Internal Migration Intentions Associated with Climate-Related Environmental Events: Evidence from the Forest-Savanna Transition Zone of Ghana.

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Abstract

Migration is at the centre of demographic research on the population-environment nexus. Increasing concerns about the impacts of climate-related environmental events on human population fuel interest in what constitute climate-induced movement, and how to explain it. This paper examines internal migration intentions of respondents in the forest-savanna transition zone where their source of livelihood has been affected by climatic conditions. Using data from the CCLONG project, we employ binary logistic regression to examine migration intentions of households in response to climate-related events. The results indicate that climate-related environmental events are not significant predictors of migration intention when controlling for socio-demographic and economic factors. Also, among households in the forest environment, the perception that, prior coping strategies as a response to climate-related environmental events are inadequate is negatively associated with intention to migrate. We conclude that the complex relationship between climate-related environmental events and internal migration intention deserves further investigation.

Key words: Climate-Related Environmental Event, Migration, Forest-savanna Transition Zone, Buoku, Bofie-Banda.

Introduction

Internal migration is recognised to be an important mechanism through which the spatial distribution of people changes over time (Greenwood, 1997). Rural–urban migration account for roughly half of urban growth in Africa between the 1960s and 1990s (Zachariah and Conde, 1981; Kelley, 1991). An estimated 50-80% of rural households in sub-Sahara Africa have at least one migrant member (DFID 2004). Considerable demographic literature on internal migration in sub-Saharan Africa discusses the characteristics of people who are more likely to move. However, these findings may not extend to the relationship between climate-related environmental events and migration. Increasing concerns about the impact of climate-related environmental events on human population further fuel the interest on what will also constitute climate-induced movement, and how to explain it.

Migration has a long standing tradition in Ghana. Every ethnic group in Ghana claims to have migrated from somewhere (Anarfi et. al., 2003). It is estimated that about 35% of migratory moves in Ghana were rural-urban (Ghana Statistical Service (GSS), 2000). The reasons behind most of these migrations are usually to find a better environment for survival and also for economic activities. In West Africa there are well established patterns of seasonal migration from the northern regions of countries such as Ghana, Togo, Mali and Burkina Faso to destinations in the south such as cocoa farms (Devereux N.d.). These seasonal migrations are influenced by the differences in the ecological zones where the north is usually dry in most part of the year with the southern portion experiencing a substantial wet period throughout the year. As a result, the southern part of Ghana tends to be the net receivers of migrants, the northern part is known for its net supplier of migrants (GSS, 2005).

In recent times, internal migration has been used as a survival strategy in environmentally vulnerable rural communities in Ghana (Kwankye et al., 2009). The relationship between climate related-environmental events and migration has been established empirically in other contexts as well. In Southwest Mexico, declining rainfall has been associated with rising migration to the United States, since many rural communities depend on rain-fed agriculture (Munshi, 2003). Findings from studies in Burkina Faso (Schoumaker and Beauchemin, 2005) and Mali (Findley, 1994) revealed that droughts in the 1970s and 1980s were associated with decreases in international, long-distance migration. Short-distance migration to larger agglomerations, however, increased during drought years.

This paper examines internal migration intentions of respondents in two rural agricultural communities (Buoku and Bofie-Banda) where their source of livelihood is affected by climate-related environmental events. The two communities provide unique environmental contexts to study migration. Buoku is a dry semi-deciduous forest while Bofie-Banda is a wooded savanna grassland. The Bouku community has in recent times experienced the setting up of stone quarry companies in the community which serve as an alternative source of livelihood for the people

while there is no such developments in Bofie-Bnada. In this paper, we address two research questions: 1) How does household's perception of coping strategies influence internal migration intentions? 2) What is the relationship between climate-related environmental events (flood, drought) and intentions to migrate, controlling for covariates which capture alternative explanations for internal migration?

Why focus on the forest-savanna transition zone?

In terms of agriculture, Ghana has, five distinct agro-ecological zones namely: rain forest, forest-savanna transition, guinea savanna, sudan savanna and coastal savanna. These zones are characterised by distinct rainfall regimes and as a result, support specific crops. The forest-savanna transition zone in Ghana is the focus of policies addressing environmental issues over the past two decades because it is particularly vulnerable to climate-related environmental events that negatively impact agriculture (MOFA, 2008). The forest-savanna transition zone is one of the food baskets of Ghana and used to be a major destination of migrants from the sudan savanna regions of Ghana (GSS, 2005). However, there are two different vegetation characteristics in the transition zone and so communities in the region experiences different types of environmental conditions.

Ecologically, the southern part of the transition zone largely comprises dry semi-deciduous forest, while the northern part consists of mosaic of gallery forests and forest patches in more-or-less wooded savanna grassland. The soils in the forest savanna transition zone are sandy in texture, have low effective water retention capacity, and nutrients leach easily if not well managed (Adjei-Nsiah, 2006). This has resulted in widespread soil impoverishments in these areas, particularly in areas where the soils are light textured surface horizons with clay pans appearing in shallow depths (MOFA, 1998). An examination of the land cover of the transition zone indicates highly depleted vegetation across the entire region as of 2000, which is projected to be worse by 2050 (Centre for International Forestry Research (CIFOR), 2008). This condition presents farmers in the transition zone with limited arable lands for their farming activities, which has serious implications for food security in Ghana as a whole.

Climate-related environmental events are exacerbating the already challenging economic, social and health issues confronting the populations in the forest-savanna transition zone and are obstacle for achieving the Millennium Development Goal (MDG) target of reducing poverty by half by the year 2015. According to the Ghana Environmental Protection Agency (EPA) report on Climate Change Impacts, Vulnerability and Adaptation Assessment in 2008, cocoa production will be seriously affected by the impact of climatic events and the ramification of this on the social and economic life of individuals, communities and Ghana as a whole will be very significant.

Today, environmental change, including climate-related environmental events presents a new threat to human security and a new situation for migration (Adger, 2001). However there is still

little understanding of how climate-related environmental events will contribute to migration, net of the traditional determinants of migration. Ghana is already experiencing high rural-urban migration (GSS, 2005). Climate-related environmental events are also spurring the increase in rural-urban migration as members of agricultural communities are moving into non-agricultural settings in search of alternative sources of livelihood (Marchetta, 2008; Van der Geest, 2011).

Climate-related Environmental Events and Internal Migration Intentions

The relationship between climate-related environmental events and migration is complex. It is difficult to distinguish individuals for whom environmental factors are the sole motivation for migration. In other words, the fact that people are migrating from a marginal environment cannot be solely attributed to environmental factors. Despite these complexities, Myers (2002) predicts that there will be more than 200 million environmental refugees by 2050. His article triggered subsequent publications on the number of people who will be displaced due to adverse effect of climate-related events (Friends of the Earth, 2007; Christian Aid, 2007; Stern, 2007; Global Humanitarian Forum, 2009). However, these estimates are criticized for methodological challenges (Castle, 2002; Brown, 2008; Castle; 2011; Gemenne, 2011; Foresight, 2011). It is important to take into account other factors when investigating whether people in low income countries will migrate as a result of climate-related events.

Environmental factors cannot be easily disentangled from the rest of the social, economic and political factors and processes leading to out-migration (Lonergan, 1998). With the exception of sudden environmental disasters, migration is just one among several possible responses and adaptations to environmental changes (Adger et al. 2007). People's subjective view and perception of climate hazard and their own vulnerability to climate variability is yet another factor in the decision to migrate calculus (Izazola, 1998; Hunter, 2005). Psychologically, people who have experienced a particular event over a long period of time may tend to perceive it as a "normal" event, and thus may not turn to migration as a response. In other words, people develop a psychological thinking that endures them to cope with environmental hardships. The intention to migrate is more likely to arise when people experience climate-related environmental events that they perceive will not get better in the future. The circumstances that may lead one to have such intention may be economical, social, political, and environmental. Therefore, it is important to recognize people's perceptions when studying environmental events and migration.

Environmental events such as floods and droughts can serve as an immediate push whilst long-term changes such as desertification can lead to a decline in living standards that increases the cost of staying versus leaving (Adamo, 2003). The frequency of environmental stress forces people to adapt to the situation by employing many kinds of adaptation measures. Internal migration is a survival strategy to many homes in rural Ghana as a result of poor agricultural yields (GSS, 2005). Rural families encourage young men and women to migrate to the urban centers in order to send remittances home and to reduce household size (Van der Geest, 2004).

Climate-related environmental events will increase rural-urban migration and as a result may leave most rural areas with particularly vulnerable populations.

The risk of being affected by climate-related environmental impact is the interaction between climate-related environmental events and social vulnerability of the population. Also, migration decisions as a response to climate-related environmental events are also influenced by perceptions as well as experiences of environmental hardships. Generally, people will adopt various strategies as ways of living under a condition. Some of the adaptation strategies in rural agricultural communities include cultivation of drought/flood tolerant crops, construction of fire belts, dependence on support from relatives and migration. To better understand these associations, this study focuses on how climate-related environmental events, perception of coping strategies, and other socio-demographic factors affect migration intentions of households in two unique agricultural settings.

Data and Method

The data for the study are part of series of data collected by members of the Climate Change Collective Learning and Observatory Network Ghana (CCLONG) project in the two communities in the transition zone from 2007- 2009. The CCLONG team conducted a household survey in the two selected communities (Buoku and Bofie-Banda) in 2009. The communities were selected because they both fall in the forest-savanna transition zone but have unique environmental histories; farmers in Bofie-Banda have stopped producing maize which is a stable food and a major cash crop in the transition zone; and the CCLONG team had an in-depth information of the communities because they had been collecting qualitative data in the communities for over two years. Survey respondents were randomly selected using a household listing completed by students of the University for Development Studies in 2008. Approximately 100 households were sampled for the study in each of the communities and this represented more than 50 percent of the households in the communities. Also, the households in the study communities are homogenous in character with about 98 percent of them being farmers. However, the setting up of stone quarry companies in Buoku in recent times could serve as alternative source of livelihood to the people.

The questionnaire was administered to heads of household. Household heads were chosen because of the role they play in decision making in the study settings. They typically have the final say in major household decisions. There were instances, in some of the qualitative works in the communities where household heads did not practically contribute anything to household income but were recognised by household members as the one responsible for making household financial decisions. Further, in order to measure the social vulnerability of households to environmental events, a combination of household head characteristics and general household information was used to assess social vulnerability. Specific variables that were used in assessing social vulnerability are age of household head, sex of head of household, educational level of head of household, marital status of head of household, present migration status of household,

household size and household income. These factors are influential in amplifying or reducing overall vulnerability to hazards (Blaikie et al. 1994, Hewitt 1997).

Dependent variable

The dependent variable in the study is intention to migrate. Household heads were asked whether they have the intention to migrate from the community based on the kind of environmental exposure they have experienced. Households that indicate yes are those who have the intention to migrate because of their experience of climate-related environmental events.

Independent Variables

The main independent variable is climate-related environmental event. We asked "what type of environmental event have you experienced since living in this community"? The response categories are grouped into four categories in the questionnaire - experience of no event, flood only, drought only and flood and drought together since one has been living in the community. It is important to note that all respondents had experienced a climate-related environmental event.

The second independent variable is household heads' perception about coping strategies used during past environmental events. The specific question was: "Do you think past strategies employed to address climate-related environmental events will be efficient if a similar event were to occur in the future"? Respondents who say yes are those who believe that coping strategies will work in the future.

Control Variables

We controlled for household size, household income, age, sex, marital status and level of education of household head, which are known to influence migration. Age is categorized into four groups in conformity with classification of youth in rural Ghana as those aged 18 years and above but less than 30years whiles those aged 50 years and above are classified as the elderly in the communities. Marital status is categorized into those married/cohabiting and those not in union. Education is categorized into those with primary/lower and those with Junior High/higher education. There were very few respondents with a secondary or higher education, and so these were combined with those with Junior High education. The size of the household was equally categorized into three. Single member households dominated among the sample population in the two study communities. We combined single households with households with just a husband and a wife. We therefore grouped household size into those less than 3 members; 3-5 member households and households with six or more members.

Analytic Approach

To examine what type of climate-related environmental events may trigger internal migration intentions, a binary logistic regression was employed to handle the dichotomous dependent variable. Three models were run for the study. The first model examined the relationship between climate-related environmental events and the intention to migrate in the study communities. The second model, examined how peoples' perception about the future of climate-related environmental events influences intention to migrate. Finally, the third model controls for socio-demographic and economic factors. The level of significance for interpreting the results is $p<0.05$.

Results

Descriptive Statistics

Table 1 shows that nearly half (46%) of the respondents in Buoku had the intention to migrate. Fifty-seven percent of the respondents in the community had experienced both flood and drought while a little over one-fifth (22% and 21%) experienced only flood or drought respectively. Household heads in Buoku (38.3 years) are, on average, younger than the national average age (46.3 years) for rural Ghana (GSS, 2008). Also, on average, households in Buoku have over four members which is not different from the national average of 4.1 members for rural forest. In terms of households perception about the efficiency of past coping strategies in the future, more than half (55%) of the respondents indicated that their current coping strategy will be efficient in the future.

In Bofie-Banda on the other hand, 40% of the respondents indicated that they had the intention to migrate. A little over two-fifth (42%) of the respondents in the community experienced both flood and drought whiles 23% and 35% of them experienced only flood or drought respectively. On the average, households have more than five members and this is similar to the national average of 5.4 members for rural savanna (GSS, 2008). The average age of household heads is however, younger than that of the national average for rural Ghana. Also, 56% of the respondents indicated that coping strategies used during previous environmental event will be efficient in the future. The categories and the frequencies for the control variables are indicated in Table 1.

Table 1: Description of Variables

Variables	Forest Environment		Savanna Environment	
	Buoku		Bofie-Banda	
Intention to migrate	**N**	**%**	**N**	**%**
Yes	46	46.0	40	40.0
No	54	54.0	60	60.0
Climate-related environmental event				
Flood	22	22.0	23	23.0
Drought	21	21.0	35	35.0
Flood and drought	57	57.0	42	42.0
Perception of coping strategies in future				
Yes	55	55.0	56	56.0
No	45	45.0	44	44.0
Age				
20 – 29	26	26.0	17	17.0
30-39	33	33.0	27	27.0
40 – 49	26	26.0	19	19.0
50+	15	15.0	37	37.0
Sex of head of household				
Male	65	65.0	61	61.0
Female	35	35.0	39	39.0
Level of education				
Primary education or lower	49	49.0	78	78.0
JHS/Higher	51	51.0	22	22.0
Marital Status				
Married/cohabiting	59	59.0	59	59.0
Not in union	41	41.0	41	41.0
Household Size				
< 3	29	29.0	29	29.0
3 – 5	41	41.0	28	28.0
6+	30	30.0	43	43.0
Household income				
< 2000	31	31.0	65	65.0
2000+	69	69.0	35	35.0
Migration Status				
Migrant	48	48.0	49	49.0
Non-migrant	52	52.0	51	51.0
Total	**100**	**100.0**	**100**	**100.0**

Association between climate-related environmental events and internal migration intentions

Turning to multivariate analyses, the results in Table 2 indicate that households experiencing both flood and drought in the Buoku are significantly more likely to report that they intend to migrate than to those who experienced only floods (Model 1). In the same model, among household heads in Bofie-Banda, experience of drought only is significantly less likely to influence the intention to migrate from the area compared to those who have experienced only flood. This association between climate-related environmental events and migration intention persists after controlling for the perception of household heads about the efficiency of current coping strategies (Model 2).

Table 2: Odd ratios of the relationship between climate-related environmental events and migration intentions in two communities in the forest-savanna transition zone of Ghana (N=100 in each community)

Characteristic	Buoku (Forest)			Bofie-Banda (Savanna)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Climate events (Flood)						
Drought	1.948	1.962	1.218	0.292**	0.261**	1.779
Flood and drought	3.964**	3.670**	1.745	1.094	1.024	0.702
Coping strategies will work in future (Yes)						
No		0.459*	0.343*		1.579	1.777
Income (< 2,000)						
2,000+			1.245			0.497
Age of household head (20-29)						
30-39			3.151			1.577
40-49			7.028**			14.177**
50+			2.404			8.803*
Level of education (Primary/lower)						
JHS/higher			1.006			3.44
Marital status (Married/cohabiting)						
Not in union			0.863			0.837
Sex (Male)						
Female			0.306*			1.887
Size of household (< 3)						
3 – 5			4.831			3.555
6+			2.736			2.206
Migration status (Migrant)						
Non-migrant			2.078			6.208***
Constant	0.467*	0.694	0.183	2.286*	2.007	0.049*

Notes: Reference groups are shown in parentheses.

P<0.10; p<0.05;*** p<0.01*

Even though perception about future coping strategy marginally explains why households who have been exposed to both floods and droughts in the forest environment are significantly more likely to report migration intention than those who experienced only floods, the results also indicate that household heads that have the perception that coping strategies will not work in the future were less likely to have migration intention compared to those who perceive that coping strategy will work in the future. Perception of future coping strategy does not have any significant influence on the relationship between households that have experience droughts compared to those that experienced only flood in the savanna area (Model 2).

Model 3 includes socio-demographic characteristics to see if the associations in Model 2 are robust. Once socio-demographic factors are controlled, there is no significant association between climate-related related environmental events and the intention to migrate. In the forest environment for instance, households that perceived that current coping strategies will not work in the future are less likely to have migration intention compared to those who think coping strategies will work. Also, household heads who are aged 40-49 years are significantly more likely to have migration intention in their household compared to those aged 20-29 years. Finally, Model 3 for the forest environment indicates that female household heads were less likely to have migration intention compared to male household heads.

Household heads aged 40-49 years in the savanna environment are significantly more likely to report migration intentions in their household while those aged 50 years and above are less likely to report migration intentions compared to those aged 20-29 years (Model 3). Non-migrant households in the savanna environment are significantly more likely to report migration intentions compared to migrant households.

Discussion

Migration intentions are influenced by social, economic, demographic and environmental factors. In this study, rainfall is essential for the livelihood of the study populations, which depend on agriculture. Climate-related environmental events challenge people's livelihood, which is directly link to their social and economic wellbeing. The complex nature of these relationships demands a thorough investigation of the environmental, socio-demographic and economic factors that trigger migration intentions. To understand how households are vulnerable to climatic events in the study communities, we considered the exposure of the people to past climatic events in area; their perceptions of coping strategies in the future; the socio-demographic and economic situation of the people as well as the agro-ecological area in which they are located. .

Our results indicate a negative relationship between perceptions of coping strategies and migration intentions of household heads in the forest environment. This is not consistent with findings from previous studies that suggest that perceptions about environmental hazards positively relates to migration intentions instead of the hazard itself (Slovic, 1987; Hunter, 2005).

We found that the influence of perceptions of coping strategies on the intention to migrate was pronounced in the forest environment and not in the savanna environment. In the forest environment, we observed that household heads that have the perception that coping strategies will not work are less likely to migrate compared to those who said coping strategies will work. This could be explained by the fact that, the stone quarry companies that have been located in the community are providing alternative sources of livelihood for the people and so migration is not considered as an option. Even though, income is not a significant predictor in the model, it shows that people with higher income in the forest environment are more likely to have migration intension than those with lower income. This also suggest that it is those with lower incomes that indicated that coping strategies will not work in the future and they did not also intend to migrate. Thus the role income plays in migration decision maybe a determining factor here. Environmental differences in an area coupled with alternative sources of livelihood play a role in determining people's perceived vulnerability to environmental events. It is easier to talk about pronounced changes in environmental conditions in forest vegetation than in a savanna area because of the frequency of environmental events and limited livelihood choices in the savanna than in the forest.

Environmental change will affect migration, specifically through its influence on a range of economic and social factors, as shown in this study (Foresight, 2011). In our study therefore, climate-related environmental events were not found to be significant predictors of migration intentions in the study communities after controlling for socio-demographic and economic factors that influences migration decision. However, perception of coping strategies, age and sex of household head were significant predictors in the forest environment while age and migration status of household heads are significant predictors in the savanna environment. Thus, the socio-demographic factors are the main predictors of migration intention in the forest-savanna transition zone. Findings from the study on north-south migration in Ghana concludes that migration decisions were not ascribed to sudden onset of environmental stress; and that environmental pull appears to be at least as important as environmental push (Van der Geest, 2011). The socio-demographic and economic predictors of internal migration are the dominant drivers.

Household heads aged 40-49 years in the forest and savanna environments significantly reported higher migration intentions compared to those aged 20-29 years because these households have a number of young people in their teens and early twenties who could stand the challenges of migration. Also, female household heads are less likely to report migration intention compared to male household heads in the forest environment. This is explained by culture of the people which gives more power to males in decision making even if they are not the head. Our results from the savanna environment also show that older household heads (50 years and above) have a less likelihood of migration intension compared to younger household heads. This is true because in a traditional agricultural system like the one practiced in the forest-savanna transition zone; older household heads do not encourage the young ones who could assist them in their farming

activities to migrate. In addition, non-migrant household heads in the savanna environment are significantly more likely to report migration intentions than migrant household heads because of the land ownership system in the area. Non-migrants rent their lands to migrant under the share cropping arrangement and migrate to the city to find something else to do (Adjei-Nsiah, 2006). Migrants on the other hand exert a lot of exploitation on the land in order to achieve their migration goals because they have very limited income to embark on another migration (Amanor, 1993).

The impact of floods and droughts in the forest-savanna transition zone is an indication that climate-related environmental events manifests itself in different ways and affects people differently. Even though, the forest savanna transition zone is one agro-ecological zone, the distinction of communities by vegetative characteristics as depicting the semblance of a forest or savanna environment, led to varying migration intentions in the area. This demonstrates that it is difficult to generalise the behaviour of people within the same ecological setting on a climate-related event. The little differences in vegetation characteristics coupled with alternative sources of livelihood can bring about varying responses. The results indicate that perception about coping strategies use in climate-related environmental events will bring about some form of migration in the transition zone, and that migration will be pronounced in the forest environment.

A notable limitation of this study is that it was conducted in very small farming communities and also involved a small sample population. It was more of an exploratory study and perhaps, if the sample size had been larger, a different story could have emerged. Even with this limitation, the study reveals interesting outcomes about households' perception of climate-related environmental events which can contribute to future studies in the forest-savanna transition zone of Ghana.

In conclusion, this study demonstrates the need to incorporate climate-related environmental events into census questionnaire and other national representative surveys like the Ghana Living Standards Survey. This will allow for more comprehensive studies to investigate the impact of climate-related environmental events on migration within any geographical region in the country. This is very important for national planning and will improve efforts to effective allocation of resources to regions that are the most severely affected by climate-related environmental events, and can thereby provide alternative economic opportunities to affected populations other than out migration.

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