An Event History Analysis of Internal Migration in Ghana: Determinants of Interregional Mobility among Residents of Coastal Central Region

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Abstract: This paper uses primary event history data from residents of coastal Ghana to examine interregional migration within Ghana. The use of life history data in migration research is relatively rare; most studies rely on imprecise measures of mobility over time. We have the advantage of a complete life history calendar (by yearly intervals) for 2500 men and women. Ghana is one country in sub-Saharan Africa where the demographic transition, associated with increasing urbanization, is well underway, so it is an important setting for the study of migration. In addition to examining rural-to-urban migration, we also look at other types of migration (rural-to-rural, urban-to-urban, and urban-to-rural). These types of moves are often overlooked in the migration literature, which tends to focus on rural-to-urban migration. Results from discrete time event history logit models indicate that only some of the usual hypotheses about migration are supported by our data. We find, net of other controls, higher probabilities of migrating for more educated persons, non-married persons, urban residents, and previous migrants. In addition, having more than two living children, being employed, or being in school all deter migration. These results are largely consistent in multinomial logit models of movement to rural or urban areas (for rural and urban sub-samples).

Introduction

The demographic literature on internal migration in the developing world is filled with generally accepted ideas about the type of people who are more likely to move, the determinants of moving, and the consequences of mobility. Yet the empirical evidence on which these assumptions are based remains thin. Few censuses or surveys give us adequate information for understanding migration patterns and timing and its relation to other life cycle processes. Although some excellent surveys have collected data on migration in other settings, solid quantitative data on migration in sub-Saharan Africa has been particularly lacking.

This paper will begin to fill that research gap by analyzing migration patterns in Ghana using event history analysis methods with data collected using a life history calendar (LHC). This allows for the analysis of demographic changes for all adults in the sample on a year-by-year basis. Thus, it gives not only the sequence of migration in relation to other social and demographic changes, but also more precise timing of these events than is generally available from standard census or survey questions about current and past place of residence.

Theoretical Framework and Previous Research

The Ghanaian Context

Ghana is a particularly valuable place to study migration as it relates to other life cycle processes. First, Ghana is one of the countries on the forefront of the demographic transition in Africa, where fertility and mortality rates have declined dramatically in the last 20 years. According to United Nations projections, the capital city of Accra may reach replacement level fertility within the next 10 years (UN, 2002). And although it remains a relatively poor country in comparison to much of the world, it has done well in terms of achieving many social indicators of development. Ghana also remains one of the few countries in Africa to have avoided large-scale conflict since its independence in 1957. Thus it gives us a potential window on how development and demographic change may interact to affect urbanization and migration in other parts of Africa, particularly in post-conflict developing societies.

Finally, Ghana is not only on the forefront of the demographic and development transitions in Africa, but also at the front of the urbanization trend. Important migration routes in

West Africa related to nomadic movements and traders have been used for centuries. Due to its central location in the region, Ghana is a key component of these routes. In recent years, the migration routes have been supplemented by increasing rural-to-urban migration, as cities in Ghana, such as Accra and Kumasi, have become magnets for not only traders, but also young migrants seeking work and educational opportunities.

The coastal region of Africa, not surprisingly, is urbanizing especially rapidly. Ghana's rapid population growth and urbanization also have important linkages to migration. The 2000 national census in Ghana recorded a population of 18.9 million people, a 54 percent increase from previous census in 1984. The intercensal growth rate was 2.7 percent (GSS, 2002:1). The 2000 census classified 37.5 percent of Central Region's population as urban. Central Region is the third most urbanized region in Ghana, following neighboring Greater Accra (87.7 percent urban), which includes the capital city, and Ashanti regions (51.3 percent) (GSS 2002:17). Nationally, about 44 percent of Ghana's population is urban, an increase from the 1984 level of 32 percent (GSS 2002:2). Ghana, like most of Africa, is still predominantly rural, but is urbanizing rapidly.

The Literature on Internal Migration

Much of the research on migration in developing countries has focused on rural-urban migration and urbanization. Governments and international organizations have shown concern about the rapid urban growth in developing countries, and the social, economic and environmental problems associated with this growth (White and Lindstrom, 2005). Despite the important (and often overlooked) role of natural increase in urban growth, rural-urban migration, and the rural-urban migrants themselves, have received substantial attention from both policy-makers and demographic researchers.

But internal migration includes more than movement from rural to urban areas. Recently, more attention has been paid to other types of migration – rural-rural, urban-urban, and urban-rural – the degree of urbanness of particular "urban" localities, as well as the usefulness of the rural/urban dichotomy in understanding internal migration (NRC, 2003). For example, step migration, or the sequence of moves from smaller communities to larger communities (White and Lindstrom, 2005), as opposed to a single move from a rural community to a large urban area, may provides a more nuanced picture of internal mobility than a simple rural-urban model. Step

migration suggests that towns and secondary cities will serve as intermediate destinations for urban-ward migrants, and highlights urban-urban movement in developing countries (White and Lindstrom, 2005). However, the sequence of movement to increasingly larger settlements implied by step migration has also been disputed by some researchers. For example, in Côte d'Ivoire and Togo, small and medium-sized towns receive influxes of migrants from both rural areas and capital cities (Dupont and Dureau, 1988). This suggests that, rather than simple step migration, there may be a more complex migratory process occurring.

In addition to rural-urban and urban-urban migration, rural-rural and urban-rural migration, while less common, also merit attention in research on internal migration in developing countries. Urban-to-rural migration appears to be more important than previously believed in sub-Saharan Africa. Retirement, returning to care for the family or farm, and economic crises (which can hit harder in cities than rural areas) all contribute to this type of migration flow. The strong link that many Africans retain with their village is hypothesized by some authors to contribute to these "reverse" urban-to-rural flows (Beauchemin and Bocquier, 2004). In Burkina Faso and Côte d'Ivoire, rural out-migration has leveled off and urban out-migration has continued to grow. Typical urban out-migrants are no longer the elderly going home to their villages to retire, but are younger adults. The economic recession does not sufficiently explain these trends, which suggests that the rural areas are attractive for youth, and that perhaps parts of West Africa remain dependent on agricultural economies (Beauchemin et al., 2004).

Using life history calendar (LHC) data from men and women who now reside in Ghana's Central Region, our paper will explore these different types of migration – rural-rural, rural-urban, urban-urban, and urban-rural – across regional boundaries. Relatively few studies have used a life history calendar instrument to examine migration. Most of these studies examined international migration from the global South northward or internal migration within the global North (Bonvalet and Lelievre, 1990; Donato et al., 1992; Kempeneers, 1992; Landale, 1994; Landale and Ogena, 1995; Lindstrom, 1996; Ortiz, 1996; and Rees et al, 2000). Very few of these explored the timing and patterns of migration within countries in Africa, Asia, or Latin America (Baydar et al., 1990; Chattopadhyay, 1997; Goldstein et al., 1997; Liang and White, 1996; White et al., 1995).

The earliest survey of migration using a life history calendar methodology in sub-Saharan Africa was probably a 1974-75 survey in Burkina Faso (Cordell et al., 1996). In 1993, the Network of Surveys on Migration and Urbanisation in West Africa (NESMUWA) carried out similar simultaneous migration surveys using nationally representative samples in eight West African countries: Burkina Faso, Côte d'Ivoire, Guinea, Mali, Mauritania, Niger, Senegal, and Nigeria. They used a similar retrospective life history calendar approach to the earlier Burkina Faso study, recording residence history for respondents from birth to the time of the interview, and also recording out-migrants from the household during the five years preceding the survey (Beauchemin and Bocquier, 2004).

In addition, between 1989 and 2001, several complementary studies on urban integration in capital cities, using a similar life history approach, were conducted for representative samples of the following cities: Dakar, Senegal; Bamako, Mali; Yaoundé, Cameroon; Ouagadougou, Burkina Faso; and Lomé, Togo (Beauchemin and Bocquier, 2004). These studies also contain migration histories, although they surveyed both migrants and non-migrants and published analyses have focused on employment and social integration more than migration patterns (see, for example, Calvès and Schoumaker, 2004; Antoine et al., 2001; Marcoux et al., 1994). Another urban integration survey, again with a migration history, but not solely focusing on migration, was conducted in Nairobi, Kenya, in 2001. This was the first survey of this type in an English-speaking sub-Saharan African country (Agwanda et al., 2004).

Migration and Fertility

Given recent concern in developing countries with rural-urban migration and urban growth, migration researchers have been particularly interested in the relationship between migration and fertility. Three main hypotheses are of particular interest to us: selection, disruption and adaptation. *Selection* suggests that migrants are distinct from those who do not move in terms of education, age, marital status, and family size preferences (Ribe and Schultz, 1980; Goldstein and Goldstein, 1981, 1983; White et al., 1995). Thus one might expect that the migrants who leave rural areas are already different from their rural counterparts who remain and that they will have more in common with their new urban neighbors. If true, then we would expect that those who move have lower fertility before and after the move than their rural counterparts and that their migration out of rural areas might inflate rural fertility rates.

Disruption suggests that migrants' fertility is interrupted and temporarily postponed because of the separation of spouses. Evidence suggests that migrants may later attempt to "catch up" to attain their desired family size, but undoubtedly some fertility disruption may slightly reduce overall fertility (Ribe and Schultz, 1980; Potter and Kobrin, 1982; Hervitz, 1985; Goldstein and Goldstein, 1981, 1983, 1984; White et al., 1995).

Finally, *adaptation* suggests that migrants change their behavior to fit their new urban environments and that new social networks will give them new ideas about fertility and family size. One might expect that migration to urban areas would lead migrants to adopt new social norms associated with delaying or reducing fertility. There is some evidence of this relationship from studies in Thailand, China, Korea, and Vietnam (Goldstein and Goldstein, 1983; Farber and Lee, 1984; Lee and Farber, 1984; Goldstein et al., 1997; Bond et al., 1999; White et al., 2001).

Yet evidence of these relationships from Africa is scarce (Oucho and Gould, 1993). A study of in Kumasi, Ghana, found that rural migrants had higher cumulative fertility than second and third generation urban residents, but lower average fertility than rural residents. Although lifetime fertility for first-generation migrants was higher than for either urban natives or successive generations of migrant children, they had lower fertility than urban natives in the year immediately after migrating. These findings suggest that a combination of the theories of selection, disruption, and adaptation may be most useful for explaining the relationship between migration and fertility changes (White et al., 2005). Through an examination of how family size and structure influence migration behavior, our study can help further explore these hypotheses.

Addressing these issues in the extant literature, this paper will:

- Describe internal migration patterns in Ghana using event history analysis;
- Examine the determinants, timing and sequence of inter-regional migration in Ghana;
- Explore the different types of inter-regional migration in Ghana, including rural-rural, rural-urban, urban-rural and urban-urban.

Data and Methods

Data

The data for this paper come from the 2002 Population and Environment (P&E) Survey of the Central Region in Ghana.[1] Central Region is one of 10 administrative regions (i.e., provinces) in Ghana. According to the 2000 census, the population of Central Region is about 1.6 million. The research team chose Central Region due to the availability of lagoons in this region that could provide the setting for a parallel study of water quality. The Ghana P&E Survey is representative of the six coastal districts in Central Region: Komenda-Edina-Eguafo-Abirem (KEEA), Cape Coast, Abura-Asebu-Kwamankese, Mfantsiman, Gomoa, and Awutu-Efutu-Senya. These districts together comprise approximately four percent of Ghana's total population (GSS 2002: 1,17).

The Ghana Population and Environment Survey is a representative household-based survey administered across 54 communities (stratified by rural, semi-urban and urban) in the six coastal districts of Central Region. The survey was designed to examine the relationship between migration, fertility, child health knowledge and behaviors, and environmental attitudes and awareness. The total sample size of individuals in the survey is 2,505; 1,092 men aged 15 and above, or 94 percent of identified eligible men, were interviewed; 1,413 women aged 15 and above, or 93 percent of identified eligible women, were interviewed in the survey. The sex ratio of the adult sample [only adults age 15 and above completed individual questionnaire] was 0.77, which reflects high out-migration of men in this region of Ghana. In fact, while the 2000 census total sex ratio for Central Region is 0.91 (the lowest in Ghana), the sex ratio for the adult population (i.e., age 15 and above) is still lower: 0.84, which is closer to the sex ratio of 0.77 from the survey.

The survey included four components: a community questionnaire, a household questionnaire, a men's questionnaire, and a women's questionnaire. The household questionnaire included questions on current household composition, basic demographic characteristics of household members, and economic characteristics of the household. The

[1] The survey was conducted by a collaborative team including the Population Studies and Training Center, Brown University (Michael J. White, PI); the Institute for Land Management and Development, University of Science and Technology, Ghana (Eva Tagoe, Co-PI); the Demography Unit, University of Cape Coast, Ghana; and the Coastal Resources Institute, University of Rhode Island, USA (Scott Nixon, Co-PI).

women's questionnaire contained questions on the respondent's socio-demographic background, birth history, health knowledge, child health (for living children under six years of age), fertility preferences and family planning, and environmental attitudes. The men's questionnaire was a reduced version of the women's questionnaire, excluding the birth history and child health modules. While the survey instruments were similar to the Demographic and Health Survey (DHS) in format and content, the instruments incorporated unique sections on knowledge of the etiology of specific childhood diseases, household hygiene practices, and environmental attitudes and awareness. The men's and women's questionnaires were administered to all adults (age 15 and above) in each sampled household.

In addition to the more standard aspects of the survey described above, both the men's and women's individual questionnaires included a retrospective life history calendar (LHC) by yearly interval from birth to current age (in 2002). While event history calendars have been used in other demographic surveys, they are rarely used in low-income, sub-Saharan African settings. Our life history calendar gathered data on several demographic and socioeconomic events over the complete life course of each respondent. More specifically, the LHC calendar included cells for each year of a person's life for the recording of region of residence, type of residence (rural or urban), education, occupation, marital status, child birth, and child death. Yearly (rather than monthly) information was gathered due to both feasibility and the unlikeliness that an older respondent would be able to recall in monthly detail events from his or her youth. However, to assist with recall, our LHC also included rows for both "national temporal landmarks" and "personal temporal landmarks" (e.g., Ghana's independence in 1957, the national election in 2000, or simply a person's year of marriage) to help a person recall the timing of specific events relative to these more easily recalled events. Moreover, information given in the background or birth history sections of the survey (e.g., age at first union, children's birth dates [and, where applicable, dates of deaths]), was also used to verify the information given for the LHC.

The descriptive statistics for this paper come primarily from the household or individual survey, while our event history data –in person-year format – will be used for our multivariate analyses. We used sampling weights in the descriptive analysis to present results that are representative of the population of this area (the six coastal districts) of Ghana's Central Region.

Methods

Our analysis uses a discrete-time event history logit model – an extension of logistic regression – to estimate the probability of a migration event occurring in the current year as a result of the previous year's characteristics. This estimation procedure divides time to migration into discrete intervals and estimates the probability of observing the event (a interregional move) within each interval. This model easily accommodates time-varying covariates, such as type of place of residence (rural vs. urban), because for each discrete interval a new value of the covariate can be included (Yamaguchi, 1991; Box-Steffensmeier and Jones, 2004). The time-varying independent variables are lagged by one year on the assumption that changes in covariates in the prior year may affect the probability of migrating in the current year. We begin the analysis at age 15 (the age of adulthood) and continue up to the current age (at the time of the survey, 2002) for all adults in our sample. As mentioned above, only yearly data are available, so the model cannot account for monthly changes. However, this model should capture the majority of the variation in migration due to changes in the previous year's characteristics.

The event history analysis begins with a simple logit model containing basic demographic and socioeconomic characteristics and then moves to a more complex model incorporating interaction effects. The model for the analysis is:

$$\text{logit}\,(p_{it}) = \alpha + \beta_x X_i + \beta_x X_{i(t-1)} + \varepsilon_i$$

where X_i is a matrix of co-variates constant over time; $X_{i(t-1)}$ is a matrix of time-varying co-variates; and the β_xs are the respective vectors of coefficients. This equation will estimate the probability of moving between regions (our first set of models) or the probability of moving between rural and urban areas (our second set of models) compared with not moving in a given year, as a function of the previous year's characteristics and constant characteristics such as birth cohort and sex. The second set of models, focusing on rural-urban moves, relies on multinomial logistic regression. These models estimate the probability of moving inter-regionally to a rural area or to an urban area, compared with not moving at all, for two subsets of the sample, rural residents at any time t and urban residents at any time t.

Measures

This analysis examines two dependent variables related to migration. First, we estimate the probability of migration over time in an event history analysis with a variable that measures whether or not a person moves between regions in a given year. Values of this move variable are set to 1 in years when a person moves and 0 otherwise. Unfortunately, with this data it is impossible to examine out-migrants, or former residents who have moved out of Central Region, but a second round of data collection, the 2004 Ghana Population and Environment Survey, from which data are still being assembled, will improve our knowledge of out-migration.

Our second migration outcome measures whether a person moves to a rural or urban area, or does not move at all. Because of the way the calendar is organized, it is impossible to know about rural-rural or urban-urban moves within a region. Our LHC only records these moves if a person moves between two regions. (For example, if a person's region of residence remains constant from year to year, there is no way for us to "see" a change in type of residence from, for example, one rural place to another rural place. It simply appears as if the person resided in the same rural place from year to year.) Thus, we perform a stratified analysis of rural residents and urban residents using multinomial logistic regression. For rural residents, those who move to a rural area in another region will be coded 1, and those who move to an urban area will be coded 2. All others, including non-movers and those who move from one rural area to another rural area in the same region, will be the base category of 0. For the urban sub-sample, those who move to an urban area in another region will be coded 1, those who move to a rural area will be coded 2, and all others (including non-movers and those who move from one urban area to another urban area within the same region) will be the base category of 0.

In addition to characteristics like sex, birth cohort, and highest level of schooling attained, which are fixed over time, we also include several time-varying independent variables in our models, including: age, marital status, schooling status (in school or not), employment status, rural or urban residence, total number of living children, birth of a child in the previous year, death of a child death in the previous year, and number of prior moves. **Appendix 1** presents the main variables for our analyses and their coding.

Hypotheses

We have several hypotheses, including:

- Young adults (or those in their twenties) will be more likely to move compared to adults of other ages;
- Men will be more likely to move than women;
- Unmarried people will be more likely to move compared to married people;
- In addition, the effect of marriage may differ for men and women, and by age;
- More educated people will be more likely to move compared to those with low levels of educational attainment;
- People with few or no children will be more likely to move than those with many children;
- Previous movers will be more likely to move compared non-movers;
- Urban residents will be more likely to move compared to rural residents.

Results

Descriptive Statistics

Table 1 displays some basic descriptive statistics for the migration variables used in our analysis. The population is a fairly mobile one, as almost 60 percent of the sample, or 1,482 persons, have moved across regions at least once in their lifetime. The average number of inter-regional moves for the whole sample is less than one-half of a move (0.47). Figure 1 presents survival curves of our sample's first, second and third interregional move. This figure illustrates that the average time to a move decreases with each subsequent move. These curves suggest that once a person has made an initial inter-regional move, the perceived costs of moving again decrease.

[Figure 1 here]

Among those inter-regional moves, we also examine type of move by origin and destination. The majority of cases of both rural and urban origin are never-movers (46.8 and 50.3 percent, respectively). Yet there is evidence that urban residents are more likely to move to

another urban destination than a rural place. Among urban residents' total moves, twice as many are to other urban places (rather than rural destinations). And overall, urban residents appear to be more mobile; urban residents have more interregional moves than do rural residents.

[Table 1 here]

Table 2 displays weighted descriptive characteristics for the main independent variables to be used in our analysis. Our sample is over 57 percent female, with an average age at the time of the survey of 35 years.[2] The mean number of children ever born is just over 3, indicating a fairly low birth rate relative to other parts of sub-Saharan Africa. The majority of the sample (54 percent) has attended primary school, but secondary school remains relatively rare, with only 14 percent attaining it. Nearly one-third of our sample (32 percent) has no schooling. Over 56 percent of the sample is married or in a consensual union, which is lower than one might expect for Ghana, although many in our sample may yet enter unions.

Examining variables related to migration and urbanization, Table 2 shows that 33 percent of the sample resides in rural areas and 67 percent in urban areas.[3] This confirms the relatively urban nature of this southern coastal area of Ghana. Among those who have moved across regions during their lifetime, the average age at migration is fairly young – about 25 years. Thus, even though the mean age of the total sample is relatively young, we do have a large proportion of inter-regional movers.

[Table 2 here]

Logistic Regression Event History Analysis of Inter-Regional Migration

Results from the dichotomous logistic nested models of inter-regional migration are shown in Table 3. These models predict the log odds of moving across regions in a given year as a function of constant characteristics (sex and birth cohort), and time-varying characteristics as measured in the previous year (age, educational attainment, in school status, marital status,

[2] Only adults, defined as men and women age 15 and beyond, were interviewed in the survey.
[3] Rural and urban residence are self-reported measures.

employment status, birth, child death, number of living children, number of prior moves, urban residence, and two interaction terms: age * marital status and sex * marital status).

[Table 3 here]

We estimate two models, one with basic demographic and socioeconomic characteristics, including migration experience and urban residence, and the second incorporating interaction effects. Across both models, the results indicate the expected curvilinear pattern for age, where the log odds of moving increase with each additional year of age up to a peak and then decline. Although women are significant less likely to move compared to men in Model 1 (-0.125, $p<0.05$), the log odds of moving do not vary significantly by sex once the interaction term is included in Model 2. However, the interaction term between age and marriage indicates that although the overall effect of marriage on migration may be negative (see Model 1), it is dependent on age. In the final model, the log odds of migrating are significantly higher for married people (0.677, $p<0.001$), but the interaction term between age and marriage shows that this effect decreases with each additional year of age (-0.023, $p<0.001$). In other words, young married people may be more likely to move than their unmarried peers, but this relationship declines over the life course.

Higher educational attainment is significantly associated with higher log odds of migrating, but being in school or employed in the previous year are both significantly associated with lower log odds of moving (-0.390, $p<0.001$, and -0.642, $p<0.001$, respectively, in Model 2) These findings are consistent with the literature and our hypotheses. In terms of fertility and its relationship to migration, we find no significant differences in the log odds of migrating based on the birth or death of a child in the previous year. Yet having two or more living children is associated with a significant decrease in the log odds of moving, compared to having no children. The large decrease between the coefficients for two children and three children compared to that for four or more children indicate the strong deterrent effect of each additional child, in particular for the fourth or greater additional child, on migration. It also indicates a potential selection effect that is consistent with some of the literature on the relationship between migration and fertility.

Turning to the variables on urban residence and mobility, we find robust and consistent results that previous movers and urban residents are significantly more likely to move compared to non-movers and rural residents (0.333, $p<0.001$ and 0.754, $p<0.001$, respectively, in Model 2). These results indicate that urban residents are indeed more mobile than rural residents, which suggests that an urban-to-urban migration pattern may be present. The multinomial logit models (discussed in the next section) attempt to address this issue. In addition, the higher log odds of moving for previous movers compared to non-movers implies one of two possibilities. First, it is possible that the economic, social, and psychological costs of moving again decrease after an individual has moved once before. Or, it is possible that there are two different kinds of people: those who are more inclined to move and those who are not. Although we do not estimate a mover-stayer model in this paper, by including the variable measuring the number of previous moves it is possible to get at some of the unobserved heterogeneity that many migration analyses cannot tap.

Finally, we find significant cohort effects in Model 2, indicating that those in the middle and younger cohorts are less mobile than the older cohort, net of all the other characteristics in our model. This finding contradicts our expectation, consistent with mobility transition theory (Zelinsky, 1971), that generations become more mobile over time. Further research will be necessary to understand the meaning of these findings.

Using Model 2 of Table 3, Figure 2 presents predicted probabilities of moving inter-regionally by age, sex and marital status. In this figure, we adjust for modal characteristics of our sample men and women. Figure 2 illustrates our finding that both age and marriage deter mobility. In addition, the crossover shown in this figure illustrates the interaction effect shown in Model 2; younger married people are more likely to move than their unmarried peers, but this relationship declines over the life course.

[Figure 2 here]

Competing Risk Model of Migration by Place of Origin & Destination

In the second set of analyses, we examine the two types of inter-regional moves—to rural areas and to urban areas—for each type of place of origin—rural and urban. In the first set of models (Table 4), we estimate the log odds of moving (to a rural destination or to an urban

destination) compared to not moving for the *rural* origin population. In the second set of models (Table 5), we estimate the log odds of moving (to a rural destination or to an urban destination) compared to not moving for the *urban* origin population. Only the highest order models are shown, although results for the lower order models were estimated. Model fit was better for the fuller models.

Table 4 displays the multinomial logit regression (competing risk) results for the rural-origin population at time t-1. The first column of coefficients are for inter-regional moves to another rural area compared to no move and the second column of coefficients are for inter-regional moves to an urban area compared to no move. First, looking at rural-rural movers, the age and gender effects found in our earlier models are not present for this sub-group. Having primary education increases the log odds of moving to a rural area compared with not moving at all (0.508, $p<0.05$), but secondary education has no significant effect. Marital status, being in school, birth, child death, and number of living children all have no significant effect on the log odds of moving from a rural area to another rural area. The interaction effects with marriage are also not significant for rural-rural movers.

[Table 4 here]

Being employed, as expected, reduces the log odds of moving between rural areas compared to not moving (-0.553, $p<0.05$). Previous movers (of any inter-regional move type) are significantly more likely to move between rural areas (0.479, $p<0.001$), which suggests again that there may be some reduced cost to second and higher moves, or some unobserved latent characteristic of people that causes them to be more likely to move. Finally, as in the binary logistic regression model, both the middle and young birth cohorts are significantly less likely to move than the older cohort is (-0.553, $p<0.05$, and -0.510, $p<0.05$, respectively).

Turning to the second column of coefficients, we find a number of significant results for rural residents moving to an urban area compared to non-movers. Age and sex again are not significant. Interestingly, married rural people have much higher log odds of moving to an urban area compared to not moving at all, but when the interaction term for age and marriage is taken into account, this effect declines over the life course. Those with primary education or secondary education are significantly more likely to move (0.864, $p<0.001$, and 0.918, $p<0.01$,

respectively). But being in school is not significant. As in the previous models, being employed is significantly associated with decreased log odds of moving to an urban area compared to not moving (-0.697, $p<0.001$).

Although birth or death of a child in the previous year are still not significant predictors of moving, the negative effect of each additional living child, including the first child, on moving to an urban area is significant. This strongly negative effect between the number of living children and moving to an urban area makes sense because Ghana's agricultural enterprise remains significant and therefore the value of children (and also the cost of educating them) deter rural-urban mobility.

Previous movers, as in prior models, are also significantly more likely to move to an urban area compared to not moving (0.295, $p<0.001$). Finally, both the young and middle birth cohorts are less likely to move than the older cohort (born before 1950), but here the results are only significant for the young birth cohort (born after 1970) (-0.944, $p<0.001$).

Moving to the urban origin population, Table 5 shows the multinomial logistic regression results for this sub-group. The first column of coefficients are for inter-regional moves to a rural area compared to no move and the second column of coefficients are for inter-regional moves to another urban area compared to no move. First, examining urban-rural movers, the typical curvilinear age pattern is again significant and present. There are no significant effects for sex or marital status, although the interaction term for age and marriage indicates a declining positive effect of being married on moving as age increases. Higher educational attainment serves as a deterrent to moving to a rural area from an urban area, as those with secondary education are significantly less likely to move (-0.659, $p<0.01$). There is also an in school effect, as students are significantly less likely to move to a rural area (-0.449, $p<0.05$). Being employed also maintains its strongly significant and negative effect on moving in this model (-0.538, $p<0.001$).

[Table 5 here]

The variables associated with children do not have a significant association with moving, with the exception that those with four or more living children have a lower log odds of moving to a rural area, compared with not moving (-0.540, $p<0.05$). Previous movers again have higher log odds of moving to a rural area compared with non-movers (0.302, $p<0.001$). Here the middle

and young birth cohorts are both significantly *more* likely to move compared to the older cohort (0.284, $p<0.05$, and 0.831, $p<0.001$, respectively). This is the only outcome for cohort that fits with mobility transition theory, but it does not seem to make sense for urban-rural moves.

In the second column of coefficients, we find the results for urban-urban movers. The expected basic demographic results are quite similar to the rest of the models: the curvilinear age pattern, with the age-squared variable significant and negative at $p<0.05$ (the age variable is positive, but not significant). Here, both primary and secondary education are associated with highly significant increases in the log odds of moving from one urban area to another compared to not moving at all (0.508, $p<0.001$, and 0.856, $p<0.001$, respectively). Being in school also deters mobility, and is associated with a 0.383 decrease in the log odds of moving to another urban area compared to not moving ($p<0.01$). Employment is also significantly associated with decreased log odds of moving to another urban area compared to not moving, as expected from our hypotheses (-0.638, $p<0.001$).

Being married is associated with higher odds of moving to another urban area (0.922, $p<0.001$), but this relationship declines over the life course (as shown by the interaction term between age and marriage with a negative and significant coefficient). Although birth and death of a child in the previous year have no significant impact, for each additional child for urban residents with two or more living children, the log odds of moving to another urban area decline. These results are significant for two children and for four or more children (-0.318, $p<0.05$, and -0.553, $p<0.01$, respectively). Children are a deterrent on migration between cities as well as rural-urban migration.

Finally, we find that previous movers are significantly more likely to move to another urban area compared to not moving (0.331, $p<0.001$). This robust result that holds throughout all of the models seems to confirm that there is some real difference between movers and non-movers, either that previous moves reduce the risk of consequent moves, or that there are two types of people, movers and stayers. In this model, the cohort variables are negative and significant for the middle and young cohorts compared to the old cohorts (-0.222, $p<0.05$, and -0.265, $p<0.05$, respectively).

Discussion and Conclusions

Overall, the results indicate strong support for many of the traditional hypotheses about mobility. We found that the typical curvilinear age pattern of migration was present in all models, although it was not significant in the rural-origin models. In addition, those who were employed were also significantly less likely to move than those who were unemployed across all of the models. In many of the models, those with more education, particularly those with primary or middle school education, were more likely to move than those with no education. Those who were in school were also significantly less likely to move than non-students, except in the rural-origin models (although coefficients were still negative, but not significant in those models). Human capital attainment is strongly positively related to mobility, while current employment or school enrollment are negatively related to mobility. And in the model predicting moves for urban residents, those with secondary education were less likely to move to a rural area than not to move, indicating that highly educated persons in urban areas do not gain much from a move to a rural area.

We found no significant gender differences in mobility, perhaps because women in Ghana have a history of relatively high mobility and autonomy in some aspects of life. Although being married was significantly positively associated with migrating in several of the full models, the interaction between age and married was significant and negative. Thus marriage increases the odds of moving, but this relationship also declines over the life course. Yet in the model of rural-rural moves, this relationship does not seem to hold, which may imply a different relationship with marriage for this type of mover compared with the other types of movers.

Although the birth or death of a child in the previous year was not significantly related to migration in any of the models, we did find that each additional child above two living children reduced the log odds of moving in the majority of the models. These relationships are particularly significant and strong in the models of moves to urban areas. Clearly having more children deters people from moving, and in particular from moving to urban areas. In addition, some of the cohort variables are significant in the models of types of moves, but the results seem somewhat contradictory, and do not support the mobility transition hypothesis. This suggests that migration in Ghana may have changed over time in response to economic, political, and social factors, but further analysis is needed to explore the reasons behind this finding.

Finally, we found that previous movers were significantly more likely to move and this relationship is strong and robust across all of the models. This suggests that either previous mobility reduces the perceived cost of moving for a second or higher order move, or perhaps that there is some unobserved heterogeneity present in this population. Maybe some people are more likely to move and others less likely, due to the "travel bug" or some other innate difference. In future analyses, we could estimate a mover-stayer model to understand this relationship better. In addition, in the first model, urban residents are much more likely to move than rural residents, indicating higher mobility levels among urbanites. In combination with the prevalence of urban-urban moves in the sample, it suggests that as sub-Saharan Africa undergoes the urbanization transition, traditional rural-urban migration patterns may be giving way to more urban-urban migration and step migration.

In summary, our findings provide strong support for many of the traditional migration relationships including differential mobility by age, employment and school enrollment status, and educational attainment. More importantly, it provides evidence that larger family sizes are associated with reduced mobility, particularly to urban areas. This finding provides some support for the selection hypothesis and has implications for the demographic transition in Africa. If rural areas retain only larger families, and people with lower fertility move to cities, then potentially the fertility decline that has already occurred in many Africa cities, including Accra, may not occur as rapidly in rural areas of Africa.

Our results also indicate a very strong positive relationship between previous mobility and further mobility, and between urban residence and mobility. This suggests that: previous mobility reduces the perceived costs of moving again, or that there are certain types of people, urban and more mobile in general, who are more likely to move. As the evidence for this relationship in the literature is scarce, it is a key empirical finding. This may also have implications for the demographic transition and urbanization, as well as social and development policy in Africa, as certain types of people move from city to city, while others remain less mobile in rural areas. Addressing the needs of both types of populations, while drawing on their strengths and resources, may be a challenge for governments in sub-Saharan Africa in the future.

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Table 1:
Number of Migrants and Total Number of Moves,
by Place of Residence and Type of Migration

Type of Move	*N*	*Mean*
Inter-Regional Migrants	1,482	59.78
Non-Migrants	1,023	40.22
Rural Origin*		
No Move	26,404	46.80
Rural Destination	154	0.27
Urban Destination	246	0.44
Urban Origin*		
No Move	28,371	50.29
Rural Destination	392	0.69
Urban Destination	847	1.50
Total Number of Inter-Regional Moves	1,639	0.47

*Note: Rural origin and urban origin moves are person-year variables. In other words, a person can move more than once. Therefore, the sample size does not sum to the number of lifetime inter-regional moves, which is measured at one point in time (i.e., the survey). In addition, these moves are only among the adults in the sample (age 15 and older).

Table 2:
Descriptive Characteristics of the Sample at Time of Survey (2002)*
(Women and Men Age 15+)

Characteristic	*N*	*Mean*	*Std. Dev.*
Inter-Regional Migrants	1,482	59.78	49.04
Age at Migration (for migrants)	1,482	25.81	14.19
Sex			
Male	1,068	42.63	49.46
Female	1,437	57.37	49.46
Age	2,505	35.21	17.28
Region of Residence			
Urban	1,683	67.19	46.96
Rural	822	32.81	46.96
Children Ever Born	2,505	3.19	3.46
Living Children	2,505	2.63	2.81
Educational Attainment			
None/Koranic	733	31.78	46.57
Primary/Middle	1,314	54.13	49.84
Secondary+	458	14.13	34.84
Marital Status			
Married/In Union	1,395	56.09	49.64
Not married	1,110	44.11	49.66
TOTAL (People)	2,505	100.00%	

* weighted values

Table 3:
Multivariate Analysis of Inter-Regional Migration
Discrete Time Event History Logit Model

Independent Variables	***Model 1***		***Model 2***	
	Coef.	**Std. Err.**	**Coef.**	**Std. Err.**
Age	0.022	0.014	0.031 *	0.014
Age Squared	-0.001 ***	0.000	-0.001 **	0.000
Female	-0.125 *	0.056	-0.119	0.075
Married	-0.018	0.076	0.677 ***	0.185
Schooling Attained (Fixed)				
None/Koranic (Ref.)	0.000		0.000	
Primary/Middle	0.431 ***	0.068	0.433 ***	0.069
Secondary+	0.498 ***	0.093	0.488 ***	0.093
In School	-0.422 ***	0.091	-0.390 ***	0.092
Employed	-0.614 ***	0.074	-0.642 ***	0.074
Birth	0.075	0.088	0.046	0.088
Child Death	-0.164	0.196	-0.171	0.196
Living Children				
No Children (Ref.)	0.000		0.000	
One Child	-0.102	0.097	-0.170	0.097
Two Children	-0.351 **	0.114	-0.379 **	0.113
Three Children	-0.392 **	0.129	-0.388 **	0.127
Four+ Children	-0.683 ***	0.125	-0.615 ***	0.125
Number of Prior Moves	0.326 ***	0.018	0.333 ***	0.018
Urban Residence	0.753 ***	0.061	0.754 ***	0.061
Birth Cohort				
Old (<1950, Ref.)	0.000		0.000	
Middle (1950-1969)	-0.135 *	0.067	-0.153 *	0.067
Young (1970-1989)	-0.149	0.079	-0.164 *	0.079
Age*Married			-0.023 ***	0.006
Female*Married			-0.070	0.104
Constant	-3.712	0.227	-3.892	0.230
Log Likelihood	-6834.50		-6825.75	
Pseudo R^2	0.078		0.079	
LR Chi^2	1160.55 (18)		1178.05 (20)	
N (Person Years)	56,414		56,414	

***p<0.001; **p<0.01; *p<0.05

Table 4:
Competing Risk Multivariate Analysis of Inter-Regional Migration
For *Rural* Origin, by Type of Destination
Discrete Time Multinomial Logit Model

Independent Variables	***Move to Rural Destination (N=154) vs. No Move***		***Move to Urban Destination (N=246) vs. No Move***	
	Coef.	**Std. Err.**	**Coef.**	**Std. Err.**
Age	-0.034	0.043	0.052	0.045
Age Squared	0.000	0.001	-0.001	0.001
Female	0.376	0.256	-0.173	0.186
Married	-0.362	0.585	1.209 *	0.529
Schooling Attained (Fixed)				
None/Koranic (Ref.)	0.000		0.000	
Primary/Middle	0.508 *	0.209	0.864 *	0.172
Secondary+	0.133	0.444	0.918 **	0.297
In School	-0.103	0.315	-0.375	0.222
Employed	-0.553 *	0.251	-0.697 ***	0.189
Birth	0.037	0.272	0.093	0.256
Child Death	0.494	0.414	-0.581	0.602
Living Children				
No Children (Ref.)	0.000		0.000	
One Child	-0.025	0.325	-0.874 **	0.268
Two Children	-0.447	0.404	-1.213 ***	0.344
Three Children	-0.649	0.470	-0.823 *	0.355
Four+ Children	-0.403	0.411	-1.008 **	0.367
Number of Prior Moves	0.479 ***	0.054	0.295 ***	0.064
Birth Cohort				
Old (<1950, Ref.)	0.000		0.000	
Middle (1950-1969)	-0.553 *	0.217	-0.247	0.160
Young (1970-1989)	-0.510 *	0.253	-0.944 ***	0.197
Age*Married	0.017	0.016	-0.045 *	0.019
Female*Married	-0.023	0.344	0.099	0.278
Constant	-4.061	0.678	-4.211	0.629
Log Likelihood	-2151.47			
Pseudo R^2	0.083			
LR Chi^2	388.10 (38)			
N (Person Years)	26,804			

***p<0.001; **p<0.01; *p<0.05

Table 5:
Competing Risk Multivariate Analysis of Inter-Regional Migration
For *Urban* Origin, by Type of Destination
Discrete Time Multinomial Logit Model

Independent Variables	***Move to Rural Destination (N=392) vs. No Move***		***Move to Urban Destination (N=847) vs. No Move***	
	Coef.	**Std. Err.**	**Coef.**	**Std. Err.**
Age	0.085 **	0.028	0.032	0.020
Age Squared	-0.001 **	0.000	-0.001 *	0.000
Female	-0.318	0.159	-0.042	0.103
Married	0.711	0.359	0.922 ***	0.264
Schooling Attained (Fixed)				
None/Koranic (Ref.)				
Primary/Middle	0.030	0.128	0.508 ***	0.102
Secondary+	-0.659 **	0.195	0.856 ***	0.124
In School	-0.449 *	0.211	-0.383 **	0.123
Employed	-0.538 ***	0.147	-0.638 ***	0.101
Birth	-0.271	0.181	0.206	0.120
Child Death	-0.110	0.392	-0.363	0.302
Living Children				
No Children (Ref.)				
One Child	0.066	0.183	-0.137	0.135
Two Children	-0.088	0.209	-0.318 *	0.155
Three Children	-0.172	0.236	-0.327	0.177
Four+ Children	-0.540 *	0.234	-0.553 **	0.175
Number of Prior Moves	0.302 ***	0.035	0.331 ***	0.024
Birth Cohort				
Old (<1950, Ref.)				
Middle (1950-1969)	0.284 *	0.145	-0.222 *	0.092
Young (1970-1989)	0.831 ***	0.168	-0.265 *	0.110
Age*Married	-0.024 *	0.010	-0.032 ***	0.008
Female*Married	-0.070	0.210	-0.205	0.144
Constant	-5.424	0.478	-3.690	0.327
Log Likelihood	-5599.66			
Pseudo R^2	0.054			
LR Chi^2	637.35 (38)			
N (Person Years)	29,610			

***p<0.001; **p<0.01; *p<0.05

Figure 1: Interregional Migration Survival Curves

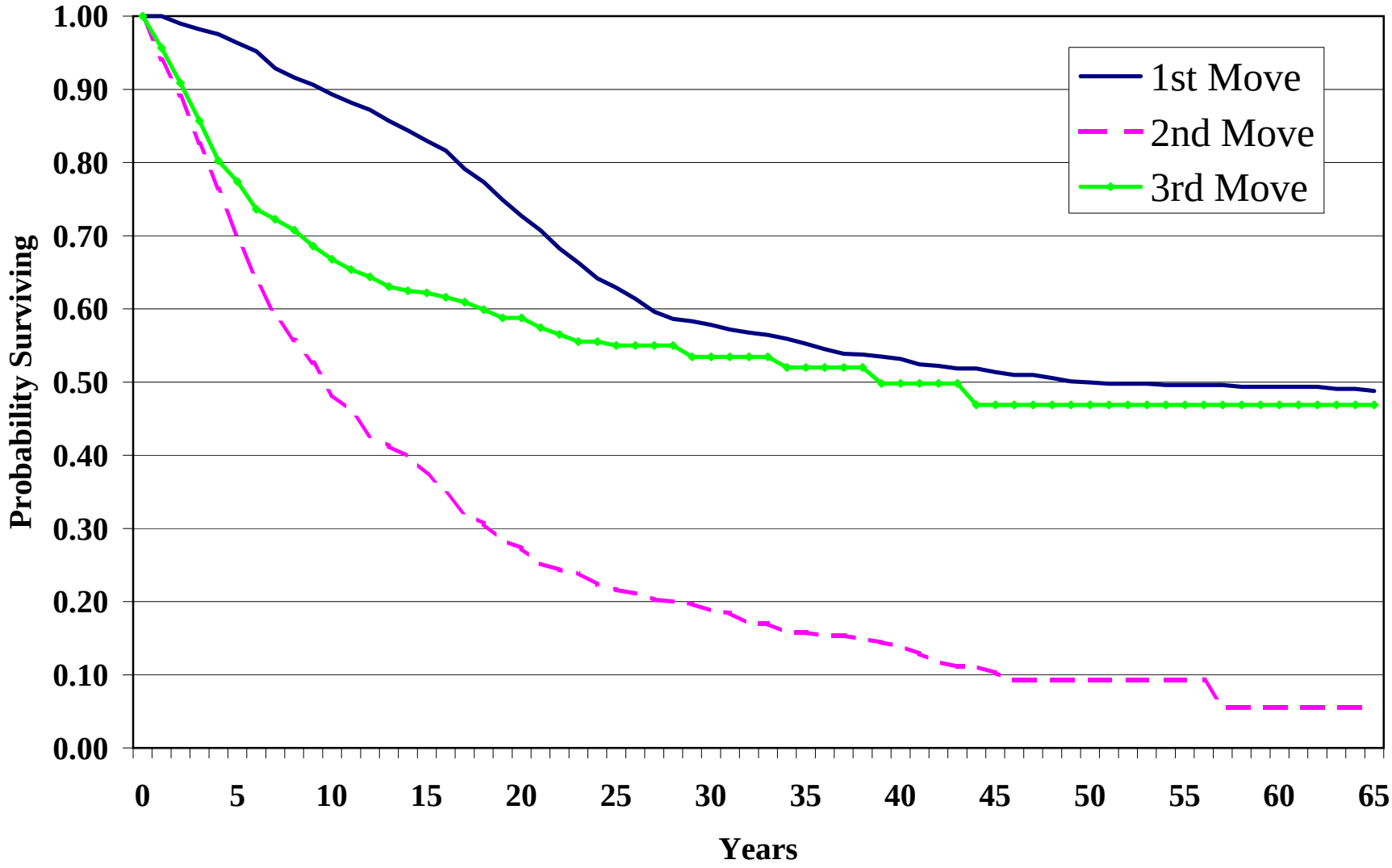
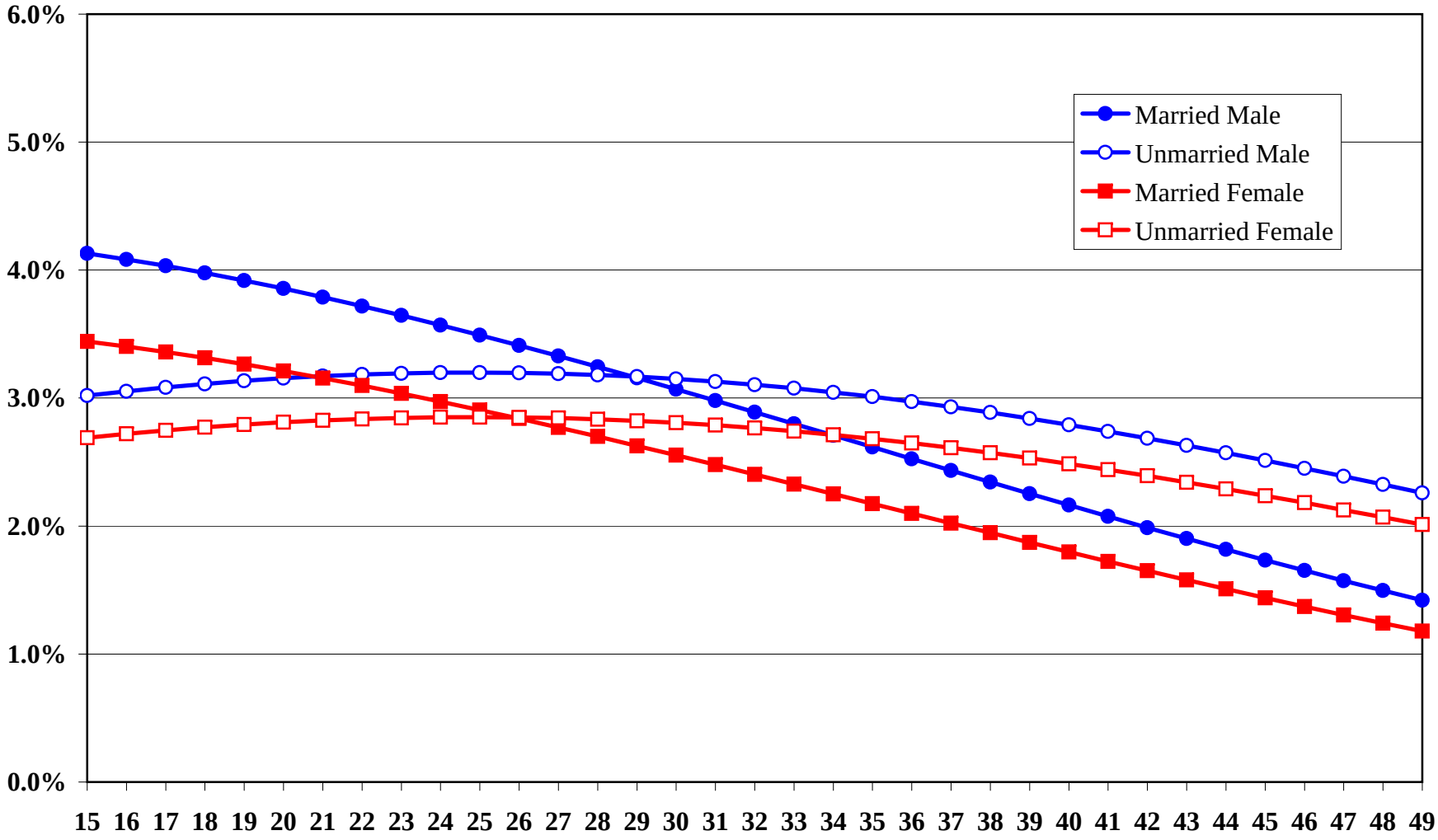


Figure 2: Predicted Probability of Moving in the Current Year (by Age)



Adjusted for modal characteristics (primary education, 2 children, urban residence, etc.).

Appendix 1: Variables and Definitions

Characteristic	Name	Fixed (f) vs. Time Varying (tv)	Definition and Coding
Dependent Variables:			
Inter-regional Migration	MOVE	tv	0=No move between regions 1=Move between regions
Rural-Urban Inter-regional Migration for Rural-Origin Population	RURMOVE	tv	0=No move 1=Move to a rural area 2=Move to an urban area
Rural-Urban Inter-regional Migration for Urban-Origin Population	URBMOVE	tv	0=No move 1=Move to a rural area 2=Move to an urban area
Independent Variables:			
Age	LGAGE	tv	Age in prior year, continuous, 15-100
	LGAGESQ	tv	Age in prior year, squared
Sex	FEMALE	f	1=Female
Marital Status	LGMARRIED	tv	1=Married/in union in prior year
Educational Attainment (Highest level attained)	EDUFIXPRIM	f	1=Primary/middle school
	EDUFIXSEC	f	1=Secondary+ school
Student Status	LGINSCHOOL	tv	1=In school in prior year
Employment Status	LGEMPLOY	tv	1=Employed in prior year
Child Birth	LGBIRTH	tv	1=Birth in prior year
Child Death	LGDEATH	tv	1=Child death in prior year
Number of Living Children (Parity minus number of child deaths)	LGONEKID	tv	1= 1 living child in prior year
	LGTWOKIDS	tv	1= 2 living children in prior year
	LGTHREEKIDS	tv	1= 3 living children in prior year
	LGMOREKIDS	tv	1= 4+ living children in prior year

Appendix 1: Variables and Definitions

Characteristic	Name	Fixed (f) vs. Time Varying (tv)	Definition and Coding
Number of Prior Inter-Regional Moves	LGMOVESUM	tv	total number of prior moves between regions as of previous year, continuous
Place of Residence	LGURBAN	tv	Type of place of residence in prior year; 1=Urban
Birth Cohort (Ref.=Born before 1950)	MID_COH	f	1=Born between 1950 and 1969
	YOU_COH	f	1=Born 1970 or later