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Catastrophic Spending on Education in Ghana: An Analysis of the Ghana Living Standards Survey (Fourth Round)

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Abstract: The main objective of this study is to estimate the proportion of households who spend catastrophically on education and also find out which of the household characteristics significantly influence catastrophic expenditure on education and to provide basis for trend analysis of catastrophic expenditure on education in Ghana. Education is fundamental to human development and growth. However, cost of education is entirely not borne by the government and this shifts partly or in some cases wholly to the household who seeks the education for its members. There are some household factors that influence catastrophic spending on education and these were what the paper seeks to find out. It was evidenced from the Ghana Living Standards Survey (GLSS) round 4 data used that households with female heads have a higher tendency of spending catastrophically on education than that of households with male heads. Households whose heads are divorced or separated have the highest tendency of spending catastrophically on education. Households in coastal regions have the highest tendency of spending catastrophically on education. The study showed that sex, age, highest educational qualification of the head of household, size of household and the region in which a household is located are significant determinants of catastrophic spending on education.

Key words: Catastrophic, education, expenditure, household

INTRODUCTION

Education contributes immensely to the social, economic and cultural achievements of societies. One of the most important insights of the new African nations is their recognition that education is the greatest instrument man has for his own progress (Garforth, 1994).

Studies have also shown that economic returns on investments in education, in most cases, exceed returns on alternative kinds of investment and that education facilitates the advancement of knowledge in pure and applied fields of study (Card, 1999; Agyeman *et al*., 2000). Microeconomics empirical studies have refined and extended the base of the evidence showing that educated men and women produce more and earn more than their uneducated counterparts in a wide range of entities (Card, 1999).

Education influences and is in turn influenced by access to other basic needs such as adequate nutrition, safe drinking water, health, shelter and others (Ferguson, 1991). Others have argued, and it is evidently clear, that countries with high illiteracy rates are technologically under-developed. (Harbison, 1973) regards education as the "key that unlocks the door to modernization, without it, African countries would be unable to enter the modern technological world".

In view of the above mentioned benefits and others, it is undoubtedly clear that the future of every independent country depends more on the rapid and effective development of the country's educational system. Hence, in all parts of the world, like in Ghana, education plays a frontline role in national development and planning and it forms comparably a higher percentage of national annual budget of many (if not all) countries the world over. Most commonwealth countries spend at least 20% of their total income on education (UNDP, 2006). For example, Ghana spends approximately 40% of her annual budget on education alone (Agyeman *et al*., 2000).

The ideal situation in developing countries is the provision of free education for all until these countries attain at least a middle income status. Kadzamira (2003) gave a vivid account of how education is funded in Malawi. Al-Samarrai (2002) also suggests that levels of household spending, the effectiveness of the public expenditure management system and the composition of public education spending are important factors explaining educational achievements. The results imply

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that the achievement of the education millennium development goals will require more than just increases in expenditure on primary education (UNDP, 2006; UNESCO, 2003). However, free funding of education is impossible since all these countries depend heavily on donor support for their annual budgets. The reality of the situation is that, people in such countries have to fund part if not all, of their education. The part funding of education is difficult for households in developing countries of which Ghana is no exception, particularly the female-headed households (Mehrotra and Delamonica, 1998). In Ghana, national surveys have shown that female-headed households and households whose heads have low educational qualification are greatly disadvantaged at funding education for their households since they are generally low-income earners (GLSS4, Ghana Statistical Service, 2006, 2005).

This study seeks to provide a baseline study that provides the basis for monitoring the ability of households to fund education of their household members in Ghana. In other words, this study will serve as a basis for trend analysis of catastrophic expenditure on education in Ghana. In this study, the researchers proposed a household to have spent catastrophically on education if its expenditure on education is at least 20% of its total expenditure less expenditure on food (Coulombe, 2004). The main objective of this paper is to estimate the proportion of households who spend catastrophically on education and also find out which of the household characteristics significantly influence catastrophic expenditure on education.

MATERIALS AND METHODS

The study covered the whole country and was based on secondary data of the fourth round of the Ghana Living Standards Survey (GLSS4). The GLSS4 data is a representative nationwide sample of more than 5,998 households, containing 25,855 persons. Detailed information were collected on all aspects of living conditions, including health, education, employment, housing, agricultural activities, operations of non-farm establishments, remittances, savings, credits and assets. This survey spans over one-year (twelve months) of data collection involving the years 1998/1999 (i.e., April 1998 - March 1999). The dependent variable used in this study was computed from the following household expenditure variables:

- Frequent non-food expenditure
- Expenditure on education
- Expenditure on household utilities
- Miscellaneous expenditure

There were some other household expenditure variables which were not used because there were too many missing values in them and for others and the expenditures were for commercial purposes. Households with missing observations for each of the expenditure variables used were dropped from the analysis which resulted in a total of 3,663 households as against 5,998 households from the GLSS4 data.

The independent variables used for the study were, age of household head, sex of household head, marital status of household head, region of household, ecological zone of household, household size, nationality of household head and highest educational qualification of household head. The dependent variable used is dichotomous and has been discuss in the following sub-section.

The binary logistic regression was conducted to assess significance of some independent variables predicting a household's catastrophic spending on education. However, before this was done, existence of multi-collinearity was checked. Ecological zone was found to have a tolerance level less than 0.05 (0.0497). After dropping Ecological zone and checking again, the tolerance level for each of the remaining variable was found to be approximately 1. This implies there is little or no multi-collinearity among the remaining independent variables.

The Headcount index and the Catastrophic Expenditure Gap (CEG) index were computed by marital status, ecological zone, and highest educational qualification of head of household, nationality, region, and sex of household head. The methods of computing these indexes have been discussed in the subsequent sub-sections.

Computation of the dependent variable: Suppose there are k non-food items (variables) of expenditure for n households and let x_{ij} (i = 1, 2, …,n; j = 1, 2, …, k) be the ith household expenditure on the jth item. Then the total non-food expenditure w_i of the ith household is given by:

$$w_i = \sum_{j=1}^{k} x_{ij}, \quad i = 1,2,....,n \tag{1}$$

Without loss of generality, let x_{iv} be the ith household expenditure on education. The proportion q_i of the total non-food expenditure of household *i* formed by its expenditure on education is given by:

$$q_i = \frac{x_{iv}}{w_i}, \quad i = 1,2,...,n \tag{2}$$

Let z(0<z<1) be the catastrophic baseline, then the ith household is said to have spent catastrophically on education if;

$$q_i > z, \quad i = 1, 2, \ldots, n \tag{3}$$

In this study, we propose the baseline proportion to be 20% i.e., z = 0.2. However, depending on the objectives of the researcher, one can propose a 40% baseline or any other proportion within the given range of z i.e., (0<z<1).

The dependent variable y is a dichotomous variable. Its value for the ith household is given by:

$$y_i = I(q_i > z) = \begin{cases} 1 & if\ q_i > 0.2 \quad i = 1,2,\ldots,n \\ 0 & otherwise \end{cases} \tag{4}$$

The head count index p_o: It is an index which is a measure of the proportion of households observed to have spent catastrophically on education. The head count index is given by:

$$P_o = \frac{1}{n}\sum_{i=1}^{n} y_i \tag{5}$$

The Catastrophic Expenditure Gap (CEG) index p_1: This is an index that measures the average excess in the proportion of total expenditure, with reference to the baseline proportion, that the households spent on education. The larger the value of this index, the greater the potential of the households to spend catastrophically on education. The catastrophic expenditure gap index is given by:

$$P_1 = \frac{1}{nz}\sum_{i=1}^{n} G_i \tag{6}$$

where $G_i = (q_i - z)y_i$; i = 1, 2, …, n. (7)

RESULTS

Catastrophic spending and share by marital status and sex of household head: Table 1 depicts catastrophic expenditure and share of catastrophic spending by marital status and sex of head household.

For all the marital statuses, female-headed households recorded higher proportions of catastrophic spending than male-headed households. Widowed female-headed households recorded the highest proportion (61.0%) with separated female-headed households recording the least (51.0%). For male-headed households, those with divorced heads recorded the highest (46.2%) proportion while those with separated heads recording the least (42.9%). For both male-headed and female-headed households, those with married heads constitute the largest shares (male -48.1%, female -52.5%) of catastrophic spending while those with widowed heads constitute the least (male -9.7%, female -5.4%).

Generally, for all categories of catastrophic expenditure and share of catastrophic expenditure, female-headed households have higher proportions than male-headed households. However, irrespective of sex, households with married heads have the highest share (49.7%) of catastrophic expenditure on education while households with widowed heads have the least share (8%).

Catastrophic spending and share by ecological zone and sex of household head: Table 2 explains catastrophic expenditure and share of catastrophic expenditure by ecological zone and sex of head of household.

The proportion of female - headed households who spent catastrophically on education is higher than male-headed households in all the three ecological zones with the Savanna zone recording the highest proportion of 57.1% for female-headed households and 55.7% for male-headed households; while the Forest zone recorded the least proportions of 43.9 and 28.7% respectively for female-headed households and male-headed households. For both male - headed and female - headed households, the Coastal zone recorded the highest share of catastrophic spending with the Forest zone recording the lowest. Overall, Savanna recorded the largest proportion (56.2%) of catastrophic spending with the least being Forest (32.3%). However, Coastal recorded the largest share (45.5%) with Forest recording the smallest (14.3).

Catastrophic spending and share by educational qualification and sex of household head: Catastrophic expenditure and share of catastrophic expenditure of educational qualification and sex of household head are depicted in Table 3.

For male-headed households, those with primary or no education spent more catastrophically on education (43.9%) whiles those with tertiary education spent less catastrophically on education (32.8%). However, for female-headed households those with primary or no education spent more catastrophically on education (55.3%) whiles those with secondary education spent less catastrophically on education (26.9%). For both male-headed and female-headed households, almost all the households that spend catastrophically on education have heads with primary or no education representing 95.3 and 97%, respectively.

Catastrophic spending and share by nationality and sex of household head: Table 4 shows catastrophic expenditure and share of catastrophic expenditure of nationality and sex of household heads. Close to forty-four (43.8%) percent of Ghanaian male-headed households spent catastrophically on education whiles the

Table 1: Catastrophic Expenditure (CE) and Share of Catastrophic Expenditure (SCE) by marital status and sex of household head

		Male		Female		Total	
Marital status	n	CE (%)	SCE (%)	CE (%)	SCE (%)	CE (%)	SCE (%)
Married	1835	43.1	48.1	53.8	52.5	46.9	49.7
Consensual	525	43.4	14.2	55.9	14.9	47.6	14.6
Separated	629	42.9	17.2	51	15.5	45.5	16.5
Divorced	382	46.2	10.8	59.1	11.7	50.7	11.2
Widowed	292	44.2	9.7	61	5.4	47.6	8
Total	3663	-	100	-	100	-	100

Authors computation using GLSS (Round IV)

Table 2: Catastrophic expenditure and share of catastrophic expenditure by ecological zone and sex ofhousehold head

		Male		Female		Total	
Ecological Zone	n	CE (%)	SCE (%)	CE (%)	SCE (%)	CE (%)	SCE (%)
Savannah	1238	55.7	41.4	57.1	38.4	56.2	40.2
Coastal	1657	42.8	42.7	55.9	49.8	47.5	45.5
Forest	768	28.7	15.9	43.9	11.8	32.3	14.3
Total	3663	-	100	-	100	-	100

Authors computation using GLSS (Round IV)

Table 3: Catastrophic expenditure and share of catastrophic expenditure by highest educational qualification and sex of household head

		Male		Female		Total	
Highest educational qualification	n	CE (%)	SCE (%)	CE (%)	SCE (%)	CE (%)	SCE (%)
Primary/No education	2816	43.9	95.3	55.3	97	47.7	96
Secondary	799	42.4	2.6	26.9	1	38.6	2
Tertiary	47	32.8	3.1	48.1	2	37.2	2
Total	3662	-	100	-	100	-	100

Authors computation using GLSS (Round IV)

Table 4: Catastrophic expenditure and share of catastrophic expenditure by nationality and sex of household head

		Male		Female		Total	
Nationality	n	CE (%)	SCE (%)	CE (%)	SCE (%)	CE (%)	SCE (%)
Ghanaian	3627	43.8	99.1	54.5	98.9	47.4	99.4
Non-Ghanaian	36	28.6	0.9	63.6	1.1	30.6	0.6
Total	3663	-	100.0	-	100.0	-	100.0

Authors computation using GLSS (Round IV)

corresponding value for the Ghanaian female-headed households are 54.5%. Taking the total non-Ghanaian male-headed households observed 28.6% spent catastrophically on education whiles the corresponding value for the non-Ghanaian female-headed households, is 63.6%. For all male-headed households observed to have spent catastrophically on education, 99.1% have Ghanaian heads while the rest 0.9% have non-Ghanaian heads. For all the female headed households observed to have spent catastrophically on education, majority (98.9%) of them were found to have Ghanaian heads with the rest (1.1%) headed by non-Ghanaians.

Catastrophic spending and share by region and sex of household head: Catastrophic expenditure and share of catastrophic expenditure by region and sex of household heads are depicted in Table 5.

Looking at the proportion of households who spent catastrophically on education in each region, Greater Accra recorded the highest value of 69.9%, followed by the Central region with a value of 56.2% while Upper West region recorded the least with a value of 27.4%. However , Ashanti region has the highest share (19.7%) of catastrophic expenditure on education, followed by Greater Accra region (19.3%) with the least share (1.8%) recorded by the Upper West region (Fig. 1).

In most of the regions, female-headed households spent more catastrophically than male-headed households.

The sample analyzed consists of 2442 male-headed households and 1221 female-headed households. More than half (54.6%) of the female-headed households observed made catastrophic expenditure on education. The corresponding value for the male-headed households was 43.5%. However, of all the households observed to have spent catastrophically on education 61.5% are male-headed while the rest (38.5%) are female-headed. These indicate that even though male-headed households have a larger share of catastrophic expenditure on education, a

Table 5: Catastrophic expenditure and share of catastrophic expenditure by region and sex of household head (n = 3,663)

		Male		Female		Total	
Region	n	CE (%)	SCE (%)	CE (%)	SCE (%)	CE (%)	SCE (%)
Western	426	36.3	11.2	51.5	7.5	39.9	9.8
Central	356	56.4	10.7	55.8	12.9	56.2	11.6
G. Accra	478	70.6	21.5	68.4	15.9	69.9	19.3
Volta	415	27.7	7.4	45.0	8.7	33.0	7.9
Eastern	474	42.9	12.4	56.6	14.1	47.7	13.1
Ashanti	657	47.1	16.2	57.5	25.2	51.8	19.7
Brong Ahafo	346	48.8	9.4	46.1	9.8	47.7	9.5
Northern	286	17.4	6.2	53.3	3.6	31.5	5.2
Upper east	88	26.6	1.6	54.2	2.0	34.1	1.8
Upper west	136	29.4	3.4	12.5	0.3	24.4	2.1
Total	3,663	-	100.0	-	100.0	-	100.0

Authors computation using GLSS (Round IV)

Table 6: Catastrophic Expenditure Gap (CEG) by region, ecological zone, sex, marital status, nationality and education of household head

Variable	CEG	Variable	CEG
Regions		**Marital status**	
Western	0.35	Married	0.38
Central	0.44	Consensual union	0.38
Greater Accra	0.62	Separated	0.37
Volta	0.24	Divorced	0.39
Eastern	0.40	Widowed	0.41
Ashanti	0.39	**Nationality**	
Brong Ahafo	0.34	Ghanaian	0.38
Northern	0.24	Non-Ghanaian	0.37
Upper east	0.26	**Highest educational**	
Upper west	0.24	**qualification**	
Ecological zone		Primary/No	0.40
Savannah	0.49	education	
Coastal	0.38	Secondary	0.31
Forest	0.25	Tertiary	0.19
Sex			
Male	0.35		
Female	0.45		

Authors computation using GLSS (Round IV)

substantial proportion of female-headed households made catastrophic expenditure on education compared with households headed by males.

Catastrophic Expenditure Gap (CEG) by region, ecological zone, sex, marital status, nationality and education of household head: Table 6 displays the distribution of catastrophic expenditure gap by region, ecological zone, sex, marital status, nationality and highest educational qualification of head of household.

The catastrophic expenditure gap which measures the potential catastrophic expenditure on education indicates that Greater Accra Region (0.624) has the highest potential and Upper West Region (0.240) the lowest are shown in Table 6.

In the case of Ecological Zone, the Savannah belt has the highest potential (0.49) whiles the Forest belt has the lowest (0.25). Considering the sex of the heads of households, female-headed households have the maximum potential (0.45) of spending catastrophically on education as compared to that male-headed household (0.35). For the marital status of heads of households studied, households whose heads are widowed have the highest potential (0.41) of spending catastrophically on education whiles households whose heads are separated (0.37) have the least potential. Households with Ghanaian heads have the maximum potential (0.38) of spending catastrophically on education. Considering the highest educational qualification attained by heads of households, households that have heads with primary or no education have the highest potential (0.40) of spending catastrophically on education, whiles those with heads who have tertiary education have the least potential (0.19).

Determinants of catastrophic spending: Logistic regression was conducted to assess whether the seven predictors, sex of head of household, age of head of household, household size, region, highest educational qualification, marital status and nationality of head of household, significantly predict a household's catastrophic expenditure on education. All the seven predictors together significantly predict a household's catastrophic spending on education ($\chi^2 = 151.756$, df = 7, n = 3663, $p<0.001$). Table 7 presents the results of the estimates of the regression coefficients with the corresponding standard errors, odds ratios and p-values.

In Table 7, the odds ratios which suggest that the odds of estimating correctly which household spent catastrophically on education significantly improved by approximately 80.8, 0.7, 12.6 and 1.9% if one knows respectively sex of head of household, age of head of household, household size and the marital status of the head of household. Also the odds of estimating correctly which household spent catastrophically on education significantly reduced by about 7.4, 7.1 and 11.4% if one knows, respectively the region of household, the highest educational qualification and nationality of head of household.

Table 7: Logistic regression predicting which household spent catastrophically on education.

Variable	B	SE	Odds ratio	p-value
Sex of head of household	0.592	0.075	1.808	0.000*
Age of head of household	0.007	0.003	1.007	0.009*
Size of household	0.118	0.016	1.126	0.000*
Region	- 0.077	0.014	0.926	0.000*
Highest educational qualification	- 0.074	0.025	0.929	0.003*
Marital status	0.019	0.025	1.019	0.464
Nationality	- 0.121	0.076	0.886	0.112
Constant	- 1.324	0.220	0.220	0.000*

*: Significant at 0.01 level of significance. Authors computation using GLSS (Round IV)

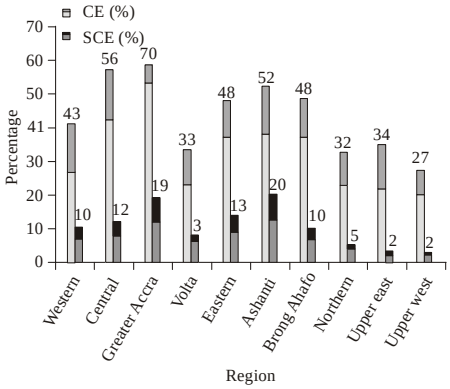

Fig. 1: Catastrophic spending and share by region

DISCUSSION

This study is one of the first studies in the area of household spending on education. Using national data on living standards of Ghanaians, the findings show some disparities in household expenditure on education.

Male-headed households, in general, spend more catastrophically on education than female-headed household, even though female-headed households recorded a higher potential of catastrophic expenditure on education. This is supported by the findings in the reports of most national surveys that female-headed households are generally low income earners (e.g. GLSS 4, Ghana Statistical Service, 2005, 2006).

With regards to age, households with older heads spend more catastrophically on education than those with younger heads. This is as expected because households with older heads are more likely to have children in higher educational institutions which require more funding. Some of them also take care of their grand children. As expected, larger (number of members) households spent more catastrophically on education than smaller households. This may be due to the fact that larger households have more wards in school (McMahon, 1999).

The educational qualification of the head of household significantly determines whether or not a household is more likely to make catastrophic expenditure on education which in line with Husen (1990). The lower the educational qualification of the household's head the greater the household's potential of spending catastrophically on education. This is as expected because the higher the educational qualification of the household head the richer the household (GLSS 4 report) and hence the higher the household's ability to spend on education irrespective of the geographical location of the household (Ghana Statistical Service, 2002, 2006).

Apart from households in the Volta, Northern, Upper East and Upper West regions who are less likely to make catastrophic expenditure on education, those in the rest of the regions have high potential of making catastrophic expenditure on education. Households in the Greater Accra region have the highest potential, followed by those in the Central, Eastern, Ashanti, Western and Brong Ahafo regions in that order. One would have thought the reverse to be the case since households in the regions found to have lower potential of spending catastrophically on education are poorer (Coulombe, 2004). However, this finding may be due to one of two evidences recorded in the GLSS 4 report. First; the regions found to have households with lower potential of spending catastrophically on education recorded, comparatively, very low school attendance rates: an indication of the fact that children of school going age are not in school and so households do not spend on education for such children. Second; education is expensive in the regions (Greater Accra region, etc.) in which households have higher potential of spending catastrophically on education.

Although households in the coastal zone have the highest share of catastrophic expenditure on education, those in the savanna zone have the greatest potential of spending catastrophically on education. According to Coulombe (2004), households in the savanna zone are the poorest, hence one is tempted to say that poor households are less likely to spend catastrophically on education because they are more likely to keep their children away from school.

CONCLUSION

The study shows clearly factors such as sex, age, highest educational qualification of the head of household; size of household and the region in which a household is located are significant determinants of catastrophic spending on education. However, the

nationality and the marital status of the head of household are not significant determinants even though they recorded some differentials in their levels. Based on the findings of the study, we recommend that catastrophic expenditure should form one of the evidences to be used to inform future educational policies such as capitation grants disbursement and the school feeding programme in Ghana.

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