

Rural Out-migration in the Drought Prone Areas of Ethiopia: A Multilevel Analysis¹

Markos Ezra, Visiting Associate Professor
Brown University

Gebre-Egziabher Kiros, Graduate Student
Brown University

This article presents a multilevel analysis of rural out-migration in Ethiopia over the 1984-1994 period. Using a recent household survey carried out in the drought prone rural areas of Ethiopia, discrete-time hazard models are used to examine the impact of individual, household and community factors on migration. Incorporating a life-course and the "new economics of migration" perspectives, our findings suggest that rural out-migration in these areas can be viewed as a function of individual, household and community characteristics. We find that mobility of people for schooling in the impoverished rural communities is minimal. Migration of both sexes was possible mainly through marriage, although females tend to depart their residences more than males. Our findings also reveal substantial period effects on out-migration trends.

Migration is an important demographic response to conditions of poverty and environmental stress in Africa (Krokfors, 1995), and Ethiopia is no exception. Although migration research in Ethiopia has been hampered by lack of adequate data (Abate, 1995), various forms of population movement in response to political turmoil, economic crisis, war, famine and security conditions have been recorded. Historical evidence in Ethiopia strongly suggests that there were large interregional movements of people from areas of relatively dense population and low economic opportunity to areas of less density and greater opportunity. For example, during the 1984-85 famine, about 600,000 settlers were moved from drought affected areas in Central and North Ethiopia to southwest Ethiopia (Rahmato, 1989). However, this settlement program was highly problematic and has encountered serious social problems despite being highly publicized. Berhanu and White (1998) also observed a sharp increase in female rural-urban migration with the outbreak of war between the military regime and opposition forces. Kloos (1982) has documented that there was considerable seasonal labor migration to the Awash valley, where agricultural mechanization and irrigation schemes are relatively well developed. Mammo (1991) has also observed that the combined effects of "urban pull" and "rural push" factors have significantly shaped urban centers in contemporary Ethiopia.

Previous studies also suggest the selective nature of migration in Ethiopia. Although most studies seem to indicate that males are more mobile than females (Rogers and Willikens, 1985), a considerable number of female rural-urban migrants have been observed in Ethiopia (CSA, 1992). For every 100 female migrants there were 84 male counterparts. In addition, a number of push factors, notably population pressure and famine, have resulted in forced migration to towns. Seasonal migration to supplement family income is common. The lack of access to sufficient farmland together with severe environmental degradation have been among the major factors which force people to abandon their farms and move to

¹ The survey used for this article was conducted by Markos Ezra for his research towards a Ph.D. dissertation. Financial support for the data collection came from UNFPA. The Institute of Development Research (IDR) of Addis Ababa University gave institutional support, including vehicles, computers and administrative assistance.

towns (Abate, 1989). In short, earlier research indicates that landlessness, agricultural policy, land fragmentation, absence of farm oxen, introduction of commercial farms, environmental degradation, population pressure, recurrent drought and famine, war, and political crisis were major factors responsible for rural out-migration (Rahmato, 1984; Cohen *et al.*, 1988; Ezra, 1997, 2000; Berhanu and White, 1998).

The goal of this research is to document out-migration in the ecologically degraded and drought prone communities in Ethiopia. This study presents a first attempt to use primary source data to examine determinants of out-migration of young adults in the environmentally degraded and drought prone areas of rural Ethiopia focusing on the period 1984 to 1994. In particular, we analyze the determinants of migration by using multilevel models to examine the net effects of individual, household and community characteristics.

The next section reviews the relevant literature followed by a discussion of the study areas; a description of the data to be used in this analysis and its limitations is followed by a discussion of the discrete-time hazard model used in this research and its advantages over other methods. The final section concludes the analysis with a discussion of the empirical results and their relevance to the migration literature in developing countries.

THEORETICAL ISSUES AND LITERATURE REVIEW

Migration theory is primarily concerned with the determinants of migration (Bilsborrow, 1998). Theoretical issues about determinants of migration are commonly explored at either the macro or the microlevel. Traditional microeconomic models of migration were founded on theories relating to individual optimizing behavior (Sjaastad, 1962; Todaro, 1969, 1976; DaVanzo, 1981). For instance, most earlier studies view rural-urban migration as a result of large differences in employment opportunities and income. Individuals are seen as likely to migrate when the expected economic benefits exceed the economic costs. Todaro (1969, 1976) argues that people migrate from rural to urban areas as long as the expected wage differential is large, even if the unemployment rate in urban destination areas is high. Potential migrants are seen as calculating their expected earnings in their place of origin in comparison to various places of destination.

The individual-level models of migration have been criticized by some researchers. Lauby and Stark (1988) argue that in developing countries, migration is undertaken as part of a family strategy for sustenance, economic improvement and risk diversification rather than only as an individual decision. This concept has been incorporated into the "new economics of migration," viewing migration as a means by which the household spreads risks. In this model, households or families are seen as the principal agents in migration decision-making (Stark, 1991). Indeed, migration is a major component of the theory of survival strategy (Stark, 1991; Bilsborrow, 1998), in which temporary or long-term migration of people from a household are seen as a way for the household to maximize its chances for survival in an uncertain environment by diversifying its sources of income. A key insight of this approach is that migration decisions are not made by isolated individual factors, but by families or households. Further, migration occurs not only to maximize expected income, but also to minimize risks and to loosen constraints (Massey *et al.*, 1993). This occurs through diversifying its sources of income or spreading risks (Stark, 1991; Stark and Bloom, 1985; Lauby and Stark, 1988; Rosenzweig and Stark, 1989). Empirical research to test migration theory as risk diversification in farm households has been remarkably supportive (Stark and Bloom, 1985; Fox and Stark, 1987).

Another perspective to study migration is the life-course approach. The life-course perspective of human mobility stresses how individuals' age-related roles and obligations change through time (Elder, 1978). Under this perspective, instead of being viewed as a symptom of disequilibrium and imbalance, migration is often seen as a normal, routine part of the experience of individuals as they proceed along their lifetime continuum. Departure of children from home as they attain adulthood - in order to marry, attend schools of higher learning and escape from childhood status - are frequently viewed as normal events. Of course, some groups in the population have a higher risk of moving than others. For instance, females may have a higher risk of experiencing a migration triggered by events such as marriage. Thus, a life-course approach emphasizes the importance of context (Moen and Wethington, 1992), in determining migration behavior.

Although either the macro or micro level of analysis can give some credible findings in explaining migration behavior (Zhu, 1998), neither approach provides a fully satisfactory explanation. Recent studies have developed empirical models that contribute to the building of multilevel migration theory (Bilsborrow *et al.*, 1987; Findley, 1987; Zhu, 1998). Following this approach, this research will use a multilevel model comprising individual, household and community level data.

The concepts of family strategy and life-course perspective are not mutually exclusive. For example, Kertzer

and Hogan (1989) successfully linked life-course events to that of the family as a household economy. In Ethiopia, as anywhere else, age is one of the most basic social categories and thereby a major determinant of social role, status and power. Rural households living in uncertain environments - being victims of economic crisis, political disruptions, famine and war - are expected to adopt family strategies such as migration to minimize risk. By using the life-course perspective and "new economics of migration" to explain determinants of out-migration in the drought prone areas of Ethiopia, the research emphasizes the societal context within which individual and household migration decisions are made.

THE ETHIOPIAN CONTEXT

Ethiopia, with 60 million people (CSA, 1998), is the second largest country in sub-Saharan Africa. According to the 1994 census, about 86 percent of the population live in rural areas (CSA, 1998), and their livelihood depends on subsistence farming by growing crops or rearing livestock. Low socioeconomic holdings, bad weather conditions, massive land degradation, and lack of basic infrastructure for intensive land use have undermined agricultural growth and reduced the labor absorption potential of agriculture in Ethiopia (Demeke and Regassa, 1996). Since the early 1970s, the country has experienced immense economic and political turmoil. Catastrophic droughts and famines have occurred frequently, with the country experiencing a protracted and devastating civil war.

In Ethiopia, agriculture constitutes about 56 percent of gross domestic product, 90 percent of exports and 85 percent of employment. As the result of successive droughts, the country has suffered a catastrophic collapse in food output (Kumar, 1990). The 1984 famine, being the most severe to date, struck hard the northern regions of Shoa, Wello and Tigray particularly.

The study area for this research covers North Shoa, Wello and Tigray regions of Ethiopia (see Figure 1). These areas have been the most severely affected by famine and drought during the last three decades. Three major ethnic groups of Ethiopia (Oromo, Amhara and Tigray) are represented in the study area. The Oromo, Amhara and Tigray constitute 32, 30 and 6.2 percent of the Ethiopian population, respectively (CSA, 1998), representing about 68 percent of the entire Ethiopian population.

Figure 1 Map Showing the Study Areas



Land scarcity and population growth in Ethiopia have led to high levels of labor intensity on the smaller plots. Peasant households are often forced to enter into sharecropping as temporary hired labor hiring-out and other arrangements to supplement on-farm income. In these areas, human settlement has been in place for a millennium. In fact, archeological evidence suggests that these areas may be among the few places in the world where sedentary agriculture began in human history. Historical accounts show that some of the crop species (e.g., barley and wheat) had been under cultivation in these areas well before the beginning of the Christian era. In these communities, the long and sustained human settlement, with no introduction of modern technology and resource management systems, has eventually led to an acute depletion of the natural land and forest resources. Historians have recorded at least 20 instances of famine in these areas since 1800 (Wood, 1977; Rahmato, 1994). The depletion of environmental resources is apparently related to the series of famines that the people of these areas have endured for the last several decades. Since the 1970s alone, three major famines have occurred in these regions. The 1984 famine left mental, physical and environmental scars that still linger in the memory of many people. Between 1984 and 1994 alone (the reference period for the present study), several short-term food deficits occurred in these communities, and food insecurity is becoming a characteristic feature of the areas under investigation. A significant segment of the population in these areas has received emergency food aid.

The present trend in these regions depicts a prevailing disharmony between the natural resource base and the population to be sustained. The rural population in Ethiopia, as in many developing countries, is totally dependent on access to land - land being the most important and decisive economic base in rural Ethiopia. The prevailing tenure system allows newly formed households to claim small farm plots. Land is state owned and has to be fragmented into smaller plots occasionally and redistributed to households including those which are newly formed. Presently, the average landholding size in these areas is below one hectare (Holt and Lawrence, 1993; Webb and von Braun, 1994; Ezra, 1997).

DATA SOURCES AND METHODS

The data for this analysis come from a household and community survey carried out between October 1994 and March 1995 in North Shoa, Wello and Tigray regions of Ethiopia. The main objective of the survey was to investigate the demographic responses of farming households to persisting ecological degradation and food insecurity in those areas. The survey covered 2,000 households selected from 40 village communities known as Peasant Associations (PAs). PAs are the smallest administrative institutions in the rural areas, and they comprise on the average about 500 households each.

Stratified sampling was used to select the PAs, while a simple random sampling method was used to select the farm households from an updated frame of peasant households in each selected PA. The sample selection procedures used can be summarized as follows: First, PAs within a selected district were classified as "less vulnerable" and "more vulnerable" PAs. This is based on the fertility of land and their level of vulnerability to food crisis. The extent of vulnerability of the communities was determined in consultation with experts in the Ministry of Agriculture, district officials, and by examining the archives of the Relief and Rehabilitation Commission (RRC) of Ethiopia (the RRC is the institute responsible for relief efforts in Ethiopia). Using stratified sampling, 20 "less vulnerable" and 20 "more vulnerable" village communities were selected for the study, and from each selected village community 50 households were selected using a method of simple random sampling, which gave a total sample size of 2,000 households.

Heads of the selected households were asked retrospective questions about the departure of household members in the last ten years as follows:

- Did any one leave your household since the 1984 famine (including during the famine)?
- If yes, what is the sex of the person who left the household?
- What was the relationship of the person with the head of the household?
- When did he/she leave (which year)?
- How old was he/she when he/she left home?
- What was the reason for leaving home?
- Where did he/she go?

In most cases, these questions were asked to the head of the household and were recorded for each person who departed from the household between 1984 and the survey date. Major events that occurred in the study areas were used in order to refresh the timing when the household members left the household. The 1984 cut-off was chosen to focus on migration since the 1984 famine and to ensure higher quality retrospective data (to minimize memory recall error). The 1984 famine affected almost every household and was fresh in the memories of respondents.

In this analysis, we use data from 4,277 persons in the age group of 10-29 years during the period of 1984 to 1994. A migrant is defined as a person who had permanently left (while 97 percent of the migrants left their usual residence one year before the survey was conducted, only 3 percent moved the same year the survey was conducted) this rural residence when he or she was between 10 and 29 years old within the period 1984 and 1994 (10 year cut-off). We restricted our analysis to migration that occurred to this age group for the following reasons. First, it is common for children to leave their residences due to marriage, to look after livestock and cattle of other farmers, or to live with close relatives as early as age 10. For example, the median female age at marriage for the Oromo, Amhara and Tigray ethnic groups are, 16, 14 and 15.6, respectively (CSA, 1993; Ezra, 1997). Second, 88 percent of the mobility recorded in the survey fall in this category. Third, according to the 1994 census, the proportion of people between ages 10 and 29 constituted 41 percent (CSA, 1998). Fourth, previous research on internal migration in Africa (Oucho and Gould, 1993) has shown that it is highest at ages 20-29. Finally, according to the United Nations (1988), children and youth combined account for more than 70 percent of total net migrants in most of the developing world.

The survey reveals that 923 (21.6 percent) persons left their households for marriage, economic motives and other reasons during the study period. While 3,265 young adults who remained at home were in the age range 10-29 during the time of the survey, the remaining 89 young adults were in the age range 30-39 at the time of the survey. They are included in the analysis because they were exposed to the risk of moving when they were between 10 to 29 years old, and they are considered non-movers, since they were still living in their same residences at the time of the survey.

Grain production and livestock sector form the mainstays of household economic and food security. Land, oxen and other livestock, as well as human labor, are the important economic resources that constitute the foundation of the household economy. However, because of the land-tenure system, the relative importance of land in determining inequality and household productivity has diminished. Ezra (1997) and McCann (1984) have argued that it is not access to land but access to oxen that is the main differentiating factor. Substantial differences in oxen ownership was observed by McCann (1987).

Before reviewing the results of the study, a discussion on some data limitations are in order. First, the survey design targeted households that were permanently residing in these areas at the time of the survey. There is no way of getting information in cases where the whole household had moved. Hence, the survey does not consider forced family migration or other cases where all family members moved. Second, the survey does not include temporary or circular migrants. Third, the survey asked the household head or spouse to answer for the mobility of household members. It is generally known that the quality of data obtained from a proxy respondent (household head/spouse, in our case) is usually lower than that collected directly from the migrant.

CHARACTERISTICS OF MIGRANTS AND NONMIGRANTS

Of the 4,277 persons from 2,000 households, 923 persons from 574 households were classified as out-migrants. While about 79 percent of the movement was rural-rural migration, 10 percent was rural-urban, and the remaining 11 percent was another form of migration (to join the army, not stated or unknown). Table 1 presents data on some characteristics of migrants and nonmigrants by gender. The mean age at migration of persons that left home is 18.6, which is greater than the mean age of nonmigrants (15.5). This suggests that age is an important factor in migration. Similar results are shown by gender, although the difference is considerably higher for males. The sex ratio (number of males over females times 100) of migrants (65.4) is strikingly less than that of nonmigrants (153.3), which suggests that females are more likely to move earlier than males. Table 1 also reveals that sons or daughters of the household head are less likely to move than their counterparts who are neither sons nor daughters of the household head.

TABLE 1
SOME DEMOGRAPHIC CHARACTERISTICS OF MIGRANTS AND NONMIGRANTS, ETHIOPIA: 1984-94

Variable	Migrants			Nonmigrants		
	Male	Female	Both	Male	Female	Both
Sex ratio ^a			65.4			153.3
Mean age	21.4	16.8	18.6	16.2	14.3	15.5
Relationship to head of household:						
Sons/daughters	72.6	80.1		85.6	91.5	
Other relatives	27.4	19.9		14.4	8.5	
n	365	558	923	2030	1324	3,354

^a Sex-ratio is number of males over number of females multiplied by 100.

In order to get some insight about the migration motives of migrants, the head of the household was asked to provide the main reason of migration for each person who departed the household. The main reasons of migration by sex, as proffered by the household head, are shown in Table 2. After conducting a pilot survey, the survey questionnaire included a pre-coded set of answers to reasons for migration. An overwhelming majority (72 percent) stated that marriage was the main reason for migration for both males and females. While marriage is the most important factor for migration of both sexes, Table 2 shows that a higher proportion of females (79 percent) migrate for marriage (64 percent). This evidence is consistent with the traditional Ethiopian context where marriage leads to departure from the parents' house. Moreover, marriage is early and almost universal. In addition, the higher migration due to marriage could be to reduce household consumption, as documented in rural Mali, where migration was seen as a strategy to reduce household size and hence food consumption (Findley, 1994). About 10 percent of both males and females left their residences to assist their grandparents or other relatives. Sending children to help grandparents, uncles and other relatives who have no children is a traditional norm in these areas. Social and kinship ties are very strong in rural Ethiopia, and mobility of one's children from one household to another is not uncommon, particularly during stress times. Such movements reflect the importance of kinship ties.

TABLE 2
REASONS OF OUT-MIGRATION FROM SAMPLED COMMUNITIES BY GENDER, ETHIOPIA: 1984-94

Reason	Male	Female	n
Marriage	234	439	673
Help grandparents/ relatives	34	58	92
To look for work	28	17	45
To take-up new job	13	4	17
Land shortage	3	3	6
Drought	2	8	10
To attend school	3	6	9
Joined the army	26	0	26
Whereabouts unknown	9	13	22
Other reasons	13	10	23
Total	365	558	923

As the communities have been victims of drought and famine, we expected mobility for economic reasons to be high. Contrary to our expectations, the reasons attributed to economic motives such as drought, shortage of land or to look for work are very low (9 percent). Only one percent (three males and six females) moved for schooling reasons. Generally, mobility of children for schooling purposes is not very common in Ethiopia where the net primary school enrollment rate is extremely low (12.9 percent for males and 11.5 percent for females). The survey also found that 26 males left their household in order to join the army. While the whereabouts of 22 people (nine males and 13 females) is unknown to the head of the household, another 23 (13 males and 10 females) moved for other reasons, such as conflict with household members.

A MULTILEVEL MODEL

A multilevel framework suggested by Bilborrow and others (Bilborrow et al, 1987) is used in this study to examine rural out-migration in the ecologically degraded communities of Ethiopia. This approach uses individual, household and community characteristics that are conditioned by social and economic structures.

Specification of Variables

The dependent variable is a dummy indicating whether or not an individual had migrated between 1984 and 1994 (i.e., 1 = if migrated, 0 = otherwise). The definitions of the explanatory variables used in the analysis are presented below.

Individual-Level Variables

Age: Age in years.

Age-square: This is included to depict the quadratic nature of the relationship between age and migration because earlier studies have shown that the age-specific migration rate usually rises with age at first, peaks and declines. Sex: coded as 0 = female; 1 = male.

Relationship to household head: 1 = son or daughter of household head; 0 = otherwise.

Household-Level Variables

Education of household head: 1 = literate; 0 = illiterate.

Number of oxen: Households are grouped into three categories according to the number of oxen they have - no oxen, one ox, and two or more oxen. Two dummy variables are created (OXEN and OXEN2), with households with no oxen as a reference category (In Ethiopia, a pair of oxen signifies the attainment of the ideal of independence and self-reliance for peasant production households.)

Housing quality: 1 = household has a house with a tin roof; 0 = otherwise. Ethnic group: Two dummy variables (OROMO and TIGRAY) are created, with AMHARA ethnic group as a reference category. Religion: 1 = Orthodox Christians; 0 = Muslims.

Community-Level Variables

Community's vulnerability to food crisis: This is a vulnerability characteristic which indicates whether or not the household in question belongs to a village that is classified as less vulnerable or more vulnerable (1 = more vulnerable; 0 = less vulnerable). As indicated earlier, classification of localities into 'more vulnerable' and 'less vulnerable' was made on the basis of information obtained from the local offices of the RRC, the Agricultural Extension Workers, and Community Leaders.

The variables age and the number of oxen are time-varying covariates. Household heads can easily recall their oxen, even recalling their names. Hence, it was fairly possible to collect acceptable data on the number of oxen retrospectively. Ideally, the variables 'education of household head' and 'housing quality' should have been allowed to vary between 1984 and 1994. However, in the context of the communities that we are studying, it can be safely assumed that these variables remain unchanged during the 10 year period (1984-1994). Rural literacy rate in Ethiopia was almost constant at 30 percent for males and 17 percent for females (CSA, 1998). In addition, it can be safely assumed that housing quality in rural Ethiopia does not change rapidly. Opportunities for improvement are highly constrained by the community's limited resources and infrastructure.

TABLE 3
DESCRIPTIVE STATISTICS OF SELECTED VARIABLES USED IN THE EVENT HISTORY

Variable	Migrant	Nonmigrant (n=923)	Total (n=3,354)	n (4,277)
Sex				
Male	39.5	60.5	56.0	2,395
Female	60.5	39.5	44.0	1,882
Relationship to household head				
Sons/daughters	77.1	80.5	85.6	3,660
Other relatives	22.9	12.1	14.4	617
Education of household head				
Literate	21.0	21.8	21.6	924
Illiterate	79.0	78.2	78.4	3,353
Number of oxen				
No oxen	19.8	15.4	16.4	700
One	39.0	46.7	45.0	1,925
Two or more	41.2	37.9	38.6	1,652
Housing quality				
Corrugated iron roof	22.3	20.5	20.7	884
No iron roof	77.7	79.5	79.3	3,383
Ethnicity				
Amhara	57.3	55.5	55.9	2,392
Oromo	8.9	12.0	11.3	483
Tigray	33.8	32.5	32.8	1,402
Religion				
Orthodox Christian	58.6	56.1	56.7	2,424
Muslim	41.4	43.9	43.3	1,853
Community crisis				
Less vulnerable	47.8	49.1	48.8	2,089
More vulnerable	52.2	50.9	51.2	2,188
Total	21.6	78.4	100.0	4,277

The descriptive statistics of the variables used in the multilevel analysis are shown in Table 3. Table 3 reveals that there are more males (56 percent) than females (44%) in the sample. The sex distribution of those who left and those who stayed behind clearly shows that the propensity to migrate is higher among females than among their male counterparts. Table 3 also shows that children who are not sons or daughters of the head of the household are more likely to move. Household heads who can read and write constituted only 21.6 percent; and farmers without oxen, one ox, and two or more oxen constituted 16.4, 45.0 and 38.6 percents, respectively, in our sample.

Discrete-Time Hazard Model of Migration

It is increasingly recognized that the most appropriate way to model determinants of migration is in the form of multilevel models (Findley, 1987; Bilsborrow *et al.*, 1987; Zhu, 1998), where individual, household and community-level contextual factors are all simultaneously considered. The multilevel approach is particularly useful for isolating the net effects of important contextual variables. In this study, following previous similar studies of determinants of migration that use multilevel analysis (Liang and White, 1996; Zhu 1998), we apply a discrete-time hazard model to investigate out-migration of young adults. This approach has several advantages. First, since age of migration was recorded only in whole years, applying a continuous time model could bias the results because of a large number of tied observations at each age. Second, the discrete-time hazard model is flexible for fitting time-dependent variables. Finally, the model allows us to control for age (at onset of each person-year) and is equivalent to a logistic model.

The discrete-time hazard model can be specified as follows (Allison, 1982; Yamaguchi, 1991):

$$\ln \frac{I(t_i; X)}{1 - I(t_i; X)} = a_i + \sum_{k=1}^k b_k x_k$$

where $I(t_i; X)$ is the conditional probability of migrating at time t_i for a given vector of individual, household and community level covariates. Note that while age and the number of oxen are time-dependent variables, the rest are fixed covariates.

To use the discrete-time hazard model, we constructed a person-year data. Each child contributes one record

for each year of exposure from age 10 to 29. For each person who was 10-29 years old in the period 1984-94, we create a dummy variable indicating whether the person moves. If the person does not move from his or her "usual residence" in a given year of interest, the dummy variable is coded 0; if the person moves, the dummy variable is coded 1. For example, a person who was 29 years old at the time of the survey and did not move contributes 10 person-years. This procedure results in a data set with 44,080 person-years. In our study, a spell (a continuous period of exposure) encompasses the person-years from age 10 to age of migration.

TABLE 4
ODDS RATIOS OF DISCRETE-TIME HAZARD MODEL OF OUT-MIGRATION,
NORTHERN ETHIOPIA: 1984-1994

Variable	Model 1	Model 2	Model 3	Model 4
Age at migration	2.741 ^a (.132)	2.754 ^a (.133)	2.757 ^a (.133)	2.745 ^a (.133)
Age-square	0.976 ^a (.001)	0.976 ^a (.001)	0.976 ^a (.001)	0.976 ^a (.001)
Sex (ref=Female)				
Male	0.461 ^a (.034)	0.460 ^a (.035)	0.461 ^a (.035)	0.460 ^a (.035)
Relationship to HH head (ref=son/daughter)				
Other relatives	5.571 ^a (.618)	5.275 ^a (.635)	5.262 ^a (.632)	5.413 ^a (.672)
Education of HH head (ref=illiterate)				
Literate		0.829 ^b (.076)	0.831 ^b (.076)	0.834 ^b (.077)
Number of oxen (ref=none)				
One		1.140 (.082)	1.152 (.083)	1.150 (.087)
Two or more		0.926 (.067)	0.935 (.067)	0.903 (.069)
Housing quality (ref=nontin roof)				
Tin roof		0.837 ^b (.075)	0.818 ^b (.074)	0.817 ^b (.074)
Ethnicity (ref=Amhara)				
Tigray		1.009 (.095)	1.016 (.097)	1.018 (.097)
Oromo		0.756 (.118)	0.704 (.112)	0.700 (.111)
Religion (ref=Muslim)				
Orthodox Christian		1.028 (.098)	1.007 (.097)	1.009 (.097)
Community crisis (ref=Less vulnerable)				
More vulnerable			1.168 ^b (.085)	1.162 ^b (.085)
Period (Ref=1984 Famine)				
1985-86				0.961 (.155)
1987-90				0.697 ^b (.110)
1991-94				0.833 (.120)
Model Chi-Square (df)	728.15 (4) ^a	765.35 (11) ^a	765.29 (12) ^a	773.61 (15) ^a
Person-Years	44,080			

Standard errors are shown in parentheses.

^a significant at .01 level

^b significant at .05 level

RESULTS AND DISCUSSION

The results of the discrete-time hazard models are presented in Table 4. Model 1 includes only individual-specific characteristics: age, age-square, sex, and his or her relationship to the household head. The second model (Model 2) adds household-level characteristics: education of household head, number of oxen, housing quality, ethnicity and religion. Model 3 adds community level of vulnerability to food crisis. Model 4 adds period or year as a control variable.

Note that the results are quite robust with the addition of household and community level variables as well as controlling for period effect. Hence, our discussion will focus on Model 4. The results are presented in odds ratios.

Clearly, all the individual-specific covariates are found to be important determinants of out-migration. As expected, and consistent with the life course perspective, age has a significant positive effect on out-migration. We included age-squared to depict the nonlinearity of the influence of age on out-migration. Another important

individual-specific determinant of out-migration is the sex of the person. Our results show that males migrate later than females (the odds are 0.46 lower for males). Relationship to household head is also found to have significant impact on out-migration. Persons who are not sons or daughters of the household head are more likely to move earlier than their counterparts.

Continuing with the household-level variables, education of household head and housing quality have significant negative effects on out-migration. The number of oxen in a household, which is the most important indicator of economic and social status, has no significant impact when considering all persons regardless of the cause for migration. Table 4 also shows that neither ethnicity nor religion are important determinants of out-migration.

TABLE 5
ODDS RATIOS OF MULTINOMIAL DISCRETE-TIME HAZARD MODEL FOR REASONS
OF OUT-MIGRATION, NORTHERN ETHIOPIA: 1984-1994

Variable	Reason		
	Marriage	Economic	Assist Relatives
Age at migration	2.775 ^a (.169)	2.203 ^a (.236)	2.440 ^a (.385)
Age-square	0.974 ^a (.002)	0.982 ^a (.002)	0.978 ^a (.003)
Sex (ref=Female)			
Male	0.361 ^a (.033)	1.147 (.218)	0.479 ^a (.105)
Relationship to HH head (ref=son/daughter)			
Other relatives	5.982 ^a (.880)	4.939 ^a (1.687)	2.177 ^a (.672)
Education of HH head (ref=illiterate)			
Literate	0.753 ^b (.086)	0.879 (.188)	1.346 (.317)
Number of oxen (ref=none)			
One	1.142 (.102)	1.528 ^b (.273)	0.958 (.212)
Two or more	0.948 (.086)	0.691 ^b (.129)	0.935 (.219)
Housing quality (ref=nontin roof)			
Tin roof	0.894 (.096)	0.550 ^a (.102)	2.588 ^b (1.123)
Ethnicity (ref=Amhara)			
Tigray	0.793 ^b (.092)	2.212 ^a (.518)	2.344 ^a (.717)
Oromo	0.562 ^a (.099)	0.571 (.235)	0.444 (.265)
Religion (ref=Muslim)			
Orthodox Christian	1.031 (.113)	0.776 (.200)	0.957 (.368)
Community crisis (ref=Less vulnerable)			
More vulnerable	1.075 (.093)	0.998 (.167)	2.082 ^a (.475)
Period (Ref =1984 Famine)			
1985-86	2.773 ^a (.736)	0.079 ^a (.033)	0.457 ^a (.215)
1987-90	1.687 ^a (.447)	0.148 ^a (.041)	0.352 ^a (.154)
1991-94	2.032 ^a (.518)	0.205 ^a (.047)	0.848 ^a (.314)
Model Chi-Square (df)	1,156.83 (45) ^a		
Person-Years	44,080.00		

Standard errors are shown in parentheses.

^a significant at .05 level;

^b significant at .01 level.

At the community level, vulnerability of the community to food crisis has significant positive effect on out-migration. This provides an empirical support to the "new economics of migration" where migration is used as a family strategy in households living in uncertain environments. Out-migration was highest during the 1984 famine and substantially declined thereafter, especially during 1987-91. In sum, age and sex of the individual, relationship to household head, education of household head, housing quality, and community's food crisis seem to be the most important determinants of rural out-migration in the drought prone areas of Ethiopia. Results of the models presented in Table 4 may conceal important determinants of out-migration because the models do not consider reasons for migration. In Table 5, we present results of a multinomial discrete-time hazard model that considers reasons for out-migration. The dependent variable in this case has four categories: non-migrant

(reference category), migrated for marriage, migrated for "economic" reasons, and migrated to assist relatives. The "economic" category includes all responses except the "marriage" and "assist relatives" categories. This way of analysis allows estimating the net effects of a particular individual, household or community characteristic on different migration motives. As indicated in the previous sections, about 10 percent of household heads explicitly reported "to help relatives" as the reason for migration. In Ethiopia, social welfare for the elderly is nonexistent. Children or family members are responsible for the care of older relatives. On rare occasions, an older parent or relative of either the household head or the spouse of the household head may move to live with the family if they cannot support themselves any longer due to old age or illness. However, most people try to remain self-reliant as long as possible. They join their offspring's house only with some embarrassment. The strategy by which the elderly are cared for is by the retention of an adult child within the parental household, thus providing a degree of economic independence to the elderly parents.

Table 5 presents very interesting findings in light of our previous discussion of the Ethiopian context. Indeed, Table 4 hides very important links. Let us begin with the individual-specific variables. In all migration motives considered in this study, age has a significant effect on the likelihood of out-migration. Again, the coefficients of age-square are significant for all reasons of migration that conform to the nonlinearity of migration trends. The sex of the individual reveals interesting results. While the likelihood of out-migration is significantly higher for females when for marriage and assisting relatives are causes for migration, it is lower (though not statistically significant) when migration is for "economic" reasons. Therefore, moving for "economic" motives is a deterrent factor for females. Consistent with the previous results shown in Table 4, other children or relatives are more likely to move than sons or daughters of the head of the household for all reasons of migration.

Turning to the household-level variables, the likelihood of out-migration when the head of the household is literate is only important when the motivation is for marriage but not for "economic" or "assistance" reasons. That is, children are less likely to move early for marriage if the head of the household is literate than their counterparts in which the household head is illiterate. This can be partly explained by the fact that parents with some education tend to send their children to schools, making children's age at marriage relatively higher. The number of oxen in a household is an important determinant of out-migration for "economic" reasons. The effect of the number of oxen seems more of an inverted U, with low migration for "economic" reasons for those with two or more oxen, and highest migration for those with single-oxen. That is, while one ox is positively associated with out-migration for "economic" reasons, having two or more oxen has a negative effect. In Ethiopia, the number of oxen serves as an indicator of the household's socioeconomic status (Rahmato, 1992; Amare, 1995). It is quite common for single-oxen farmers to complain that they were not able to plant on time or to prepare their land adequately. Odds ratios of the housing quality variable suggest that young adults living in relatively good quality households are less likely to move for "economic" reasons than those living in poor quality households, but *they* are more likely to move to assist relatives. One possible explanation is that sending someone to assist relatives could be a household strategy to spread risk, and households with good quality housing have relatives that are willing to accommodate the migrants.

Examination of the influence of ethnicity on out-migration by considering motivation of migration reveals that ethnicity is an important determinant of out-migration. The significant effect of ethnicity can be seen as the importance of cultural influence on migration motives and the economic conditions of these groups. The Tigray and Oromo ethnic groups are less likely to move for marriage compared with the Amhara ethnic group. This is also reflected in the lowest age at first marriage (14 years for females) for the Amhara ethnic group. Being from the Tigray ethnic group, on the other hand, appears to have a positive impact on migration for "economic" motives and to "assist relatives." Religion appears to have no influence on out-migration.

The community's vulnerability to food shortages contributes significantly to out-migration to assist relatives. This could be a family strategy to minimize risk. Another important finding is that while migration for marriage was substantially lower during the famine year, the highest propensity of out-migration due to "economic" reasons or to "assist relatives" is shown during that year. This is as expected since households postpone marriage during crises and move in search of food to other areas or to live with relatives that are less affected. Not surprisingly, migration for marriage was substantially lower during the famine year (in 1984) than in any other period. Migration for "economic" or "assist relatives" was the highest in 1984 compared with any other period.

CONCLUSION

The main objective of this study has been to document determinants of out-migration of young adults in the

drought prone regions of rural Ethiopia. It represents the first attempt to explain mobility under environmental and economic stress using first-hand data and a methodology that considers individual, household and societal contexts. Using multilevel models, we have demonstrated that migration as a life-course event and the "new economics of migration" can adequately explain the migration patterns of people living in uncertain environments.

Our findings reveal that rural-rural migration is the most important type of internal migration in rural Ethiopia. Besides periodic or seasonal movements, 79 percent of migration was rural-rural. Contrary to most studies documenting that males are more mobile than females (Rogers and Willikens, 1985), our study shows that females are more likely to move than males. Our analysis also indicates that mobility of young adults in impoverished rural communities are severely constrained. Mobility for both sexes was possible through marriage, although females tended to depart their residences for marriage more than males. A possibility of mobility for schooling in these areas is almost negligible. We have found that individual, household and community characteristics play significant roles in determining out-migration. Period effects in relation to the 1984 famine are also important in determining the patterns of migration.

Of special interest in this study is the impact of a community's vulnerability to food crisis on out-migration. This variable is found to significantly influence out-migration overall and to assist relatives in particular. It could be that the strategy of sending an adult child to help elderly relatives has another advantage for the household by reducing household size, and hence consumption, just as out-migration for marriage can be a strategy to reduce household consumption.

REFERENCES

Abate, A.

1995 "Demography, Migration and Urbanization in Modern Ethiopia." In *An Economic History of Modern Ethiopia*. Ed. S. Bekele. Oxford: CODESRIA. PP 277-327.

1989 "Internal Migration and Urbanization in Ethiopia." Paper presented at the conference on Population Issues in Ethiopia's National Development, Addis Ababa, July 20-22.

Allison, O.

1982 "Discrete-Time Methods for the Analysis of Event Histories." In *Sociological Methodology*. Ed. S. Leinhardt. San Francisco: Jossey-Bass. Pp. 61-98.

Amare, Y.

1995 "Household Economic Status, Seasonality and Food Strategies in Ethiopia: The Case of Wogda, Northern Shewa." Ph.D. Dissertation, Boston University.

Berhanu, B. and M. White

1998 "War, Famine, and Female Migration in Ethiopia, 1960-1989." Paper presented at the Annual Meeting of the Population Association of America, Chicago.

Bilsborrow, R.

1998 "The State of the Art and Overview of the Chapters." In *Migration, Urbanization, and Development. New Directions and Issues*. Ed. R. Bilsborrow. UNFPA: Kluwer Academic Publishers. Pp. 1-56.

Bilsborrow, R. *et al.*

1987 "The Impact of Community Characteristics on Rural-Urban Out-migration in a Developing Country," *Demography*, 24(2):191-210.

Central Statistical Authority (CSA)

1998 *The 1994 Population and Housing Census of Ethiopia, Analytical Report on the National Level, Volume I*. Addis Ababa: Central Statistical Authority.

1993 *The 1990 National Family and Fertility Survey Report*. Addis Ababa: CSA.

1992 *Volume II. The Analysis of Local Moves and Internal Migration*. Addis Ababa: CSA.

1991 *Analytical Report of the 1984 Population and Housing Census of Ethiopia*. Addis Ababa: CSA.

Cohen, J. M. *et al.*

1988 "Food Production Strategy Debates in Revolutionary Ethiopia," *World Development*, 16(3):325-348.

DaVanzo, J.

1981 "Microeconomic Approaches to Studying Migration Decisions." In *Migration Decision-Making: Multidisciplinary Approaches to Microlevel Studies in Developed and Developing Countries*. Ed. G. F. De Jong and R. W Gardner. New York: Pergamon Press. Pp. 90-129.

Demeke, M. and T Regassa

1996 "Nonfarm Activities in Ethiopia: The Case of North Shoa." In *Proceedings of the Fifth Annual Conference on the Ethiopian Economy*. Addis Ababa. Pp. 125-161.

Elder, G. H. Jr.

1978 "Approaches to Social Change and the Family," *American Journal of Sociology*; 84:S 1-S38.

Ezra, M.

2000 "Leaving-home of Young Adults Under Conditions of Ecological Stress in the Drought Prone Communities of Northern Ethiopia," *GENUS*, LVI (n-3-4) 2000. Pp. 121-144.

1997 "Demographic Responses to Ecological Degradation and Food Insecurity: Drought Prone Areas in Northern Ethiopia." Doctoral Dissertation, Population Research Center, University of Groningen. Thesis Publishers, Amsterdam.

Findley, S. E.

1994 "Does Drought Increase Migration? A Study of Migration from Rural Mali during the 1983-1985 Drought," *International Migration Review*, 126(3):539-553.

1987 "An Interactive Contextual Model of Migration in Ilocos Norte, The Philippines," *Demography*, 24(2):163-190.

Fox, M. and O. Stark

1987 "Remittances, Exchange Rates and the Labor Supply of Mexican Migrants in the U.S.," Discussion Paper Series No. 33. Cambridge, MA: Harvard University Center for Population Studies. Pp. 16.

Hill, A.

1998 "Demographic Responses to Food Shortages in the Sahel," *Population and Development Review*, Supplement to Volume 15.

Holt, J. and M. Lawrence

1993 *Making Ends Meet: A Survey of the Food Economy of the Ethiopian Northeast Highlands*. United Kingdom: Save the Children.

- Kertzer, D. I. and D. P. Hogan
1989 *Family, Political Economy and Demographic Change: The Transformation of Life in Casalecchio, Italy, 1861-1921*. Madison: University of Wisconsin Press.
- Kloos, H.
1982 "Farm Labor Migrations in the Awash Valley of Ethiopia," *International Migration Review*, 16(1):133-165.
- Krokkfors, C.
1995 "Poverty, Environmental Stress and Culture as Factors in African Migrations." In *The Migration Experience in Africa*. Ed. J. Baker and T. Aina. Sweden: Nordiska Afrikainstitutet.
- Kumar, B.
1990 "Ethiopian Famines - 1973-1985: A Case Study." In *The Political Economy of Hunger*. Ed. J. Dreze and A. Sen. Oxford, Clarendon Press. Pp. 173-216.
- Lauby, J. and O. Stark
1988 "Individual Migration as a Family Strategy: Young Women in the Philippines," *Population Studies*, 42:473-486.
- Liang, Z, and M. J. White
1996 "Internal Migration in China, 1950-1988," *Demography* 33:375-384.
- Mammo, K.
1991 "Migration and Urban Development in Ethiopia: The Case of Nazareth." Unpublished M.A. Thesis. Addis Ababa: Addis Ababa University.
- Massey, D. S.
1989 "Social Structure, Household Strategies, and the Cumulative Causation of Migration," *Population Index*, 56:3-26.
- Massey, D. S. *et al.*
1993 "Theories of International Migration: Review and Appraisal," *Population and Development Review*, 19(3):421-466.
- McCann, J.
1987 "From Poverty to Famine in Northeast Ethiopia: A Rural History 1900-1935." Philadelphia: University of Philadelphia.
-
- 1984 "Ploughs, Oxen, and Household Managers: A Reconsideration of the Land Paradigm and the Production Equation in North-East Africa." Working paper No. 5. Boston University: African Studies Center.
- Moen, P and E. Wethington
1992 "The Concept of Family Adaptive Strategies," *Annual Review of Sociology*, 18:233-251.
- Oucho, J.
1998 "Recent Internal Migration Processes in Sub-Saharan Africa: Determinants, Consequences, and Data Adequacy Issues." In *Migration, Urbanization, and Development: New Directions and Issues*. Ed. R. Bilborrow. Unfpa: Kluwer Academic Publishers. Pp. 89-120.
- Oucho, J. O. and W T S. Gould
1993 "Internal Migration, Urbanization, and Population Distribution." In *Demographic Change in Sub Saharan Africa*. Ed. K. A. Foote, K. H. Hill and L. G. Martin. Washington, DC: National Academy Press. Pp. 256-296.

Rahmato, D.

1994 "Neither Feast nor Famine: Prospects for Food Security in Ethiopia." In *Ethiopia in Change: Peasantry; Nationalism and Democracy*. Ed. A. Zegeye and S. Pausewang. British Academy Press.

1992 "The Dynamics of Rural Poverty: Case Studies from a District in Southern Ethiopia." CODESRIA, Monograph Series 2/92, Dakar, Senegal.

1989 "Famine and Survival Strategies: A Case Study from North-East, Food and Famine." Monograph No. 1, Institute of Development Research. Addis Ababa: Addis Ababa University.

1984 *Agrarian Reform in Ethiopia*. Trenton, NJ: Red Sea Press.

Rogers, A. and F. J. Willikens

1985 *Migration and Settlement: A Multiregional Comparative Study*. Dordrecht: D. Reider.

Rosenzweig, M. R. and O. Stark

1989 "Consumption Smoothing, Migration, and Marriage: Evidence from Rural India." *The Journal of Political Economy*, 97(4):905-926.

Sjaastad, L. A.

1962 "The Costs and Returns of Human Migration," *Journal of Political Economy*, 70:80-93. Supplement 5, part 2.

Stark, O.

1991 *The Migration of Labor*. Cambridge, MA: Basil Blackwell.

1984 "Rural-Urban Migration in LDCs: A Relative Deprivation Approach," *Economic Development and Cultural Change*, 13:475-486.

Stark, O. and D. E. Bloom

1985 "The New Economics of Labor Migration," *American Economic Review*, 75:173-178.

Todaro, M. P

1976 *Internal Migration in Developing Countries: A Review of Theory Evidence, Methodology and Research Priorities*. Geneva: ILO.

1969 "A Model for Labor Migration and Urban Unemployment in Less Developed Countries," *American Economic Review*, 59:138-148.

United Nations

1988 *World Population Trends and Policies*. Monitoring Report. New York: United Nations.

Webb, P and J. von Braun

1994 *Famine and Food Security in Ethiopia: Lessons for Africa*. Wiley: Chichester.

Wood, A.

1977 "A Preliminary Chronology of Ethiopian Droughts." In *Drought in Africa*. Ed. R. Harrison and E Bezzaz. Report No. 6. London: International African Institute.

Yamaguchi, K.

1991 *Event History Analysis*. Newbury Park: Sage Publications.

Zhu, J.

1998 "Rural Out-migration in China: A Multilevel Model." In *Migration, Urbanization, and Development: New Directions and Issues*. Ed. R. Bilborrow. UNFPA: Kluwer Academic Publishers. Pp. 157-186.