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Editorial   4

Articles

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Aim and Scope: *The Ghana Policy Journal* is a multi disciplinary publication of The Institute of Economic Affairs (IEA), Accra, Ghana. IEA is Ghana's first public policy think tank and it was established in 1989. *Ghana Policy Journal* is intended to be a forum for the presentation and discussion of views from a wide range of scholars dealing with policy-related issues concerning Ghana, and Ghana's links and relationships with the rest of the world. *The Ghana Policy Journal* is partly sponsored by the Ghana Research and Advocacy Programme.

EDITORIAL

This year marks the 20th anniversary of the founding of the Institute of Economic Affairs (IEA), Ghana's first public policy think tank. The IEA has been committed to the advancement of multi-party democracy and economic development through constructive engagement with the government, the private sector, civil society and the general public. The Institute has been a trail blazer in various areas and one of its achievements has been the launch of the *Ghana Policy Journal* (GPJ). The GPJ is the first public policy journal to be published by an independent think tank in Ghana. It is a multidisciplinary journal committed to publishing high quality, peer reviewed articles in areas such as economics, education, law, politics, and health. This third issue of GPJ contains six articles.

The lead article by Eugenia Amporfu examines the gap between the health status of rural and urban women in Ghana. Using maternity data, she shows that rural women have a poorer health status than urban women and recommends some policies to improve the health of rural women. The second paper by Vijay Bhasin looks at the determinants of technical efficiency of women food processors in Cape Coast. His analysis indicates that there is ample scope for women food processors to increase their technical efficiency. As such, he proposes ways in which this objective can be achieved. The issue of natural resource conservation is addressed by Godwin Vondolia in the third article in this issue. Using the contingent valuation method, he assesses the preferences of farmers for the Kakum National Park, which is used as a proxy for evaluating the National Biodiversity Strategy (NBS). His findings indicate that Ghanaian farmers have strong preferences for the NBS which reflect losses they incur in the form of destruction of their crops and property. He advocates the use of distributional weights in evaluating the NBS.

The fourth article, which examines the determinants of output in Ghana's manufacturing industry, is jointly authored by Kwabena Anaman and Charity Osei-Amponsah. They show that the level of output of the manufacturing sector in the long-run is largely driven by the level of per capita real gross domestic product (GDP), the export-import ratio and political stability. In the short-run, output is significantly affected by the export-import ratio and political stability. They advocate that the Government should shift from the narrow focus on agro-industry (as contained in the GPRS II document) to a broader base. Improvement of market access, particularly in the West Africa and Africa regions, is seen to be of paramount importance.

The penultimate article by Ernest Awanta investigates the view of students, their conceptions of mathematics, their attitudes towards and habits of learning mathematics, as well as their perceived difficulty level of various mathematics topics in Ghana. He sources his data from a sample of 800 junior and senior high school students drawn from the Ashanti and Brong-Ahafo regions. The results indicate that topics involving technical manipulations are least preferred, whereas those involving visual and hands-on experiences are most preferred. He points to the urgent need to cater for learner differences and to devise ways to assist students with learning difficulties. This requires curriculum tailoring and differentiation. He notes that the current educational environment is examination-oriented and he advocates for care to be taken to safeguard students from ever-increasing examination pressure and its backwash. He is of the view that his findings have policy significance not only in the two regions where the sample was obtained, but also in other regions in general.

The final paper by Mohammed Sulemana attempts to enhance our understanding of the causes and impacts of conflicts in the Northern region of Ghana. Based on a survey of 600 people from different parts of the Northern Region, he explores the perceptions of people about conflicts in the region. His analysis indicates that almost all of the respondents believe that a major conflict is likely to occur in the future. He therefore calls for an urgent examination of the potential dangers of another inter-ethnic and intra-ethnic conflict. His findings indicate unambiguous early warning signs of a potential conflict and therefore the Government should adopt adequate measures to forestall further conflict in the region. It is interesting to note that the current Bawku conflict occurred after this article was written. Although, not of the scale indicated by this article, it highlights the need for a long-term solution to the problem of ethnic conflict in the Northern regions.

On behalf of the IEA, I would like to thank all the contributors to this volume. At this stage of Ghana's development process, there is an urgent need for evidence-based research to inform public policy. It is my hope that GPJ will continue to play a useful role as an outlet for research-based papers on Ghana and the African region, in general.

John Asafu-Adjaye
Acting Editor

THE GAP BETWEEN THE HEALTH STATUS OF RURAL AND URBAN WOMEN IN GHANA :
A CASE STUDY OF PATIENTS AT A MISSION HOSPITAL IN THE ASHANTI REGION

by

Eugenia Amporfu [1]

ABSTRACT

Rural women play an important role in sustaining the agricultural sector which is often the backbone of many developing countries. However, their share of the national pie does not often reflect the importance of their contribution to the economy. This can have a negative impact on their health. This study used maternity data from a mission hospital in Kuntenase district in the Ashanti region of Ghana to compare the health status of rural and urban women. The results showed that rural women had poorer health status than urban women. In addition, improvement in health was more likely to occur among urban women then rural women. The paper recommends some policies to improve the health of rural women.

Keywords: gender-related health care, health economics, health status, rural women, urban women, women health

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1. INTRODUCTION AND PROBLEM STATEMENT

The agricultural sector is the backbone of many developing economies. Since farming technologies in such economies are often labour intensive, the health of the rural population is crucial for sustaining the economies. Women form a significant proportion of the rural population and are often involved in the farming of foodstuffs traded domestically to feed the nation's population. Rural women's health then is fundamental to economic and social development. In order to encourage farming in Ghana a public holiday was introduced in honour of farmers and fishermen and women. Awards for the best national and regional farmers have also been instituted. However these awards tend to favour large scale farming. Such a policy is likely to favour men rather than women since women are less likely than men to be involved in large scale farming. Women tend to be involved in small scale semi-subsistence farming activities. Because profit in small scale farming is in general less than that of large scale farming, rural women are often low-income earners.

As discussed in Ballantyne (1999), the health impact of social and economic status differs between men and women with women's health being more sensitive to economic status than men (Denton and Walters, 1999). Rural women are also more likely, than urban women to be uneducated. There is an extensive literature on the impact of gender disparities on women's health and the resulting impact on children. For example, Wisdom *et al.* (2005) have shown that socioeconomic status and health accessibility have significant impact on women's mortality and mental health. Macassa *et al.* (2003) have shown that gender inequality has a negative impact on women's health whether or not individuals have first hand experience of discrimination. Kahn *et al.* (2000) argue that income inequalities negatively impact low income women with young children. Institute for Food and Policy Research (2003) as well as the World Bank (2003) have documented the positive relationship between women's social status and child wellbeing.

These findings imply that an improvement in women's status in society has a positive impact on the health of women and children. The literature has also compared the health status of urban and rural women and shows unequal utilisation of health care between the two groups of women. Among the reasons given for such differences include lack of access to health information and health care, poor quality, culture and cost in the rural areas (Byles *et al.*, 2006; Centre of Excellence for Women's Health (CEWH), 2004; Leipert and George,

2008; Wong *et al.*, 1995). These factors have varying impact on the health of rural women. According to the literature, the impact of culture on rural women's health can be positive or negative. Some studies found the closeness of rural communities is a positive factor in providing social support for rural women to handle the multiple stressors and challenges of rural life and hence reduce the need to use conventional health care (Byles and George, 2006). Other studies however found that the closeness of rural communities deter sick women from seeking the needed health care especially if the illness is stereotyped (Thorndyke, 2005).

These studies in general found that urban women are more likely to use conventional health care than rural women either because of differences in access or differences in preference for conventional health care. However, the impact on the health on rural women varies across studies. Byles and George (2006) found no difference in the health of rural and urban Australian women in spite of the difference in health care utilisation. Others however found rural women sicker than urban women. For example two separate studies found that rural Canadian women have higher mortality rates (CEWH, 2004) and lower life expectancy (Leipert and George, 2008) than those in the urban areas. Chinese data have also shown a higher maternal mortality rate among rural Chinese women (Wong *et al.*, 1995).

To the author's knowledge no such comparative study has been done with African data. Any health comparison has mainly been on the use of contraceptives among African rural and urban women. For example, White and Speizer (2007) found that urban Zambians were more likely to use contraceptives than their rural counterpart as a result of lack of education of rural people on the use of contraceptives. Other studies have shown that the elderly women in rural Africa have higher preference for traditional healers than conventional health care (Nelms and Gorski, 2006).

Among the limited studies on women's health using Ghanaian data are Duda *et al.* (2007) which surveyed the prevalence of presumptive hypertension among women in Accra, the capital city of Ghana. The study found higher than anticipated prevalence of hypertension among the urban women and recommended steps to increase awareness of the disease among women. Such a study, useful though it was in providing information on women's health, did not provide any information on rural women's health. Recommended policies in the study then may not be applicable to rural women because, as stated in CEWH

(2004), urban solutions do not always solve rural problems. In an economy like Ghana where rural women play an important role in feeding the nation, the health status of rural women is an important determinant in the supply of foodstuffs in the economy. All things being equal, an improvement in the health of rural women could imply an improvement in the supply of foodstuffs and a resulting reduction in food prices; hence a reduction in inflation.

Despite such importance, no study has yet used Ghanaian data to compare the health status of rural women with that of urban women. Women's social status is partly determined by access to education, medical care and economic autonomy (Koenen *et al.*, 2006). Since independence in 1957, the status of urban Ghanaian women has improved. More women have tertiary education, are active in the labour market and so can afford good medical care. The positive impact on child wellbeing is partly seen in the increase in enrolment in education because an educated woman is likely to educate her children regardless of gender. Such improvement in women's status, however, exists mainly in the urban areas than in rural Ghana.

With the help of the poverty alleviation programme embarked on by the government, the rural girl-child may now have access to basic education and food. Rural women however remain largely uneducated and poor. Even though illiteracy may also be common among urban women, they are more likely to have access to health care in terms of shorter distances to health care centres than rural women who may have to travel long distances and/or may have to face problems with the availability of transport. Lavy and Germain (1994) found from Ghanaian data, a high negative correlation between distance and utilisation of health care. The Ghana Living Standards Survey of 1992 also showed that the opportunity cost in terms of time spent outside economic activity was higher among the non-salaried than salaried workers. Thus, rural women, because they require long travel time to access health care and are in general non-salaried farmers, face a higher cost of care than women in the urban areas. Rural women then are likely to consume less health care than their urban counterparts. It is therefore hypothesised in this study that rural women are likely to have poorer health status than urban women.

The major objective of this study is to analyse the health status of rural and urban women in Ghana using a case study of patients at a mission hospital in the Ashanti Region. The rest of the paper is organised as follows. The next section (Section 2) describes the model used for the study. This is followed by a

description of the analysis of the data in Section 3. The results of the analysis are reported in the fourth section. Thee conclusions and policy implications from the study are reported in the final section of the paper.

2. METHODOLOGY

The methodological approach used in this study has two parts. The first part uses the data to compute the traditional indicators for health status: maternal mortality and morbidity rates. The second part uses multivariate logistic regression to examine the difference in the impact of the factors that affect mortality rate depending on whether the subject lives in a rural or urban area.

For the first part, the type of mortality rate used is period mortality rate which is defined mathematically by Jack (1999) as follows in Equation 1:

$$\tau_{a,p}^{t}(n) = \tau_{a}^{t} + (1 - \tau_{a}^{t})\tau_{a+1}^{t} + (1 - \tau_{a}^{t})(1 - \tau_{a+1}^{t})\tau_{a+2}^{t} + \ldots + (1 - \tau_{a}^{t})\ldots(1 - \tau_{a+n-1}^{t})\tau_{a+n}^{t}$$

$$= \tau_{a}^{t} + \sum_{i=1}^{n}\left(\prod_{j=0}^{i-1}(1 - \tau_{a+j}^{t})\right)\tau_{a+i}^{t}$$

Equation 1

where $\tau_{a,p}^{t}(n)$ is the period n year probability of death for an individual of age a at time t. τ_{a+i}^{t} is the fraction of individuals at age $a + i$ that died within time t and so $\prod_{j=0}^{i-1}(1 - \tau_{a+j}^{t})$ is the period survival function. The a represents the lowest age in the sample and it is 14 in the sample for this study. For the purposes of the current study, Equation 1 refers to the probability that a woman of age a dies within n years. This kind of definition of mortality rate, also referred to as mortality risk, allows for the computation of annual mortality rates of a given age range of a population. Maternal mortality rates were computed for rural/urban women in this study.

Even though mortality rate is a good measure of health status, because it is observable and measured with accuracy, it is not a complete measure. Death

represents a deterioration of health stock below a minimum level (Grossman, 2000) and so a fall in the mortality rate of a population represents an improvement in health. However, mortality rate does not capture a deterioration of health stock to a level that is still above minimum. This kind of health deterioration is captured by morbidity rate. Hence morbidity rates are also measured to derive a more complete picture of the health status of the cohort than what mortality rate alone would capture.

The main indicators of morbidity are prevalence and incidence of diseases. Prevalence refers to the number of cases with the particular disease or complication while incidence here refers to the number of new cases of the disease in a year. Since the data are hospital data on patients' records, the analysis uses information on patients' diagnostics to measure morbidity. Hence the morbidity rates measured are observed or objective morbidity rate. It must be mentioned that the use of patients' diagnostics has its own weakness in that patients' records do not provide detailed information on the variation of severity or effect of diagnostics on the functional capacity of patients. Being inpatient data however implies that the disease must be severe enough to affect the patients' functional capacity and require retention in the hospital. Also, since the observations of the data are already patients, it is likely for morbidity rates to be higher than that of the national population. The analysis of morbidity then focuses on the difference between morbidity of rural and urban women and the changes over time.

The second part of the analysis uses the statistical software, Statistical Package for Social Sciences (SPSS), to run a multivariate logistic regression of mortality on the patient's characteristics. This second part is important in shedding light on the factors or characteristics of the women which significantly affect mortality. The delineation of these factors can guide policy makers on the factors on which to focus to reduce mortality and hence improve the health of women. In addition, logistic regression analysis is an appropriate method of estimation when the dependent variable is binary given the characteristics of the data used in this study.[1] The regression equation is outlined in Equation 2 below:

$$y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + e_i$$

Equation 2

where y_i is a binary variable which equals 1 if a patient died during childbirth and 0 otherwise. X_1 is patient's age in years, X_2 is a dummy variable which equals one if the patients lived in a rural area and zero otherwise, X_3 equals one if the patient had caesarean section and zero otherwise, X_4 also equals one if the patient had a normal delivery and zero otherwise and X_5 equals one if the patient had complications. Complications here include, among others, anaemia, haemorrhage, eclampsia, and retained placenta. The selection of diagnostics, that were ranked as complications, was done with the help of a nurse-midwife.

Income and education of patients are likely to affect mortality but were not included in the model simply because the information was not available. When patients' income is not available, the median income of the patients' community is often used in the literature as a proxy for income. The local communities of the patients in the data can be grouped into three: villages, towns and cities. In general, villages have the lowest and the cities have the highest median income. Thus, X_6 represents the median income of the patients' communities. A similar reasoning is used in the literature to create proxy for education (see for example, Amporfu, 2008). In this case patient's communities could be ranked according to the education level of the population. However, this proxy is not used in the current study because there is already a dummy indicating whether or not the patient lives in a rural community. Patients (women) who live in rural areas are likely to be uneducated and so a proxy for education might be highly correlated with the rural dummy variable which may cause a significant multicollinearity problem and weaken hypothesis testing.

Finally, X_7 is a dummy variable which equals one if the patient was registered under the National Health Insurance Scheme (NHIS) and zero otherwise. This dummy was included to find out the extent to which the presence of health insurance affect mortality rate of maternity patients. With the exception of age, all the independent variables are dummy variables.

3. DATA ANALYSIS

The main data used for this study were a three year (2005-2007) maternity in-patient data from a mission hospital in the Kuntenase district of the Ashanti Region, about 30 kilometres from Kumasi, the capital city of the Ashanti Region. For the purposes of this study, the data had information on patients' age, address, outcome (mortality and readmission), diagnostics and procedure. The sample size was 4,847 but reduced to 4,525 after the removal of the

observations with some missing data. Table 1 below summarises information from the data. As shown in Table 1 about half the patients lived in rural areas. This is consistent with information from the United Nations population database (United Nations, 2007). The major cause of death, anaemia is preventable and treatable.

The data have several advantages for the current study. First, the proportion of rural women in the sample is consistent with that of the whole Ghanaian population hence making the data a close representation of the national population. Hence the results of the analysis could exhibit at least some of the variations in the health status of rural and urban women in Ghana. Second, since all observations are from the same hospital, the selection bias that could result from hospital choice is minimised. Both the rural and urban patients had access to public hospitals. The mission hospital used in the study is located a few kilometres from the district hospital and so the rural as well as urban patients chose the mission hospital over the public hospitals. Thus the data are a self selection of women who are likely to expect higher quality and/or less expensive care from a mission hospital and so are likely to be homogeneous at least in their expectation. Since the patients might still differ as a result of their life experience, education, income or cultural background, unobserved heterogeneity may still exist among them. However, any existence of unobserved heterogeneity is not likely to bias the results because the method of estimation is not affected by unobserved heterogeneity (Kennedy, 1998).

Table 1: Summary data description of the sample

ITEM	NUMBER
Sample size	4,525
Percent rural (%)	51
Average age (years)	26.85
Age range	14-45
Number of deaths	14
Patients with NHIS	241
Major cause of death,	Anaemia

Third, the use of hospital data allows the measurement of morbidity to be observed morbidity which is more objective than unobserved morbidity. Fourth, since hospitals are able to attract people from far and near, hospital data are an affordable means of obtaining information on a cross section of the population. The people in the data come from different parts of the Ashanti Region and so form a good cross section of the national population since the health characteristics of the residents may not differ significantly from the rest of the nation. An alternative would be to travel to villages, towns and cities to interview over four thousand subjects or patients; needless to say, this would be very costly.

4. RESULTS
4.1. Maternal mortality rates

The maternal mortality rates are reported in Table 2. These rates are close to the death rates (per 1000 population) reported in the United Nation's database on population for the period under study for Ghana. For example, the database reported an annual average of 0.093 for the period. This is close to the 0.091 reported in this study in Table 2. Such results increase confidence in the reliability of the results. The mortality rates in Table 2 are the annual mortality rates of women currently alive and within ages 14 and 49. The rates then represent the probability that a woman at age 14 will die within 35 years from maternal problems.

As expected the results show that the mortality rates of rural women were significantly higher than those of urban women throughout the three years under study. The rates are expressed per 100,000 individuals. This implies that, for example, in 2005, 394 out of 100,000 rural women were likely to die compared to 16 for their urban counterparts. Similarly, the annual averages mean that, during the study period, 213 out of 100,000 rural women were likely to die annually compared to 6 for urban women. The age range used (14 – 49 years) falls within the productive years of women (retirement age in the formal public sector is 60).

The fall in mortality implies improvement in health status over time. However, the fall is greater for urban women than for the rural women. For the urban women, mortality rate fell by 93.8 percent in 2006 and remained at the low level the following year. In the case of rural women, the drop was 56.9 percent in 2006 followed by another 54.7 percent in 2007. The women received care from the same

health facility and, from Table 1, the cause of mortality was mainly anaemia, which is treatable at the facility. Anaemia can be detected during prenatal consultations and treated so that it does not cause complications during delivery. The difference in the drop of mortality rate then could be because urban women increased their prenatal consultations more than their rural counterparts.

Table 2: Mortality rates for rural and urban women

Year	All women	Rural	Urban
2005	0.166	0.394	0.016
2006	0.073	0.170	0.001
2007	0.035	0.077	0.001
Annual average	0.091	0.213	0.006

The results from the regression showed a high correlation between the rural dummy variable and the proxy for income. The dummy variable for registration for the NHIS was also found to be highly correlated with the rural dummy variable. Hence the two dummy variables for income and registration in the NHIS were removed from the regression. The removal of the NHIS dummy variable is important because people with NHIS may be systemically different from those without NHIS in terms of attitudes towards risk. Thus, including a NHIS dummy in the model without purging it from attitude towards risk could result in biased estimation. Complication was also found to be highly correlated with caesarean section. Hence the dummy for caesarean section was also dropped from the analysis.

The results from the regression analysis, reported in Table 3, show a negative relationship between age and mortality. Such results are consistent with the age range and the nature of the data used for the study. The result then implies that teenage maternity patients, whether urban or rural, are likely to die from child birth but such likelihood falls with age. After controlling for age, complications and area of residence (rural or urban) the results also show that the reduction in mortality rates over time is not statistically significant at the 5% significance level. The regression results also show that the coefficients of the rural and complication dummies are positive indicating that mortality rates of rural women are significantly higher than those of urban women and women with complications are more likely to die than those without complications.

To find the difference in the mortality rates of rural and urban women with complications, the regression was rerun after including interactions of the rural and complication dummy variables. Interactions between the rural and year dummies were also included to find changes in the mortality rates for rural and urban women over the years under study. The results are reported in the last column of Table 3 and they show that rural women are more likely to die from their complications than urban women. The negative coefficient for complications implies that urban women were not likely to die from complications. The coefficients for the rural dummy variable for the base year was positive but the differential coefficients for the interactions of rural with 2006 and 2007 were negative, but less in magnitude than that of the base year, and positive respectively. Such results imply that the gap between the mortality rates of rural and urban women dropped in 2006 but increased again in 2007 at the 10% significance level. Consistent with the results in Table 2, the results also imply that mortality rates of rural women remained higher than urban women over the years. The year dummies had negative coefficients at the 5% significance level, implying significant reduction in mortality rates for urban women over the years. This again is consistent with the large drop in mortality rates for urban women in 2006 shown in Table 2.

Thus, the results implied that the rural population lost considerable labour annually due to maternal health problems, 13 times more than the urban population. The table also shows that mortality rates of both rural and urban women fell over the years.

Table 3: Regression analysis results

Dependent Variable Independent Variables	Mortality	Mortality
Age	-0.017 (0.08)	-0.584 (0.019)
Complication	1.138 (0.016)	-14.323 (0.037)
Rural	2.159 (0.005)	1.279 (0.006)
2006	-0.593 (0.257)	-0.584 (0.027)
2007	-1.358 (0.174)	-0.584 (0.027)
Rural*Complication		-1.337 (0.055)
Rural*2006		15.802 (0.052)
Rural*2007		-0.864 (0.096)
Constant		12.615 (0.101)
	-6.708 (0.000)	-6.004 (0.000)

Notes
*With the exception of age all the independent variables are dummy variables.
The p-values are in brackets.

4.2. Maternal Morbidity

A close examination of the data showed that a different group of patients had complications each year. This could eithermean that the patients died from their complications or were cured or those who were not cured sought care from some other hospital and so did not show up in the hospital of the study anymore. Thus, only incidence was measured for each year. Table 4 shows that for rural women, the incidence of all complications increased in 2006 but fell in 2007. In the case of urban women, incidence dropped over time. The data for 2007 were only up to August and so the proportion of the sample with the disease, rather than the number of cases, is a better tool for examining the changes in morbidity over time. The proportion of cases with complication or particular diagnostics, referred to in the study as morbidity rates and computed as a percentage of the relevant group, are also reported in Table 4. The morbidity rates computed for anaemia, haemorrhage, and malaria indicate the probability that a patient's health is deteriorated by those diseases.

Table 4: Women's Morbidity Rates

	Rural Women			Urban Women		
	2005	2006	2007	2005	2006	2007
All complications (%)	0.41	0.37	0.36	0.38	0.33	0.35
All complications (incidence)	257	284	130	367	340	149
Anaemia (%)	1.4	1.7	1.2	0.5	0.8	0.5
Haemorrhage (%)	3.4	4.0	3.8	1.6	1.4	4.0
Malaria in Pregnancy (%)	8.0	7.9	5.8	9.6	6.9	7.0

With the exception of malaria in 2005 and 2007, and haemorrhage in 2007, the morbidity rates are in general higher for rural women than urban women. When all complications are combined, morbidity rates fell slightly (9.5 percent in 2006 and 2.7 percent in 2007) over the years for rural women. For urban women, however, there was a larger drop (13 percent) in 2006 but this was followed by a slight increase (6 percent) in 2007. As expected, malaria was the main cause of morbidity among the women especially urban women. The morbidity rates from malaria dropped significantly (28 percent) in 2006 for urban women but for rural women, it was not until 2007 that a similar drop (26.5 percent) occurred. Haemorrhage was the next dominant cause of morbidity, affecting rural women more than urban women. There was an increase in morbidity (17 percent), due to haemorrhage, for rural women and remained high through 2007. For urban women however, there was a sharp increase (71 percent) in 2007. Anaemia, though the major cause of death, was the least cause of morbidity and was more prevalent among rural than urban women. The morbidity rates due to anaemia rose for both groups of women in 2006 but fell in 2007.

Several reasons could explain such difference in morbidity. Even though the labour intensive farming technology used in rural communities forces the village population to exercise and so has a positive effect on their health, this exercise could be too strenuous for pregnant women. Since women are likely to start giving birth at an early age in the rural areas such a strain could have long term repercussions on women's health. Rural pregnant women may not be exposed to information on how to care for their health because rural women are less likely than urban women to attend prenatal classes. For example, anaemia and haemorrhage can be minimized through proper diet and refraining from certain strenuous activities. Such information is made available at prenatal classes.

Table 5 reports the fraction of the patients in rural and urban areas that have NHIS. Such information shows the extent the registration to the NHIS is correlated with residence of patients. As shown in Table 5, the operation of the NHIS in the hospital did not begin till 2006 and rural women are less likely to register for the NHIS than urban women. Even though the proportion of those with NHIS increased in 2007, the increase is higher for the urban women than the rural women. The reason that is often given for failure to register for the NHIS is affordability. A lot of rural women may belong to the indigenes who qualify for fee exemption. Educating the rural population on the need to register could increase the number of rural women registered in the programme to improve access to health care.

Table 5: Registration for NHIS (%)

Year	Rural Women	Urban Women
2005	0	0
2006	4.9	6.4
2007	12.1	17.1

5. CONCLUSIONS AND DISCUSSION OF POLICY IMPLICATIONS

The study has shown that rural women are in general sicker than urban women. In addition rural women are 13 times as likely to die from maternal health problems as urban women with anaemia as the main cause of death. Mortality rates for urban women dropped about twice as much as the drop for rural women. Any improvement in morbidity that occurred during the study period was likely to be observed among urban women before extending to rural women. If the improvement in mortality and morbidity was due to allocation of resources to improve health then the share of rural women in the resources was not enough to lead to a similar improvement in health status. The study also showed that while the incidence of malaria, the main cause of morbidity, decreased slightly during the study period, the incidence of haemorrhage actually increased significantly especially for urban women.

Two likely reasons for the difference are poverty and education. As already explained women in rural areas are likely to be low income earners and so may not be able to afford some of the basic requirements for good health. For example, pregnant women are supposed to engage in less strenuous work to ensure good health. However pregnant farmers are often forced to do strenuous

farm work because they are unable to afford hired labour. By engaging in strenuous activities pregnant farmers become vulnerable to haemorrhage. It is thus not a surprise that morbidity rate due to haemorrhage was higher among rural than urban women. The micro credit programme under the poverty alleviation programme was expected to provide loans to farmers to improve their business but a large percentage of rural women did not have access to such credit. The programme should give more attention to female farmers.

In addition to personal poverty, rural women live in poor communities that lack the basic infrastructure such as potable water, electricity and good road network which are crucial to good health. Thus in addition to engaging in strenuous farm work, rural women have to be exposed to water borne diseases as well. Spending more resources on research for less strenuous farming technology could improve the health of rural women. In addition more resources could be spent on feeder roads to ensure easy transportation of farming products to urban areas and hence reduce the strain on the health of rural women.

The second major reason for the poor health of rural women is lack of education. Typically rural women do not have formal education and are less likely than urban women to attend prenatal lessons. Hence, rural mothers often die from preventable diseases like anaemia. It is extremely important then that rural women be more educated. An effective tool to aid rural women could be a rural women's organisation that is ran by rural women themselves and not urban women as is often the case. Such an association could communicate effectively, the needs of rural women to the government for help.

The study also revealed that young mothers are more likely to die from childbirth than older ones. Given that the youngest mother in the data used was 14, such a result implies that teenage pregnancy can be detrimental to the health of young women. There is thus the need for a rigorous education to encourage girls to have a sense of purpose in life, apart from marriage and childbirth. Such an education is likely to induce girls to postpone childbirth to at least the post teen years. Improvement in the health status of rural women is important for the success of the poverty alleviation programme because the resulting reduction in mortality rate for example, will reduce children dropping out of school due to the loss of a parent or a guardian. Even though poverty alleviation programmes reduce financial burden of child education on parents, children are still dependent on parents and guardians for all other needs. Since child wellbeing is likely to receive a lot of weight in the spending of assets controlled by women than men (Quisumbing and Maluccio, 2003), improvement in the status of rural women could secure rural children's education.

ENDNOTE
1. More descriptions of the model are provided in the data analysis section.

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DETERMINANTS OF TECHNICAL EFFICIENCY OF WOMEN ENTREPRENEURS
IN THE FOOD PROCESSING ENTERPRISES IN CAPE COAST*

by

Vijay Bhasin [1]

ABSTRACT

The study looks at the determinants of technical efficiency of women food processors in Cape Coast, Ghana. The study estimates the Cobb-Douglas frontier production function for the women food processors. Electricity, water, equipment and man-hours worked are found to be the significant determinants of value of output. The elasticity of labour with respect to output is noticed to be the highest. The distribution of technical efficiency shows that there is ample scope for the improvement of technical efficiency of women food processors. The significant determinants of technical efficiency of women food processors are found to be the level of education, number of children, access to credit, and adoption of new and efficient technologies at work place. The Government of Ghana should design policies to concentrate on these significant determinants of technical efficiency to alleviate poverty of women food processors in Cape Coast.

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1. INTRODUCTION

Although women form a significant percentage of the human population, they earn only 10% of the world's income, and own less than 10% of the world's property (UNIFEM, 1997). Women, partners of men in the administration of resources, are undeniable colleagues in the production of goods and services. The formal sector employs a small percentage of workers but controls a disproportionate amount of resources. The informal sector, although with minimal resources, provides employment for a large percentage of people. In the informal sector, women appear to be more than men. They are in activities generally reserved for women. These are petty trading of diverse articles (clothes, shoes, cosmetics, jewellery and others), sale of foodstuffs, catering, tailoring and other types of services (hairdressing, massage, cosmetic services, food processing, etc.). In all countries, women as a group are disadvantaged as compared to men as a group (UNDP, 1997). Women have limited access to essential resources such as education, land, technology and credit. Moreover, they are at a disadvantaged position as far as the formal sector employment is concerned. In such a case, the informal sector is the only sector that can provide employment for the disadvantaged group.

Empirical literature on the importance of technology to women's ventures has often considered technology and rural women rather than urban women especially in agricultural production and processing (Boserup, 1970; Whitehead, 1981, 1985; Adekanye, 1985; Stamp, 1989). This is not strange given that African women are primarily food producers and processors, and rural dwellers. However, as more women move to urban areas and obtain some education, new economic opportunities are opened for them, usually in the informal sector. Women in Ghana generally have less access to formal education, credit and technology, and therefore have low participation in the formal sector. Many women take up self-employment after fulfilling apprenticeship requirements in the micro enterprises, which fall in the informal sector. These include technology-related occupations such as hairdressing, dressmaking, food processing, and tie and dye.

Studies on technology and urban women have tended to focus their attention on the labour force participation (Joll *et al.*, 1983; Trager, 1987; Okine, 1989; Psacharopolous et al., 1989; Gazier, 1992; ILO, 1994; Lachaud, 1996), with the exception of Soetan (1996); while ignoring the relationship between the adoption of new technologies at work-places and technical efficiency of women

food processors. Technical efficiency is measured as the ratio of the actual and potential output. The adoption of new technologies at the work-place is defined as the use of new and efficient milling machines (capital embodied technological change). Since the adoption of new and efficient milling machines increase both the actual and potential output, it will impact the technical efficiency positively.

It has been noticed in the literature that discriminatory treatment based on gender is bad for efficiency and growth (Elson and Evers, 1997). For example, studies from agriculture in Africa indicate that if women and men shared the same educational levels and access to modern inputs (improved seeds, fertilisers, extension services, etc.), yields could increase as much as 22% for food crop farmers, and that giving women primary schooling alone would raise yields by 24% for maize farmers (World Bank, 1995). A study from Tanzania shows that reducing time constraints in a community for small holder coffee and banana growers could increase household cash incomes by 10%, labour productivity by 15%, and capital productivity by 44% (Elson and Evers, 1997).

In the market sector of the economy, discrimination based on gender is often hidden and sometimes difficult to reveal (Elson and Evers, 1997). Discriminatory access to productive assets (land, modern inputs, capital, etc.) has also been shown to have a negative impact on economic efficiency and growth. For example, discrimination on the labour market means that wages paid to women underestimate women's productivity, and thus underestimates the returns to women and society. Moreover, discrimination in the credit market means that women are either denied credit or that the rates of interest charged from women overestimate the risks of lending to women and underestimate the returns to women and society. Clearly, all such distortions reduce the overall efficiency of the economy. Efficiency also depends on the health status of women. Haddad and Kennedy (1992) have noted that there are strong efficiency reasons why policy makers should improve women's nutrition. According to Fogel (1994), there exists causal relationship between health and productivity and efficiency of women in low-income countries. In addition, the importance of different forms of human capital to the enhancement of productivity and efficiency of workers has been emphasised by Bouis (1990), Berham (1996) and Schultz (1997).

The incomes of women food processors could be increased by increasing the factors' productivity or their technical efficiency. It is very difficult to increase the productivity of different factors of production under uncertain economic

environment. Thus, the only option left is to increase the incomes of women food processors by increasing their technical efficiency. The challenge to policy makers is to know whether technical efficiency of women entrepreneurs (food processors) can be increased through the adoption of new and efficient technologies their at work place or some other factors so that the economic status of women can be improved. This could only be done when the policy makers know which ones of the following are the significant factors that influence their technical efficiency.

It is argued that technical efficiency is determined by individual characteristics of women entrepreneurs. Factors influencing such characteristics may be divided into two groups - human capital variables that dominate the decision-making process of women entrepreneurs, and institutional variables that could influence women entrepreneurs' capacity to apply their decisions at the enterprise level without any constraints. The human capital variables are: age of operator, level of education, business experience, leisure time, number of children and health status; and institutional variables are access to credit and adoption of new and efficient technologies at work place. Age of operator and number of children are expected to be negatively influencing technical efficiency through actual output. On the other hand, business experience, leisure time, health status, and access to credit are expected to be positively influencing technical efficiency through actual output; whereas level of education and adoption of new and efficient technologies at work place are expected to be positively influencing technical efficiency through actual output as well as potential output.

The study concentrates on Cape Coast which is the capital of the Central Region of Ghana. According to Ghana Statistical Service (2007), Central Region was the fourth poorest region in Ghana in 1998/99 and its position changed to seventh poorest region in Ghana in 2005/06. According to Ghana Statistical Service (2005), women outnumber men in the total population, with a composition of 50.5 and 49.5 per cent, respectively. Women also outnumber men in the urban areas, while in the rural areas; their proportions are about the same. Moreover, in the urban areas, women outnumber men in the private informal sector in trading and other services. Since the incidence of poverty in the Central Region is higher than some of the other regions and more women are engaged in the private informal sector of urban areas, the present study concentrates on the alleviation of poverty of women food processors in Cape Coast by identifying the significant determinants to raise their technical

efficiency and income. The study was confined to Cape Coast only because of time and financial constraints.

The objectives of the study are to:

1. Estimate the appropriate form of production function for the women food processors in Cape Coast.
2. Estimate the technical efficiency of women food processors in Cape Coast.
3. Identify the significant determinants of technical efficiency of women food processors in Cape Coast and suggest policy recommendations.

The study shows that the Cobb-Douglas frontier production function is the most appropriate production function for the women food processors. The distribution of technical efficiency shows that there is ample scope for the improvement of technical efficiency of women food processors because only 5% of women food processors have their technical efficiency which is above 91%. The significant determinants of technical efficiency of women food processors are level of education, number of children, access to credit, and adoption of new and efficient technologies at work place. The paper is organised in six sections. Section One presents Introduction. Section Two reviews both the theoretical and empirical literature. The theoretical model is presented in Section Three. Methodology is explained in Section Four. Section Five presents the Analysis of Findings. The conclusions and policy recommendations follow.

2. LITERATURE REVIEW

The theoretical literature on technical and allocative efficiency emphasises two broad approaches to the estimation of stochastic production frontier and stochastic cost frontier and these are: (a) The non-parametric programming approach and (b) The statistical approach. The estimation of stochastic production frontier provides estimates for the technical efficiency and the estimation of stochastic cost frontier provides estimates for the allocative efficiency. Technical efficiency reflects the ability of a firm to obtain maximal output for a given set of inputs. Allocative efficiency reflects the ability of a firm to use the inputs in optimal proportions, given their respective prices. In the case of a stochastic production frontier, the value of technical efficiency lies between zero and one, while the value of allocative efficiency lies between one

and infinity in the stochastic cost function case. If the firm operates below the stochastic production frontier then it is considered as technically inefficient (the value of technical efficiency is less than one). On the other hand, if the firm operates above the stochastic cost frontier then it is considered as allocatively inefficient (the value of allocative efficiency is more than one).

The non-parametric programming approach requires one to construct a free disposal convex hull in the input-output space from a given sample of observations of inputs and outputs. This approach can be used where a firm produces multiple outputs. In this approach, estimates can be obtained for technical, allocative and scale efficiencies (Farrell, 1957; Afriat 1972; Hanoch and Rothchild, 1972; Diewert and Parkan, 1983; Varian, 1985; Charnes *et al.*, 1994). A major criticism of this approach is that the convex hull, representing the maximum possible output, is derived using only marginal data and not utilising all the observations in the sample. Thus the production efficiency measures are susceptible to outliers and measurement errors (Forsund *et al.*, l980). Secondly, the method has very demanding data needs. Finally, this being a non-parametric approach, no statistical inferences from the estimates can be derived.

The statistical approach can be sub-divided into the neutral-shift frontiers and the non-neutral shift frontiers. The former approach provides estimates for the technical and allocative efficiencies by specifying composed error formulations to the conventional production and cost functions (Aigner *et al.,* 1977; Meeusen and van den Broeck, 1977, Schmidt and Lovell 1979; Jondrow *et al.*, 1982; Lee, 1983; Huang, 1984; Schmidt and Sickles, 1984; Schmidt, 1986; Waldman, 1984; Greene, 1988; Bauer, 1990; Cornwell *et al.* , 1990; Kumbhakar, 1990; Fried *et al.* , 1993; Coelli, 1995; Battese and Coelli, 1995). The latter approach uses a varying coefficients production function formulation (Kalirajan and Obwona, 1994; Obwona, 1995). A major criticism of the statistical approach is that it cannot provide estimates for the technical and allocative efficiencies for those firms that produce multiple outputs.

The empirical literature on the measurement of technical and allocative efficiency in the agricultural, manufacturing and services' sectors of sub-Saharan African countries is very limited. Croppenstedt and Demeke (1997) have estimated the technical efficiency of private farmers engaged in the cereal crop production in Ethiopia and observed that education is weakly correlated with farm efficiency. Admassie and Asfaw (1997) have estimated the technical

and allocative efficiency of farmers in Ethiopia and observed that educated farmers are relatively and absolutely more efficient than those without education, and the mean profit efficiency of farmers is 54 percent. Croppenstedt and Muller (1998) have noted that the average farm specific efficiency of farmers in Ethiopia ranges from 51 to 76 percent depending on the assumed distributional form of the one-sided error.

Njikam (1998) has examined the impact of trade liberalisation on the technical efficiency of electrical industry of Cameroon and found a positive effect of trade policy liberalisation on this technical efficiency. Weir (1999) has observed that the farm-level efficiency in Ethiopia is approximately 55 percent and increased schooling reduces inefficiency of farmers. It has been established by Ajibefun and Daramola (1999) for the Block Making, Metal Fabricating and Sawmill industries of Nigeria that the age of operator, level of education and the level of investment are the most significant determinants of both technical and allocative efficiency. In another study Obwona (2000) has shown for the tobacco growers of Uganda that the most significant determinants of technical efficiency are the family size, level of education, health status, hired workforce, credit accessibility, and fragmentation of land and extension services. Weir and Knight (2000) have observed for farmers in Ethiopia that a one year increase in average schooling attained in the household reduces measured farm inefficiency in the production of cereal crops by 2.1 percentage points. Thus, if educational attainment is raised from zero to four years of primary schooling on average in the household, mean efficiency could increase by 15 percent.

Njikam (2000) has estimated pre and post trade reform stochastic frontier production functions for seven Cameroonian industrial sub-sectors, namely, food, beverage & tobacco, textile & leather, wood & furniture, paper & printing, chemical and rubber, and observed that the mean technical efficiency of the manufacturing sector in the pre-trade reform period was 83.78 and the mean technical efficiency in the post-trade reform was 81.87. The firm-specific technical efficiencies in the post-trade reform period are significantly higher than those of the pre-trade reform period. Bhasin and Akpalu (2001) have shown that the significant determinants of technical efficiency of women entrepreneurs of Cape Coast, Ghana, engaged in hairdressing are age of operator, business experience, credit and contact with the lender. In dressmaking, the significant determinants of technical efficiency of women entrepreneurs are age of operator, level of education and credit. However, the significant determinants of technical

efficiency of male wood processors are age of operator, business experience, training programmes, credit and contact with the lender.

Bhasin (2002) has shown that the significant determinants of technical efficiency of onion growers in the Upper East Region of Ghana are farm experience, distance of the farm from the house of the farmer and extension services. The significant determinants of technical efficiency of pepper growers are age of the farmer, distance of the farm from the market, and extension services. On the other hand, the significant determinants of technical efficiency of tomato growers are age of the farmer, level of education, distance of the farm from the house of the farmer, and soil fertility management practices. It seems that no work has been done so far in Ghana on the determinants of technical efficiency of women food processors. It is important to look at the determinants of technical efficiency of women food processors in Ghana, particularly Cape Coast because of the poverty status of the Central Region and the role women play in the private informal sector of urban areas.

3. THEORETICAL MODEL

In this study, we use the stochastic frontier, also called "Composed error" model of Aigner *et al.* (1977) and Meeusen and van den Broeck (1977). Consider a firm using k inputs (x_1, x_2 …,x_k) to produce a single output Y. Efficient transformation of inputs into output is characterised by the production function, which shows the maximum output obtainable from various input vectors. Technical efficiency is defined as the ratio of the actual output and potential output. Moreover, the concept of technical efficiency refers to the management of resources in an efficient manner. The estimates for the technical efficiency can be obtained by using the stochastic frontier production function that is defined as shown in Equation .:

$$Y_i = x_i \beta + (V_i - U_i), \, i = 1, 2, …..N \qquad \text{Equation 1}$$

where Y_i is the production (or the logarithm of the production) of the ith firm;
   x_i is a k X 1 vector of input quantities of the ith firm;
   β is a vector of unknown parameters;
   V_i are random variables; and
   U_i are non-negative random variables, which are assumed to account for technical inefficiency.

The random errors, V_i, are assumed to be independently and identically distributed as N $(0, \sigma_V^2)$ independent of U_i's. The U's are also assumed to be independently and identically distributed as, for example, exponential (Meeusen and van den Broeck, 1977) and half normal (Aigner et. al., 1977). In the present study, we assume that U's follow half normal distribution and use mixed chi-square distribution (Likelihood Ratio Test) to test for the one-sided error. Technical efficiency (TE) of an individual firm in the context of the stochastic frontier production function (1) is defined as in Equation 2

$$TE_i = E(Y_i \,^* / \, U_i, x_i) / E(Y_i \,^* / \, U_i = 0, x_i) \qquad \text{Equation 2}$$

where $Y_i \,^*$ is the production of the ith firm, which will be equal to Y_i when the dependent variable is in original units and will be equal to $\exp(Y_i)$ when the dependent variable is in logs. If we decide to use the log version of equation (1) then the technical efficiency is defined as $\exp(-U_i)$. On the other hand, if we decide to use the non-log version of equation (1) then the technical efficiency is defined as $(x_i \beta - U_i) / (x_i \beta)$. The value of technical efficiency will lie between zero and one. The most efficient firm gets a score of one while the less efficient ones have scores ranging between zero and one. If you look at the form of production function that appears in equation (1), we can say that technical efficiency does not appear as an input in the total production function. This may be because the technical efficiency refers to the management of resources, and it is difficult to measure the degree of management and that is why it cannot appear as an input in the production function.

The maximum likelihood estimates for the parameters of the stochastic frontier production function and the predicted technical efficiency are obtained by using the computer programme, FRONTIER 4.1 (Coelli, 1994), in which the variance parameters are expressed in terms of shown in Equation 3

$$\sigma^2 = (\sigma_U^2 + \sigma_V^2), \text{ and}$$
$$\gamma = \sigma_U^2 / (\sigma_U^2 + \sigma_V^2). \qquad \text{Equation 3}$$

The term γ represents the ratio of the variance of inefficiency's error term to the total variance of the two error terms defined above. The value of γ can range between 0 and 1. The significance of the γ parameter can be used to test whether the stochastic frontier production function is preferred to the average production

function. If the null hypothesis, that γ equals zero, is accepted, this would indicate that σ_U^2 is zero and hence that the U_i term should be removed from the model, leaving a specification with parameters that can be consistently estimated using ordinary least squares.

The technical efficiency model is estimated by regressing the predicted technical efficiency on a vector of human capital variables (age of operator, level of education, business experience, leisure time, number of children and health status), and institutional variables (access to credit and adoption of new and efficient technologies at work place). Whether these variables are important for the technical efficiency of women entrepreneurs or not can be judged only by examining the significant values of the parameters. The technical inefficiency model can be specified as in Equation 4.

$$TE_i = \delta_0 \ + \ \sum_{j=1}^{m} \delta_j H_{ij} + \varepsilon_i \qquad \text{Equation 4}$$

where H is a vector of exogenous variables and the parameters of this equation are estimated by OLS. The statistical significance of the δ's enables us to identify the policy variables through which the technical efficiency of the women entrepreneurs can be raised.

4. METHODOLOGY

The data collection process required a preliminary survey in order to construct the sampling frame and draw sample. A pilot survey was conducted to identify the population of women food processors located within the municipality of Cape Coast and its neighbouring towns in 2002. One hundred and twenty six women food processors were identified for this purpose. Their names and locations were entered on slips. Lottery method was used to select the sample of forty women food processors.

Research assistants who were very proficient in Fante were selected and trained for one week so that they could interpret the questionnaire to the women entrepreneurs. The questionnaire was validated through pilot survey, sampling procedures, and follow up survey. Before the final questionnaires were administered, pilot survey was again conducted on five respondents. The survey revealed some weaknesses in the structure of some of the questions in the original questionnaire. The questionnaire was therefore modified accordingly

and was administered by the research assistants. Statistical test for the validation of the questionnaire revealed at the 5% level of significance that we should go ahead for the collection of data. Information was collected on types of milling/grinding machines used in the food processing, value of output, physical quantities of inputs, human capital variables and institutional variables. There was a follow up survey to confirm some of the responses provided by the respondents.

Since the food processors produce differentiated products, we use the value of output instead of physical output as a dependent variable in the empirical estimation of production function. The inputs that are included in the production function are the expenditure on equipment, expenditure on electricity, expenditure on water and the man-hours worked. Technical efficiency of women entrepreneurs refers to their capabilities to manage resources in an efficient manner. The value of technical efficiency lies between zero and one. The most efficient women entrepreneur gets a value of one for technical efficiency. The less efficient women entrepreneurs get values ranging between zero and one.

The limited information maximum likelihood method is used to obtain estimates for the parameters of preferred frontier production function. The likelihood ratio test is used to test the appropriateness of stochastic frontier production function (which includes two error terms) in relation to the standard production function (which includes only one error term). Once it has been established that the stochastic frontier production function fits the data better, the distribution of technical efficiency is examined, which shows whether there is any scope in the improvement of technical efficiency of women entrepreneurs. Thereafter, the estimated technical efficiencies are regressed on the human-capital and institutional variables. The Ordinary Least Squares (OLS) method is used for the estimation of regression equations. The general model is reduced to the preferred model by deleting the insignificant variables. This model helps us in identifying the role of adoption of technology and other policy variables through which the technical efficiency of women entrepreneurs could be raised.

5. RESULTS

The maximum likelihood estimates of preferred frontier production function are indicated in Table 1. First of all it is important to note that the Likelihood Ratio test statistic is statistically significant at the 5% level of significance, which

implies that the frontier production function fits the data better than an average production function.[1] This point is also buttressed by significant Variance Ratio. It is evident from the estimated Cobb-Douglas frontier production function of women food processors that electricity, water, equipment and man-hours worked are found to be the significant determinants of value of output, with elasticity coefficients of 0.14, 0.09,0.60 and 0.11, respectively.[2] Since the sum of the elasticity of output with respect to the various inputs is less than one, which either suggests decreasing returns to scale or perhaps some missing explanatory variables (rent on land/shops and other materials) in the production function. The elasticity of labour with respect to output is the highest because labour is a crucial input in the food processing business and that shows the policy makers should concentrate on the labour input to increase the incomes of women food processors.

The distribution of technical efficiencies of women food processors is indicated in Table 2. The mean technical efficiency of the women food processors is 64.5%. Most of the women food processors are operating at efficiency levels above 51%, with the least efficient women food processor operating at an efficiency level of 13.9% and the most efficient women food processor operating at an efficiency level of 91.3%. The distribution of technical efficiency shows there is ample scope for the improvement of technical efficiency of women food processors in Cape Coast and its neighbouring towns.

Our findings for technical efficiency of women food processors in Cape Coast and its neighbouring towns are very similar to the findings of Admassie and Asfaw (1997), Croppenstedt and Muller (1998), Njikam (1998), Weir (1999), Ajibefun and Daramola (1999), Obwona (2000), Bhasin and Akpalu (2001), and Bhasin (2002). Admassie and Asfaw (1997) have observed that the mean profit efficiency of farmers in Ethiopia is 54 percent. Croppenstedt and Muller (1998) have noted that the average farm specific efficiency of farmers in Ethiopia ranges from 51 to 76 percent depending on the assumed distributional form of the one-sided error. Njikam (1998) has observed that the technical efficiency of electrical firms in Cameroon varied from 50.98% to 94.39% with a mean efficiency level of 81.91% before trade liberalisation. It remained between 38.85% and 95.76% with a mean efficiency level of 76.87% after trade liberalisation. Weir (1999) has observed that the farm-level efficiency in Ethiopia is approximately 55%. Ajibefun and Daramola (1999) have observed that the technical efficiency of block makers in Nigeria varied between 19.0% and 85.0% with a mean efficiency level of 72.0%. The technical efficiency of

metal fabricators in Nigeria was found to lie between 27.0% and 92.0% with a mean technical efficiency of 80.0%.

The technical efficiency of saw millers in Nigeria varied between 30.0% and 90.0% with mean technical efficiency of 78.0%. Obwona (2000) has observed that the technical efficiency of tobacco growers in Uganda varied between 44.8% and 97.3% with mean technical efficiency level of 76.2%. Bhasin and Akpalu (2001) have observed that the technical efficiency of women hairdressers in Cape Coast, Ghana varied between 39.3% and 94.4% with mean technical efficiency of 75.7%. The technical efficiency of women dressmakers varied between 41.9% and 99.0% with mean technical efficiency of 83.4%. On the other hand, technical efficiency of male wood processors varied between 69.7% and 100.0% with mean technical efficiency of 89.1%. Bhasin (2002) has observed that the technical efficiency of onion growers in the Upper East Region of Ghana varied between 65.6% and 97.1% with mean technical efficiency of 82.0%. The technical efficiency of pepper growers varied between 67.4% and 99.9% with mean technical efficiency of 88.7%. The technical efficiency of tomato growers varied between 12.8% and 100.0% with mean technical efficiency of 70.4%.

Table 1: Maximum Likelihood Estimates of Cobb-Douglas Frontier Production Function

Sub-sector Variables	Informal Food-Processing
Intercept[3]	1.4213*
	(0.3732)
Electricity	0.1458***
	(0.1223)
Water	0.0902***
	(0.0775)
Man-hours	0.6007*
	(0.0743)
Equipment	0.1130***
	(0.0893)
Variance Ratio	0.9094**
(γ)	(0.0656)
Total Variance(σ^2)	0.5046*
	(0.1457)
Log-Likelihood Function	-23.6950
Likelihood Ratio Test	8.1747**

Table 2: Distribution of Technical Efficiencies

Efficiency	Women Foods Processor	
	Number	%
11-20	2	5.0
21-30	0	0.0
31-40	1	2.5
41-50	4	10.0
51-60	7	17.5
61-70	6	15.0
71-80	13	32.5
81-90	5	12.5
91-100	2	5.0
TOTAL	40	100.0

MEAN	64.51%
MIN	13.9%
MAX	91.3%

Given a technology to transform physical inputs into outputs, some women food processors are able to achieve maximum efficiency of 91.3%, while the others are technically inefficient. This discrepancy could be because the latter group does not have adequate technical knowledge compared to the first group. On the other hand, this discrepancy may exist because of human capital, institutional and socio-economic variables (Kalirajan and Shand, 1989, Bhasin and Akpalu, 2001, Bhasin, 2002). The computed technical efficiencies are modelled to depend on certain human-capital and institutional variables. We expect to observe a negative relationship between the age of operator, number of children and technical efficiency. On the other hand, we expect to observe a positive relationship between level of education, business experience, leisure time, health status, access to credit, adoption of new and efficient technologies at work place and technical efficiency.

First, we estimate the general model with all the human capital and institutional variables. Due to the problem of multicollinearity, coefficients of some of the variables are insignificant and bear incorrect signs. These variables are deleted in stages from the regression equation to arrive at the preferred model. However, it should be mentioned that dropping of multi-collinear variables could reduce the biasness of the estimated coefficients. The estimated coefficients of the general model for the women food processors are presented in the Appendix. The estimates for the preferred model are given in Table 3. The significant determinants of technical efficiency of women food processors are level of education, number of children, access to credit, and adoption of new and efficient technologies at work place. While interpreting the results, we should keep in mind that only one variable changes and other variables are kept constant.

Level of education of the women food processor is positively related to her technical efficiency. One additional year of schooling enhances the technical efficiency of women food processors by 4.6%. Education enhances the stock of human knowledge and this consequently increases her efficiency. Educated women should be encouraged to open food-processing businesses. The number of children staying with the women food processor has a negative impact on her technical efficiency. One additional child staying with the women food processor reduces her technical efficiency by 2.2%. Looking after many children will make the women food processor more tired and can make her less efficient. Women food processors should try to limit the sizes of their families by adopting family planning methods and taking less social responsibilities.

We have observed that those women food processors that have better access to credit are relatively more efficient. Additional loan of one million cedis (100 Ghana cedis) enhances the technical efficiency of women food processors by 5.0%. If the amount of loan is utilised for the purchase of media equipment (radio, television etc.) through which the women food processor can acquire more information and ultimately manages the resources efficiently then we can say that the access to credit can influence her technical efficiency. Since the amount of credit matters for her efficiency, the government should try to increase the flow of funds through the various suppliers of informal and formal credit. Adoption of technology at the work place has a positive impact on the technical efficiency of women food processors. Adoption of one new and efficient food grinding machines at the work place increases the technical efficiency of women food processors by 1.9%. Those institutions that promote the development and adoption of new technologies should popularise new and efficient food grinding machines among the women food processors so that their efficiency could be raised. The value of R^2 indicates that the estimated regression equation is a good fit. The significant value of F indicates that the independent variables that are considered in this study are jointly significant.

Table 3: Determinants of Technical Efficiencies.

Sub-sector Variables	Informal Food-Processing
Intercept	0.4796*
	(0.1490)
Level of Education	0.0460
	(0.0106)
Number of Children	-0.0220**
	(0.0095)
Credit[4]	0.00005
	(0.00001)
Technology at Workplace	0.0190**
	(0.0078)
	0.97
F-Statistic	324.11*

Notes: 1. The figures in the parentheses are the standard errors.
2. * indicates that the statistics are significant at 1% level of significance.
3. ** indicates that the statistics are significant at 5% level of significance.

Our findings with regard to the determinants of technical efficiency are in conformity with some of the findings of Weir (1999), Ajibefun and Daramola (1999), Obwona (2000), Weir and Knight (2000), Bhasin and Akpalu (2001), and Bhasin (2002). Weir (1999) has observed that increased schooling reduces inefficiency of farmers in Ethiopia. Ajibefun and Daramola (1999) have shown that the significant determinants of technical efficiency of block-makers and saw-millers in Nigeria are age of operator, level of education, business experience, and number of employees and level of investment. The significant determinants of technical efficiency of metal fabricators in Nigeria are age of business, level of education, business experience and number of employees. Obwona (2000) has shown that the significant determinants of the efficiency of tobacco growers in Uganda are the family size, level of education, health status, hired workforce, and credit accessibility, fragmentation of land and extension services. Weir and Knight (2000) have observed for farmers in Ethiopia that a one year increase in average schooling attained in the household reduces measured farm inefficiency in the production of cereal crops by 2.1 percentage points.

Bhasin and Akpalu (2001) have shown that the significant determinants of technical efficiency of women entrepreneurs of Cape Coast, Ghana, engaged in hairdressing are age of operator, business experience, credit and contact with the lender. In dressmaking, the significant determinants of technical efficiency of women entrepreneurs are age of operator, level of education and credit. However, the significant determinants of technical efficiency of male wood processors are age of operator, business experience, training programmes, credit and contact with the lender. Bhasin (2002) has shown that the significant determinants of technical efficiency of onion growers in the Upper East Region of Ghana are farm experience, distance of the farm from the house of the farmer and extension services. The significant determinants of technical efficiency of pepper growers are age of the farmer, distance of the farm from the market, and extension services. On the other hand, the significant determinants of technical efficiency of tomato growers are age of the farmer, level of education, distance of the farm from the house of the farmer, and soil fertility management practices. The present study has identified two new significant determinants of technical efficiency of women food processors and these are the number of children and adoption of new and efficient technologies at work place.

6. CONCLUSIONS AND POLICY RECOMMENDATIONS

The Cobb-Douglas frontier production function is found to be the most appropriate production function for the women food processors. Electricity, water, equipment and man-hours worked are found to be the significant determinants of value of output. The elasticity of labour with respect to output is noticed to be the highest. The distribution of technical efficiency shows that there is ample scope for the improvement of technical efficiency of women food processors because only 5% of women food processors have their technical efficiency which is above 91%. The technical efficiency can be improved by concentrating on its significant determinants. The significant determinants of technical efficiency of women food processors are level of education, number of children, access to credit, and adoption of new and efficient technologies at work place. Educated women should be encouraged to open more food-processing enterprises. Keeping in view that number of children is a significant determinant of technical efficiency; policies should be designed to reduce the number of children born by educated women food processors such as by providing knowledge about the family planning methods. Access to credit to women entrepreneurs should be increased so that they can adopt new and efficient technologies at the work place.

ENDNOTES

1. The average production function assumes only one error term that is normally distributed.

2. The inclusion of rent on land/shops and materials as inputs besides electricity, water, man-hours and equipment in the production function yielded inconsistent estimates and that is why these two inputs were excluded from the production function. Moreover, since the trans-log production function yielded inconsistent estimates, the Cobb-Douglas production function was selected for analysis.

3. The intercept takes care of the omitted variables.

4. The value of the coefficient of credit is low because it is expressed in thousands of cedis.

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Appendix: General Model Estimates for Technical Efficiency

Sub-sector Variables	Informal Food-Processing
Intercept	0.5042*
	(0.1775)
Age of Operator	0.0003
	(0.0008)
Business Experience	0.0011
	(0.0015)
Level of Education	0.0057
	(0.0166)
Health Status	-0.0084
	(0.0329)
Number of Children 1	-0.0251**
	(0.0112)
Credit	0.00006*
	(0.00001)
Leisure Time	-0.0007
	(0.0008)
Technology at Work Place	0.0201**
	(0.0082)
R^2	0.97
F-Statistic	149.17*

Notes: 1. The figures in the parentheses are the standard errors.
2. * indicates that the statistic is significant at 1% level of significance.
3. ** indicates that the statistic is significant at 5% level of significance.

DO GHANAIAN FARMERS HAVE PREFERENCES FOR THE NATIONAL BIODIVERSITY STRATEGY? A CASE STUDY OF FARMERS LIVING AROUND THE KAKUM NATIONAL PARK IN THE CENTRAL REGION*

by

Godwin Kofi Vondolia [1]

ABSTRACT

Natural capital constitutes about 20% of Gross Domestic Product (GDP) in developing countries. However, international environmental agreements require these countries to conserve these resources irrespective of immediate human preferences. The present study uses contingent valuation method to assess the preferences of Ghanaian farmers for the Kakum National Park, a microcosm of the National Biodiversity Strategy. The results demonstrate that Ghanaian farmers have strong preferences for the National Biodiversity Strategy. These preferences largely reflect losses households incurred in the form of destruction of crops and property. The findings of this study support the use of distributional weights in evaluating the National Biodiversity Strategy and biodiversity conservation programmes. It is shown that local residents can be partners in biodiversity conservation in developing countries if their preferences are integrated into the design of the National Biodiversity Strategies.

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1. INTRODUCTION

Natural capital remains the main stay of economies of developing countries. It constitutes about 20% of the Gross Domestic Product (GDP) of these countries (see World Bank, 2006). Natural resources are a major source of revenues to the governments of these countries. These resources also prrovide different forms of livelihood to the citizens. The livelihood of 90 percent of 1.2 billion poor people depend on forest resources (Baird, 2001). Angelsen and Wunder (2003) indicate that forest products serve as specialised, diversified and coping strategies for these households. Natural and environmental resources are particularly important to the poor since the poor have a high rate of time preference (Holden *et al.*, 1998) and live in biomass-based subsistence economies (Dasgupta and Mäler, 1994).

In 1987, the World Commission on Environment and Development (WCED) in conjunction with international environmental agreements re-emphasised sustainable development to the development discourse. The premise of the WCED is that poor people overuse environmental resources whereas the degradation of the environmental further impoverishes them. Therefore, at the 1992 Earth Summit, governments of the world agreed on a new agenda for sustainable development. This agenda is the Convention on Biological Diversity (CBD) which calls on governments to establish protected areas and manage them in support of conservation, sustainable use and equitable distribution of benefits. The CBD was construed to mean a *de facto* establishment of national parks. These conservation efforts were successful in terms of the number of protected areas established and national and international agreements and conventions ratified that deal with environmental conservation.

In many developing countries, there is a dilemma with regards to protection of biodiversity. Whereas there are legitimate reasons for the establishment of protected areas, there are also cogent arguments for permitting the consumptive use of these natural resources. Thus, despite the investments in the provision of alternative income-generating activities to local communities through promotion of ecotourism and decentralisation of conservation decision-making and Integrated Conservation and Development Projects (ICDPs), the rate of environmental degradation remains a challenge of conservation. Conflicts between management of protected areas and local communities are common features of biodiversity conservation. For example, illegal hunting occurs in 77% of the total protected areas in Venezuela and 66% of the protected areas in Venezuela have shown significant loss of vegetation and biodiversity (Romero, 1992). The perceptions of resource users towards conservation policies can be a major determinant of their success. Research shows that an individual's perceptions of the legitimacy and fairness of regulations are crucial for compliance (refer to Tyler, 1990; Kuperan

and Sutinen, 1994). This suggests that sustainable development has environmental, economic and social dimensions (Munasinghe, 1994).

International Environmental Agreements (IEAs), for example, CBD require compliance at the national and local levels. Ghana is a signatory of CBD and about 16% of the total land area of Ghana has been designated for ecosystems conservation in the form of forest reserves, national parks, and wildlife reserves (Government of Ghana, 2002). A major challenge of environmental conservation programmes especially in developing countries is how to garner local support and build legitimate regulatory institutions that can design conservation policies which are acceptable to all stakeholders. Preferences of local residents and resource users remain an important but elusive input into such conservation policies.

The main purpose of this study is to investigate the preferences of Ghanaian farmers for National Biodiversity Strategy based on a case study of farmers living around the Kakum National Park in the Central Region of Ghana. Ghana is divided into 10 politically-administrative regions with the Central Region one of the 10 regions. Kakum National Park is framed as a microcosm of the National Biodiversity Strategy. Therefore, the present study aims at: (1) assessing the willingness to pay (WTP) of farmers for use and non–use values for the conservation of Kakum National Park; (2) using debriefing questions to assess the perceptions of the farmers with regards to conservation of Kakum National Park and (3) proposing policy measures to design conservation policies. The remainder of the paper is organised as follows: The next section presents further literature review on the topic while the third section provides the theoretical basis of the study. The methodology and results are presented in the fourth and fifth sections respectively. The sixth section contains the conclusions and policy implications of the paper.

2. LITERATURE REVIEW

The application of stated preference in environmental decision-making in developing countries is quite common. For example, Kramer (1993) presents an evaluation of Mantadia National Park in Madasgacar. Kramer (1993) combines the opportunity cost approach with contingent valuation method (CVM) to estimate the economic impacts of the park to local villagers. Under the opportunity cost approach, the mean value of losses to households for establishing the Mantadia National Park was estimated at $91 per household per year. However, an average household requires $108 worth of rice per year as a compensation to trade the use of the Mantadia National Park. The establishment of Mantadia National Park represents potential Pareto improvement in resource allocation since the aggregate net benefits of the park are positive. Muchapondwa (2003) uses CVM to assess the Communal Areas Management Programme for Indigenous People (CAMPFIRE) in

Zimbabwe. Among the main conclusions of the study, the local communities do not support the CAMPFIRE project and imposing it on them amounts to failure of collective action. Typically, the local communities view the CAMPFIRE as a public "bad" and thus adequate economic incentives need to be provided as a measure to enhance the support for the project. Holden and Shiferaw (2002) present a case study on Ethiopia by investigating the farm households' interest, willingness to pay and ability to pay to sustain land productivity. These studies on conservation of biodiversity quantify the benefits and costs of these national policies. The main assumption is that preferences of these households are homogeneous and are reflected in these national programmes. The main point of departure of the present study is that many conservation programmes are paternalistic and may not reflect the preferences of resource users.

The studies conducted on Kakum National Park provide inconsistent evidence. Oppong *et al.* (1996) indicate that the majority of the sampled people living around the Park support the establishment of Kakum National Park since the establishment of the park generates bequest values among the local residents. However Dei (1996) foresees simmering discontent among local people and suggests the promotion of agro-tourism as a means of compensating the local people. Speculations on the reasons for the inconsistent evidence can produce a tall list. However, these may include methodological differences and sampling frame. Whereas Oppong *et al*. (1996) dwell on the benefits, Dei (1996) dwells on the costs of the establishment of the park. These are plausible reasons for the inconsistent evidence. It has been found that local people used to harvest products from the park prior to the establishment of the park (Agyare, 1996; Dei, 1996; Oppong *et al.,* 1996; Abane *et al.,* 1999). Agyare (1996) concluded that at the time of establishing the park, the local people expected improvement in infrastructure and economic conditions in communities around the park; and as a result traditional authorities were cooperative. Oppong *et al.* (1996) and Abane *et al.* (1999) conclude that the local people feel the rainfall pattern has improved after the establishment of the park. Destruction of farm produce by elephants from the park is common in the Kakum Conservation Area which includes the Kakum National Park. Azika (1994) estimates that farmers lost at least 50% of their crop produce. Dickinson (1998) computes the total elephant raids into farmers' crop farms for 1997 to be 1,100 which affected about 550 farmers in the Kakum Conservation Area.

The present study seeks to use open-ended CVM to estimate preferences for the establishment of the Kakum National Park. According to Alvarez-Farizo *et al.* (1999) there are three important reasons for the estimation of bid curves using the open-ended CVM. First, it can be used as a test of theoretical validity, which involves checking whether the signs of explanatory variables conform to *a priori* or theoretical expectations. Secondly, bid curves serve as a test of discriminant validity to assess the explanatory power of independent variables and finally, bid

curves serve as a means of benefit transfer. Despite the usefulness of CVM, it does not have universal support which culminated the establishment of the Blue Ribbon Panel in the United States to establish its usefulness and limitations. Among the guidelines stipulated by the Arrow *et al.* (1993), a policy relevant contingent valuation (CV) study should pass the scope test.

In many instances, the market system cannot be relied upon for accurate values for environmental amenities. As a result, hypothetical market has to be constructed so as to infer the economic values of these environmental amenities. The present study applies CVM to estimate open-ended bid curve for indigenous people for the Kakum National Park in Ghana. The results of the study are used for theoretical and discriminant validity. The motives of indigenous people for making a positive bid are also assessed.

3. THEORETICAL MODEL

Environmental valuation in economic theory is important since markets for environmental services like carbon sequestration cannot provide reliable values for these services. Thus the value of these environmental services must be inferred from indirect means. According to Danchev (2003) individual consumers have vague appreciation for biodiversity although they are aware of the fact that there is something serious about it especially if its existence is threatened. However, if this problem is carefully explained to the consumers, they may change their attitudes to the biodiversity depending on their value system. They may be willing to support the conservation of biodiversity depending on their value system.

There are several reasons for households to support biodiversity conservation. These reasons are reflected in the total economic values (TEVs) of biodiversity conservation (refer to Pearce and Moran, 1994 for details). These reasons are linked to the option value, existence value, bequest value and use values of the environmental resources. We assume that consumers are rational; however, their preferences differ because preferences depend on a set of economic and non-economic characteristics which are reflected in their motivation to support the conservation of biodiversity. The total economic value of protected areas can be divided in two broad categories: use and non-use values. The use values include direct values, indirect ecological function use values, and option use values. The direct use values are the contribution that environmental assets make to current consumption and production. Examples of direct use values are food, biomass, recreation, health and spiritual services derived from the environmental assets. The biological functional services provided by the environment to support current production and consumption constitute the indirect ecological function use values. Examples comprise ecological functions such as carbon sequestration; flood control, storm protection and waste sink. The option value is the premium that

consumers are willing to pay for currently-unutilised environmental assets to avoid the risk of not having it in the future, within the lifetimes of these consumers. The existence values reflect the satisfaction of knowing that an environmental asset exists, although there is no intention of using it. The desire to conserve environmental assets for the benefit of future generations constitutes the bequest value.

The total economic value of biodiversity to a household is an important input in the household's utility function given as follows in (1):

$$W_i = W\left(x_1, x_2\right)(1)$$

where W is utility, x_1 is a composite good and x_2 is value of biodiversity to the household reflected by the total economic value discussed earlier. The household maximises utility subject to the budget constraint specified as follows in (2):

$$\sum_{i=1}^{2} p_i x_i = M \ (2)$$

where p_i denotes the price of good x_i and M is the total household income. The household maximises the utility subject to the budget constraint. It is easy to derive the indirect utility function by substituting the uncompensated demand functions into the direct utility function. The indirect utility function can be specified as follows in (3):

$$\Psi_i = \psi\left(p_1, p_2, M\right)(3)$$

The indirect utility function prior to the implementation of the National Biodiversity Strategy (NBS) is given as follows in (4):

$$\Psi_i^0 = \psi\left(p_1, p_2, M^0\right)(4)$$

The implementation of the NBS affects the income of the household. The new indirect utility function is given as follows in (5):

$$\Psi_i^1 = \psi\left(p_1, p_2, M^1\right)(5)$$

The household's welfare estimate for the implementation of the National Biodiversity Strategy is given in (6):

$$\psi\left(p_1, p_2, M^0\right) = \psi\left(p_1, p_2, M^1 - WTP\right)(6)$$

where WTP is the willingness to pay for implementation of the National Biodiversity Strategy.

The bid curve may then be specified as:

$$WTP_i = \beta`X + \varepsilon \ (7)$$

where $\beta`$ is vector of parameters, X is a vector of explanatory variables, and ε is the stochastic disturbance term which is assumed to be independently, identically distributed.

There are two problems with the above formulation. Firstly, in many CVM studies, respondents report 'zero bids' which might be attributed to genuine 'zero bids', 'protest bids' and 'do not know' responses. Secondly, some of the explanatory variables may suffer from significant missing information due to the sensitive nature of those variables. The first problem generates *self-selection* problems. The second problem also results in the estimation of bid curves with unrepresentative sample from the population, another source of sample selection bias. The effects of the sample selection bias are that the stochastic disturbance term will be non-random and consequently the estimated parameters will be biased.

Heckman (1979) suggest an econometric procedure for solving the sample selection problem. The procedure involves the identification of a latent variable $z*$ that captures whether or not an individual gives a valid WTP response. The latent variable is revealed by an indicator variable z_i that takes on the value of 1 if $p_i > 0$ and the value of 0 otherwise. This means that $z_i* > 0$ if $z_i = 1$ and p is observed. Alternatively, $z_i* = 0$ if $z_i = 0$ and p is not observed. This latent variable may be determined by a set of explanatory variables. We specify this latent variable as:

$$z_i* = \alpha`Z + u \ (8)$$

where Z denotes the vector of explanatory variables of latent variable. The Inverse Mill's Ratio (IMR) is derived from the latent variable regression, is given as:

$$\lambda_j = \phi(-\alpha`Z_j) / \left[1 - \Phi(\alpha`Z_j)\right] \ (9)$$

where $\phi(.)$ is the standard normal density function and $\Phi(.)$ is the standard normal cumulative density function. The IMR is then added as an additional explanatory variable in the structural equation which is modified to be:

$$WTP_j = \beta`X + \gamma\lambda + \varepsilon* \ (10)$$

where γ is the covariance between the two stochastic disturbance terms.

However, the Heckman model has found limited use in empirical CVM studies. The main arguments raised by Alvarez-Farizo *et al.* (1999) is that WTP is censored and negatively skewed. These problems might lead to misleading parameters if Ordinary Least Squares (OLS) estimation method is used. In order to solve this problem, many empirical studies (see Alvarez-Farizo *et al.*, 1999) use an econometric procedure proposed by Tobin (1958). The main argument is that the explanatory variables might influence both the probability of limit response and the

size of non-limit response. Typically, the explanatory variables might influence the probability of making a positive bid and at the same time influencing the amount of bid. Generating another latent variable, $p_i{}^*$ underlying p, we may present the argument formally as:

$$p_i{}^* = \beta`X + \varepsilon \ (11)$$

Let L_i represent the lower limit of WTP of zero; and if $p_i{}^* \leq L_i$, then $p_i = L_i$, and the observation is censored at the lower limit. Alternatively, if $p_i{}^* \geq L_i$ then $p_i = p_i{}^* (= \beta`X + \varepsilon)$, and p_i is observed. The expected value of p is given as:

$$E(p) = \Pr ob(p > 0) * E(p / p > 0) \ (12)$$

where the first term on the RHS is the probability of that p is positive, and the second term is the expected value of p given that p is a positive value. Realigning the expected value of p with the notation used in the regression, we can specify the expected value of p as:

$$E(p) = \Phi(\beta`X / \sigma_\varepsilon) * (\beta`X / \sigma_\varepsilon + \sigma_\varepsilon \lambda_\varepsilon) \ (13)$$

with $\lambda_\varepsilon = \phi(\beta`X / \sigma_\varepsilon) / \Phi\left[\beta`X / \sigma_\varepsilon\right]$ and σ_ε is a scale parameter.

Donald and Moffitt (1980) propose a two-stage procedure for decomposing the effect of the explanatory variable on the dependent variable. The two stages involve the impact on the probability of being above the limit and the impact on the dependent variable if it is already above the limit. Mathematically, this is given as:

$$\partial E(p) / \partial X_k = \left[\Phi(\beta`X / \sigma_\varepsilon)\right] * \left[\partial E(p^*) / \partial X_k\right] + E(p^*) * \partial\left[\Phi(\beta`X / \sigma_\varepsilon\right] / \partial X_k$$
$$(14)$$

where $E(p^*)$ is the expected value of p conditional on being above the limit.

In terms of WTP, the two effects have an important interpretation. The first effect is the probability of bidding a positive WTP and the second effect is the impact on the amount WTP conditional on the positive WTP was made in the first place. The above Tobit model could now be extended to capture the sample selection. The expected value of the Tobit model with selection is given as:

$$E(p \mid z = 1) = \Pr ob(p > 0, z = 1) * E(p \mid p > 0, z = 1) \ (15)$$

where z is an indicator variable taking the value of 1 if p is observed and takes the value of 0 if otherwise. The probability that $p > 0$ and $z = 1$ is given as:

$$\Pr ob(p > 0, z = 1) = \Phi_2(\beta`X / \sigma_\varepsilon, \alpha`Z, \rho) \ (16)$$

where Φ_2 is the bivariate normal probability distribution and ρ is the covariance between the error terms. The expected value of p given that $p > o$ and $z = 1$ is:

$$E(p \mid p > 0, z = 1) = \beta`X + E(\varepsilon \mid \varepsilon > -\beta`X, \mu > -\alpha`Z) \, (17)$$

The corresponding Tobin-like expression for the selected sample is the multiplication of the above two equations; and this is provided as:

$$E(p \mid z = 1) = \Phi_2(\beta`X) + \sigma_\varepsilon \left[\phi(h)\Phi\left[\delta(k - \rho h)\right] + \rho\phi(k)\Phi\left[\delta(h - \rho k)\right] \right]$$

(18)

where $h = -\beta`X / \sigma_\varepsilon$; $k = \alpha`Z$; and $\delta = -1/(1 - \rho^2)^{-2}$.

Unlike the Heckman two-stage procedure, the selection and the structural equations can be estimated by the method of maximum likelihood (Greene, 2003). Within this framework, internal and external scope in WTP can be tested. In the internal scope test, respondents respond to two different environmental amenities. Then, bivariate probit model is used to test for the sensitivity to scope. For the external scope test (split-sample scope test), the sample of respondents is split into two and these groups vote on two separate environmental amenities and the WTPs are regressed on the bid amounts.

3.1. Suggested Hypotheses for the Study Based on the Theoretical Model

The following expectations are offered based on economic theory. *A priori* we expect the effect of household size to be unclear in response to both the WTP and the bid since arguments can run in both directions. The frequency of crop raiding by elephants as well as whether the farmer has ever suffered from crop raiding by elephants is expected to enhance the chances of making a positive bid and the size of the actual bid. The extent of destruction of crops and property through elephant raiding suffered in the previous year, captured by a willingness-to-accept (WTA) compensation is expected to be positively related to the probability of making a positive bid and the amount of bid made. The scope of the environmental amenity upon which the bid is made is expected to improve the chances of making a positive bid and the amount of bid made. The educational attainment of the household head is expected to improve the chances of the household making a positive bid as well the amount of the bid. The respondents who support the proposed Kakum Conservation Plan should be more willing to finance the implementation of the plan. The effect of the gender of the householder is not clear with regards to making a positive bid and amount of bid. The chances of making a positive bid as well as the actual bid made is expected to improve if at least one of the household members is employed at the Kakum National Park. The longer the respondents stay in the communities adjacent to the Kakum National Park, the more likely he/she will be willing to make a positive bid and the greater the amount they should be willing to pay so as to improve the conservation of the park.

4. METHODOLOGY

The data for this paper are derived from a household survey conducted by the author during the summer holidays of 2003. The National Oceanic and Atmospheric Administration (NOAA) Panel (Arrow *et al.,* 1993) has recommended steps that should be followed so as to enhance the reliability and validity of the policy recommendations of CV studies. Among the guidelines recommended by the NOAA Panel are that CVM should have a high response rate, pass the scope test, it should be a discrete choice, in-person interview should be adopted and pre-testing of the survey instrument is also encouraged. Much effort was made to follow the stipulated guidelines of the NOAA Panel in undertaking the study. The interviewers were carefully chosen and were involved in the administration of questionnaires so they required little training with regards to the administration of the contingent valuation questionnaire. They also understood the local language. Respondents were also adequately informed that the research work was being conducted by a university for research purpose and thus the research work had nothing to do with the formulation of government policy. These steps were undertaken to minimise *sponsor-bias*. The respondents were also assured of their anonymity. The survey instrument was pre-tested after which the necessary corrective measures were taken. Data were also entered into a computer at the end of each day of field interviews. It was therefore convenient to seek clarification from the enumerators with regards to illogical responses and illegible handwriting. Personal interviews were used to gather the data.

The population of the study was the inhabitants of communities surrounding Kakum National Park. The questionnaire was administered to households in some selected communities surrounding the Kakum National Park (KNP). In total, two hundred (200) households were interviewed. The communities, with the number of respondents coming from each community as indicated in the bracket, are as follows: Antwikwa (10), Masomago/Seidukrom (31), Abrafo (28), Kruwa/Obengkrom (39), Mfoum (30), Bobi (10), Abaka-Nkwanta (15), Afeaso (13), Tawiah-Nkwanta (14) and Wawase (10). In each community, some households were purposively selected to reflect different locations as 'start addresses' around which on the average of three (3) households were interviewed depending on the subjective determination of the size of each community. Efforts were made to ensure that every part of each community was represented. Surrounding villages and cottages were also included. This sampling method was adopted because there was no reliable census data for the construction of objective sampling frame.

According to Mitchell and Carson (1989), the CVM should provide a realistic scenario to the respondents. In order to assess the economic value of KNP, a change in environmental quality in the form of a new conservation plan was designed for KNP. The new conservation plan comprised: (1) planting more trees, (2) fencing KNP, (3) employment of more personnel and (4) expansion of the size of KNP. Through this plan, elephants and other animals would be prevented from moving outside the park. Thus the losses local residents incurred like destruction of crops and livestock by animals from KNP would be reduced. Moreover, endangered species like the Diana monkey (*Cercopithecus diana)* in the park would be better protected.

The Kakum Conservation Plan had four key components. Respondents were asked to vote on these four components of the Plan that the respondents wanted. Their responses were then used to construct the scope of the Kakum Conservation Plan acceptable to them and this formed the basis for which the bid was based. This was also used as an explanatory variable in the regression analysis. According to the scope test, a bid for a composite good should be higher than a bid for a subset of the good. Thus we expect that as the scope of the environmental amenity increases, the amount of bid made should also increase. After the vote on the scope of the environmental amenity, the respondents were introduced to the WTP question and the description of the payment vehicle. The WTP question is as follows:

The Kakum Conservation Plan described above can be implemented only if a fund like Kakum Preservation Fund is available. The fund would be used to buy equipment to fence the park; and employ more personnel for protection of animals and plants in KNP. Suppose Kakum Preservation Fund is established; and the fund is administered by the Government of Ghana. A representative of the fund will collect the same amount from each household in the village annually. The Government and tourists will also contribute to the fund. Moreover, you are guaranteed that the fund will only be used for improving the conservation of KNP.

After this statement, the WTP of the respondents was solicited and the motives of those who were not willing to pay to conserve KNP were explored. For those willing to pay, the payment vehicle was further explained to them. Since ability to pay was vital to obtain realistic bids, the payment vehicle was presented conservatively to reflect this. The description of the payment vehicle reads:

Before you answer the question, I would like you to reflect on the fact that you have a limited income. So after making this payment, you must still buy food, clothing and shelter among other things. Note that you are contributing towards the conservation of KNP alone but not for other services like garbage collection among others. The extent to which this fund can improve KNP depends on the amount that you and others contribute to this fund.

Respondents were also allowed to suggest alternative payment vehicle that they preferred and their WTPs under the alternative payment vehicle were elicited. The payment vehicles suggested by the respondents included taxes and voluntary contributions among others. The two payment vehicles provided almost the same level of WTP. The amount the respondents were willingness to pay was stated in cedi, the currency of Ghana. The value was converted to the United States dollar using the prevailing exchange rate of 8,500 cedis to one United States dollar.

A dummy variable was included in the analysis to capture education. The dummy variable took the value of one when the respondents had at least secondary school education and zero otherwise. In order to correct for the selection bias that might result from selection of only the respondents who made a positive bid, the inverse Mill's ratio was obtained from the probit estimation and introduced as a regressor variable in the selection equation. The result of the analysis indicated that there was a selection bias in the sample used in the estimation of the bid curve. The use of the inverse Mill's ratio corrected for the selection bias in the selection equation.

Although efforts were made to ensure reliability and validity of bids, some weaknesses were inevitable. One major problem with the data collection was that since the communities had been subjected to several interviews from different research workers particularly, with regards to assessment of crop-raiding without compensation, there were a few cases of resistance to our survey from the respondents. However, they became more willing to participate in our study when it was emphasised to them that the problems facing the Park and their livelihoods had to be looked at from several directions for more durable solutions to be found. Also, the communities were chosen purposively, that is, the research focused on the communities that shared boundaries with the Kakum National Park. Since the questionnaires were administered during the major farming season in Ghana, some farmers could not be met in the house. However, since the farms were not far from the communities, these farmers were tracked to answer the questions. It must also be acknowledged that some important variables were omitted. For example, it was not possible to get income data from the respondents since the economy being studied was predominantly subsistence.

In the preliminary regression analysis, dummy variables were introduced to suppress community differences that might influence the bid. For example, crop raiding by elephants might be very intensive in some communities so these communities might be very eager to finding a solution to the problem and hence members of these communities might provide higher bids. But these dummy variables were not statistically significant; and were therefore dropped in subsequent estimations. A dummy variable was also introduced to capture interviewer bias.

5. RESULTS

5.1. Introduction

The results of the analysis indicated that households supported the improvement in the conservation of the Kakum National Park. Among the 200 respondents sampled, about 97% supported measures that would improve upon the conservation of the Park. The few respondents who did not support the proposed Kakum Conservation Plan were of the view that it was the responsibility of Government of Ghana to conserve forests on their behalf. About 57% of the respondents were willing to pay to conserve the Kakum National Park through contribution to the Kakum Preservation Fund (KPF). About 30% of the respondents who were not willing to pay could be attributed to protest behaviour. This was inferred from the debriefing questions administered. However most of the respondents who were not willing to pay into the fund could be attributed to genuine 'zero bid'. The annual mean WTP per household under our proposed payment vehicle (which involved direct collection of monies from households) was US$2.68 while it was US$2.71 under the respondent's preferred payment vehicle. However, after correcting for the protest behaviour by deleting those responses which indicated protest response, the average annual WTP per household was US$3.83 and US$3.93 respectively for the two payment vehicles respectively.

5.2. Results from the Probit Model Regression Analysis

A probit model was used to determine the factors that influenced the respondents' probability of making a positive bid to improve the conservation of Kakum National Park as the first step in the estimation of the selection equation. **The explanation of variables and their units of measurement used in the regression analysis are provided in the Appendix.** The probit model passed the scope test. That is, as the scope of the environmental amenity increased, the probability of respondents making a positive bid also increased. This was because the parameter introduced for the environmental scope (SCOPE) was statistically significant. Also, there was significant interviewer bias, since the dummy variable introduced to capture the interviewer influences (INTERD1) was statistically significant. It was also established that the frequency of destruction (NODEST) was statistically significant implying that the higher the frequency of crop raiding by elephants, the lower the probability of making a positive bid to conserve the Kakum National Park. This reflected the protest behaviour reported earlier. The dummy variable for gender (GENDER) was also statistically significant indicating that male household heads are more likely to make a positive bid as compared to female household heads. The likelihood ratio test statistic was 52.36 at 10 degrees of freedom and was statistically significant. The adjusted McFadden R^2 value was 0.19. This value compared favourably with the reasonable value of 0.15 recommended by Mitchell and Carson (1989). After correcting for protest behaviour, interviewer dummy variable was still significant likewise the frequency of destruction. The scope of

environmental amenity was also significant and had the expected sign. Gender was statistically significant as well. The McFadden R^2 was 0.525. Based on the McFadden R-Square, we could say that the correction for protest behaviour improved upon the explanatory power of the model.

5.3. Results from the Selected Equation Regression Analysis

The conditional bid curve was also estimated with the selection equation. Both the amount that respondents are willing to pay under our suggested payment vehicle (AWTP) and the amount the respondents are willing to pay under their preferred payment vehicle (AWTPOV) were used in the estimation of the selection equation. The two bid curves passed the scope test. The results again underscored the fact the fact there was interviewer bias in the administration of the CV instrument. Most of the parameter estimates had the expected signs and were statistically significant as well. The longer the respondent stayed in the community, the more likely he or she would make a lower bid on condition that he or she made a positive bid in the first place. The number of hours that the householder used to collect non-timber products from the park prior to the establishment of the park positively influenced the conditional bid.

Similarly, the extent of destruction suffered in the previous year due to crop raiding by elephants increased with the amount of bid offered given that the respondent made a positive bid in the first place. Thus, householders that suffered most in the previous year were willing to make a higher positive bid so as to improve the conservation of Kakum National Park. Interestingly, employment of a household member at the Kakum National Park did not have the expected result. It rather had a negative effect on the conditional bid made. Male-headed households on the average made a higher positive bid compared to female-headed households. Educational attainment of the head of the household increased the positive bid given that the household made a positive bid in the first place. Thus the household heads who were more educated were more likely to make higher positive bids to improve upon the conservation of Kakum National Park. The inverse Mill's ratio was statistically significant confirming selection bias in the estimation of the selection equation.

Table 1: Selected Equation Regression Coefficients Incorporating Protest Behaviour

Variables	AWTP		AWTPOV	
	Coefficient	T-ratio	Coefficient	T-ratio
Interd1	-1.4910	-4.7275*	-1.5357	-4.8302*
Yrsta	-0.0197	-2.6346*	-0.0202	-2.6921*
Hrs	0.0559	2.3464*	0.0543	2.2787*
Dest	0.0805	0.2684	0.0790	0.2632
Nodest	-0.0231	-0.6931	-0.0202	-0.6041
WTA	0.0083	3.1613*	0.0017	3.1919*
Hhempl	-0.8312	-2.0180*	-0.8335	-2.0210*
Splan	6.0206	0.0001	6.0380	0.0001
Scope	0.6391	3.9511*	0.6627	4.0631*
Hhsize	-0.0773	-1.9545	-0.0809	-2.0410*
Gender	0.7014	2.4076*	0.7152	2.4479*
Occup	0.3697	0.4644	0.3874	0.4866
Edn12	2.0151	4.4996*	2.1288	4.7280*
IMR	2.7609	4.8455*	2.8181	4.8814*
Constant	-8.1783	-0.0001	-8.2791	-0.0001
Sample Size	200	200		
Log-likelihood fn	-356.2265	-356.9584		
E(Y) at mean	0.2228	0.2056		

* indicates that the t statistic is statistically significant

Given the mean values of all the independent variables, the expected value of the dependent value was 0.2228. We computed the conditional probability for each independent variable. The estimated coefficients of the bid curves using the two WTPs (based on the two different payment mechanisms) are presented in Table 1 above. The number of explanatory variables that was statistically significant reduced after correcting for protest behaviour. The dummy variable for the interviewer bias was still significant. The numbers of hours that the household used to harvest non-timber products from the reserve prior to the establishment of the park was still significant. Gender was statistically significant and male-headed households made higher positive bids as compared to female-headed households. The income loss from crop raiding by elephants was also statistically significant and had the expected sign. Educational attainment of the household was statistically significant. Educated household heads offered higher bids given that they made a positive bid in the first place.

There was sample bias due to protest behaviour. The coefficients of the bid curves corrected for protest behaviour are presented in Table 2. With the correction for protest behaviour, the dummy variable which captured whether the respondent supported the plan or not became a constant and was consequently dropped. The study also sought to find out the motives behind the positive bids. The response revealed that 85% of those respondents made a positive bid so as to avoid crop raiding by elephants. Generally, the coefficients of the bid curve (reported in Table 2) possessed the expected signs as suggested by economic theory.

Table 2: Selected Equation Regression Coefficients after Correcting for Protest Behaviour

Variables	AWTP		AWTPOV	
	Coefficient	T-ratio	Coefficient	T-ratio
Interd1	-0.9923	-4.2161	-1.0171	-4.3017*
Yrsta	-0.0097	-1.3850	0.0591	2.6457*
Hrs	0.06038	2.7053*	0.0591	0.2247
Dest	0.0699	0.2359	0.0666	0.2247
Nodest	-0.0163	-0.5490	-0.0126	-0.4254
WTA	0.0016	3.1692*	0.0016	3.1768*
Hhempl	-0.3512	-0.9197	-0.3437	-0.9003
Splan	0.1087	1.0781	0.1276	1.1742
Scope	-0.0208	-0.6205	-0.0225	-0.6669
Hhsize	0.5875	2.3665*	0.5927	2.3864*
Gender	0.5875	2.3665*	0.5927	2.3864*
Occup	0.5170	0.6483	0.5393	0.6762
Edn12	2.2318	4.9718*	2.3337	5.1776*
IMR	1.5000	4.7972*	1.5077	4.8023*
Constant	-0.5780	-0.6291	-0.6246	-0.6797
Sample Size	138	138		
Log-likelihood fn	-364.22189	-365.10089		
E(Y) at mean	3.4890	3.5136		

indicates that the t statistic is statistically significant

6. CONCLUSIONS AND POLICY IMPLICATIONS

The main objective of this study was to assess the preferences for National Biodiversity Strategy which sought to increase the total area devoted to biodiversity conservation to about 16% of total land area of Ghana. This was undertaken through the use of the CVM method dealing with the preservation of the Kakum National Park. Based on the preferences of farmers living around the

Kakum National Park, the study has thrown light on some key policy issues with regards to environmental policy formulation in Ghana. Despite the paternalistic nature of the formulation of the National Biodiversity Strategy, farmers have strong preferences for the National Biodiversity Strategy. To some extent, these preferences for the National Biodiversity Strategy are a reflection of cost of destruction to crop produce and property. Educational attainment plays an important role in biodiversity conservation. Creation of environmental awareness through educational campaigns and sensitisation of the indigenous people should be encouraged. Moreover, since entrance fees at KNP are inefficient for both domestic tourist and international visitors (Navrud and Vondolia, 2005), higher revenue can be generated from higher entrance fees to compensate welfare losses among these households; and to provide income opportunities, employment and empowerment of women in these communities. These measures are crucial for ensuring the sustainability of the National Biodiversity Strategy. The establishment of protected areas imposes extra cost on local communities in addition to taking away their source of livelihood. For example, crop raiding by elephants has been very intensive to the extent that the indigenous people are making a positive bid just to curb this crop raiding.

The study has implications for the welfare evaluation of biodiversity conservation programmes in developing countries. The preferences of farmers remain an important element for success of the National Biodiversity Strategy. It is therefore recommended that higher distributional weights should be put on the impacts of biodiversity programmes among the local communities in the evaluation of National Biodiversity Strategy. The unequal distribution of costs and benefits of the National Biodiversity Strategy is a major factor for conflict between park management and local communities. So biodiversity conservation programmes should be designed in such a way that these extra costs to local communities are minimised. In effect, there should be better communication among conservationists, local people and the government so that the preferences of the local people are used as direct inputs into biodiversity conservation policies.

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Appendix: Explanation of Variables and the Units of their Measurement

Variables	Description	Unit of Measurement
WTP	Dummy variable denoting willingness to pay	WTP=1 if willing to pay and 0 otherwise
AWTP	Bid respondents made	In US$
AWTPOV	Bid made under preferred payment vehicle	In US$
Interd1	Dummy variable denoting terviewer	Interd1 = 1 if Baba and 0 otherwise
Yrsta	Number of years respondent has been living in the community	Years
Hrs	Hours used to collect products from the forest	Hours
Dest	Dummy variable denoting destruction	Dest = 1 if crop destr-oyed last year and 0 otherwise
Nodest	Number of times experience destruction to crop	Number
WTA	Income lost from destruction in the previous year	US$
Hhempl	Dummy variable denoting whether any member of household is employed at park	Hhempl=1 if employed and 0 otherwise
Splan	Dummy variable denoting support for the plan	Splan=1 if support the plan and 0 otherwise
Scope	Number of components of the plan accepted	Number
Hhsize	Household size	Number
Gender	Dummy variable capturing gender of the head of the household	Gender=1 if respondent is male and 0 otherwise
Occup	Dummy denoting the occupation of the head of the household	Occup=1 if respondent is farmer and 0 otherwise
Edn12	Dummy variable capturing whether the head had formal education	Edn12=1 if the respondent had formal education and 0 otherwise

DETERMINANTS OF THE OUTPUT OF THE MANUFACTURING INDUSTRY IN GHANA FROM 1974 TO 2006*

by

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and

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ABSTRACT

In this paper, we sought to ascertain the determinants of manufacturing output in Ghana based on available data from 1974 to 2006 using cointegration and error correction model analysis. Our measure of the output of the manufacturing industry was the share of the total economy attributed to the manufacturing industry based on the value added to the gross domestic product. We showed that the level of output of manufacturing industry was driven in the long-run period by the level of per capita real gross domestic produce (GDP), the export-import ratio and political stability. In the short-run period, the level of output of manufacturing was driven by export-import ratio and political stability. The importance of the export-import ratio variable in affecting both long-run and short-run manufacturing output suggested that increasing level of manufacturing in Ghana would partly depend on the growth of export-based manufacturing firms.

Keywords: agriculture, economic growth, export-based industrialisation, Ghana, industrialisation, manufacturing industry.

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1. INTRODUCTION AND PROBLEM STATEMENT

Industrialisation, focussing on manufacturing, has become a major focus of African countries including Ghana. In 2008, a special session of the continental political grouping, the African Union, was devoted to the issue of industrialisation by African countries. Specific to Ghana in recent times, manufacturing was a major issue of discussion during the campaign period leading to the December 2008 General Election. All the four major political parties in Ghana, the National Democratic Congress (NDC), the New Patriotic Party (NPP), the Convention People's Party (CPP) and the People's National Convention outlined ambitious programmes for the expansion of the manufacturing industry that they would pursue if elected to form government. Further, the Growth and Poverty Reduction Strategy 2 (2006-2009) (GPRS 2) of the previous NPP government in Ghana stressed the linkage of manufacturing to agro-industry as an important part of the government agenda. The renewed focus on manufacturing in Africa is the result of the persistent weakness of African economies characterised mainly by production and export of raw materials and large balance of trade deficits in many African countries including Ghana.

The performance of the economy of Ghana since independence in 1957 can be divided into three period phases. These are (1) the 1957 to 1966 period, (2) 1966 to 1983 period and (3) 1984 to the present (2008). The first period was marked by the rule of Dr. Kwame Nkrumah and the CPP. This period was marked by moderate economic growth averaging around 4.5 per cent per annum and relatively low levels of inflation. This was also the period when considerable initial attempts were made to industrialise the country with the establishment of selected industries located around the country, the development of the Akosombo Hydroelectric Dam, the new Township and Industrial City anchored around the Port of Tema and the setting up of the Ghana Industrial Holding Corporation (GIHOC).

The second period is the period of political instability starting from the first military coup in February 1966 to 1983. This period was characterised by low economic growth and stagnation, considerable depreciation of capital stock and two of the worst recorded droughts in the history of the country in 1977 and 1983. The earlier attempts at manufacturing in the First Republic (1960-1966) were largely abandoned

during this period. The period from 1984 to 2008 marked the new period of political stability characterised by moderate economic growth averaging around 4.8 per cent per year and moderate levels of inflation. This period witnessed no successful military coups and generally good climate with occasional moderate droughts (for example in 1998/99 and 2006/2007). The moderate growth was also anchored around extensive economic liberalisation based on programmes enacted by the government with extensive support from the World Bank and the International Monetary Fund. While this period saw sustained moderate economic growth, it was marked by the relative decline of the manufacturing industry and the extensive sale and/or privatisation of stated-owned industries including the near-dissolution of GIHOC.

Average annual economic growth, measured as the change in real gross domestic product (RGDP), was 4.8 per cent from 1984 to 2008 (the new period of political stability). This annual economic growth varied from a low of 3.2 per cent in 1984 to a high of 6.4 per cent in 2007. The provisional economic growth rate for 2008 was 6.2 per cent. The recent over six per cent annual economic growth rates (from 2006 to 2008) have also been linked to very high levels of government budget deficits which are unsustainable, averaging 10 per cent of GDP. Despite the continuous annual economic growth and political stability over the last 25 years, unemployment has continued to be a major socio-economic problem. Further, the growth of the last 25 years has not led to a similar appreciable growth in formal employment outside of the government work force. This has led to increased poverty in urban areas such as in the capital city, Accra, even though overall people classified as poor in Ghana declined from about 51 per cent of the population in 1991/92 to about 28.5 per cent in 2005/2006. High levels of unemployment especially among the youth have attracted the attention of policymakers who have formulated several strategies to deal with this problem. New initiatives include the National Youth Employment Scheme which is similar to the Workers' Brigade Movement of the First Republic.

High economic growth rates are important to reduce poverty and unemployment levels among the population. However significant reductions in poverty are also associated with pro-poor growth policies that allow the employment of large numbers of the population in meaningful employment. This is often achieved

through accelerated expansion of the manufacturing industry and labour-intensive construction work programmes. Over the last 25 years, strategies to accelerate economic growth and overall socio-economic development of Ghana have focused on using the private sector as the main engine of growth. Recent government strategy, as outlined in the GPRS 2 document, favours the use of agriculture, information and communication technology and tourism as the main growth drivers.

It is generally acknowledged from empirical evidence that countries that have moved quickly from a low income status to a middle-income status have used their industrial sector, especially the construction and manufacturing industries, as the major driving forces of economic growth. Specific to Ghana, Anaman and Osei-Amponsah (2007) for instance, have established strong causality links between the growth of the construction industry and the growth of the overall macro-economy based on the 32-year period from 1974 to 2005 for Ghana. They conclude that the construction industry has been a major driver of growth in Ghana and moves the entire economy along as the industry expands. The linkage between the growth of the manufacturing industry and the growth of the macro-economy is also analysed by Osei-Amponsah and Anaman (2008). They show that the growth of the macro economy precedes or Granger-causes the growth of the manufacturing industry with a one-year lag. However, the growth of the manufacturing industry does not precede or Granger-cause the growth of the macro-economy.

The Government of Ghana considers private sector development, which includes the improvement of investment and the enhancement of basic service delivery, as one of the necessary factors for sustaining and expanding businesses, stimulating growth and reducing poverty. Despite the 25 years of continuous political stability and economic liberalisation from 1984 to 2008, the performance of the private sector has not been impressive. A major characteristic of the unimpressive performance of the private sector has been the weak performance of the industrial sector. Ghana's industrial sector is made up of four sub-sectors or industries. These industries are (1) mining and quarrying (2) manufacturing (3) electricity and water and (4) construction. Overall, the industrial sector performed marginally well against the projected targets set in the Government's Ghana Poverty Reduction Strategy (GPRS 1). However, the contribution of manufacturing industry to GDP continues to

decline due to a number of factors such as the high costs of production and the influx of cheaper imports from Asia and other parts of the world. For example, the growth rate of the manufacturing industry fell from 5.5 per cent in 2005 to 4.2 per cent in 2006 and further deteriorated to -2.3 per cent in 2007 (Institute of Economic Affairs, 2008).

Industrialisation linked to manufacturing is normally associated with the decline of agriculture's share of the GDP and the corresponding rise of the output of the manufacturing industry. The rise of industrialisation, based on increasing the output of the manufacturing industry, is viewed as an essential part of a successful economic development strategy. This strategy is also often accompanied by strong rises in per capita income levels and the accumulation of factors of production. However, the factors that determine the pace of manufacturing are the subject of debate in the economic development literature and appear to vary from country to country. Given the importance of the manufacturing industry in the drive of Ghana to achieve a middle-income status in the shortest possible time, it is important to ascertain the determinants of the output of the manufacturing industry in this country. We have therefore undertaken this econometric study to estimate the determinants of manufacturing output in the country to provide some policy recommendations that will promote a vibrant industrial era in Ghana. The rest of this paper is organised as follows: the next section provides a summary of the literature reviewed. This is followed by a discussion of the methodology used for the study. The subsequent section discusses the results of the study. The conclusions and policy recommendations follow.

2. LITERATURE REVIEW

Industrialisation is the development of a modern manufacturing sector which involves the organisation of enterprises, specialisation and the application of improved technology. The promotion of industries is necessary for rapid and sustained development of developing countries such as Ghana. Not surprisingly, in the period after independence, many African governments pushed for industrialisation based on manufacturing as a means of rapid socio-economic

development. Given the limited experience and the weak capacity of the private sector in manufacturing at the time, the push for manufacturing was often done through public investment in small, medium and large scale industries (Steel and Webster, 1992). Manufacturing involves social change. While its narrow outcome is an increase in industrial production from existing or new factories, a broader set of societal changes have also generally accompanied, if not preceded, the development of manufacturing. According to Gerschenkron (1962), these changes include a situation of political stability, the availability of experienced entrepreneurs, a capable urban work force and capital, the emergence of a market for industrial goods, and the presence of a growing body of technical knowledge.

During the 1970s, the newly industrialising countries of East Asia started to emerge as economic power houses on the back of increasing share of the manufacturing industry as a proportion of GDP. A study by the World Bank (1993) suggested the rapid growth of East Asia during the second half of the 20th Century was underpinned by spetacular growth in the manufacturing industries. This is supported by more recent studies such as those by Drysdale and Huang (1997), Jacob (2005), Sun (2006) and Kim and Park (2006). Storm and Naastepad (2005, pp. 1079-1084) argued that the extraordinary growth of the manufacturing industries in East Asia was the outcome of a virtuous cycle initiated by government-led increases in investment which led to higher growth and productivity and drove an accelerated expansion in exports.

The theoretical literature on the determinants of industrialisation, based on manufacturing, has several variants. There are theories that stress the role of local demand in generating sufficient expenditure on manufacturing goods (Murphy *et al.*, 1989). Other theories emphasise the importance of comparative advantage and doubt the pro-industrialising effects of high agricultural productivity (Matsuyama, 1992. A study by Breinch (2005) nests several theories in a unifying framework and introduces features of economic geography. The study uses a multi-location model with transport costs in which industrialisation is driven by access to markets and comparative advantage patterns. The model is used to indicate how costly international trade and relative geographical position are important determinants of

the level of industrialisation especially that dealing with the size of the manufacturing sector in developing countries.

Breinch (2005) asserts that in a world where neighboring countries show similar specialisation patterns, comparative advantage effects are less significant, in particular if agricultural reforms are coordinated across countries in a geographical region. Raising income above subsistence levels does not only alleviate rural poverty but it generates demand for manufactured goods necessary for successful industrialisation. Hansen and Prescott (2002) and Gollin *et al*. (2002, 2007) highlight the role of agricultural productivity in the process of industrialisation. The former authors have developed a model in which the transition from agriculture to industry is brought about by faster technological progress in the industrial sector and is slowed by higher productivity in the agricultural sector. They suggest that most of the late industrialised countries began the process of industrialisation late because of low agricultural productivity. Further, once a society produces the basic nutritional requirement of food, labour starts moving from agriculture to industry. Indeed, virtually every country that has experienced sharp increases in living standards over the last 200 years has done so through some of industrialisation that involves manufacturing.

Zhang *et al*. (2000) developed a framework to model the determinants of land use based on policy and historical experiences in China. A long period panel data set at the provincial level was constructed from various governmental sources to conduct the empirical analysis and hypothesis tests. Their results provide a better understanding of the driving forces behind the changes in China's agricultural land use. The empirical evidence showed that industrialisation and urbanisation are important factors influencing the conversion of farmland. Hence industrialisation and grain self-sufficiency policies are inherently in conflict with each other. Further, the relationship between land use intensity and industrialisation appears to be one of an inverse U-shape relationship. Industrialisation brings down non-labour input costs of agricultural production, promoting the practice of multiple cropping. On the other hand, industrialisation, especially the rapid development of rural enterprises, offers more non-farm job opportunities, raising wages and making intensive farming unattractive as surplus labour is exhausted.

Basu and Guariglia (2008) investigate whether, in addition to differences in agricultural productivity, differences in initial years of schooling can explain why some countries industrialise later than others. They use a neoclassical growth model, which predicts that countries with a greater initial knowledge gap industrialise later. They then use this model as a baseline and calibrate it to historical data of the United Kingdom (UK). It is established that their baseline model performs well in replicating actual historical UK real GDP per capita series during the era following the Second Industrial Revolution. The widespread adoption of increasing-returns-to-scale, industrial, technologies as a key aspect of industrialisation has been emphasised in both the theoretical and empirical literature. The empirical evidence suggests that industrial technologies are adopted throughout input chains in the economy. Ciccone (2000) derives two main results from his analysis of implications of available technologies for effective industrialisation. First, industrialisation's effect on aggregate income and productivity may be large even if increasing returns at the firm level are small. Second, minor improvements in the productivity of technologies may lead to higher level of industrialisation and increases in aggregate income and productivity. This will be the case especially if firms coordinate their decisions to adopt industrial technologies. Hence the coordination of activities of industrial firms by government may be useful to accelerate industrialisation.

Miguel *et al*. (2002) examined the effect of industrialisation on social capital in Indonesia from 1985 to 1997 using nationally representative surveys. They analysed a set of social capital measures including multiple measures of activities related to voluntary association, levels of trust and informal cooperation, and family outcomes. There were three main findings. First, districts that experienced rapid industrialisation showed significant increases in most social capital measures. Second, districts that were close to rapidly industrialising areas exhibited high rates of out-migration, significantly fewer community credit cooperatives, and a reduction in mutual cooperation as assessed by village elders. Finally, initial social capital in a district did not predict subsequent industrial development.

Louri and Minoglou (2001) analysed the determinants of de-industrialisation of Greece, based on the manufacturing share of the real GDP, using time-series

econometric analysis. They concluded that the relatively weak performance of the manufacturing industry in Greece was determined by the low GDP per capita, the long economic recession and unfavourable manufacturing trade conditions. The literature summarised above suggests that there are several factors that determine the level of industrialisation as measured by the output of the manufacturing industry. Some of these factors are related to government policy such as the coordination of activities of industrial firms by government. Coherent government policy to assist industry implies at the minimum some degree of political stability and governance institutions. Other factors are related to the size of the local economy as measured by the real GDP or per capita real GDP, trade conditions in manufacturing and other sectors of the economy and shocks such as the tripling of world oil prices in the 1970s, droughts and severe energy shortages.

3. METHODOLOGY

3.1. Specification of the Econometric Models

Following the approach used by Louri and Minoglou (2001), we use time-series econometric approach to ascertain the determinants of the level of industrialisation, as measured by the relative share of the manufacturing industry of the GDP of Ghana using data from 1974 to 2006. Based on the literature review summarised in the earlier section and specific conditions of Ghana including historical realities, the general model of the level of manufacturing output is specified below in Equation 1.

$$\text{MSHARE} = A_0 + A_1\,\text{EIRATIO}_t + A_2\,\text{PCRGDP}_t + A_3\,\text{ROILPRI}_t + A_4\,\text{STABLEP}_t + A_5\text{WEATHER}_t + V_t \qquad \text{Equation 1}$$

where MSHARE_t is the share of the manufacturing industry as percentage of the gross domestic product in time t;

EIRATIO_t is the ratio of total exports to total imports in time t;

PCRGDP_t is the per capita real gross domestic product in time t in Ghana cedis;

ROILPRI_t is the real oil price based on crude prices in the international market in time t;

STABLEP is a dummy variable denoting political stability with a value of 1 for the years of political stability and zero for years of instability. The years of political instability, denoted with a value of zero, are 1977, 1979, 1981 to 1983. These were years characterised by military coups or unsettled governments with many attempted coups such as in 1983;

WEATHER is a dummy variable for years of very low rainfall or droughts. A value of 1 denotes 1977, 1983, 1998 and 2006 and zero for all other years;
Ai (i = 0,1,2,3,4,5) are the parameters to be estimated and
V_t is the error term.

The empirical model is based on a log-linear model based on its superiority to the linear model derived from a specification test (Ramsey Reset model test). The empirical model used in this study is described as follows in Equation 2.

$$\textbf{LMSHARE} = B_0 + B_1 \, \textbf{LEIRATIO}_t + B_2 \, \textbf{LPCRGDP}_t + B_3 \textbf{LROILPRI}_t + B_4 \, \textbf{STABLEP}_t + B_5 \, \textbf{WEATHER}_t + U_t \qquad \textbf{Equation 2}$$

where LMSHARE, LEIRATIO, LPCRGDP, LR OILPRI are the natural logarithms of MSHARE, EIRATIO, PCRGDP and ROILPRI respectively;
Bi (i = 0,1,2,3,4,5) are the parameters to be estimated and
U_t is the error term.
A long-run growth function, as depicted in Equation 2, if it is a valid cointegration function, will also have an equivalent short-run error correction model (ECM). The short run ECM is shown in Equation 3 as follows:

$$\Delta \textbf{LMSHARE}_t = C_0 + C_1 \Delta \textbf{LEIRATIO}_t + C_2 \Delta \textbf{LPCRGDP}_t + C_3 \, \Delta \textbf{LROILPRI}_t + C_4 \Delta \textbf{STABLEP}_t + C_5 \Delta \textbf{WEATHER}_t + C_6 U_{t-1} + W_t \qquad \textbf{Equation 3}$$

where U_{t-1} is the lagged error term from the cointegration equation depicted in Equation 2, W_t is a normal random error term, Δ is the first difference operator and Ci (i = 0,1,2,3,4,5) are the parameters to be estimated.

3.2. Estimation of Models

It is now well established in economic literature that time-series econometric modelling must test for stationarity and cointegration of the economic variables. Thus, the models were estimated using time-series methodology that allowed for the testing of stationarity of the variables and long-run relationships based on cointegration analysis. Stationarity of the variables in the growth models was estimated based on the Phillips-Perron (PP) test (Phillips and Perron, 1988) and the Augmented Dickey Fuller (ADF) test (Dickey and Fuller, 1981). The first differences of the variables were also subjected to the test for stationarity using the PP and ADF tests. The tests were undertaken using the Time-Series Processor (TSP) package Version 4.5 (Hall and Cummins, 2001). The null hypothesis for both tests was that there was a unit root in the time series. The optimal number of lagged first differences in the ADF test was chosen automatically by TSP. Cointegration analysis was undertaken to determine whether the variables had valid cointegration relationships among themselves. This analysis is discussed next.

3.3. Cointegration Analysis

The autoregressive distributed lag (ARDL) method developed by Pesaran *et al.* (2001) was used to establish cointegration relationships among the variables using the Microfit 4.0 for Windows software (Pesaran and Pesaran, 1997). The advantage of the ARDL method is that it can be applied to the model whether the variables are stationary (i.e. I(0)) or integrated of the first order I(1)). As shown by the results of this study, the economic variables were a mixture of stationary and non-stationary variables which make the ARDL method clearly suitable. The ARDL method involves two steps. First, the existence of a long run relationship among the variables in the model is determined. The existence of a long run relationship is established by the bounds test based on a correctly specified and appropriate ARDL model and an associated unrestricted error correction model (Pesaran *et al.*, 2001).

The determination of an appropriate and correctly specified ARDL model is based on test criteria such as the Schwarz-Bayesian Information Criterion and Adjusted R^2 and various diagnostic tests for econometric problems. The unrestricted error correction model is directly derived from the ARDL model. The ARDL model is a vector autoregressive (VAR) model. Hence the unrestricted error correction model is a re-

parameterisation of the VAR model (Pesaran *et al.*, 2001). The bounds test determines whether the coefficients of the lagged terms of the unrestricted error correction model are jointly equal to zero. This is the null hypothesis. If the test statistic lies above the upper bound then the existence of a long run relationship among the variables is proven. The second step involves derivation of the long-run relationship from the unrestricted error correction model once the existence of a long run relationship among the variables has been confirmed.

3.4. Data and Data Sources

Data used in the study were obtained from the various issues of the International Financial Statistics Yearbook Issues from 1985 to 2007 published by the International Monetary Fund. Data for the most recent issues were used for the economic variables superseding values found in earlier editions. Data on GDP and market share attributed to the manufacturing industry were obtained from the Ghana Statistical Service. The data used for the analysis were those available from 1974 to 2006. Data for 2007 and 2008 available from the Ghana Statistical Service were considered too provisional to be useful for our analysis.

4. RESULTS

The results of the econometric analysis are summarised in Tables 1 to 4. Table 1 reports the summary results of the unit root tests of the variables both at the levels and first differences based on the ADF and PP tests. Based on the ADF test, the results show that while the variables are non-stationary at the levels, there are stationary based on their first differences. However, for one variable, $\Delta\text{LEIRATIO}_t$, stationarity is confirmed by the PP test and not the ADF test. The mixed results from the stationarity tests support the use of the ARDL method since this method is not conditional on the order of integration of the variable. The results of the estimated optimal ARDL manufacturing share of the economy model are reported in Table 2. As indicated earlier, the ARDL methodology is actually well suited for variables which are both stationary and non-stationary. The results from Table 2 confirm that the model is correctly specified based on the Ramsey Reset test. There is also no significant autocorrelation as measured by the Langrange Multiplier (LM) test for autocorrelation. Further, there was no significant heteroscedasticity as measured by the LM heteroscedasticity test. The high adjusted R^2 of the model suggests its strong power of the independent variables in explaining the variation in the dependent variable.

Table 1: Summary of ADF and PP Unit Root Tests of Variables at the Levelsand First Differences.

Variable	ADF Statistic	P Value	PP Statistic	P Value
$LMSHARE_t$	-10.613	0.000**	-3.470	0.915
$LEIRATIO_t$	-3.014	0.128	-15.822	0.159
$LPCRGDP_t$	-1.057	0.936	-4.639	0.846
$LROILPRI_t$	-3.598	0.030**	-16.134	0.150
$\Delta LMSHARE_t$	-4.064	0.007**	-10.906	0.378
$\Delta LEIRATIO_t$	-2.825	0.188	-22.132	0.046**
$\Delta LPCRGDP_t$	-3.857	0.014**	-12.677	0.282
$\Delta LROILPRI_t$	-5.449	0.000**	-23.103	0.038**

Notes

** denotes statistical significance at the 5% level.

Δ denotes first difference operator.

Table 2: Results of Estimated Optimal ARDL Manufacturing Share of the Economy Model of Ghana Based on Data from 1974 to 2006 with variables measured in Constant 2006 Values.

Explanatory Variable	Parameter Estimate	T-Statistic	P Value
INTERCEPT	-0.687	-4.174	0.000**
$LMSHARE_t$	0.322	1.866	0.075*
$LEIRATIO_t$	0.304	1.909	0.069*
$LPCRGDP_t$	0.419	1.433	0.165
$LROILPRI_t$	0.133	1.541	0.137
$LROILPRI_{t-1}$	-0.220	-2.486	0.021**
$STABLEP_t$	0.168	3.518	0.002**
$STABLEP_{t-1}$	0.153	2.671	0.014**
$WEATHER_t$	-0.21	-0.629	0.535

R^2 0.826**
Adjusted R^2 0.765**
Probability level of significance of model specification based on
the Ramsey Reset test of correct model specification 0.336
Probability level of significance level for autocorrelation based on the
Langrange Multiplier (LM) test 0.597
Probability level of significance for heteroscedasticity
based on the LM heteroscedasticity test 0.110

Notes

** denotes that parameter is statistically different from zero at 5% level.
* denotes statistical significance at the 10% level

The estimated long run relationship derived from the estimated optimal ARDL model are presented in Table 3. These results show that the variables, LEIRATIO, LPCRGDP and STABLEP, are statistically significant determinants of the dependent variable in the long run. This implies that the level of manufacturing output is influenced in the long-run period by the level of per capita real GDP, the export-import ratio and political stability. The results of the estimated short-run parsimonious error correction model derived from the long-run model are presented in Table 4. The power of the model is considered moderately strong given its adjusted R^2. The results indicate that in the short-run period, the deviations in the level of manufacturing output are significantly driven by changes in the export-import ratio and political stability.

The error correction term in the short-run ECM model is statistically significant indicating that the independent variables in the long-run model Granger-cause or precede manufacturing output. The proof of Granger causality based on the statistically significant error correction term also justifies the use of the single-equation model for the study. The value of -0.678 as the coefficient estimate of the error correction term (refer to Table 4) means the correction of the dependent variable from its long run value is undertaken in about one-and-half years (1/0.678). Given the fact that both in the short-run and long-run periods, the export-import ratio variable significantly influences the dependent variable, this raises the importance of this variable as a pivotal factor in policy analysis dealing with increasing the level of the output of the manufacturing industry in Ghana.

Table 3: Results of Estimated Long Run Relationship Derived From the Optimal ARDL Manufacturing Share of the Economy Model of Ghana Using Data from 1974 to 2006.

Explanatory Variable	Parameter Estimate	T-Statistic	P Value
INTERCEPT	-1.013	-4.878	0.000**
LEIRATIO $_t$	0.449	1.799	0.085*
LPCRGDP$_t$	0.618	1.802	0.085*
LROILPRI$_t$	-0.129	-1.143	0.265
STABLEP$_t$	0.474	5.865	0.000**
WEATHER$_t$	-0.032	-0.655	0.519

Table 4: Results of Estimated Short-run Parsimonious Error Correction Model Derived from the Long-Run Manufacturing Model of Ghana Using Data from 1974 to 2006.

Explanatory Variable	Parameter Estimate	T-Statistic	P Value
INTERCEPT	-687	-4.174	0.000**
ΔLEIRATIO	0.304	1.909	0.068*
ΔLPCRGDP	0.419	1.433	0.164
ΔLROILPRI	-0.133	-1.541	0.136
ΔSTABLEP$_t$	0.168	3.518	0.002**
ΔWEATHER$_t$	-0.021	-0.629	0.535
U_{t-1}	-0.678	-3.928	0.001*

R^2 0.645**

Adjusted R^2 0.522**

Notes

** denotes that parameter is statistically different from zero at 5% level.

* denotes statistical significance at the 10% level.

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

The determinants of the level of manufacturing output in Ghana, based on the share of manufacturing industry of the gross domestic product, were established using secondary data from 1974 to 2006. We used cointegration and error correction model analysis to establish the determinants. We showed that the level of output of the manufacturing industry was driven in the long-run period by the level of per capita real GDP, the export-import ratio and political stability. In the short-run period, the level of output of the manufacturing industry was influenced by the export-import ratio and political stability. Because exports and imports were measured in monetary terms, our results implied that the level of manufacturing output would increase with increased export earnings either because of price or quantity changes.

With the political stability over the last quarter of century in Ghana (1984 to 2008) coinciding with moderate continuous economic growth averaging 4.8 per cent per annum, but continuously shrinking share of the manufacturing industry, increased level of industrialisation would have to be linked to rapid growth in the level of exports vis a vis imports especially in the area of manufactured exports which have been shown in other empirical works to be linked to improvement in total factor productivity (refer to, for example, the recent work by Siliverstovs and Herzer for Chile). This increased level of exports would require a sustained push by the government to assist manufacturers in reducing the constraints of energy and infrastructure in the country and in accessing export markets especially those in West and Central Africa. The government should consider the provision of enhanced tax incentives and targeted subsidies to promote the expansion of manufactured exports. Public intervention through the mobilisation of finance for manufacturing firms needs to be improved.

As argued by Storm and Naastepad (2005, pp. 1084-1085), an important lesson to be drawn from the rapid growth of the manufacturing industries in East Asia during the second half of the 20[th]Century is that the sole reliance on market forces or market-friendly policies cannot explain the structural change of East Asian economies towards manufacturing production especially export-oriented manufacturing production. Market imperfections and market failure characterise industrial production and the fact that the rate of individual industrial investments is often low

requires coordinated industrial investments. We share the view of Storm and Naastepad that industrialisation requires a "Big Push" in the coordination and financing of complementary investments, the responsibility of such coordination falls with the government.

The narrow focus of the government of Ghana on industrialisation mainly linked to agro-industry (as contained in the GPRS 2 document) needs to be broadened to include emphasis on the development of industries other than agro-based industries. This is necessary to improve access to markets in the West Africa and African Regions given that agro-based industries are common in these two regions. Other export-oriented industries that need strong support from the new NDC government include book publishing, computer assembly plants, garments and textiles, pharmaceuticals and new industries related to the emerging oil and gas industry given the recent discovery of commercial quantities of oil and gas in Ghana. The new government may also consider the setting up of a revived GIHOC to facilitate speedy public-private development of new firms in the manufacturing industry and related sectors such and the gas industry, information and communication technology and integrated rural development sectors.

Finally, our study suggests that since the export-import ratio is an important determinant of manufacturing industry in Ghana, further research work is needed on the analysis of export and import trade as it relates to both the growth of manufacturing industry and the entire economy. This topic is part of our on-going research agenda.

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STUDENTS' VIEWS OF MATHEMATICS:
A SURVEY OF JUNIOR AND SENIOR HIGH SCHOOLS
IN THE ASHANTI AND BRONG AHAFO REGIONS*

by

Ernest K. Awanta[1]

ABSTRACT

This study investigated the views of students, their conceptions of mathematics, attitudes toward and habits of learning mathematics, and their perceived difficulty level of various mathematics topics in Ghana. A questionnaire survey was administered to a random sample of 800 junior high and senior high students in the Ashanti and Brong-Ahafo Regions. The data collected showed a clear picture of students' perception of mathematics learning with regard to categories of interest, preference for understanding, confidence and competence, textbooks, classroom learning and outside-class learning, and learning habits. It also depicted substantial trends of changing views and attitudes toward mathematics learning across grade levels. Students' responses to the Conception of Mathematics were consistent with previous studies, and demonstrated some specific characteristics of their views of mathematics. This survey has provided useful background information regarding students' needs and aspirations in mathematics learning for curriculum planners and frontline teachers in future curriculum reform and implementation.

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1. INTRODUCTION AND PROBLEM STATEMENT

The policy of compulsory basic education has been implemented continuously for nearly 20 years in Ghana after its initial introduction in the first post-independence government of Dr. Kwame Nkrumah and the Convention People's Party (1957-1966). Despite the optimistic expectations in the 1990s, the quality of education in the second decade of its implementation has aroused the concern of the public in general and educators in particular. A comprehensive review of compulsory education has revealed that mathematics, next to English, is the subject which children find most difficult (Wong, 2000). Moreover, the proportion of students who encounter difficulties in learning mathematics increases from Primary 3 onward. This indicates a need to improve curriculum and instruction in this subject.

The school curriculum is a major factor in shaping the quality of education (CRDD, 2007). It has been recognised that the quality of mathematics education directly affects learning in other scientific disciplines, hence influencing the development of human resources in the field (see for example, Awanta, 2005, CRDD, 2007). This is seen most necessary in a developing country such as Ghana, where every citizen needs to become mathematically literate (CRDD, 2003).

Research and experience in different parts of the world suggest that comprehensive appraisals should be carried out before the commencement of curriculum reform (Lawton, 1989; Skilbeck, 1984). Certainly, comprehensive appraisals of curriculum reform before its commencement were performed in countries other than Ghana. "Mathematics Counts" (Cockcroft's Report of the Committee of Inquiry into the Teaching of Mathematics in Schools: Cockcroft, 1982) of the United Kingdom and "Everybody Counts" (Report to the Nation on the Future of Mathematics Education: Mathematical Sciences Education Board, 1989) of the United States are two well known examples of research into mathematics education.

In response to the needs for a comprehensive curriculum review in Ghana, the government of Ghana, for that matter the Ministry of Education and the Ghana Education Service, requested for the conduct of a holistic review of the curriculum from primary school right up to the Senior High School. The purpose of this was to

investigate the views of various stakeholders, including students, teachers, parents, university professors, employers and curriculum planners, on the existing curriculum, including mathematics curriculum. The focus of this article is on students' views of mathematics.

Just as issues of Ghanaian Mathematics Teachers' conceptions of mathematics and its teaching (Awanta, 2007) have been investigated, the close relationship between students' view on mathematics and their learning of mathematics has been widely recognised (e.g., Pehkonen and Torner, 1998; Schoenfeld, 1989, 1992; Silver, 1985; Underhill, 1988; Wittrock, 1986). In the present article, the researcher studied students' views of mathematics and mathematics learning, including their conception of mathematics, their attitude toward mathematics, their learning habits in mathematics, and their perceived difficulty in learning mathematics. The findings, I believe, will present an important reflection of the realistic learning situation of mathematics class in Ghana from the learners' perspective. In order to elaborate, the researcher aimed at investigating the following in the study:

1.   students' conceptions of mathematics (e.g., "Is mathematics seen as being calculable and useful, and involving thinking?");
2.   students' attitudes toward mathematics learning such as interest, preference for understanding and confidence;
3.   their perceptions of classroom learning and the habit of learning mathematics; and
4.   the levels of difficulty of various topics as perceived by the students.

2. METHODOLOGY
2.1 Sampling and Administration

The study was carried out in the month of April 2008 in two regions of Ghana, the Ashanti and Brong-Ahafo Regions. Ghana is divided into 10 politically-administrative regions. The survey went through a two-step convenience sampling procedure to select students (respondents) for the study. The convenience sampling procedure was employed because the researcher was on his rounds in these regions for the purpose of supervising his undergraduate students who were on internship (teaching practice) programme. First, a sample of 10 junior high schools and 15 senior high schools out of

all government assisted schools in these two regions was selected. Second, participating students were selected using a random sampling technique. The students in these classes were requested to respond to a questionnaire. The overall return rate was 95%. The characteristic of the respondents are listed in Table 1 and the numbers of respondents in different streams (Science, Arts, and Vocational) in senior high are listed in Table 2.

Table 1: Characteristic of Respondents

	Junior High	Senior High	Total
Male	270	300	570
Female	80	150	230
Total	350	450	800

Table 2: Streams of the Respondents in Senior High School

Arts	Science	Vocational	Others	Total
270	100	132	11	450

2.2 Instruments

In the questionnaire students were requested to:

1. rate the level of perceived difficulties of the topics they learned in the current academic year, and how difficult they find the learning of specific topics within the curriculum;

2. respond to 20 individual questions about their attitude toward and habits of learning mathematics, such as their confidence in doing mathematics and their dependence on teachers and textbooks;

3. respond to 15 individual questions about their conception of mathematics (the item about "what they think mathematics is" was excluded from the junior high school questionnaire to make it shorter for these young students);

4.   indicate the time they spent in the previous week on homework in general and mathematics homework in particular; and

5.   indicate whether they had private tutors (or attended tutorial classes) outside their schools.

The questionnaire items for all grade levels were set in English, the official language of the respondents. Pilot tests of the student questionnaire were performed with 100 students (35 from University Junior High, Winneba, 50 from Winneba Senior High and 15 from Apam Senior High). Based on the feedback about the pilot tests, a number of minor amendments and standardisation in procedures were made. This, in a way established the reliability of the questionnaire. The questionnaire was also validated by the researcher observing a sample of respondents to determine the degree to which their actual behaviour was consistent with their responses. Details of the instruments used are listed as follows.

2.3 Perceived Level of Difficulty

The topics used in the questionnaire were taken from the mathematics syllabuses issued by the government (CRDD, September 2007). Students were requested to rate the level of perceived difficulty of each of these topics on a 5-point Likert scale (1 = very difficult, 2 = difficult, 3 = fairly easy, 4 = easy, and 5 = very easy). Since the questionnaire was administered in April (i.e., near the end of the academic year), most of the topics listed should have been taught. However, if the topic had not yet been taught, students were requested to check across the column "not yet taught" instead of rating the level of difficulty. For each individual topic, those respondents who reflected that the topic had not yet been taught did not go into the analyses.

2.4 Attitude toward Mathematics and Habits of Learning

The subscale comprised 3 items on interest, 4 items on preference for understanding, 3 items on confidence, 3 items on competence, 4 items on textbooks and classroom learning, and 3 items on outside-class learning. They were set in a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = fairly agree. 4 = agree, 5 = strongly agree). It was supplemented by 2 items on habits of learning, with four options each. These options can be found in Table 6.

2.5 Conceptions of Mathematics

The Conception of Mathematics Scale was adopted from a grounded research conducted by Wong, Lam and Wong (1998). It consisted of 6 items on the notion that "mathematics is a subject of 'calculables'" (sample item: "Mathematics is a subject that involves addition, subtraction, multiplication and division"), 6 items on "mathematics involves thinking" (sample item: "learning mathematics cannot be relied on rote memorisation"), and 3 items on "mathematics is useful" (sample item: "Mathematics is widely applicable in daily life"). They were set in a 5-point Likert scale.

3. DATA ANALYSIS AND RESULTS
Perceived Difficulty of Topics

At present the Junior High School has only one general mathematics syllabus. The same applies to the Senior High School. The main rationale for the mathematics syllabus in Ghana is focused on attaining one crucial goal: to enable all Ghanaian young persons acquire the mathematical skills, insights, attitudes and values that they will need to be successful in their chosen careers and daily lives (CRDD, 2007). These syllabuses therefore require a strong mathematics background.

A list of topics was given to the students for rating. The topics were taken from the mathematics syllabuses issued by the government (CRDD, 2007). Students were requested to rate the level of perceived difficulty of each topic on a 5-point Likert scale (1 = very difficult, 2 = difficult, 3 = fairly easy, 4 = easy, and 5 = very easy). The result is summarised in Table 3.

Table 3 shows that as students moved up the grade levels, they found mathematics more and more difficult. The mean score of Junior High students' rating was 4.24, with a downward trend to about 2.6 in Senior High. In the Junior High the topics with the greatest perceived difficulty were "Algebraic Expressions" and "Linear Equations and Inequalities". The easiest topics were "Collection and Handling Data" and "Integers" (Addition and subtraction of fractions with the same denominator). In comparison, it is observed that the easy topics for students are those which do not involve tedious calculations.

In the Senior High, the range narrowed slightly but the mean continued to drop noticeably. In fact, none of the topics had a mean score higher than 4. The most difficult topics were "plane geometry" and "vectors in a plane." Even though it is not captured in the table, data analysed indicated that even some perceived easy topics ("number bases, relations and functions, percentages, surds, ratio and rates") had a low mean score.

Table 3: The Two Easiest and the Most Difficult Topics as Perceived by Students

	Range and Mean	The two easiest topics and their mean scores (in parenthesis)	The two most difficult topics and their mean scores (in parenthesis)
Junior High	3.81-4.68 Mean=4.24	■ Collection and Handling Data (4.68) ■ Integers (Addition and subtraction of fractions with the same denominator) (4.56)	■ Algebraic Expressions (3.81) ■ Linear Equations and Inequalities (3.82)
Senior High	2.71-3.47 Mean= 2.66	■ Statistics (3.47) ■ Set and Operations on Set (3.47)	■ Plane Geometry (2.71) ■ Vectors in a Plane (2.94)

Although all the topics were designed for easy understanding by students, they did not appear to be easy for them. The ratings for all the topics were found in a narrow range.

Students' Attitudes toward Mathematics

As shown in Table 4, the statements that Junior High students most agreed to were "I wish there could be more pictures in the textbook so that I can understand the content better" (mean = 4.16: those who agreed outnumbered those who did not by 65%), "I have confidence in doing numerical computations" (mean = 4.022, difference = 64%) and "I am interested in mathematical calculations" (mean = 3, difference = 57%). On the other hand, the three statements that these students most disagreed to were "Understanding the content is unimportant; but it is important to know how to do the calculations in examinations" (mean = 2.00, difference = 59%), "It is not necessary to read the textbook; the teacher will explain everything" (mean = 2.27, difference = 42%), and "I seldom try those problems not required by the teacher" (mean = 2.61, difference = 25%). It is obvious, therefore, that their responses were unanimously positive with regard to their attitude toward the subject.

For Senior High students, the three statements that they most agreed to were "I have confidence in doing pure numerical computations" (mean = 3.73, difference = 46%), "I wish there could be more pictures in the textbook so that I can understand the content better" (mean = 3.64, difference = 39%), and "If I understand the concept concerned, I can always find a way to calculate the problems" (mean = 3.58, difference = 38%). Though the responses were still relatively positive, they began to diversify slightly. The three statement students most disagreed to were "I often take part in mathematics extracurricular activities (mean = 2.14, difference = 60%), "Understanding the content is unimportant; but it is important to know how to do the calculations in examinations" (mean = 2.16, difference = 58%), and "It is not necessary to read the textbook; the teacher will explain everything" (mean = 2.20, difference = 57%).

Table 4 : The Three Statements Most Agreed to and the Three Statements Students Most Disagreed to

	Statement that most agreed to	Statement that most disagreed to
Junior High	• "I wish there could be more pictures in the textbook so that I and understand the content better." • "I have confidence in doing numerical computations." • "I am interested in mathematical calculations."	• "Understanding the content is unimportant; but it is important to know how to do the calculations in examinations." • "It is not necessary to read the textbook; the teacher will explain everything." • "I seldom try those problems not required by the teacher."
Senior High	• "I have confidence in doing pure numerical computations." • "I wish there could be more pictures in the textbook so that I can understand the content better." • "If I understand the concept concerned, I can always find a way to calculate the problems."	• "I often take part in mathematics extracurricular activities." • "Understanding the content is unimportant; but it is important to know how to do the calculations in examinations." • "It is not necessary to read the textbook; the teacher will explain everything."

Trends of Students' Attitudes

In order to have a clearer picture of the trends of students' attitude toward mathematics, observations were made according to these categories: interest; preference for understanding; confidence and competence; textbooks, classroom learning and outside-class learning; learning habits; and conceptions of mathematics.

Interest

Table 5 reveals that students' interest in solving mathematical problems, attending mathematics classes, and mathematical calculations all dropped substantially from Junior High to Senior High although their interest in leaning mathematics maintained a score close to 3 throughout the grade levels.

Preference for Understanding

Table 5 shows that, in general, students at all levels realised that understanding was important. This is reflected in the low score (2.00 to 2.27) for "Understanding the content is unimportant ..." and the high score (3.86 to 3.47) for "If I understand the concept concerned, I can always find a way to calculate the problems." Although there was a concern for understanding the reasons behind a formula, there was a slightly decreasing trend in this concern from Junior High to Senior High. Students tended to be more receptive to formulas in the higher grade levels.

Confidence and Competence

As far as confidence is concerned, the students' confidence in numerical computations and solving word problems dropped continuously. A similar pattern was found in how they perceived their competence in understanding the content in the mathematics class. A slight increase was also found in the mean score of the statement "Though I know how to calculate, sometimes I don't know the reasons for the calculation."

Table 5: Trends of Students' Attitudes toward Mathematics

Item	Level	
Interest	JHS	SHS
I love solving mathematical problems.	3.82	3.19
I am very interested in attending mathematics classes.	3.86	2.99
I am interested in mathematical calculations.	3.91	3.03
I seldom try those problems not required by the teacher.	2.61	3.02
Preference for understanding		
Reading the explanations in the textbook is not necessary, we can learn just by reading the formulas.	2.27	2.20
When learning a new topic, I wish that the teacher could tell us the formula right away and not ask us to look for it for ourselves.	2.48	2.73
When learning a new topic, I wish that I could think it through by myself first and not having the teacher telling me everything.	3.57	3.30
Understanding the content is unimportant; but it is important to know how to calculate in examinations.	2.00	2.16
If I understand the concept concerned, I can always find a way to calculate the problems.	3.86	3.58
In learning a new topic, I am not concerned with how the formulas come about; I only care about how the formulas are applied in solving problems.	2.64	2.80

Confidence		
I have confidence in problems that involve substituting numbers into formulas.	3.30	3.08
I have confidence in doing pure numerical computations.	4.02	3.73
I have confidence in doing word problems.	3.73	2.95
Competence		
I fully understand the content in the mathematics class.	3.61	2.97
Usually I fully understand word problems.	3.53	2.93
I have difficulty in solving word problems.	3.06	3.05
Though I know how to calculate, sometimes I don't know the reasons for the calculation.	3.14	3.36
Textbook, classroom learning and outside-class learning		
Usually I won't confine myself to reading the formulas of the textbook but I read the explanation in the textbooks.	3.17	2.89
Teachers often ask us to read the explanation in the textbooks.	3.49	3.25
It is not necessary to read the textbook; the teacher will explain everything.	2.51	2.59
I wish there could be more pictures in the textbook so that I can understand the content better.	4.16	3.64
I hope that I could have less homework.	.95	3.40
I would use calculators for numerical calculations.	-	3.32
I often read mathematics "supplementary readers."	3.11	2.30
I often take part in mathematics extracurricular activities.	2.96	2.14

To recapitulate, the trends in the above domains were consistent. Students did realise that just knowing how to calculate was not enough and understanding the concepts behind the calculation steps enabled one to be more effective in finding ways to solve problems. It is clear that students' interest and confidence dropped continuously as they moved up the grade levels. The drop was especially significant from JHS to SHS. The same is true for their perceived competence in doing mathematics, especially in solving word problems.

Textbooks, Classroom Learning and Outside-class Learning

As the students moved up the grade levels, they relied more and more on textbooks. Younger students hoped for a more lively approach in their textbooks, such as the inclusion of more pictures. It is worthwhile to note that JHS is the only grade level that feels a pressure induced by homework. This is probably due to the need to prepare for the senior high school place allocation examination (Basic Education Certificate Examination) that takes place at the end of JHS 3. A low level of participation in mathematics-related extracurricular activities was also found.

Learning Habits

Table 6 reveals the part on students' learning habits in the questionnaire. The results indicated that most JHS students took positive steps (e.g., consulting the teacher) to solve their problems and were reluctant to give up when they encountered learning difficulties. This habit shifted at SHS. Their intention to consult the teacher dropped noticeably. They preferred to seek help from their classmates. It is also at this grade level that most students did not mind copying the work of others. This is alarming. Fortunately, the rate of choosing to give up at this grade level was still low. This may be because peer influence is not quite strong until the stage of adolescence. The most worrying attitude toward learning difficulties was found among SHS students, who had the highest rate of opting for giving up. Most of the students did not know how the mathematics they learned could be applied, and the extent of difficulty they encountered in learning mathematics increased with the grade levels. The same was also true for the extent of mathematics topics they did not understand.

As reported by the students, they used, on average, 7.39 hours per week on homework, and 2.19 out of the 7.39 hours per week on mathematics homework (no table displayed

for this). The proportion of time spent on mathematics homework was around 30%, which was consistent with the figures obtained in earlier studies (Wong, 1992; Wong and Cheng, 1991a,). The highest percentages occurred at SHS. Furthermore, over 30% of the students either had private tutors or joined tutorial classes.

Table 6: Learning Habits of Students

Item	Percentage	
	JHS	SHS
When I meet difficulties in learning mathematics, I will		
(a) consult the teacher	41.2	18.8
(b) discuss with classmate	41.4	53.3
(c) search for references	15.9	23.8
(d) give up	1.4	8.1
When I meet difficulties in solving mathematics problems, I will		
(a) insist on working them out by myself	25.2	9.0
(b) accept others' advice	61.7	31.9
(c) accept others' assistance	10.9	43.2
(d) don't mind copying others' work	2.2	15.8
The extent of topics that students did not know their applications (on a 5-point scale)	2.74	2.81
Number of hours spent weekly on homework	8.61	8.78
Number of hours spent weekly on mathematics homework	2.31	2.61
Time spent on mathematics homework	26.8	29.7
Students having tutors or tutorial class	30.8	33.6

4. DISCUSSION

Previous studies (Lam, Wong and Wong, 1999; Wong, Lam and Wong 1998) reveal that students often perceive mathematics as a subject of "calculables," which could be the most tangible part of mathematics. Students in the early grades felt quite confident when tackling something that they can manipulate step by step. However, if this view is reinforced and the student sees this as the only aspect of mathematics, it could be an obstacle to deeper understanding of the discipline. Another facet of students' conception of mathematics is that mathematics involves thinking: mathematics is a "thinking exercise"; just as "physical exercises" strengthens the body, so doing mathematics strengthens the mind. Such a conception is common among the teachers, too (Awanta 2007 and Wong, 2001). Another dimension of students' conception of mathematics found in earlier research studies is that mathematics is useful, particularly when applied to daily life.

Using the Conception of Mathematics Scale which was developed according to these three dimensions (mentioned above) and the findings of earlier empirical research (Lam, Wong and Wong, 1999; Wong, Lam, a nd Wong 1998), it is found in the present study (as presented in Table 7) that the subjects strongly agreed with the statements in the subscale "mathematics is a subject of 'calculables'." The mean score ranged from 3.27 to 3.38. The perception that "mathematics involves thinking" was even stronger; the mean score for JHS was 3.90 and it continued to increase to 3.92 at SHS. As for the usefulness of mathematics, in general, students perceived mathematics as a useful subject.

Table 7: Students' Conception of Mathematics

Sub-scale	Mean (on a 5-point Scale)	
	JHS	SHS
Mathematics is a subject of "calculables."	3.38	3.27
Mathematics involves thinking	3.90	3.92
Mathematics is useful.	3.72	3.24

The research findings revealed that JHS students were generally interested in mathematics but then the interest dropped substantially, especially at SHS. Among all students, the interest in attending mathematics lessons was not as high as the interest in mathematics itself. They also possessed a very positive attitude toward mathematics, opting for deep understanding rather than rote learning. Items in this aspect were mostly rated as "strongly agreed." Students unanimously agreed to the statement "When learning a new topic, I wish that I could think it through by myself first and not having the teacher telling me everything," and strongly disagreed with the opposite statement "When learning a new topic, I wish that the teacher could tell us the formula right away and not ask us to look for it for ourselves." This may surprise many of our mathematics teachers. The students' responses in the present study reflected that they were not only concerned about how the formulas are applied to solving problems, but also how the formulas come about. They tended to believe that if one understands the concept concerned, one can always find a way to solve problems.

In addition, students showed confidence in solving problems, especially numerical and routine problems. However, they had trouble with word problems. Their confidence with word problems dropped as they moved up the grade levels. It is possible that competence in language (English, in most cases) might have adversely affected performance in solving mathematical word problems.

However, this does not mean that students did not encounter problems in learning mathematics. They faced real (actual) learning problems – the discrepancy between what one hopes for and what one can really do. This could be the source of frustration and helplessness. This is evident from the fact that they strongly agree with the statement "Though I know how to calculate, sometimes I don't know the reasons for the calculation."

When we look at the perceived difficulty of topics, we get a pessimistic picture. On moving up the grade levels, students' attitude toward mathematics learning became more and more negative and they perceived greater difficulty in the topics learned. There are a number of speculations on the reasons behind this, but certainly we have to take into consideration that younger students may underestimate the learning difficulty they are facing. However, since mathematics is an "accumulative" subject, decreasing interest and accumulating learning problems at junior levels may turn out to be major learning difficulties at senior levels, especially when the content of learning becomes more abstract and requires more conceptual understanding.

If our students have interest and a high regard for mathematics, their declining performance could be attributed not only to their competence, but also to the mismatch of the curriculum in a broader sense. Curriculum developers and teachers should reflect upon whether our intended curriculum (curriculum documents, textbooks) and our implemented curriculum (including classroom teaching and teaching style) suit the needs of our students and help them to sustain their interest in the subject throughout their schooling. The desire for more pictures in the textbooks may be taken as an indicator of the urge for liveliness in teaching and teaching materials. The lack of interest in participating in mathematics extracurricular activities (including "supplementary readers") as indicated by the students' responses lend support to this speculation. Whether the problem lies in the lack of provision of extracurricular activities, lack of enthusiasm in participation, or lack of time due to heavy homework needs further investigation and is beyond the scope of this research.

The research suggests that more attention should be paid to the two grade levels, namely JHS and SHS. The interest in mathematics dropped noticeably at SHS, which was the only grade level that students hoped for less homework. The researcher is not sure whether this is resulted from the pressure of the BECE examination on JHS 3 students. But definitely, over-drilling can hamper understanding, which needs both time and space to promote.

Students also showed no interest in mathematics textbooks, and they were also reluctant to make an effort to understand the subject. Besides, the rate of opting for giving up (when facing learning difficulties) was highest at SHS. One of the reasons might be the inadequate provision of help to those who lag behind. Why was the problem so serious at SHS? Basically, as students moved up the grade levels, they became more and more negative toward mathematics. However, those who were able enough to remain in the school system were, perhaps, more academically motivated. Moreover, students may choose not to study mathematics at this level.

5. CONCLUSIONS AND POLICY IMPLICATIONS

It is not easy (and may not even be desirable) to summarise a list of topics that students found the most difficult (or the easiest). But it seems that those topics involving technical (if not tedious) manipulations were least welcome by the students, whereas those requiring visual and hands-on experiences were students' favorites. Apparent difficulty and impracticality were also some of their concerns.

The new mathematics curricula for the new millennium (21st Century) have recently been published (CRDD, September 2007). Nevertheless, this is just the beginning of curriculum reform. A great deal of effort is needed to ensure that the spirit of the curricula is understood and practised by all concerned. In this light, the present research offers timely information on the learning style of students and the difficulties they face. The rich data collected in this research offer curriculum planners and frontline teachers a full picture of mathematics education in Ghana, where the study was conducted. With this information in hand, curriculum planners and teachers should be able to have a better curriculum implementation. On the other hand, there is a pressing need to cater for learner differences and to devise means to help students with learning difficulties. Curriculum tailoring and differentiation should be considered. In such an examination-oriented culture, every care should be taken to safeguard students from ever-increasing examination pressure and its backwash. These research findings could help not only educators in the two regions that the research was conducted, but also those in Ghana generally, to understand how students perceive mathematics learning.

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UNDERSTANDING THE CAUSES AND IMPACTS OF CONFLICTS
IN THE NORTHERN REGION OF GHANA*

by
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ABSTRACT

This paper examines the causes and impacts of conflicts in Northern Region with particular reference to the Konkomba inter-ethnic conflicts. It situates the question of conflict within the context of the Northern Region of Ghana and defines conflict as a situation in which people, groups or individuals are involved in a serious disagreement or argument which degenerates into violence. Conflict can also be seen as antagonism between individuals or groups in society. An analysis of inter-ethnic conflicts in Northern Region reveals a pattern of struggle for paramountcy and autonomy. One of the main causes of conflict between Konkomba and other ethnic groups such as the Dagomba, Nanumba and Gonja is the struggle for paramountcy and autonomy. Land ownership and control of land are another major source of ethnic conflicts in Northern Region. Land has remained a thorny social, economic and political issue which has generated a lot of ethnic conflicts between Konkombas and Bimobas, Konkombas and Dagombas, Konkombas and Nanumbas, Konkombas and Gonjas, Gonjas and Nawuris and recently Konkombas and Nawuris.

The study relies on a survey of 600 people in different parts of the Northern Region to ascertain the perceptions of people about conflicts in the region. The analysis suggests that almost all the respondents are of the view that an impending major conflict is likely to occur in the Northern Region. There is enough evidence to suggest that all the ethnic groups that were involved in the major conflict in 1994 are stock piling arms to be used in the event of another ethnic war. This observation calls for an urgent examination of potential dangers of another inter-ethnic and intra-ethnic conflict. The early warning signs detected from this study are unambiguous. Therefore adequate measures must be adopted by the Government of Ghana to forestall a major conflict in the Northern Region in the near future.

1. INTRODUCTION

Nothing raises so much fear and apprehension in the Northern Region of Ghana as the speculation of fresh ethnic conflicts, similar to those that rocked the Region in 1994. The wave of inter-ethnic conflicts and intra-ethnic conflicts in recent times went down in Ghana's history as the worst since political independence in 1957. The notion that violence may arise again has made the issue of ethnic conflicts a sensitive, yet important subject for discussion, aimed at formulating policy options for conflict management. Indeed, whenever the issue is raised, there have often been misconceptions, panic, confusion and skepticism, within the government, opposition, civil society organisations as well as within public circles and among conflicting parties.

It is a historical fact and current reality that most districts in Northern Region are haunted by actual or potential ethnic conflicts. This is partly because of the fact that different communities continue to consciously or unconsciously rely on ethnicity to perpetuate their dominance and hegemony in an atmosphere characterised by fear, suspicion and prejudice. The proliferation of ethnic conflicts in this region is so widespread that there is hardly any district where the problem has not reared its ugly head. West Gonja District, Nanumba South District, Nanumba North District, Gusheigu-Karaga District, Yendi District, East Gonja District, Bole District, Tamale Metropolitan Assembly, Saboba-Chereponi and Zabzugu-Tatale are all examples of areas where some conflicts have occurred. The necessity for a new paradigm in approaching the issue of ethnic conflicts and their management cannot therefore be overemphasised in this context. From the recent experience as well as studies carried out on ethnic conflicts in Northern Region, there is increasing evidence to suggest that even where a conflict has been brought under control, psychological trauma (i.e. fear and suspicion) left behind are seldom healed. In this context, we view ethnic conflicts as the anti-thesis of peace, stability and sustainable development and hence the need for inquiry into the causes and management of conflicts using non-violent means.

The main objectives of this study are to provide a brief outline of the causes and impacts of ethnic conflicts in the Northern Region of Ghana with particular reference

to the Konkomba inter-ethnic conflicts and to discuss the way forward in terms of conflict management and conflict prevention. The rest of this paper is organised as follows: the next section (Section 2) provides some working definitions of ethnic conflicts and a set of propositions capturing the essence of our understanding of ethnic conflicts and the management of these conflicts. This is followed by a description of the methodology used for this study in Section 3. An overview of some ethnic wars in the Northern Region is provided in Section 4. Section 5 is devoted to the causes of ethnic conflicts in the Northern Region. The next section (Section 6) deals with the impacts of the ethnic conflicts in Northern Region with particular reference to the Guinea Fowl War. The seventh section evaluates the conflict resolution efforts after the major 1994 ethnic conflict. The eight section deals with policy implications of the study. The ninth and final section concludes the paper.

2. THEORETICAL FRAMEWORK AND DEFINITIONS
2.1. Introduction

Ethnic groups are groups of people who see themselves or are seen by others as sharing a distinctive and enduring collective identity and traits based on certain features (Achebe, 1975). These features include belief in a common origin, a common ancestral heritage, a common history, a common lineage, a common kinship, a common destiny and culturally-specific practices and beliefs, common/shared interest/aspirations, social cohesion, physical appearance, language, a shared geographical territory. Common religious beliefs and practices may further contribute in varying degrees to ethnic identity. An ethnic conflict refers to a situation where people mobilise to fight other people on the basis of ethnic identity. An ethnic conflict could be inter-tribal or intra-tribal. The term **identity conflict** is increasingly used as an alternative to ethnic conflict (Amutabi, 1995). The former expression defines conflict in terms of one of its dominant drivers (the need for identity). However, since the focus of this paper is on ethnic conflict as the dominant line of tension in Northern Region, the term ethnic conflict is preferred and is therefore used in this paper.

2.2. Propositions of Ethnic Conflicts in the Northern Region of Ghana

We outline with further explanation five main propositions concerning ethnic conflicts in the Northern Region of Ghana. These are as follows:

1. Ethnic conflict in the Northern Region may not cease either on the ground or in people's minds for a long time; unless contending parties and groups resolutely embark on a conscious effort to manage conflicts as well as to build a civil society that is relatively free from intolerance, discrimination, violence and bloodshed.

2. Ethnic conflict is a major and primary source of violence and instability in Northern Region. The causes of conflicts in Northern Region are obviously complex and varied. Ethnicity is a major cause of conflict in the Northern Region. Conflicts increasingly present themselves as ethnic conflicts with ethnic identity serving as the rallying point or the mobilisation agent for the manifestation of the conflicts. The management of ethnicity and its related issues should therefore be a central part of processes to resolve these conflicts.

3. Ethnicity is a natural social phenomenon. There have been several theoretical debates on the nature of ethnicity. However, ethnicity is formed and shaped by deep historical, cultural, social, psychological and biological realities. Ethnicity is largely seen as a social construct. Ethnicity is a dynamic process, which is subject to change, assimilation and manipulation (Bienien, 1974).

4. Past and present inter and intra-ethnic conflict and conflict management strategies in Northern Region have tended to concentrate on symptoms of the effects and not the root causes of the conflicts. Although numerous resolutions or management strategies have been attempted in the past and present, none of them seem sustainable in creating an atmosphere for lasting peace, security and inter-ethnic as well as intra-ethnic co-existence in Northern Region. Although, much has been said about ethnic conflicts in Northern Region, yet very little has been done to bring about lasting peace in

the Region. Again, very little research has been carried out to ascertain the root causes of ethnic conflicts in Northern Region.

5. The final proposition is that ethnic conflicts in Northern Region cannot be resolved militarily.

3. METHODOLOGY

3.1. Introduction

This study adopts the survey method to collect data from 600 people in selected areas of the Northern Region. A qualitative approach is used for the analysis of these data to understand the perceptions and causes of ethnic conflicts in the Region. The Northern Region is the largest politically administrative region of the Republic of Ghana. The vegetation of the region is largely guinea savannah. The region is characterised by a mono modal rainfall pattern with a prolonged period of dry season. The Northern Region is situated north of the Black Volta River and the Volta Lake. There are about 20 ethnic groups in the region. Each ethnic group has its own distinctive culture. There are five major tribes of special interest in this study. These are the Gonja, Dagomba, Nanumba, Konkomba and Nawuris.

The Northern Region is sparsely populated with a population less than a fifth of the country. Although sparsely populated, the mean household size is higher than the national average. Over 70% of the region's population is rural, engaged in subsistence agriculture. Income levels and consumption expenditure are below national averages. The region has poor infrastructure. The level of education of the population is low. Poor health and sanitary conditions and inadequate social amenities are characteristic of the Region. There is considerable poverty with the majority of the population of the Region living below the national poverty line.

3.2. Sampling Procedures and Data Collection Techniques used for the Study

Adults from all the major traditional authorities constituted the population for the study. The East Gonja District, Nanumba North and South Districts, Gushiegu-Karaga District, Zabzugu-Tatale District, Saboba-Chereponi District and Yendi District were

purposively selected for the study. This is because these districts were involved in the 1994 major ethnic conflict. In each district, cluster sampling was used to select suburbs while simple random sampling technique was used to select areas for the study. Systematic sampling technique was then used to select houses. In each house only one household member was interviewed. A total of 600 questionnaires were administered at the household level. Purposive sampling was also applied in selecting some institutions, civil society organisations. Non-governmental organisations (NGOs) connected with conflict management, resolution and peace initiatives were also interviewed. Some of the NGOs interviewed are the Northern Network for Development, Amasachina, and the Northern Network for Peace Building. Personal or face-to-face interviewing was employed as the major technique for data collection. This technique offered the respondents the opportunity to express themselves freely as much as possible and allowed the questions to be explained clearly to them.

4. OVERVIEW OF SOME ETHNIC WARS IN NORTHERN REGION

Many ethnic wars have been fought in Northern Region, especially between Abudus and Andanis, (Dagbon intra-ethnic conflict), the Konkomba and Nanumba, the Konkomba and the Gonja, the Konkomba and the Dagomba, the Konkomba and the Bimoba, Gonja and Nawuris and recently between the Konkomba on one hand and the Nanumba, the Gonja and Dagomba on the other hand. It should be noted that the immediate cause of these wars could be related to a particular resource such as fish, cow, mango, guinea fowl and others. However there are always remote causes. The following sections provide a brief description of some of the major conflicts in the Northern Region based on historical assessment.

4.1. The Konkomba–Dagomba War of 5th of September 1940 (The Cow War).

The immediate cause of this war was given as the Konkomba people claiming that the Chief of Zegbeli (a Dagomba) had secretly conspired with a British Veterinary Officer to kill their cows by administering a dose of rinderpest vaccine. Since it was the Dagomba Chief who led the veterinary officer to their kraal, he was to be held responsible for the death of their cattle. The Konkomba therefore declared war against the Dagombas. The Chief of Zegbeli was assassinated before the police arrived to restore order (Ake, 1995).

4.2. Konkomba – Dagomba War at Sambuli from the 19th to 21st May 1946 (The Fish War).

This war took place on the 19th, 20th and 21st May 1946. (DC Reference No. 285/3/1937 of 24th May, 1946)[1]. This was another war that was fought between Konkomba and Dagomba over fishing in a pond. The immediate cause of the war was that a Dagomba man was found fishing in a pond that Konkomba claimed belonged to them.

4.3. The Pito War of April 1981

In April 1981, there was a short but devastating armed conflict between the Nanumba and Konkomba in the Nanumba District. Many people were killed during the conflict. In addition, many villages were burnt down and properties were either looted or destroyed. The civilian government appointed a commission of enquiry to investigate the causes of this war and to recommend remedial measures to prevent another war from occurring. The commission of enquiry was still sitting when the government was overthrown in a military coup on the 31st of December 1981. The work of the commission was abruptly brought to an end after the coup. The root causes of the conflict were never ascertained and no remedial and preventive measures were put into place.

4.4. The Nawuri and Gonja War of 1989

In 1989, an ethnic conflict erupted between the Gonja and the Nawuri in Kpandia over ownership of land in the Kpandai area. Several lives were lost and property destroyed.

4.5. The Gonja and Nawuri/Konkomba War of 1991.

In 1991, the Nawuris assisted by the Konkomba attacked the Gonjas in Kpandai area and took over control of the land and kingship in Kpandai which had always been in the hands of the Gonjas. Many Gonjas were permanently displaced from Kpandai and its immediate environs.

4.6. The Guinea Fowl War of 1994

The Guinea Fowl War was the biggest ethnic war in the history of Ghana. The Guinea Fowl War engulfed seven administrative districts; Nanumba District, Yendi District, Zabzugu-Tatale District, Saboba-Chereponi District, East Gonja District, Guishiegu-Karaga District and Tamale Metropolitan Area. This war was triggered by a fight between a Konkomba man and a Nanumba man at Nakpayilli market in the Bimbilla District over the purchase of a guinea fowl. This was the immediate cause of the war, hence the name "Guinea Fowl" War. The triggering incident occurred on the 31st of December 1993. The resulting conflict was a major ethnic war which engulfed the Nanumba, Dagomba, Gonja on one hand and the Konkomba on the other hand.

While the apparent immediate cause of the Guinea Fowl War was a disagreement over the purchase of a guinea fowl at Nakpayilli market on 31st December 1993, the actual war started in earnest on 1st February 1994 at Nakpayilli where the argument over the purchase of the guinea fowl had begun. At the end of the day, over 200 people were reported killed at Nakpayilli. After the burning down of Nakpayilli, the war moved to the surrounding Nanumba villages. By the afternoon of 1st of February 1994, Bimbilla, the traditional seat of Nanumba, and also the district capital had received a large influx of refugees from Nakpayilli and its immediate environs. The Bimbilla Na, the Chief of Bimbilla, caused war drums to be sounded and war was formally declared between the Konkomba and Nanumba. On the 2nd of February 1994, news reached Salaga, the capital town of East Gonja, that war had broken out between Konkomba and Nanumba and pandemonium broke out in Salaga. Schools were immediately closed down and government workers vacated their offices. As a result of the confusion, fear and anxiety created by the Nanumba-Konkomba ethnic war, the Kpembe-wura, the divisional overlord of the area, caused a local announcement to be made to the effect that the conflict in Bimbilla had nothing to do with Gonja and Konkomba. People were advised to go about their normal work peacefully.[2] However on Thursday 3rd of February 1994 Konkombas were at war with Dagombas. The war was launched from the direction of Bimbilla. Nakpachie was attacked on the morning of 3rd February 1994. The Ya Na, the King of the Dagombas, declared war between the Dagbon Kingdom and the Konkombas.

How did the 1994 ethnic war start in Gonja land? It is not within the scope of this paper to go into the genesis of how the war started in East Gonja. However, it is important to emphasise that, despite the assurances of the Kpembe-wura, and the

District Chief Executive given to the people in East Gonja that, the war was between the Nanumba and Konkomba and had nothing to do with Gonja; war did break out between the Konkombas and Gonjas. Barely two days had elapsed after the assurances from the Kpembe-wura to the people of East Gonja that the war broke out between the Gonjas and Konkombas. It was alleged by the Gonjas that, on Friday, 4[th]February 1994, one Salifu Adamu and his son were on their way to the farm when they were attacked by some Konkombas. Adamu was shot dead and his body incinerated, while his son who suffered cutlass wounds, ran to Kpembe to report the case to the Kpembe-wura. Two other men, Salifu Issifu and Malam Sanda T.T., were on their way to Salaga to say their Friday Muslim prayers when they were also shot dead. According to the Konkomba version, a Konkomba man from Bunjai (a village near Salaga) went to Salaga to conduct business but never returned.

The Konkombas further alleged that; on the same day; two Konkomba settlements near Salaga were burnt down by the Gonjas. The Gonjas however claimed that these villages were attacked after Konkombas had started the war on 4[th]February 1994. On 6th February 1994, the Yagbon-wura, the Overlord of the Gonja Traditional Area, formally declared war between the Gonjas and the Konkombas. He therefore deplored some warriors from West Gonja to East Gonja. On the 7[th]of February 1994, the war between Gonja and Konkomba started in earnest at Bunjai between the Gonja warriors transferred from West Gonja to East Gonja and Konkombas at Bunjai.

5. CAUSES OF ETHNIC CONFLICTS IN THE NORTHERN REGION

The causes of the ethnic conflicts in Northern Region especially the 1994 ethnic conflict may not render themselves easily to categorisation. Nevertheless, it is a common practice that such causes are delineated under some broad categories. For the purpose of this paper, the broad categories of causes of ethnic conflicts are summarised below.

5.1. Struggle for Paramountcy and Autonomy

One of the main causes of conflict between Konkomba and other ethnic groups i.e. Dagomba, Nanumba and Gonja is the struggle for paramountcy. The Konkomba feel that they are "equal" to the other ethnic groups and if the other ethnic groups have their own paramountcy, then they also deserve the right to have one.

This is buttressed by a "Petition for Paramount Stool" sent to the National House of Chiefs by Konkomba Chiefs, Elders and Youth. The petition to the National House of Chiefs proposed the creation of a paramount stool for Konkomba land to be known as "Ukpakpabur". The petitioners stated that they were "speaking on behalf of the entire Konkomba in Ghana." The basic demand of the petitioners was for "Paramountcy and Traditional Council". They wanted a paramountcy and a "defined traditional area of their own". The seat of the Paramountcy was to be sited at Saboba (Mahama, 2003).

Many argue and evidence supports the contention that this petition ignited the ethnic conflict in the Northern Region in 1994. The petitioners provided reasons for their demand for paramountcy in their petition to include:

(1) The population of the Konkomba in the Northern Region as one of the grounds for their demand. "The Konkomba are number two in terms of tribal numerical strength in Northern Region" said the petitioners.

(2) The linguistic and cultural differences between Konkomba and the four tribes – Dagomba, Mamprusi, Gonja and Nanumba who dominate traditional politics in the Northern Region was another ground for the Konkomba demand for paramountcy and traditional council.

(3) The Konkomba attributed the lack of paramountcy for them now to the "Apostles" of the policy of indirect rule who are said to have wrongly described the Konkomba as "stateless people without chiefs or central authority" and who are said to have elevated the Head Chiefs of Dagbon, Mamprugu, Nanum and Ngbanya (Gonja) to the status of paramountcy and placed under them "the so-called chiefless societies including the Konkomba" in order "to make their rule over the region less expensive and restrictive."

They regarded their lack of paramountcy as denial of "Traditional Independence." "The time has now come", the Konkomba said, "for all to reflect over this issue and accord tribes without paramountcies their right to live in a clearly defined traditional area of their own practicing their own culture and traditions and helping to promote the same culture and tradition for the national good."

"In Ashanti Region where the people all speak the same language and have almost the same culture, there are over 30 paramountcies and traditional councils apart from the Asanteman Council," the Konkomba reminded the National House of Chiefs in their petition for paramountcy and traditional council. The petition further stated that, the Upper West Region "had over twelve of their chiefs" raised to paramount status. Finally the petitioners indicated that since the Konkombas have their own land, their own political district and a different culture and language, they ought to be given traditional independence. "The cry of those who had been denied traditional independence in the country is so loud and clear that it has rendered Ghana's independence from the British in 1957 meaningless to them," the Konkomba asserted.

The demand of the Konkomba was not just for paramountcy but a right to live in a clearly defined traditional area of their own, practicing their own culture and traditions, and helping to promote the same culture and tradition for the national good. After a cursory look at the petition of the Konkomba, one can summarize their demand as one for paramountcy and a traditional Council for all Konkombas in Ghana, a right to live in a clearly defined area of their own, the grant to them "traditional independence."

Implicit or explicit in their demand is their claim of the ownership of some land; "Konkomba have their own land, their own political district and a different culture and language." "What made the Konkomba request for a separate paramountcy reprehensible?" They asked. In their view, a grant to them of these demands will rather "encourage the development of each ethnic identity and promote inter-tribal co-operation and bring trust, confidence, and peaceful coexistence among all the tribes in the North."

The YaNa in a speech at the inauguration of Dagbon Youth Association in December 1993 had observed that, "the Konkomba demand for a paramountcy to be known as Ukpakpabur has far-reaching implications for Dagbon and its citizenry." The YaNa reiterated that, the current generation is yet to enjoy what their forefathers left for them, their children have not tasted it yet nor their grandchildren, how can they give away an inch of what they have not fully enjoyed." The Dagombas, he said will not give "an inch of their land away." The Dagombas have shown before and after their war with the Konkomba that it was not the Konkomba demand for paramountcy, but it was the Konkomba demand for Dagbon land that was the major issue of conflict. The Dagombas saw the Konkomba demand for a "right to live in a clearly defined traditional area of their own" as a demand for Dagbon land. "Those desires of the Konkomba, the Dagomba are not prepared to grant". YaNa was clear

in his reply to the Konkomba petition that if the Konkomba had rooted their application through the Dagomba Traditional Council "solely for paramountcy", he might grant the Konkomba request.

Most Dagombas see the Konkomba demand for Paramountcy and a Traditional Council as one of the major causes of ethnic war in Northern Region. On the contrary, in Nanumba there had been no petitions, no demand and no known disputes of Konkomba in Nanum regarding either landor chieftaincy. Similarly, in Gonjaland there had been no petitions, no demand and no known disputes of Konkomba in Gonjaland regarding either land or chieftaincy.

What other reasons might have caused the ethnic conflict especially the 1994 ethnic conflict?

5.2. Ownership and Control of Land

Land is yet another major source of ethnic conflicts in Northern Region, both in the long term and in the short term. For a long time in the history of this country, land has remained a thorny economic and political issue which has generated a lot of ethnic conflicts between communities and ethnic groups.

The interviews confirm that, the remote causes of most of these inter-ethnic conflict is land. All the Konkombas interviewed claimed the Saboba-Chereponi land belongs to them and not the Dagombas, and the Nawuris on the other hand claim Kpandai lands belong to them and not the Gonjas. The first time the Konkomba made a claim to part of Dagbon land officially was in 1978 before the committee on ownership of land and position of tenants in the Northern and Upper Regions (refer to the Issifu Alhassan Committee, 1978). The Konkomba however did not make any claim to Gonja or Nanumba land to the Issifu Alhassan Committee.

Again, in 1993 the YaNa decided to promot e some of his divisional chiefs to the status of paramount chiefs. The Konkomba sent a petition to the National House of Chiefs demanding that the Konkomba headman of Saboba be made a paramount Chief. In addition, the Konkomba demanded the creation of a Traditional Council for Konkomba. Their petition stated that the petitioners wanted "the creation of paramount stool for Konkomba land". The YaNa dismissed the Konkomba petition.

When the 1994 "Guinea Fowl" war ended and the Government called for peace among the warring factions, the Konkomba again made the acquisition of land at the peace talks unequivocal. "Our arguments for and against the question of whether Konkombas have any title to land in the country, especially in the Northern Region will be based on oral traditions of the Konkomba, writings of scholars, work of ethnographers and historians."

The Konkomba then presented to the Permanent Negotiation Team set up by the Government to bring peace to the warring factions in Northern Region a map in which they showed an area they claimed to have inhabited before they were expelled from there by the Dagombas. They called this area their historical area. They also showed an area on the map which they wanted the Dagomba to release to them to constitute their traditional area. "Since nobody can undo history we are not advocating that all lands in the Oti Basin we occupied as aborigines before the invaders (conquered us) should be returned to us. However, land which was effectively under our control during and after the plebiscite cannot be taken from us by twist of the law". This conflict in my vivid and candid opinion is linked with chieftaincy, and chieftaincy is linked with land.

5.3. Leadership

Although mystery still surrounds the root causes of the recent clashes between the Konkombas on one hand and Gonjas, Nanumbas, Dagombas on the other hand, one fact that is clear from field interviews, reports, newspaper articles, press statements and other documents is that leadership played a crucial role in fueling these clashes. Indeed, what has been heard from the field, written or pronounced in the aforementioned conflicts, implicates the leadership of the day i.e. top government officials, top ranking members of the ruling party and opposition parties, and other high ranking members and elite of the various groups/combatants.

Ninety percent of the respondents attributed leadership as one of the main causes of ethnic conflict in Northern Region. A Committee of Enquiry was appointed after the ethnic conflict between the Nawuri and Gonja and between the Gonja and Konkomba in 1989 and 1990. While the Committee was still at work, the Chairman of the (PNDC) is reported to have made a speech at Tamale Secondary School in 1991 during the fortieth anniversary of the school to the effect that no ethnic group came to earth with land. He wanted to "know whether any of the chiefs claiming ownership of land in Northern Region can carry a barrel of sand. Therefore it was not right for any majority tribe to lay claim to land and deny any minority tribe the use of any land". Some commentators therefore trace the causes of the Guinea Fowl War to this remark by the PNDC Chairman.

The Presidential Advisor on Chieftaincy Affairs of Government in October 1993, made a speech in Accra on the occasion of the out-dooring of the newly installed Dagomba Chief for Greater Accra Region as guest speaker, and said, "Government has recognised some cheating in chieftaincy. Government has decided that every group of people should have their own chief. Immigrants should be allowed to be installed as chiefs. Dagomba Chief in Accra is only helping the Ga Chief to rule in Accra. Government wants me to tell you that chieftaincy is not only for one group of people. Every group must be able to install chiefs."

In his address to the Northern Region House of Chiefs, Nana Akuoku Sarpong, reiterated; "…what lies at the base of the threatened peace is the right to be recognised as minorities in the midst of majorities and I am here to give expression to this desire. I am also to give expression to the feeling of the majorities that minorities must respect the customs of the majority…."

When the Government was being implicated as taking sides, the Government sent a twelve-member delegation to the Northern Region to meet the chiefs, opinion leaders, and the youth to reiterate Government's neutrality in the matter. The chiefs gave the delegation the assurance that they would not disturb the peace and tranquility in Northern Region.

As the Government delayed in finding a solution to the Konkomba-Dagomba impasse, tension mounted on both sides. Many groups made it clear to Government that, there was tension and sense of insecurity prevailing in Northern Region. Many groups including The Dagomba Youth Association took cognizance of the mounting tension. They called on Government to, "Take all necessary steps to contain the threat to peace and security in Northern Region."

On 25th January 1994, a three member committee under the chairmanship of Nana Obiri Yeboah, visited the region to hold discussions with the chiefs to find solutions to the impasse. When the three–member committee left for Accra on January 26 th, 1994, they left without a road map to peace in Northern Region. Ironically, on the same day that the three-member delegation concluded its discussions with the Saboba Chief, there was confusion and chaos in Bimbilla between the police and some indigenes over the release of confiscated arms and ammunition back to some Konkomba. The police seized arms and ammunition belonging to some Nanumba and according to the Nanumba, the police refused to return their arms and ammunition to them and took them to the police station. The disgruntled Nanumba reported the two incidents to their kinsmen. Rumor quickly spread that the Police had confiscated arms and ammunition belonging to Nanumba and had meanwhile released their seized arms and ammunition to the Konkomba.

The Nanumba mobilised to the Police Station to demand the release of the confiscated arms and ammunition. Warning shots were fired to disperse the crowd, unfortunately some Nanumbas were hit. This infuriated the Nanumba and they attacked and over powered the Police on duty and set the Police station ablaze with the arms and ammunition. This incident should have been enough to warn the Government that war was imminent for it to take preventive measures, unfortunately nothing concrete was done. The Government described it as an isolated incident citing indiscretion on the part of both police and some Nanumba. The Government did not see the importation of ammunition into the area by both Nanumba and Konkomba as a threat to the security of the area. A few months later, war broke out between the Konkomba on the other hand and the, Namumbas, Gonjas and Dagombas.

After the war, the President of the Republic in November 1994, decided to embark on a tour of the conflict area to talk to the parties involved. At Banda and Saboba, the President advised the Konkomba that, as settlers they are required to pay farm dues to their landlords and that no land in Ghana is without an owner. The Konkomba this

time were very surprised at the President's speech and they issued a press statement condemning the speech. At Keta-Krachi the President advised the Konkomba to learn to live peacefully with their hosts. This statement it was felt, meant that the President had prejudged the Konkomba as guilty with regard to the the conflict in Northern Region[3]. This time, while the Konkomba were protesting the President's speeches, the Dagombas, Nanumbas and Gonjas were jubilating and celebrating the speeches. They concluded that if the President had made the statements he made during his tour before the start of the conflict, the conflict would not have erupted. The Dagomba, Nanumba and Gonja see this statement as forming the foundation to finding a lasting solution to the ethnic conflict in Northern Region.

5.4. Struggle for Self-esteem and Need for Separate Cultural Identity

Many of the respondents (about 95% of Konkombas) reiterated that, the other tribes; the Nanumbas, Gonjas and Dagombas do not respect them. Hence, the need to fight to restore their self-esteem. "The Nanumba, Gonja and Dagomba see us the Konkomba as second class citizens although we are all Ghanaians with the same rights", reiterated a Konkomba man at Saboba. The self-esteem of individuals is deeply connected to the self-esteem of the ethnic group. Given the need for a positive self-esteem, identification and recognition, ethnic groups reveal a fundamental drive towards establishing a favourable self-esteem vis-à-vis other groups through processes of inter group comparison and the subconscious filtering and censoring of information concerning other groups. Perceptions about other groups are therefore negatively influenced by a group's need to establish its own self-worth that would favour it and its offspring. The problem with ethnic conflicts is that some of the key issues in it are not about material resources that can be negotiated. They often involve status, culture and identity.

5.5. Relative Deprivation and Perception of Discrimination and Marginalisation by Some Ethnic Groups

Again, about 90% of the Konkombas interviewed, were of the opinion that, they live in relative deprivation compared to the Gonjas, Dagombas and Nanumbas. This they attributed to the fact that, when they farm, these major tribes mentioned come to tax them. They take many of their produce to the chiefs and this makes their situation worse. They reiterated that, the other ethnic groups are lazy and rely on them for produce for their chiefs through taxes (both in cash and kind). Some Konkombas and

Nawuris attributed the cause of the war to misuse of authority by the Dagomba, the Nanumba and Gonja. "The chiefs of Dagomba, Gonja and Nanumba exploited and collected large sums of money in the form of taxes from us." Similarly when we hunt in Dagbon, we have to give the hind leg of the animal killed to the Dagomba Chiefs. When we brew "pito" or "akpeteshie" we have to send a pot or gallon to the local Dagomba Chief. When we send our cases to the chief for arbitration we pay heavy fees, depending on the status of the chief to settle the case. We also have to give some farm produce to the Dagomba Chief after every harvest." "Are we slaves?" asked a Konkomba elder.

Ethnic groups make an assessment of their well-being in the first place not through an analysis of their objective conditions, but rather through comparisons with other groups. They will determine their status of deprivation by establishing the discrepancy between what they have and what they feel they are entitled to. What they feel they are entitled to is determined by their perceptions of relative status. This dynamic of relative deprivation has been indicated as an important contributor to ethnic conflict in Northern Region. If an ethnic group feels strongly that it is being discriminated by another ethnic group, it becomes a potential for ethnic conflict. Being a victim of discrimination or oppression is in itself a cause for serious conflict. The fact that the greater majority of conflicting ethnic groups in Northern Region, especially Konkomba are seen to be marginalised and discriminated against or are seen to be in the minority increases the prospects for ethnic conflict. Marginalised and threatened minority groups are always seen to be in conflict with other groups.

5.6. Socialisation and Inferiority Complex Syndrome

Many of the Konkomba say the other major tribes regard them as inferior human beings. Again, because of this perception, they have to fight to prove to the other tribes that, they are not inferior, but a strong tribal group. "You have to understand that, there is a stereotype hate preaching about we Konkombas by the other ethnic groups." A Konkomba man reiterates. Ethnic groups who find themselves in conflict or who feel other groups consider them inferior may employ various psychological mechanisms to move from perceived "inferiority" to "superiority".

Through socialisation processes, there are exaggerated perceptions of the justifiability and moral superiority of their own position and the basic evil of 'the other'. The creation and nurturing of an 'enemy image' is passed from generation to generation and this is an important cause of ethnic conflict in Northern Region.

5.7. Selective Interpretation of Past Historical Events

Almost 98% of the Konkombas, see the other ethnic groups as perceived enemies. In the same way, the other ethnic groups, i.e. the Gonjas, Nanumbas and Dagombas also see the Konkomba in a similar light. An important part of the process of maintaining ethnic identity is the continuous interpretation of historical events. This interpretation is invariably selective and aimed at enhancing the self esteem and image of the group and its sense of victimhood. By attaching ideological differences to such selective interpretations, they are strengthened to the point of acquiring the status of absolute truth. Particular importance is the fact that new generations are socialised into a selective understanding of the past and thus internalises these perceptions.

5.8. Perception of Threat from Other Ethnic Groups

Under conditions of great insecurity and uncertainty (as prevails in certain parts of Northern region) due to previous occurrences, an ethnic group might tend to exaggerate the potential threat of other ethnic groups to its own security and consequently adopt a worst-case scenario of the threat posed by opposing groups. This so-called threat led to continues purchase and stockpile of arms, which creates unnecessary panic and tension. These arms are used at the least provocation.

When the question, "Do you foresee an outbreak of an ethnic war similar to the 1994 ethnic conflict?" was posed, ninety percent of the respondents responded yes. Only ten percent responded not sure. When asked, do you see the other ethnic group(s) involved in the 1994 ethnic conflict as posing any threat to your existence, all the respondents responded yes.

5.9. Perception of Discrimination by the Government

If an ethnic group feels strongly that it is a victim of state discrimination it becomes a great cause of serious conflict (Andries, 1998). The group always has the feeling that, the Government is not on its side, it must therefore take its own destiny into its own hand, hence "fighting for its rights"instead of relying on the Government and state institutions to resolve its differences. Despite this perception, the state remains the single most important institution to deal with and to manage ethnic conflict.

6. THE IMPACT OF ETHNIC CONFLICTS IN NORTHERN REGION WITH PARTICULAR REFERENCE TO THE GUINEA FOWL WAR

6.1. Introduction

The Guinea Fowl War was the most widespread and longest lasting ethnic war in Ghana. The war covered an area approximately 45,000 square kilometers and involved a population of about two million people. Seven Administrative Districts were involved; East Gonja District, Yendi District, Bimbilla District, Gushiegu-Karaga District, Zabzugu-Tatale District, Tamale Metropolitan and Saboba-Chereponi District. The impact as well as the consequences of ethnic conflicts in Northern Region especially the 1994 ethnic conflict may not render themselves easily to categorisation. Nevertheless, it is a common practice that such impact and consequences must fall under broad categories such as social, economic, political, religious, as well as psychological. The impacts discussed in this section are in particular reference to the 1994 Guinea Fowl War.

On 12th February 1994, the President of the Republic of Ghana decided to make an official visit to the conflict area to assess the extent of damage. He was horrified by what he saw; dead bodies littered on the roads and in the villages. Between Bunjai and Salaga there was not a single village un-affected by the massive burning. Between Salaga and Bimbilla the story was the same. The President witnessed a worse situation on the Bimbilla-Yendi road. He saw many more burnt villages. It was alleged that, at a point, the President's convoy had to stop to clear some dead bodies on the way before they could pass. The whole road was littered with dead bodies of children, women, the aged, and youth. The President was flabbergasted by the ugly scene.

6.2. Burnt Villages.

It is a deliberate attempt not to classify losses especially burnt villages according to ethnicity e.g. Konkomba, Dagomba, Nanumba and Gonja. The reasons are that, in most of the villages the Konkombas co-habitat with the other ethnic groups. Although, it is possible to classify settlement as purely Konkomba, Nanumba, Gonja, Dagomba, the author prefers to classify burnt villages according to districts. Classifications according to ethnicity can be subjected to several interpretations and this can fuel tension. On 1[st]February 1994 the first village in Nanumba District went

down in flames, the village was Nakpayilli where the disagreement over the purchase of the guinea fowl had taken place some months before. By the close of the day more than two hundred people lay dead. In all about 52 villages were burnt down completely.

On Friday 4th February 1994 Sambu was completely burnt down and more than a hundred people lost their lives. Villages around Sambu were also burnt. Sunson which is about 13 miles from Yendi was also completely burnt down and more than fifty people died. Demon was also completely burnt down with more than twenty people feared dead. In Namongbani, the chief and his second in command died with about fifty others. Ngani a small village was burnt down on 7th February 1994 and about twenty people died. Nakpali-Woribogu in the Zabzugu-Tatale District was also completely burnt down and several people died. On the 9th of February 1994, Sabari was burnt down, the chief and about fi fteen others lost their lives. On 10th February 1994, Tibrundo, Abalado and Gyanntido were burnt down. On 11th February 1994, Kpatinga in the Gushiegu-Karaga District was also completely burnt down with several people left dead. Sapka was burnt down on the 9th of March 1994, Dabogushie on 20th March 1994, Bachiboriya and Kpabia on 22nd March 1994, Sang on 25th March 1994, Tusaani and Kuligaduli on the 26th of March 1994 and Andoyill on the 10th of April 1994. The number of villages burnt in the Dagbon Traditional Area included 83 villages in the Yendi Dist rict. In the Gushiegu-Karaga District, about 74 villages were burnt down. In the East Gonja District, 71 villages were either partially or completely burnt down.

The inter-NGO consortium gave the total number of villages burnt down in the 1994 ethnic war as three hundred and fifteen (318). The break down is as follows; Zabzugu-Tatale District –30 villages, Yendi District – 82 villages, East Gonja District – 73 villages, Gushiegu-Karaga District – 77 villages and Bimbilla District – 56 villages. The total number of houses burnt down in the Bimbilla District alone was about 17,520. In July 1994, the inter-NGO consortium report put the total number of displaced people at about 160,000. About 60,000 were Dagombas, 30,000 were Gonjas, and 50,000 were Nanumbas. The remaining 20,000 were Konkomba.

6.3. Losses of Livestock

One other significant loss after the 1994 ethnic conflict was the loss of cattle, sheep, goats, pigs, guinea fowl, poultry etc. In most of the villages burnt down, the livestock were looted. Most of the people who lost their cattle may never be able to recover the losses. In Northern Ghana, cattle are family properties which take several

years to accumulate. It was difficult to ascertain the exact number of livestock lost, however, the figure estimated from the interviews runs into several thousands of cattle, sheep and goats.

6.4. Social Consequences

The social consequences of the clashes were enormous and cannot be easily quantified, especially the psycho-social ones. Most of the victims of these clashes were left homeless, landless, destitute, injured, dead, abused, to mention only a few of the atrocities resulting from the conflict. There was loss of security in the clash-prone areas as the civilians took the law into their own hands, targeting perceived enemies. As a result of insecurity, there was massive loss of human life. Many people sustained physical injuries and others were traumatised. The state of insecurity interfered with the day-to-day socio-economic and political undertakings within the conflict areas. There was loss of life among the Konkombas, Nanumbas, Gonjas, Nawuris, Dagombas and Basaris. The actual death toll of the 1994 clashes could not be ascertained. However, the death toll was quoted in thousands. Some put the death toll at about 5,000 whilst others put it approximately 10,000. The injured also run in thousands and those displaced approximately 122,000. Whole families were "wiped out". Mr. John Bawah, a Minister of State collapsed at his village Kitoe when he saw many of his family members had been massacred and murdered in cold blood during the ethnic conflict. Most of the people who died where buried in mass graves.

A flashback on the Government figures of those who died, those who were injured and those who were displaced, reported a far lesser number than the above estimates. This was one of the far-reaching social consequences of the clashes. The conflict has also created mistrust, prejudice and psychological trauma characterised by mental anguish and general apathy, among the various ethnic groups in Northern Region. As a result of the clashes, thousands of school-going children were displaced. Some dropped out due to financial and socio-economic constraints. In all the affected districts, there was a mass exodus of teachers who feared for their lives whilst teaching in the hostile districts. Since then, many schools have had to do without the services of experienced teaching staff and the effect of this problem on the performance of examination results was very serious and is still serious. The clashes prevented some of the primary and secondary school graduates from continuing with higher education and training because of financial constraints caused by the conflict. Many of the schools and pupils lost their textbooks, exercise books and uniforms.

Most students in second circle and teacher training institutes could not take their examinations and others had to drop out, whilst others were transferred to schools in Southern Ghana.

However, during and after the clashes, there has been a crisis in terms of identity and culture, especially for the offsprings of the ethnic groups that fought each other. Several families have torn apart and single parenting increased. Children of mixed families are at crossroads in terms of ethnic and cultural identity. Some have been forced to live on the paternal ethnic side, while the others live on the maternal side, depending on where the pressure is most. This trend has created a new dimension in societal lives where children (potential marriage partners) are forbidden from engaging in any affairs with the `enemy' ethnic group. This has affected inter-ethnic marriages and interactions. In short there is ethnic hatred and polarisation among the combatants. Those who survived the war still retain its physical and psychological scars.

6.5. Economic Consequences of the War

The total economic impact of the clashes in the affected areas is literally unquantifiable. There was wanton destruction of property and economic resources. The clashes had lasting consequences that will continue to alter the Northern Region's economic development for many years. One overall observation that emerges from the clashes is the fact that the economic consequences go far beyond the available statistics. For example, many undocumented assets such as corn mills, grinding mills, lorries, cars, farm produce, houses, cattle, goats, sheep, markets, stores and shops were destroyed. Virtually any thing that one could lay his hand on was destroyed. Most women lost all their properties and several years down the line, some women's income generating activities are yet to be activated. Only a few have been able to start their income generation activities. Most of the women and men have lost everything they had accumulated in life.

As a result of the clashes, thousands of families lost a lot of personal, family and household possessions. Many of the victims have still not received any assistance from government. Many of them have not been able to recover from the loss. They still live in penury and squalor. Again, the once booming and brisk markets of Salaga, Chamba, Bimbilla, Nyakpayilli, Kpandai are no longer vibrant.

6.6. Fear of Renewed Clashes

Many well-meaning Ghanaian and the ethnic groups involved in the 1994 ethnic conflict have expressed fear of renewed ethnic clashes in Northern Region.

6.7. Lack of Interest to Invest in the Northern Region

Many investors are afraid to invest in the Northern Region for fear of renewed clashes and lost of investment. It can be deduced from development trends in Ghana and Government pronouncements that Government has lost interest in developing the Northern Region. The Government always says that, hundred million Ghana cedis is spent every month on peace keeping in the Northern Region. Government insists this money could have been better used for the development of the Region.

6.8. Bad Image of the Northern Region

The image created in the minds of many about Northern Region is that of a Region in chaos, anarchy and mayhem. Northerners are also seen as violent people.

6.9. Land leasing impediment

Since the Overlord of Dagbon was assassinated in 2002, it has become virtually impossible to get a lease on land in Dagbon and this has affected drastically the development of land and land related issues. The Regent in Dagbon, according to the peace map, is not vested to adjudicate land issues and has no power to issue lease on land.

6.10. Political consequences

The aftermath of the intra-ethnic conflicts and inter-ethnic conflicts in Northern Region has revealed that, general elections and support for parties are not issue based or ideologically based, but that, political parties have become vehicles of ethnic interest and sentiments.

7. CONFLICT RESOLUTION EFFORTS SINCE THE CLASHES

7.1. Government Response to the War

According to available evidence, the Government made little or no effort to house or assist the victims who were unable to return to their former homes after the 1994 ethnic conflict. There was no attempt to resettle and compensate the thousands of victims who had been rendered homeless and without property. The provision of

relief assistance seemed woefully inadequate. Most of the people who received some of the relief items were not the real victims of the conflict. Some of the victims were quick to claim that much of the relief assistance went only to those who were well connected.

The Government invited the warring parties to a peace talk in Accra after the ethnic conflict in 1994. The Government delegation met the warring parties in the 1994 conflict separately on 12th April 1994. The Dagomba, Gonja and Nanumba delegation told the Government delegation that they would work together as a team. At the meeting, the Government delegation made it clear that, it did not have any peace proposal.

On the 30th of May 1994 the Government announced the appointment of a committee to investigate the causes of the 1994 ethnic conflict with a view of finding a permanent settlement of the conflict and establishing a lasting peace in Northern Region. The committee was called Permanent Negotiation Team. It was a seven-member Committee under the Chairmanship of Nana Dr. Obiri Yeboah II, Omanhene of Efutuakwa and Member of the Council of State. The other members of the committee were; Mr. Peter Nanfuri (Director of BNI), Colonel James Annoh (Director of Military Intelligence), Mr. C.K. Dewornu (Former Inspector General of Police), Nana Adjei Ampofo, E.O. Mensah (Member of Parliament for Wenchi East) and Hon. E.K.D. Adjaho (Member of Parliament for Avenor). On the 9th of June, 1994 under the auspices of the Permanent Negotiation Team, the warring parties signed a cease-fire accord. Interestedly, the Nawuri, Basari and Nchumuru also signed the cease-fire accord as demanded by the Gonja delegation.

The signing of the cease-fire by the warring parties was a positive step to ending hostilities in the Northern Region. It was permanent, immediate and unconditional. Again, during the sittings of the committee, the issue that came out strongly was the Konkomba claims of part of Dagbon land. The Dagomba had always insisted that
there would be no peace until the Konkomba whom they regarded as starting the war had apologised. The Permanent Peace Negotiation Team after several difficulties got the Konkomba to Yendi to render an apology to YaNa and the people of Dagbon for their involvement in the war at a ceremony on the 20th December 1994. What happened in Yendi received mixed reactions from the Konkomba and the Dagomba. While the Dagomba were happy about the apology by the Konkomba, the Konkomba Youth

Association reacted as follows, "We Konkombas, have been compelled by the regular and persistent enquiries of both the public and our people to bring to your attention and knowledge the effect of the use of the word 'apology' and how the Dagomba as usual have turned this achievement of the year to their undue advantage and request you, the team, as arbitrators, to let the world, Ghanaian public, and especially the Konkomba know the truth of what really happened at Yendi on the 20th December, 1994.......We wish to emphasise here that the ceremony was surely a RECONCILIATION GESTURE and NOT an apology, as the world is being made to believe." The hope of peace which the ceremony had intended to bring was shuttered and dashed by the letter of the Konkomba Youth Association. At long last, through the efforts of the Permanent Peace Negotiation Team, the YaNa elevated the chief of Sanguli Lana, Chereponi Fame, Nambile Na, Nakpali Lana and the SabobaNa to Paramountcy on the 28th of November, 1995 together with twenty other Dagbon chiefs.

The elevation of the Saboba Chief to paramount status was a major breakthrough in the Northern Conflict and a major achievement of the Permanent Peace Negotiation Team. However, the Konkomba were unhappy about the elevation of the Saboba Chief along side the SanguliNa and Chereponi Fame to paramount status, it did not meet their demand for a single paramountcy. The SabobaNa threatened that if the elevation of the Saguli, Chereponi Fame is allowed, the peace being sought in Northern Region will not be achieved. Despite the threat, the status quo remains.

7.2. Religious Organisations Response to the Conflict

The major religious organisations i.e. Christian organisations and Muslim organisations have done very little to bring about lasting peace among the combatants. Religion could break ethnic and cultural barriers between the various ethnic groups.

7.3. NGOs and Donor Agencies' Response

One of the major responses of the NGOs during the clashes apart from intervening with relief assistance, was the formation of the inter NGO Consortium. This network did tremendously well in bringing peace to the Region. They succeeded in bringing the various combatants to a workshop and a series of meetings in Kumasi. Many of the combatants especially women were assisted to go into income generation activities with funds from the consortium. Many of the combatants were helped by

various NGOs to resettle in their new localities. The Nairobi Peace Initiative, an international peace organisation, headed by Professor Hizkias Asefa, deserves the praise of all Ghanaians for the tremendous success they achieved in bringing a lasting peace in Northern Region through the Kumasi Agreement on Peace and Reconciliation.

7.4. Traditional Institutions

Traditional leaders, apart from the Asantehene (King of the Asantes), have done very little to bring about lasting peace in the Region.

7.5. The Elites

They have done virtually very little to bring about peace. They and their families are not affected directly by the conflicts. Most of them live in Accra, they fuel the war from Accra, they write all the beautiful petitions, yet none of them goes to the battlefield. In addition, most of them benefit directly or indirectly from the conflicts.

8. DISCUSSIONS AND POLICY IMPLICATIONS

It is the responsibility of political leaders and leaders of civil society to manage ethnic conflicts and to devise appropriate political and socio-economic measures to control the eruption of conflicts. While it is certainly useful and necessary to learn from historical examples, the immense difficulty of finding a workable formula has to be acknowledged. The search for a workable formula is still ongoing. This situation makes it imperative that political and social leaders should engage in their own struggle to find solutions that will fit their conditions. Their solutions have to be discovered and forged by themselves because they have to implement and maintain them (Basara, 1997).

Imposed models fail precisely because they are imposed and because they invariably ignore aspects of the local condition. Interventions in ethnic conflicts by the international community and NGOs should serve to support the struggle of local leaders to find workable and realistic solutions. There is need for a thorough and comprehensive analysis of the causes and conditions of the conflict, taking all the different perceptions and opinions seriously. This should inform conflict resolution strategies. Superficial and one-sided views invariably do not bring lasting peace.

Conflict resolution processes should be inclusive of all parties that are involved. Conflict resolution interventions should empower disputants to deal more creatively with their conflict. In this light NGOs should facilitate communication between parties in conflict when levels of antagonism make normal communication difficult or impossible. Secondly, there is the the need for facilitation of an analysis of the causes of the ethnic conflicts, preferably as a joint effort involving all conflicting groups (Zartman, 1985).

There is no single workable strategy to resolve ethnic conflicts. However, this does not preclude us from making recommendations towards the process of conflict management in Northern Region. At the end of every war, the most important things that need to be done are; restoration of peace to the conflict zone, the reintegration of the warring parties, and the reconstruction of the war zone. The question we pose at this point is whether these have been adequately done. In our opinion, certain issues need urgent attention and these among others include the following:

- The need to formulate a comprehensive peace accord to be signed by all parties involved in the 1994 ethnic conflict.
- The need to urgently address the remote causes of the 1994 ethnic conflict between the Nanumba and Konkomba and the Gonja and the Konkomba.
- The need to adequately address or lay to rest the Konkomba demands for part of Dagbon land they can call their own.
- To critically consider the role of Youth Associations in preventing future ethnic conflicts. It is a known fact that many of the Youth Associations played a key role in the 1994 ethnic conflict.
- There is an urgent need to resolve the impasse between the Gonja and the Nawuri in Kpandai and also the Konkomba and Nawuri in Kpandai.
- There is the need for a real, sincere and complete reintegration of the warring factions. As we write today, Konkombas cannot freely visit and sleep in Tamale, Gonjas cannot visit Kpandai freely, the displaced Gonjas from Kpandai cannot return to Kpandai, Dagombas cannot sleep in Saboba-Chereponi, Konkombas cannot sleep in Bimbilla and Salaga.
- The situation where chiefs are imposed on settlers or minorities must give way to the one where settlers or minorities elects their own head chiefs, and to maintain checks and balances, the head chief should swear an oath of

allegiance to the traditional authority. It is easier to rule the minority and settlers through their elected head chiefs whilst at the same time, maintaining allegiance through the traditional authority.

Conflict management strategies should include the following:

Positive and Conscious Socialisation

The process of acquiring social learning is known as socialisation. It is through the process of socialisation that individuals or groups acquire knowledge, skills and dispositions that enable them to participate as responsible members of their ethnic groups and the entire society. The process of creating social order is essentially one of devising means whereby mankind's innate drives can be controlled for the sake of harmony in the society (Akinsola, 1964). Unfortunately, the leadership in our traditional homes who are supposed to champion this cause have abandoned this crucial responsibility of socialising the youth positively to learn to forgive. Instead, they have resorted to ethnic indoctrination of hatred. People should be socialised to learn to forgive one another. They should be socialised to learn to live in harmony with their neighbours and other ethnic groups.

Civic Education

The various civil society organisations and NGOs in the region should implement civic education programmes within the school system and outside. The school curricula and civic education programmes should include fundamental issues that affect the essence of interdependence between different ethnic groups and peaceful co-existence between different ethnic communities. Vigorous civic education is necessary for the re-orientation of the various conflicting ethnic groups. This type of education should include the following special programmes: effects of ethnic conflict, peace education, inter-ethnic harmony and peaceful co-existence, the need to forget about the "bitter" past, coping with social and cultural diversities without conflict, counseling and consoling people who are traumatised, conflict and conflict resolution. Politicians from the conflicting ethnic groups should be the ambassadors of this campaign. They should lead the campaign and the traditional authorities and youth organisations should follow suit. Leaders and civil society organisations should take the initiative of organising seminars and conferences to sensitise the ethnic groups in general and their opinion leaders in particular, on the need for inter-ethnic harmony, peaceful co-existence and the need to promote lasting peace for development.

9. CONCLUSIONS

The information contained in this paper, should guide the government, policy makers, donor agencies, civil society, religious organisations and non-governmental organisations, local and international civic institutions, traditional institutions, and other interested parties to come out with workable strategies to bring about lasting peace in Northern Region. There is an urgent need to examine the potential dangers of another inter-ethnic and intra-ethnic conflict in Northern Region. There is the saying that, there is no smoke without fire. Early warning signs must be noted, and adequate measures adopted, because the 1994 ethnic conflict was not in doubt, although the politicians and traditional leaders denied the possibility of war. There is enough evidence to prove that, all the ethnic groups that were involved in the 1994 conflict are fully prepared in case of "another ethnic war". Should we sit doing nothing till another war similar to that of 1994 erupts again? If adequate measures are not put in place to resolve the Northern conflict once and for all, the eruption of another ethnic conflict would be disastrous. It could degenerate into a civil war.

ACKNOWLEDGMENTS

ENDNOTES

1. Refer to various annual reports for the Northern Territories, ADM/5/1, available from the National Archives, Accra, Ghana.

2. Refer to the *Daily Graphic* Wednesday 22nd of March 1995 page 1 for details of the story.

3. Press statement by Konkomba and Basare Youth Association, Baskom, November 1994.

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