were receiving. They opined:

> Initially because I thought the disease was spiritual, when my breast got swollen I stayed home for three months and a man was treating me with herbs. After the third month I requested that I wanted to go to the hospital because I was not seeing any improvement. I have stopped the herbal treatment and I have realised that my health is getting better (Sarah, 29 years).

> When I was diagnosed with the disease, I did not come back to the hospital. I resorted to herbs and concoctions because I heard that this disease is caused by witches and the only way to get cured is to use herbal concoction and perform some spiritual cleansing. When I realised that the affected breast was deteriorating and the pains were becoming too much, I said to myself let me go back to these people (hospital) maybe I will get better. That is why you see me here and I can say that I am gradually getting better (Araba, 60 years).

For others it was the influence of their family members to discard alternative treatment and concentrate on the orthodox treatment "I was advised by my family to come to the hospital because I will get good treatment" (Aunty Esi, 60 years).

> I believe in herbs and other spiritual fortification. When I was diagnosed I was using herbs on the infected breast. I am in the hospital because my son advised me and brought me here. He said I was getting worse. I don't see it so. This disease is a difficult one and the forces behind it are strong so it takes time for healing to manifest for all to see. I knew I was getting better when I was applying the herbs. Now I am in the hospital, what can I do? He is my son and I do not want to appear as a stubborn mother (Bruwaa, 55 years).

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Conclusion and Recommendations

The study has so far explored the various interpretations of breast cancer by patients and concluded that woman's interpretation of the illness was subjective. It was a concept that infiltrated health seeking behaviours of patients. For example, the interpretations given to the illness to a very large extent shaped their understanding of the illness, time they reported the illness for diagnosis and decision regarding treatment. Also, residential location of patients presented a socio-cultural environment through which patients understood their realities as women living with breast cancer especially in terms of flow of information and interpretations attached to the illness

In line with the above conclusions, the study recommends that, hospitals administration should take steps to create avenues for patients who are willing to form survivor groups to share their experiences with other women. For example, women who have undergone mastectomy can advise other patients who are reluctant to go for surgery. They can better explain and share their experiences with women and debunk all misconceptions surrounding the illness. Also, it is incumbent on health workers, especially the public health and the community health nurses, to intensify public education especially on the triggers of the disease. As this is done it will gradually change the orientations of women and minimise the rate at which women will attribute the disease to spiritual causes. This will prompt women to do regular screening and seek medical help early when they detect changes in their breasts. This education could be organized at schools, places where women usually congregate such as the ante natal clinics, markets, religious establishments, gynaecology units, family planning units, and women associations. These approaches when implemented well will augment the current efforts by some non-governmental organizations in creating awareness of the disease.

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IN-LECTURE SMARTPHONE USE AND ACADEMIC PERFORMANCE: A REFLECTION ON THE SUSTAINABLE DEVELOPMENT GOAL NUMBER FOUR

Rabiu K.B. Asante[1] & Rosemond A. Hiadzi[2]

Abstract

This paper draws on lessons from the relationship between student mobile phone use during lectures and the overall academic performance of students in relation to the Sustainable Development Goals number 4. Findings from a random sample of 150 University of Ghana students confirm a relationship between mobile phone use during lectures and academic performance of students. Students who use their mobile phone handsets during lectures reported lower academic performance. It is important for the framers of goal number 4 to consider how to reduce the problematic use of mobile phones during the learning process so as to truly achieve the principles of equity and quality education for all.

Keywords: Smartphone use, Academic Performance, In-lecture, Students, Sustainable Development Goals.

Introduction

On September 2015 the UN General Assembly submitted the new global initiative, the Sustainable Development Goals, as a continuum from the Millennium Development Goals (SDGs). The Sustainable Development Goals comprise 17 goals and 169 targets with a 15 year span. Goal number 4 has 17 targets and focuses exclusively on education. Specifically, this goal aims at ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all people. However, its 17 targets fail to directly acknowledge the potential of using ICT to achieve

[1] Lecturer, Department of Sociology, University of Ghana. Email:rkbasante@ug.edu.gh
[2] Lecturer, Department of Sociology, University of Ghana. Email: rhiadzi@ug.edu.gh

ISSN 0855-4730 *e*ISSN (online): 2590-9673

this aim. The positive uses of ICT in education abound (Chen and Peng, 2008; Jacobsen and Forste, 2011). Others have also revealed the problematic uses of ICT particularly the mobile phone and the internet (Sanchez-Martinez and Otero, 2009; Hong, Chui and Hong, 2012). Very little attention has been paid to the link between ICT use in education and the 4th Sustainable Development Goal. However, for education to be inclusive and equitable it will be necessary to limit the possible negative impacts that ICT use can have on quality education across the divide. It is in this respect that this paper draws lessons from in-lecture smartphone use and academic performance in accessing the 4th Sustainable Development Goal.

ICT and the Emerging Dominance of Smartphones

Information Communication Technology in education is often seen in terms of the use of computers. However, in recent times, it is more evident in the form of smartphone use. The internet and smartphones have become an integral part of modern day living. Today, the internet's role is evident in every facet of our lives ranging from communication to entertainment, education, business operation, social activity, shopping and a lot more. In the area of education, many schools around the world are expanding their investment in information technology (IT), specifically the internet, and are actively promoting internet use on their various campuses for academic purposes. Due to the pervasiveness of the use of mobile phones by students and the added functions of the internet, it is important to understand whether and how the use of these devices by students has any relationship with their academic performance.

Academic Performance and Mobile Phone Use

The effects of cell phone use on academic performance have been explored by a number of researchers. With regard to the specific function of calling and texting, a few studies have shown the relationship between these two variables. For example, in a study amongst university students in the United States, Jacobsen and Forste (2011) found that there was a negative relationship between cell phone use and the grade point average (GPA) of students. Another study among Taiwanese University students

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found a positive correlation between cell phone use and reported academic difficulties among the study sample of female students (Hong, Chiu, and Hong, 2012).

A study among Spanish high school students for instance, showed a correlation between intensive cell phone usage and poor academic performance, in addition to other related negative behaviours such as excessive alcohol use and smoking (Sánchez-Martínez and Otero, 2009). In this study, intensive cell phone use was operationalized in terms of monthly expenses on mobile phone and data usage.

Internet and the Limitless Mobile Phone Functions

Apart from the basic functions of calling and texting, the internet has allowed for other functions to be performed on the cell phone. Other functions such as the use of social media and the playing of video games amongst others are all possible today because of the internet. With specific reference to the influence of social media on academic performance, studies in various parts of the world such as North America, Europe and Asia have found a negative relationship between time spent on social networking sites such as Facebook, Twitter and MySpace and self-reported academic performance (e.g., Chen and Tzeng, 2010; Karpinski, Kirschner, Ozer, Mellott, and Ochwo, 2013). In addition, playing of video games has been associated with poor academic performance, evidenced in lower GPAs (Jackson, von Eye, Fitzgerald, Witt, and Zhao, 2011; Jackson, von Eye, Witt, Zhao, and Fitzgerald, 2012).

Multitasking and Mobile Phone Use

In literature, the concept of multitasking has been used as a possible explanation for the negative relationship between cell phone use and academic performance (Jacobsen and Forste, 2011; Junco and Cotton, 2011; 2012; Karpinski et al., 2013; Kirschner and Karpinski, 2010; Rosen et al., 2013; Wood et al., 2012). According to these studies, students who use a variety of electronic media while in class, including mobile phone find it difficult to learn. Such students recorded lower scores on follow up tests as compared to their colleagues who did not engage in such

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multitasking (Wood et al., 2012). Another study that utilised a hierarchical regression to measure the relationship between multitasking and college GPA found that multitasking with particular reference to Facebooking and texting had a negative influence on college GPA after controlling for such variables as time used in preparing for class, student's internet skills, sex, and actual high school GPA (Junco and Cotton, 2012).

With respect to the rate of distraction that Facebook and other social media present to students when they are studying, a research by Rosen et al. (2013) found that students did get distracted by social media while studying. This distraction occurred after less than 6 minutes of studying. This finding is very significant in guiding policy and it is thus useful to have such research replicated within the sub-Saharan region in general and Ghana in particular.

Some studies have also shown the reverse, that is to say, that low levels of internet usage is associated with improved academic performance (Chen and Peng, 2008). In the same way, the specific purposes for using the internet have an effect on academic performance. When the internet is used to seek information relevant to studies, it has been found to improve academic performance, and when it is used for other purposes such as playing games, it reduces academic performance (Cheng and Tzeng, 2010). It is clear from the above review that students, particularly at the college level, are increasingly getting distracted in their studies by the unbridled use of the mobile phone during studies or at lectures. This will obviously have an impact on any policy which aims at achieving inclusive and equitable quality education, as captured in goal 4 of the Sustainable Development Goals. Let us turn our attention to the scope of goal 4 of the Sustainable Development Goals.

Sustainable Development Goal Four (4)

The sustainable development goal number 4 was born out of the failure to achieve universal primary education under the implementation of the millennium development goals. As the UN reports, the available data for 2013 showed that 1 out of 5 children dropped out of school and 2 out of 5 school drop outs will never go back to school. Consequently, a revised

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version of the universal primary education was introduced as goal number 4 under the Sustainable Development Goals. The aim of goal number 4 is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. In order to achieve this, 7 targets were set. These include:

4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes

4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education

4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations

4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy

4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development

4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all.

4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and

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information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries.

4. C By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States. (United Nations Economic and Social Council, 2016: 15-24)

In the UN's Secretary General's report from the Economic and Social Council (2016) the UN outlined specific indicators that can be employed in achieving the targets for goal number 4. However, only the indicator for target 4.4.1 identified the need to capture the ICT skills of youths and adults (United Nations Economic and Social Council, 2016:19). It must be noted here that capturing ICT skills is not the same as establishing the unintended consequences of applying those skills. It is from this background that this paper wants to draw on the experiences of Ghanaian University Students in applying their ICT skills during lectures and examine how that can affect the achievement of equitable and quality education for all. This is particularly important since the principles of equity and equality of education run through all the targets. However, how can there be equity and quality if we are not able to tackle the potential risks associated with ICT use? As shown from the earlier review, the use of the internet and mobile phones can impede the progress of students.

Gratification Theory

According to the gratification theory, people who consume either traditional or social media actively choose and utilise a specific form of media in response to specific needs. For instance, when a media consumer needs an escape from work routine, he/she relies on specific media (such as Facebook, and Instagram) to gratify this need. As such, the theory focuses on what people do with the media rather than what the effects of the media are on the individual (Katz et al., 1974). Research has shown that one form of gratification that modern media present as opposed to traditional media (which exclude the use of the internet) is its function of interactivity (Ha and James, 1998). This refers to the ability of users of

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modern media to provide a response to a source or communicator. According to Toffler (1980), new media also allow consumers to have control over both the content and its use. It is therefore imperative to investigate what sorts of gratification students as consumers of social media derive from using their mobile phones (smartphones) during lectures.

More importantly, the Sustainable Development Goal 4 has as its main objective to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. In order to be able to achieve this goal, there is the need to also pay attention to the role of the mobile phone in the lives of the student with reference to its added features of the internet. This is based on the backdrop that, research conducted in the western world has shown a negative relationship between students' use of the smart phone and their academic performance. Little is however known about the interplay between smart phone use and academic performance in Ghana, although Ghanaian students have access to these devices and utilize them during lectures. As such, if we want to improve the quality of education of our students, it is imperative for us to understand the interplay between smartphone use and the academic performance of our students. Although the directive that is often given by lecturers to students is aimed at ensuring that students switch off their mobile phones or put them in silent mode in order not to disrupt the class, this paper questions the relevance of this directive in modern times when smartphones no longer need to be put in the silent mode in order not to be disruptive during lectures.

The study, therefore, focuses on University students who own mobile phones (smartphones) and use them during lectures in order to determine the effects on their academic performance. The paper generally aims at drawing lessons from the relationship between smartphone use during lectures and the overall academic performance of students in relation to the Sustainable Development Goals goal number 4. More specifically, the study sought to answer the following research questions:

Research Question 1: Do students use their handsets during lectures, and what is the nature of in-lecture handset use?

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Research Question 2: What is the interplay between in-lecture handset use and academic performance?

Research Question 3: What are the lessons for sustainable development goal number 4?

Methodology

The study employed the quantitative research design, particularly, the cross-sectional design across the undergraduate student population of the University of Ghana during the 2013/2014 academic year. The following section looks at the participants, procedure, measurement and data analysis.

Participants

One hundred and fifty respondents were randomly selected from the University of Ghana using the cluster sampling method. The respondents were between the ages of 20 and 29 years, with a whopping majority (90%) aged 20 to 25 years. A little over half of the respondents were females (51%). Two-thirds of the students were in the final year of undergraduate studies. Although students selected offered several courses across the divide, the majority (77%) reads social science courses. All the respondents were resident on campus (See table 1).

Procedure

Questionnaires were distributed to 200 resident students at the University of Ghana campus. Using the cluster sampling method, all residential halls of the University of Ghana were selected for the study. The residential blocks in each hall were randomly selected, followed by the room numbers. The informed consent of those who were selected to participate in the study was sought. Those who agreed to participate in the study were also given the option of opting out of filling the instrument. Completed instruments were left at the porters' lodge of each residential hall. This improved the validity of the responses since participants knew they would not meet the researchers again. By the end of the data collection period 150 questionnaires were returned, accounting for a response rate of 75%.

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Table 1: Characteristics of Respondents (N=150)

Gender		%
	Male	49
	Female	51
Level		
	100	13
	200	15
	300	25
	400	48
Course of study		
	Social Science	83
	Fine Arts	3
	Sciences	14

Source: Field Data, 2014

Measures

Participants provided their background information. This included age, gender, course of study, academic year group and place of residence. This was followed by a series of questions measuring smartphone use attitude during lectures. For academic performance, efforts were made for students to report on their Grade Point Average (GPA) for the previous semester. However, students had difficulties in reporting their GPA; consequently they were made to rank their performance from excellent, to very good, good, average, pass, and fail. The academic performance variable was re-categorized into two. First, the performance ranging from excellent to very good was categorised as high performance and those from good, average and fail were also re-categorized as low performance.

Data Analysis

Frequency analysis was employed to explore all the variables to ensure data quality. Multiple response frequency analysis was used to establish

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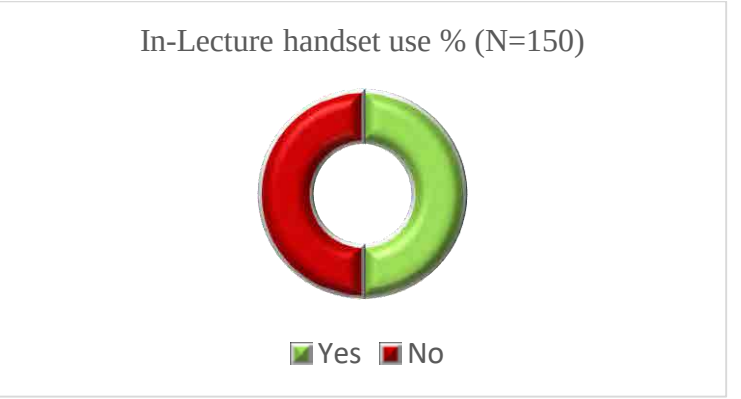
the top reasons for using the mobile phone during lectures as well as frequency of use. Chi-square analysis was employed to examine the relationship between in-lecture smartphone use and gender. Finally, a Chi-square test was further employed to examine the relationship between performance and in-lecture smartphone use.

Results

Research Question 1: Do students use their handsets during lectures, and what is the nature of in-lecture handset use?

On the questionnaire, respondents who indicated that they used their smartphones during lectures were of an equal proportion to those who did not. Despite the fact that lecturers are against the use of mobile phones during lectures, half (50%) of the respondents managed to use their handsets during lectures, undetected by lecturers (see Figure 1). More than half of in-lecture smartphone users spent from 31 to 61 minutes on their handsets. An average lecture at the university lasts two (2) hours (see table 4). Based on this evidence, up to half of these lecture hours is cumulatively spent on the mobile phone.

Figure 1: Status of in-lecture Smartphone use



Source: Field Data, 2014

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This clearly shows that students at the University of Ghana are actively using their handsets during lectures.

Table 2 shows that often students engage in this act and not always for the purpose of research or referencing during lectures. A large proportion (96%) of the time spent on the handset during lectures is often for the purpose of chatting with friends and family members. Some identified boredom at lectures (66.7%) as the second dominant reason for using their handsets. Research was chosen as the least reason for using the mobile phone during lectures.

Table 2: Reasons for in-lecture Smartphone Use

Reasons for in-lecture smartphone use	N	%
Socialize and Chat	72	96.0%
Research	42	56.0%
Boredom	50	66.7%
Total	75	100.0%

Source: Field Data, 2014

Table 3 shows the relationship between gender and in-lecture mobile phone use. Gender has been recognized as a major variable in technology studies, particularly the use of the mobile phone. This table further throws more light on this variable. Female students are twice (60.8%) as likely as male students (37.8%) to use their mobile phone during lectures. . A chi-square test of independence confirmed a relationship between gender and in-lecture smartphone use ($X^2 = 8.642$, df =1, $p<0.05$). This suggests that female students are more likely than their male counterparts to use their handsets during lectures. It would be interesting to find out why female students tend to be the dominant users of mobile phone during lectures. Despite the gender difference in in-lecture smartphone use, there was no significant gender difference in performance (($X^2 = 0.00$, df =1, p=0.98). However, the likelihood of one's performance dipping if the practice continuous is undeniable.

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During lectures, students are warned to refrain from using their handsets. However, the evidence here suggests that despite the insistence of lecturers on compliance with this instruction, students still find a way to use their phones. If in the strictly regulated environment of the lecture room they still use their handsets, then in circumstances such as their private studies where they need greater self-control, it might be harder for them to refrain from using the mobile phone.

Table 3: Cross-Tabulation of Sex and In-lecture Smartphone Use

		Sex		
		Male	Female	Total
		(N=74) %	(N=76) %	(N=150)%
In-lecture smartphone use	Yes	37.8%	61.8%	50
	No	62.2%	38.2%	50
	Total	100.0%	100.0%	100

($X^2 = 8.642$, df =1, $p<0.05$)

Research Question 2: What is the interplay between in-lecture handset use and academic performance?

In looking at the interplay between in-lecture smartphone use and academic performance a chi-square test of independence was employed. Evidence from table 4 suggests that of those who use their mobile phone during lectures, close to two thirds (69.2%) had low academic performance. In contrast, those who did not use their handset during lectures 64.7% had high academic performance. A chi-square test of independence further revealed a significant relationship between in-lecture mobile phone use and academic performance ($X^2 = 16.97$, df =1, p=0.000). This suggests that there is a high probability that actively using a mobile phone during lectures could reduce one's academic performance. This suggests a possible relationship between academic performance and in-lecture smartphone use.

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Table 4: Results of Chi-square test of independent and Descriptive Statistics for Academic Performance by In-lecture handset use

		Performance Ranking		
		High	Low	Total
		(N=74)	(N=76)	(N=150)%
In-lecture mobile use	Use	35.3%	69.2%	50
	No	64.7%	30.8%	50
	Total	100.0%	100.0%	100

(X^2 = 16.97, df =1, p=0.000)

Length of Mobile Phone Use and Academic Performance

One other angle examined regarding mobile phone use during lectures and its effect on academic performance was the length of time spent on the mobile phone. It was observed that more than half (56.7%) of those who were online for 30 minutes or less had high academic performance. However, a lesser proportion was recorded for those who spent more than 31 minutes. Additionally, two thirds of those who spent between 30 and 60 minutes on their mobile phone while at lectures recorded lower performance. A chi-square test of independence further suggests that there is a relationship between hours spent on smartphone in-lecture use and academic performance of students ((X^2= 5.707, df=1, p<0.05)).

Table 5: Time Spent on smartphone during in-lecture and Performance

		Hours spent on smartphone in-lecture		
		30 minutes and less	31- 61 minutes	Total
		(N=30) %	(N =45) %	(N =75) %
Performance	High	56.7%	28.9%	40.0%
	Low	43.3%	71.1%	60.0%
	Total	100.0%	100.0%	100.0%

ISSN 0855-4730 *e*ISSN (online): 2590-9673

(X^2= 5.707, df=1, p<0.05)
Source: Field Data, 2014

Research Question 3: What are the lessons for sustainable development goal number 4?

One of the targets of goal number four is to achieve equity for all. It is a known fact that men are dominant in higher education (Ghana Statistical Service, 2012). However, because female students are more likely to be the ones using mobile phones during lectures, this target should take cognisance of the fact that even the women we have at the higher education levels could still lose out on receiving equitable education since they may be easily drawn into using their mobile phones while at lectures or during their personal studies.

Another running principle in goal number 4 is the issue of quality education at all levels. Although this research was conducted on tertiary students it shows clearly that actively using the mobile phone during lectures can potentially harm the quality of tutoring and lecturing. This is particularly so because students who are actively engaged on their mobile phones during lectures might not be attentive enough to engage their lecturers using questions. This therefore takes a lot out of the students' learning process. It will be necessary for the framers of goal number 4 to assess ways in which the principles of the goal can be implemented taking cognisance of the use of mobile phones by students during lectures.

Discussion[3]

The focus on the role of ICT in education has often been on the importance of computer education. However, in the past decade the computing power of mobile phone handsets, especially the internet enabled and smart devices has mimicked the functions of personal computers. With these handsets, users have unbridled access to information from anywhere and at any time. However, with the advent of social media and Instant messaging apps, the computing capacity of mobile phones has moved

[3] Limitations of the study: A larger sample size would have been more beneficial in generalizing the findings beyond tertiary institutions.

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beyond the search for information. These applications open up a lot of possibilities for users. It is therefore not surprising that the mobile phone is the single most visible communication device in the world and in Ghana for that matter (ITU, 2012). The mobile phone handset has the inherent capacity to enhance and also hamper learning. It is a double edged sword. Despite its ubiquitous nature, the Sustainable Development Goal number 4 which aims at ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all has ignored the capacity of the mobile phone. The capacity of the mobile phone to enhance formal education is well noted, but the problematic uses of the mobile phone and how that can affect quality education should not be ignored.

This study fills that void by showing the extent to which students use their mobile phone handsets during lectures and the possible relationship to students' academic performance. The most striking finding is that students' in-lecture handset use is evenly split, with half admitting to using it. More than half of those who use it do so for more than 30minutes during lectures, during which time they are engaged with friends and relatives on issues that have nothing to do with the ongoing. This is a clear indication that mobile phone use during lectures is popular among students and educators cannot ignore its existence.

Like other studies, this paper suggests a possible relationship between academic performance and students' in-lecture smartphone use. This finding is consistent with the works of Jacobsen and Forste (2011), Hong, Chiu, and Hong, (2012), Chen & Tzeng (2010), Jackson, von Eye, Witt, Zhao, & Fitzgerald (2011). Obviously this is a trend that educators must try to control, because it has the capacity to reduce students' engagement with lectures. It also raises questions about teaching pedagogies. Lecturers must employ techniques and teaching tools which will engage the attention of the students to reduce their boredom. Ultimately, institutions must consider developing a policy on handset use during lectures and identify the possible punishment for the culprits. It is necessary to share with students the evidence available in cross-cultural studies which show that in-lecture mobile phone use can lower students' performance. Target 4.4.1 of goal 4 of the Sustainable Development Goals can also include an

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assessment of the problematic use of ICT which can reduce the capacity of nations to achieve the principle of inclusive, equitable, and quality education for all.

Conclusion

Handset use during lectures is not a phenomenon found only in educational institutions in developed nations. It is increasingly becoming prominent in the lecture theatres of educational institutions in developing nations. Evidently, there is a relationship between handset use and academic performance of students. Unfortunately, despite the good intentions of the Sustainable Development Goals, goal 4 failed to consider the possible impact that mobile phone use can have on academic performance, and by extension, quality education. Despite the capacity of the mobile phone handset to improve education, educators have to take a second look at how to manage its use during lectures so that it does not affect the learning process of students.

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ISSN 0855-4730 *e*ISSN (online): 2590-9673

CONSTRUCTING FAILURE: STUDENTS' DISCURSIVE PRACTICES, VALORIZATION AND CHOICE OF BEHAVIOUR IN LEARNING AND EXAMINATION SITUATIONS

Casimir Adjoe[1]

Abstract

This study about how students construct failure is motivated by the desire to investigate what students mean by failure, that is, how students constitute the object of failure and how they relate to the object so constructed. Studies regarding what students think of failure, how they define it, and what they do to prevent it or to manage it are rare. It is an exploratory study that may contribute to the understanding of the logic of students' attitudes and behaviour when they are confronted by examinations. It is an ethnographic study using mainly interviews and observations. The information was analyzed within the framework of students' experiencing, attitudinizing and acting. The analysis shows that the students' language is full of words related to set goals, targets, hopes and aspirations, dreams, vision, performance and non-performance, achievement, factors and control. These indicators amount to a participation in the discourses and logics of the market, consumption, commodification and profitability. As the study points out, students' experiencing turned into beliefs about consumption and the market. Thus, for some students, satisfaction comes only when the courses in which they are participating and the grades they attain in the courses fit the jobs and the job descriptions that they have set their targets to do in future. Participation in schooling is therefore about being fashioned for a market. With this belief, their attitudes and their postures are informed by the logic of the market.

[1] Lecturer, Central University, Miotso near Dawhenya, Off the Accra - Aflao Road
Email: casimir.adjoe@gmail.com

ISSN 0855-4730 *e*ISSN (online): 2590-9673

Keywords: Failure, desire, examinations, targets and goals, experiencing, consciousness, attitudinizing, acting.

Introduction

The aim of the study is to understand students' discourses about failure and the logic upon which they are constructed. There are possible implications and consequences of such logic for student behaviour and choices, especially in examination contexts. Diffuse stories of examination malpractices and the extent to which students go to carry them out in the writing of examinations, and other kinds of things that happen to enable students achieve the grades they want abound in the Ghanaian educational system as sometimes reported in the media and in the grapevine among students, and the actual incidents of suspensions and dismissals of students caught involved in examination malpractices as reported in the news and other domains every year, and monitored in tertiary environments too. These have set me thinking that it may be proper to begin researching the language of failure and the discursive practice or formation to which it belongs among students. This may modify the taken-for- granted notions guiding our thinking about the subject which have mainly been constructed from guessing the meaning of the phenomenon through the commonsense judgements proffered and characteristic of under researched subjects. This spawns reasons about students' attitudes and actions, which, in fact, may be unrelated to the roots of the problem. This is reflected especially in attributing the phenomenon to students' laziness, youth corruption and indiscipline, and the other negative labels attached to the actions rather than what is stemming from students' own perception and understanding of what failure means to them. Whereas these conclusions and characterizations may stem from the already existing frames and discourses we use to make our own commonsense judgments, students may be working within other frames or discourses we are yet to discover.

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Methods

I began researching the phenomenon through the distribution of fifty questionnaires among students in an English department in Levels 200 and 300, and among Level 100 students in the Business School, using stratified sampling, taking a 10% sample from each cohort. This gave me the basis of conceptualising and formalizing ten main variables for further investigation on the subject. After the initial determination of variables, I selected five students from among the Level 200 and Level 300 students in the English department and five others from the Central Business School for in-depth interviews on the ten variables, asking for and using volunteers. The interviews yielded richer data, and together with my own observations of students and other opportunistic interviews, have the kind of data that enabled me to make an analysis of the phenomenon according to critical theoretical approaches, drawing upon structuralist discourse and upon Guttenplan's (2000) three categories and distinctions of consciousness relating to experiencing, attitudinizing, and acting. The information was analysed on the basis of the assumption that students' perceptions, choices, behaviour and actions are heavily influenced by the emotions created from their experiencing. These emotions in turn create attitudinizing modes that result in specific attitudes related to their perceptions; these attitudes are consequently moulded into behaviors or actions aimed at affecting what they are experiencing at the level of consciousness.

These processes, that is, experiencing, attitudinizing, and acting, eventually manifest in the kinds of language the students employ to describe and make statements about themselves and their desires. They are articulated in the form of repetition of ideas and words, such as recurrent words and ideas, and also as parallel ideas and words in their discourses. Other variations of repetition and parallelism, including deviations, are used to foreground their thinking and to articulate the main themes in their consciousness. Attention will therefore be focused on the repetitions, parallel ideas and deviations that foreground their consciousness or thinking in their answers for analysis. Repetitions and parallel ideas emphasize the importance of the themes and thoughts of the utterers of

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thought, while the deviations foreground a departure from common knowledge into original and individual self-expression.

The Three Key Coordinates of Consciousness

In exploring the landscape of the mind, Guttenplan (2000), identified three important aspects of mental activity: experiencing or consciousness, attitudinizing, and acting. He argued that while experiencing refers to and relates to the manner in which the mind appropriates consciousness, or how the mind organizes the objects and events in which it is participating, or in which it is affecting it by bringing it to attention, attitudinizing refers to the modes in which and by which consciousness relates its appropriation and organization of mental activity to the emotions leading to the creation of attitudes. The process continues into acting. Acting points to the relating of the mental activity of attitudinizing or the modes along which consciousness affects the emotions, and the translation of the attitudes created through the process of attitudinizing into behavior and activity or actions. Thus, mind is central in this environment; it is the agent responsible for organizing and relating the objects, events, and the participation of the individual in all of these in a particular way to consciousness as experiencing. The mind, in a similar way, relates what it has organized into modes of affecting the emotions of the individual. The modes which consciousness shapes for the emotions lead into actions and are manifested in the behaviours of the individual.

These three constructs are relevant for the study of students' valorization and choice of behavior in both learning and examination situations, constituting them into social subjects. Social subjects are constituted as a result of the behaviours and actions of individuals being translated into specific contexts, so that they are not isolated from the relation to objects and persons in the environment in which they occur but become necessarily integral to them. As social subjects, these three constructs also culminate into the language of students (attitudinizing), and the choices they make in examination situations or contexts (actions or behaviours) shaped by a certain experiencing and mode of perception, hence attitudes which culminate into the valorization of choices and further resulting in actions with respect to examinations. Following Guttenplan, since 'It is

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easier to see what people do than what they believe, but it is also easier to see what they believe than what they experience,' (Guttenplan 2000:19) these constructs can be a guide towards understanding how experience and its processing into action can be discerned from students' choices of behavior and actions during examination.

Thus, it may be discerned that what they believe or perceive creates their attitudes, and these are eventually translated into actions. Yet what they believe is an articulation of what their experiencing co-ordinates in their minds and emotions as attitude. According to Bloor (1991), in his Sociology of Knowledge, the process of experiencing and relating consciousness to experiencing and emotions creates its own sustainable logic from the organization of experiencing. This process is capable of providing clear, distinct, and obvious relations of things, ideas, and objects, thus, knowledge and belief without recourse to any other supporting resources. When supported by other resources, they create social or psychological contexts, constituting social subjects. The argument here, therefore, is that students' choices and behavior during both learning and examination situations are the consequence of a mental activity based upon experiencing, attitudinizing and acting which trace out and depend upon their own distinct logic that can be traced, understood, and appropriated, particularly in relation to the contexts in which they exist and participate in experiencing.

Consequently, how do we explain the mental activity of experiencing, attitudinizing and acting that frame students' choices and behavior in learning, examination situations and school context as a whole?

Experiencing and Consciousness

Our ability to experience, and in so doing to be conscious or aware of something, is a central activity of the mind (Guttenplan 2000:10). In the view of Guttenplan, experiencing, both inside and outside of a person, is the organizing of objects and events by consciousness, and is a phenomenon that is repeated in many different ways in both space and time. And for many people, this forms the core of mental activity or the mental realm – the engagement with organizing the objects and events that

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present themselves to the mind. The question which arises, nonetheless, is who or what is responsible for the directing of attention or focus on the particular aspects of experience that engage the individual for organizing? Who influences the selection of the experience, and how is the experience selected for organizing? In this regard Guttenplan (2000) postulated the 'self' as the main director of attention. The question this poses, however, is how does the 'self' play this role, and does it mean that the 'self' is 'separate from the experiential activity itself and its attendant consciousness, 'or are they united rather like the dancer and the dance?' (Guttenplan, 2000:12). However, the major idea is that a 'self' is created and available that takes control of the process of consciousness in organizing, ordering and thereby giving shape and direction to the objects and events which the individual comes into contact with, or that impact the individual. All the various aspects of this process – the self, the objects and events, the mind, and their processes of interacting or organizing create the individual and their consciousness.

Attitudinizing and Attitudes

Guttenplan (2000) also notes that apart from consciousness organizing the objects and events in the mind as a mental activity, there is often a shift from attitude as posture to attitude as a feature of a mind. In this connection, attitudes assume the character of what is meant by beliefs, desires and expectations. The word 'posture' appears to carry a sense that appropriately characterizes such things as beliefs and desires because it is something we manoeuvre ourselves into, and which is therefore observable in our behavior. Posture is therefore a conscious activity of the mind deriving from a choice of direction or attention by consciousness or the 'Self'. Hence, we are usually able to tell what someone believes or desires by things done and said such as by a person's behavior. In this sense an attitude is ''a mental state which we often 'read' off from behavior.'' (Guttenplan 2000:12). In this regard, Guttenplan provides an example using the concept of posturing in relation to attitudes: '' When someone is said to adopt a 'menacing attitude', for instance, the question raised is not merely how a person is standing, although bodily position is being described. Instead, what is special about the 'menacing attitude' is that it is a posture directed towards someone or something, one that has a

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target in mind. This is the typical thing about such things as beliefs and desires. They are not merely states of mind which we discern through behavior; they are rather states of mind that have a special kind of directedness. Therefore, ‘’I don’t just believe or desire, I believe that something is the case, or I desire someone or something.’’ (Guttenplan 2000:13). The emphasis in this regard is the directedness of posture, or the factor to which it draws attention or directs attention.

Guttenplan’s use of the notion of how grammar and its functionality are organised to illustrate his point further gives clarity to the directedness of attitude. In parallel with grammatical and functional organization, the ‘something’ towards which attitudes are directed will be referred to as the complement of the attitude. Complements in grammar are usually part of declarative sentences. This recognition is significant in the sense that declarative sentences are used as ‘propositions’, that is, they are typically used to say how truly or falsely things are. It seems therefore, possible too, to report virtually all attitudes using declarative sentences in the same way as complements. Thus, “Because complements of belief reports typically contain a complete declarative sentence that expresses a proposition, and because the other attitudes can apparently be twisted into this shape, philosophers have settled on the idea that the products of ‘attitudinizing’ can all be called propositional attitudes. … We can also call the item to which an attitude is directed its content.” (Guttenplan 2000:14). On account of the fact that the notion of a ‘complement’ seems too grammatical, and yet the word ‘content’ seems to capture something about the attitude itself, the word ‘content’ would be preferred over ‘complement’, nonetheless, in reference to the subsequent analysis here.

Consequently, it may be ascertained that the activity of attitudinizing results in our having attitudes with contents, meaning that each attitude has typical manifestations in behavior, and therefore all of them seem suitable for treatment as propositional attitudes. In this regard propositional attitudes and their contents can conveniently be reported as, and identified by their characteristics as declarative sentences. (Guttenplan 2000:15).

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Acting and Actions

Actions, when referred to are usually thought of as physical action. But in this context actions are regarded as more extensive than physical actions. Actions include the mental activities of experiencing and attitudinizing; for, to direct one's attention to some item in the stream of consciousness or to experience it is nothing short of an action, and a purely mental one at that. (Guttenplan 2000:16). Thinking of your favourite colour, working an arithmetical sum, etc, involves acting; only in neither case is there any ordinary change wrought in the physical environment. These processes which can be described as thought and inference would then seem to be the tip of a very large iceberg consisting of actions whose claims to belong in the mental realm cannot be challenged.

As with experience and attitudinizing, each case of an action comes with a subject, or perhaps more appropriately in the case of action, an agent. Indeed, just as for particular items of consciousness or attitudes, it is simply impossible to have an action without an agent. (Guttenplan 2000:17) The usual idea that the 'mental' consists in the 'inner', makes it difficult for many to conceive of actions as part of the items consisting the mental realm. Yet we are able to know what is going on within a person only by the desires and needs, beliefs and intentions manifested by him or her. Thus, when we see the actor of an action, we see some or all of the attitudes consisting of desires, needs, intentions, and beliefs working in the transformation of the materials; and unless we can see the mind in the process unfolding before us, we simply don't count that process as an action, because it may simply be an accidental product. (Guttenplan 2000:16).

How then are these three categories of experiencing, attitudinizing and actions applicable to students' discourses about failure and their behavior towards failure, and the actions they take to prevent it? This project will attempt to trace these through students' attitudes consisting of beliefs, desires, intentions and needs, and eventually through their behaviours and choices. This will be achieved through interviews and observations, and students' own written work and utterances.

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What Students Understand by Failure as a Phenomenon

Students understand failure by how they experience it. The common denominator in all their responses is that **'**It is a state or condition of not meeting a desirable or intended objective.' In other words, 'Failure is when I do not reach my goal no matter what.' Thus, students begin by setting up their experiencing and perceptions through specific expectations which can already be described as attitudinizing modes. These expectations relate to the objects, events, and interactions they have encountered personally or seen operative in the circumstances of other people which constitute themselves into attitudes and beliefs and contents which they subsequently desire for themselves and give directionality to as desires. Consequently, the attitudes and eventual behavior of these agents or actors result according to a directionality influenced by the desire, intention, hopes, requirements, aspirations, dreams, plans, needs, and attempts to meet a set goal or target or expectation. In effect, in the manner in which at least 70% of students expressed it, **'**Failure is when one hopes to achieve something and he or she is unable to achieve it. It is the vice versa of success'; 'Failure is a goal or target not achieved'; 'Failure is a state of not meeting a desired or required objective'; **'**Failure is when l am not able to attain my set target or goals due to one sort of shortcoming or another'; 'Failure, to me, is when a desired set goal is not achieved; or when l am unsuccessful in producing a desired result'; 'Failure is when your needs, aspirations, goals, and plans you have in life are not met. This is also when one's dreams do not come out the way it is expected'; 'Failure is being unable to succeed or achieve something in one's life, exams, or in an activity'.

The gap between desire, intention, hope, aspirations, dreams, plans, needs, and attempts and set goals and targets or expectations, becomes a crucial element in the definition of failure. How that gap is managed in order to produce the result of reaching the goal or target being desired or intended is the major concern in this conception of failure. When this general fashion of thinking is taken to the domain of examinations, students regard it in terms of the processes of writing examinations and the achievement

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of set grades. What is missing in all these answers is the process of achieving the set goals. There is no recognition or emphasis of what is involved in achieving the expectations, dreams, goals or target; that is, the mechanisms and resources or the infrastructural support and the resources that go into that support for the attainment of the goals or targets set for oneself.

In this regard, students already have a posture (desire, intention etc) and directedness (set grade or performance), and hence the potential for action or behavior within a non-contextual scenario and hence not as social actors, but as individuals without consideration for context. It is to be expected, therefore, that this posture will conflict with the real contextual conditions of their own existence as social actors. In the encounter with the real contextual conditions as social actors, students are thereby confronted with the resolution of such conflict. And in this, what is the ultimate guiding discourse produced by their consciousness and attitudinizing towards action and behavior?

What Students think of as Failure in Examinations

When applied to the achievement of grades, students point out that failure occurs when at the end of the semester you are not able to obtain your desired Grade Point Average (GPA). When applied to examinations, failure occurs "…when one does not meet his or her goal for a specific overall grade in all the courses in an examination'' or when one is unable to achieve a targeted grade or pass mark in an individual examination or course. For some, failure occurs when the person gets, for example, a 'D' or 'D+'. Although a 'D' is a pass mark above the shade of an 'F' which signifies a failed exam, it is still considered a failure. For some, even a 'B' grade is still considered a failure: 'To me, failure in exams is when I prepare less, get complacent and when at the end get below a 'B' grade'. This can be understood in the light of a student's understanding that it is considered a failure if 'the student's targeted grade is not achieved, rather, he or she gets a lower grade'. For nine out of ten students, this is the basic understanding of failure apart from any additional views and understanding they may still hold of what failure means to them in general.

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What does this understanding of failure mean in terms of experiencing? What this means for experiencing is that, as asserted by Guttenplan (2000), the ability of students to experience, and in so doing to be conscious or aware of what they desire and expect, is a central activity of the mind. In effect, it is the result of the organizing of objects and events by their consciousness into a specific logic of targets and goals. Drawing again upon Guttenplan, it is recognizable that the agent of the students' consciousness is the 'self'; and it is the 'self' that is responsible for the directing of attention or focus on the particular aspects of experience selected to engage the individual for organization into action. The major idea is that a 'self' is created and available on account of the context in which the individual perceives and encounters the world around himself or herself and that takes control of the process of consciousness in organizing, ordering and thereby giving shape and direction to the objects and events which the individual comes into contact with or that impact the individual.

Hence, the self, the objects and events, the mind, and their processes of interacting create the individual student and their consciousness, and what their attention must engage. The implication is that what they think of failure arises from the beliefs and attitudes that are shaped by what it means to be in control of all contexts in which they find themselves and all the encounters and interactions in which they engage. The ability to be in control of contexts and all encounters therein offers enormous rewards, whereas the inability to be in control of the contexts and encounters do not only create beliefs and attitudes of inadequacy, but also of pain because they are unable to achieve the goals they have set for themselves.

How Do Students think of Failure in a Course?

And when students experience failure, how does it affect their emotions and articulate their feelings into specific attitudes and shape them towards adopting a posture? Students' experience of failure, leads to the expression of emotions and the shaping of feelings into attitudes and beliefs, resulting in a posture. The manner in which failure affects the emotions varies slightly with individuals, but the common denominator is invariably one of disappointment and blame. Sometimes, this disappointment is

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expressed towards oneself, such as in the case of the student who expressed that: 'When one is unable to understand the examination question; this leads to diversion and causes failure'. For another student, 'Failure in examinations means less preparation and hard work. ' For such students, making up three out of ten students interviewed, the way in which experiencing manifesting as failure affects their emotions and sets up their attitudes is that 'it serves as a wakening call to be more serious'.

However, for the majority, as many as 70%, the blame cannot be attributed to themselves, but to some other person, situation, or condition. Thus, for the majority, constituting seven out of ten students, even if students deserve any amount of blame for their failure, they 'cannot be blamed entirely.' For the students who take this posture, it is so because failure in examinations 'is an embarrassment and disgrace, and it brings a person's morale down.' This is expressed by some students as 'the shame of failure.'

Why do Students think of Failure the way they do?

A small proportion of students, that is, 30% of students interviewed who, although, they feel disappointed when they are not able to achieve their desired grades, nevertheless attribute their inability to attain the goals they set for themselves, that is, their target grades or expectations to themselves and even give specific reasons for their inability, such as is expressed by a student: 'When one is not getting the lecturer's teaching, and one refuses to ask questions or go for research to get understanding of it.' For others in this same category, their inability is attributed to the fact that, 'I am not able to deliver or reproduce a substantive proof of myself to the lecturer that shows that l fully understand the course.' Thus, students in this category, comprising 30%, show ability towards self-reflexivity.

On the other hand, seven out of ten students, or 70%, owing to the disappointment they feel about failure feel experiencing in a different way and so express various views relating to the sacrifices they made. In the first place, failure is painful because 'Failure in a course brings down your GPA and makes your grades go down'. In the second place, failure in a course is painful because 'at the end of all the hard work and sacrifices I

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am going through in school, I am unable to come out with a first class.' Not making a first class is considered a failure because then 'I am unable to leave or make a positive mark in class and school.' In the third place, failure in a course is painful because it can disrupt 'the purpose for pursuing that course'. Hence anything that would not help the achievement of the targeted grades for a first class to materialize, such as a low grade must create disappointment because it is 'a grade that does not permit one to move to the next level on the academic ladder'. These students tend to be dominated by the pain of failure or disappointment; their experiencing shapes for them a belief and attitude, and therefore, a posture. As a posture usually has a target, the students' target will be to eliminate the target, which is pain, by eliminating the 'sacrifices' they made that did not yield the desired results, or to compensate for them in a certain way that will result in a distinctive behavior or action.

Comparing how Students think of Failure at Job Interviews and Applications?

As getting jobs requires a long process of applications and interviews, and often multiple applications, interviews and scrutiny by further examinations, it was thought that it could provide another kind of content and a useful comparison to the ways students understand failure in examinations. It could then also provide another perspective from which to understand students' views, beliefs and attitudes towards failure. A similar understanding will guide a comparison of how they think about what they consider to be failure in application to other aspects of life.

Students thought that at job interviews, failure is about 'Not getting the job in spite of everything'. It is also expressed in other varied ways: 'When at the end of the interview one is not given an appointment letter'; 'Failure at interview is considering yourself not being selected even before the interview'; 'Failure at job interviews comes about when an interviewee is not called for a job after being interviewed; he considers himself a failure'; 'Failure at job interviews is when at the end of the session the interviewers think you have not performed up to their expectations'; 'If one is not given the job as a result of incompetence, misconduct, at the interview grounds

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or not meeting the job requirements.' For every seven out of ten students interviewed on interviews, the above represent their understanding of failure at job interviews. Underlying them all is not getting the job one has applied for or been interviewed for, which was the specific goal or set target of the student.

According to these interviews, failure at job interviews can be attributed to reasons that fall in the domain of the interviewee. It is because they are 'not capable of tackling simple questions. People are sometimes timid as well because they have never spoken to people in high hierarchy officially.' It is also because ' when l won't be able to answer questions posed at me to my best of knowledge, knowing very well it is my fault for not making it through the interview successfully since I didn't do my research and wasn't well equipped for it.' It is also because the interviewee 'is unable to produce the necessary elements of delivery to attain employment.' But above all, what it means is that the interviewee 'is not able to answer the required questions and the questions related to your courses. It is very embarrassing and shows that you don't know what you are about.'

Thus, all ten students interviewed understood failure at job interviews to mean 'not getting the job interviewed for'. They also attributed the cause of any such failures to the responsibility of the interviewee, because what it means for them is that the interviewee did 'not prepare well for the interview', and that the interviewee was 'unable to deliver what the employment requires; for example, confidence, tact, etc.' It is interesting that whereas students attribute all the responsibility of failure at job interviews to the interviewee, with respect to academic work or examinations, they do not attribute all responsibility to the students.

How do Students think of Failure in Life?

In talking about life in general and what is regarded as a failure of life, students noted that it is about 'Not reaching your goals or not achieving your dreams'. In expanding what this means, a student explained further that 'Failure in life is when you've planned on achieving something so that during your lifetime that thing will be attributed to you and you are not

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able to attain that thing.' It is not being able to get to a standard or status in society when I compare friends to myself. I think I should be more of than I am now. If I cast my mind back to the goals and vision I had, I think I am way behind.' And so, 'Failure in life is when one passes through life without leaving a positive mark or difference, or making a significant attempt to change the life of another human being.' Failure in life is therefore associated with non-performance and the non-accomplishment of set goals involving the self.

Students consider that 'Failure in life is serious. But depending on the individual, someone's success is someone's failure.' In this regard, 'Failure in life is when one measures his or her success against someone else's own. In this case, one will never be satisfied, one will not be good enough, and one will struggle to celebrate his or her accomplishment.' However, one's life cannot be regarded as failed unless when 'life is falling in any area of your life' one does 'not make any attempt to rise again.'

In all this, students recognize and assert that when one is not able to achieve set goals and targets in the short term that eventually lead to long term non-performance, it is 'due to certain mistakes and mishaps that one makes consciously or unconsciously or certain things that one couldn't control.' Thus, they recognize that performance or non-performance is a complex matter that has many elements that depend on what they as individuals consciously control or are unable to control, in as much as those they cannot control are also present. But the reason failure in life matters is that it leads inevitably to leading 'a miserably hopeless life as a result of non-performance.' The misery and hopelessness resulting from failure to achieve goals that enable and signal performance, therefore, compose the experiencing for the students.

The Positive aspects of Failure

Nonetheless, students also assert that 'Failure sometimes is good because it makes you realize your mistake, thus makes you work harder in order to correct yourself.' In order to give materiality to this claim, students narrated real life experiences about themselves, recounting incidents of

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failure in their own lives and how they responded and dealt with it. "I failed mathematics in my final year in secondary school. I registered for Nov-Dec and l attended classes and studied hard. I failed for the first time, but I didn't lose hope; I registered again and by God's grace I passed".

Another student was diagnosed with muscular degeneration in both eyes ten years before the interview, and it changed her whole life because as a child, she had many plans, one of which was to go to university after her secondary education. The doctors advised her not to go to university because she won't be able to cope like the other students. It caused her to become depressed because she felt she was going to be a failure in life. She was very angry with God and with everybody around her, including her parents and family members, and at a point, felt like killing herself. However, she is in university now, and although things are not easy, she believes God will see her through. For this student, going to university, in spite of all the difficulties it involves for her, is still a triumph, because she is achieving her set goal to attend university.

Another student's frustration on account of failure in an examination was allayed, and his motivation was fired up on account of being made to understand 'where he went wrong'. He became determined to correct his mistakes. He had a grade 'F' in 'Practice in Criticism' in Level 200. He was so devastated that he could not eat for days because he felt the lecturer had not been fair to him. He gathered the courage to go to see the lecturer about the cause of his failure; the lecturer explained to him where he went wrong and corrected him. He felt satisfied and determined to rewrite the examination as a result.

Yet another student was able to experience failure in a sporting activity, but managed to bounce back to hold his head high on another occasion. She once ran a race for her house in senior high school and fell down almost at the end point. She felt ashamed and did not rise up till the race was over, her friends picking her up from the ground. She considered this a failure in her life because it was just a few steps away from the finish line and she could have crawled to the finish line but did not. However, she was determined to run again to make up for her loss; she ran another

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time, which she made successful, crossing the finish line and winning the race.

Another episode related failure in her life as not gaining admission to two schools which she really wanted to attend. The first instance was due to her complacency and ignorance by feigning to be learning. The second instance was because she was afraid of her environment, but also because she was partly full of herself. Dealing with these two failures was difficult, but she learned to understand herself by understanding God's purpose and timing. Through knowing God better and accepting the fact that everything that happens is for her good, she learned that she needed to work on herself by letting go of some of her behavioural problems; and she did so.

And in another episode, a student thought at one time that his life had come to an end because he could not enter the university immediately after his secondary education due to the fact that he failed one elective paper and his parents at the time could not mobilize funds for him to enroll into remedial classes. He, however, fought against his fate of 'failure' by thinking afresh. He took a different route and entered into the Teacher Training College which enabled him to earn a salary and organize funds on his own to better his grade.

All the stories buttressed four main points that the students were making: "I consider failure in life to be, allowing the opinion of others to hinder you from achieving your set target or vision." I consider failure in life to be, not being able to reach set targets and goals in one's life due to some factors beyond a person's control, or due to mistakes made through the behavior of the person. Failure is leaving this world without leaving a positive set role model or goal for generations to copy from. Failure is when all hopes and aspirations are shattered in a person's life, and the person was unable to change the negative course of events into a positive course of events.

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Discussions

It is noteworthy that the students' language is full of words related to set goals, targets, hopes and aspirations, dreams, vision, performance and non-performance, achievement, factors and control. These factors amount to the participation in the discourses and logics of the market, consumption, commodification and profitability. Hence, in relation students experience academic life and the attainments within it and outside it in terms of consumption, performance and non-performance. Hence, when experiencing shapes the attitudes and posture of the students, it does so specifically in relation to consumption. Experiencing includes the whole range of students' participation in all activities related to achieving the set goal of obtaining a certificate; and hence experiencing is also embodiment. It is embodiment in the sense in which Gendlin (1996) describes the participation of the individual in all the sensations, sensibilities, and perceptions available to the individual in the particular setting and context of an event. The effect that experiencing produces upon the individual is translated into a belief or beliefs – beliefs being the combination of the perspectives selected from the multiple possible others available to the experiencer and the emotions attached to those perspectives. Beliefs create attitudes, attitudes being the orientation of the combination of the perspectives and emotions attached to these perspectives and their direction towards particular objects or set goals. Attitudes, when directed towards specific goals and their achievements, produce an orientation that can be described as the posture. Posture entails an implied intention to act or to be ready for action, that is, to invest belief with content or the benefit of the achievement of a concrete objective or goal.

As the study points out, students' experiencing turned into beliefs about consumption and the market. Thus, for some students, satisfaction comes only when the courses in which they are participating and the grades they attain in 'the courses fit the jobs and the job descriptions 'that they have set their targets to do in future. Participation in schooling is therefore about being fashioned for a market. With this belief, their attitudes and their postures are informed by the logic of the market.

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Conclusion

As students take on the language and logic of the market, hence of commodification and consumption and profitability and their processes and expectations, their beliefs and attitudes are shaped into a posture of achievement of goals; targets, performance and non-performance, and their choices are thereby influenced by the same logic and its elements. Thus, their choices and actions in academic environments and examination situations which constitute them into social subjects are similarly governed by such logic and posture. The consequences of such logic and posture are thereby reflected in the language or preferences and choices of the students. A student's choice of attitude and behavior in the academic context and during examinations are consequently heavily influenced consciously or unconsciously by the logic of the market, commodification and consumption, and profitability and unprofitability, and can be understood beneficially as such. Any attempts at solving difficulties arising from academic and examination situations cannot, therefore, ignore the discourses of students relating to the logic of the market and how it understands and defines achievement. In order to determine the origins of these discourses in the student's experiencing, it would be necessary to turn to the context of student experiencing, in this case, the framework of a specific university's strategic plans, policies and orientations, and in a wider frame, the State's educational orientations (Bourdieu 1990: 1978).

On the other hand, it is obvious that students have omitted any references to ethics and morality which have hitherto governed the references to examination malpractices in their choices of behavior in the discussion about failure and examinations, but have oriented themselves exclusively to the language and discourse of commodification and the market. To be able to reintroduce any elements of ethics and morality on which the prior discourses and discussions about examination malpractice and other references are made into the discourse of students, a conscious effort will be needed to be made towards re-establishing the linkage between examinations, failure and success in the educational domain. From this exploratory study, the suggestion is that the linkage between the ethical and moral frames that governed the norms of discourse related to

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examination malpractice have either been eroded or broken by subscription to the logic of the market. The extent to which this preliminary study is applicable can be further studied by various other methods. Further research on the phenomenon is therefore highly recommended.

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