AGE MIGRATION SCHEDULES IN KENYA

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ABSTRACT

This study was motivated by two research questions: do age profiles of migrants in Kenya exhibit regularities as captured by the model migration schedule? Can summary measures and parameter estimates of the model migration schedules be graduated from observed Kenyan migration data for comparative analysis? The study adopted the 7- parameter standard schedule, which comprises of three components: a constant, a negative exponential curve representing the pre-labor force ages, and a double exponential (unimodal) curve representing the labor force ages. The Model Migration Schedule was fitted in Microsoft Excel workbook in four steps using data from Kenya Population and Housing Census, 2009. The results indicate that regional migration schedules in Kenya are slightly high during infancy, and become extremely low during the ages of primary and secondary education, but sharply rise reaching the highest peak between the ages of 14 and 24, and gradually decline thereafter.

Introduction

Migration in developing countries lately has drawn a great deal of academic attention, in view of the necessity to solve aggravating social problems associated with the population concentration in urban areas and also in view of the administrative needs to plan regional development. The research on the mechanism of such migration had not much progressed in the field of the population studies, partly due to the larger complexity of the methodologies used than those of fertility and mortality studies and also partly due to the poor availability of basic data.

This study, thus applied the standard migration schedule to 2009 Kenya Census data so as to establish prevailing age-sex migration patterns at sub national level in Kenya. Specifically, the study seeks to establish age-sex specific migration flows in Kenya and derive summary measures using the Model Migration Schedule.

Estimation of Model Migration Schedules

Improved methods for measuring migration and understanding its important role in spatial population dynamics have been receiving increasing attention in recent years. The search for improved methods for measuring migration has, for example, stimulated research on the construction of multiregional life tables and demographic accounts, and the need for a better understanding of spatial population dynamics has fostered mathematical analyses of the fundamental processes of spatial population growth and redistribution (Rogers 1980).

Migration literature has until very recently adopted a curiously ambivalent position with regard to migration measurement. The paucity of work in migration measurement problems is in distinct contrast to the corresponding demographic literature in should provide guidance in developing measures of migration. Research on mobility has been broadly concerned with the estimation of migration flows, the identification of migration propensities by age, sex and other characteristics (Rogers and Castro, 2001; Rogers et al., 2003; Rogers and Jordan, 2004) and with explanation migration by economic and social determinants. More importantly, use of indirect estimations of age-specific migration flows has been developed and extensively used in developed countries (Rogers and Castro, 2001; Rogers et al., 2003; Rogers and Jordan, 2004), however, their utilization has been limited in developing countries (Raymer and Rogers, 2006).

Regularities in the Age Patterns of Migration

Empirical schedules of age-specific rates exhibit remarkably persistent regularities in age pattern. Mortality schedules normally show a moderately high death rate immediately after birth, after which the rates drop to a minimum between ages 10 and 15, and then increase slowly until about age 50, and thereafter rise at an increasing pace until the last years of life. Fertility rates generally start to take on nonzero values at about age 15 and attain a maximum somewhere between ages 20 and 30; the curve is unimodal and declines to zero once again at some age close to 50 (Rogers A and J Watkins. 1987). Similar unimodal profiles may be found in schedules of first marriage, divorce, and remarriage.

The most prominent regularity in age-specific schedules of migration is the high concentration of migration among young adults; rates of migration also are high among children, starting with a peak during the first year of life, dropping to a low point at about age 16, turning sharply upward to a peak near 20 to 22, and declining regularly thereafter, except for a possible slight hump at the onset of retirement and possibly an upward slope after that hump (Rogers A and J Watkins. 1987).

Underlying these persistent regularities in the age patterns of migration are a collection of different cause-specific age patterns (Rogers and Castro 1981b). Migrations due to marriage and education are concentrated between the ages of 10 and 30 years and are essentially unimodal in age profile(Rogers and Castro, 1981; Rogers and Watkins, 1987; Raymer and Rogers, 2006). Migrations caused by change of employment and moving closer to the place of work have profiles that are bimodal, with local peaks during infancy and during the early years of labor-force participation (Raymer and Rogers 2006). The age profiles of housing reasons for migration are similar to those of the aggregate migration schedule, exhibiting roughly the same peaks: during the early years of labor force participation, and at retirement. Finally, health is apparently an important cause of migration only for the elderly(Raymer and Rogers 2006). .

The different cause-specific age patterns may be interpreted within a life course framework in which individuals pass through different states of existence (Elder 1985). Starting with birth and then entry into the educational system at the elementary level, the “passage” may also include entry into military service or university, marriage, multiple entries into and withdrawals from the labor force, perhaps divorce and remarriage, retirement, death of spouse, and moves to enter sanatoria or to rejoin relatives. Life course analysis focuses on the processes of change and ultimately seeks to explain such change.

The formal demography of migration and population redistribution views interregional population transfers as a collection of independent individual movements. Yet it is widely recognized that a large fraction of total migration is accounted for by individuals whose moves are dependent on those of others, for example; children migrating with their parents, wives with their husbands, grandparents with their children. Indeed, family migration is such a well established phenomenon that Ryder (1978) has even suggested its use as a criterion for identifying family membership: a family comprises of those individuals who would migrate together. Hence, to the extent that migration is undertaken by families as a unit, the age composition of migrants tells us something about family patterns.

To better understand the influences that family and dependency relationships have on migration age compositions, Castro and Rogers (1983a and 1983b) have illustrated how by disaggregating migrants by age, sex, and dependent/independent categories, it is possible to illustrate a number of ways in which the aggregate age profile of migration is sensitive to relative changes in dependency levels and in rates of natural increase and mobility. Viewing the migration process within a framework of dependent and independent movements allows one to observe, for example, that if the independent component is mainly comprised of single persons, then the associated dependent migration may be insignificant in terms of its relative share of the total migration. On the other hand, if migration tends to consist primarily of family migration, then the share of dependent children may become a very important component of the aggregate migration age pattern. In short, just as observed population age compositions reflect particular characteristics of past fertility and mortality regimes, so do observed migration age compositions reflect key aspects of a population’s age composition. The reverse relationship also holds true. Just as observed migration age compositions reflect particular age compositions of populations, so population compositions influence key aspects of migration age compositions (Little and Rogers 2007).

The availability of data on in – migration can help us analyze trends in parameters and indices for model age migration schedules over time to see whether they are characterized by regularity and stability or otherwise. Extensions of the standard model migration schedule by Wilson (2010) to better represent those migration age patterns characterized by significant and highly age-focused student migration can be replicated to determine in what ways student migration age profiles vary across the country. Historical time series of parameters derived from model schedules can also be extrapolated to project the shape of migration profiles into the future.

Rogers and Castro (1979, 1985) have concentrated their studies on age-specific migration patterns that are disaggregated by family status and by causes of migration. “For example, if divorce is a reason for migration, and if the level of migration and the number of divorces per capita both increase with economic development, should one expect a particular shift in the age profile of aggregate migration?’ (Rogers and Castro 1985, pp. 188-189).

If the age pattern of migration is influenced by its cause-specific structure, it should be possible to interpret the differences in specific age patterns of migration. For example, migration motivated by health reasons is a phenomenon characteristic of old persons, whereas education-related migration is characteristic of young people In order to understand better why people move, it is important to disaggregate cause-specific migration data by age and sex. The different cause specific age patterns may be interpreted within a life-cycle framework, by referring to both individual and family life cycles.

Analytical Framework

The framework for this study is based on Rogers and Castro (1981) framework for the analysis of migration. According to this framework, the standard model migration schedule is the sum of five component curves (Rogers and Watkins, 1987):

Migration intensity = childhood curve + labor force curve + retirement curve + elderly curve + constant.

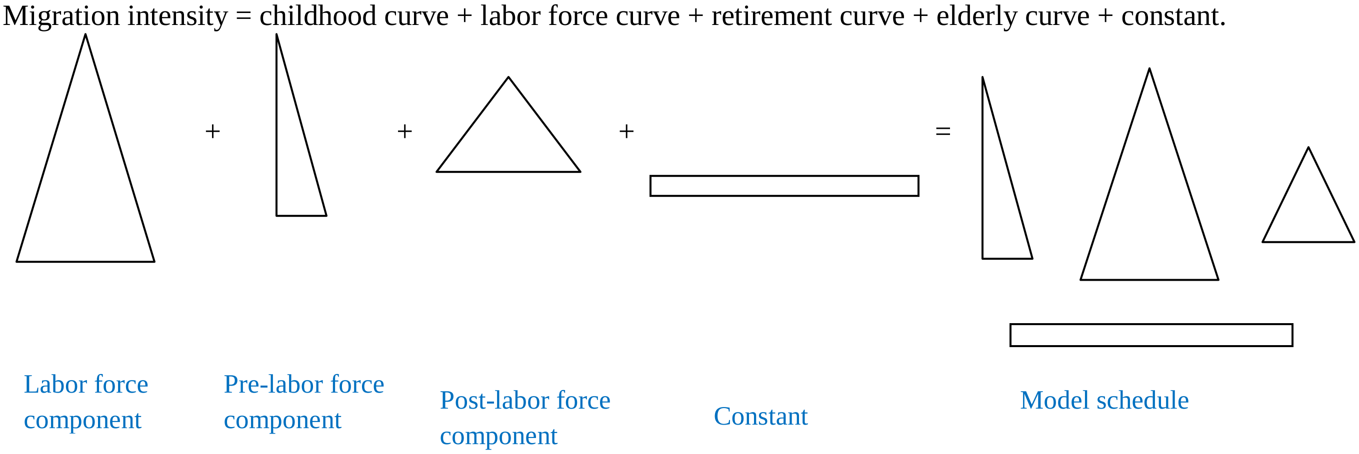

Figure 1: Fundamental components of a model migration schedule
Source: *Rogers 1984*

Almost all age profiles will require the childhood, labor force and constant components, but only some will include retirement and elderly curves. Expressed algebraically, the full model migration schedule contains 13 parameters and may be written as:

$$\mathbf{M(x) = a_1 \exp(-\alpha_1 x) + a_2 \exp\{-\alpha_2 (x-\mu_2) - \exp[-\lambda_2(x-\mu_2)]\} + a_3 \exp\{-\alpha_3 (x-\mu_3) - \exp[-\lambda_3(x-\mu_3)]\} + a_4 \exp(\lambda_4 x) + c}$$

DATA AND METHODS

Sources of Data

Migration data by sex and single years of age were obtained from the Kenya National Bureau of Statistics 2009 Census via the Integrated Public Use Micro data Series (IPUMS) - International data extract service at the Minnesota Population Center. IPUMS data are an invaluable resource for cross-national comparison, but are inevitably subject to sampling variability. The data are the latest available for the country. Also, the use of the Provincial data from the 2009 census was informed by multinational comparative studies which indicate that the level of inter-regional migration depends on the size of the areal unit selected, if the areal unit chosen is such as a county or a commune, a greater proportion of residential relocation will be included as migration than if the areal unit chosen is a major administrative division such as a state or a province.

These data were derived from the following census questions which sought to establish previous residence and duration of residence:

"**Where was [person] living in August 2008?**" and "**When did [person] move to the current district?**"

The data is therefore transition-type data, and count surviving migrants rather than migrations (Courgeau 1979, Rees and Willekens 1985). The migration intensity used in this study was the intensity recommended for this type of data by Rees et al. (2000), or the migration probability conditional upon survival within the country (hereafter just migration probability).

For out-migration from any particular region, the migration probability for each cohort was calculated as follows:

Out-migration probability =

$$\frac{\text{People resident in the region one year before the census who were living elsewhere in Kenya on census night}}{\text{People resident in the region one year before the census who were living anywhere in Kenya on census night}}$$

The numerator was obtained by cross tabulating in SPSS the variables Age, Sex and MIGRATE1 while the denominator was obtained by cross tabulating the variables Age, Sex and MIGKE. The model schedule was fitted using in a Microsoft Excel 2007 workbook. The workbook is designed to use single year interval, single year of age period-cohort migration data (Bell and Rees, 2006) of the type typically obtained from a census or survey.

Results

This section provides a description of the results of some of the preliminary analysis, which include the migration patterns based on observed values and model migration schedules by region and their respective derived basic parameters (Model Migration Schedule Parameters). The observed (or a graduated) age specific migration schedule can be described in a number of ways: heights at particular ages; locations of important peaks or troughs; slopes along the schedules' age profile; ratios between particular heights or slopes; areas under parts of the curve; and to both horizontal and vertical distances between important heights and locations.

Model Migration Schedules by Region

This section presents the resulting analysis and migration profiles. They are subsequently presided by Region in what was formerly known as Provinces.

- **Nairobi Region**

Figures 2a and 2b describe migration schedules for Nairobi for males and females, respectively. The model migration schedule for the out-migration of both males and females in Nairobi region indicate peaks at infancy and young adult ages (labor force ages). This is an indication of the propensity of children to migrate with their parents. The two peaks are in line with the Rogers and Castro 7-parameter standard model schedule. The peaks in the first year of life and labor force migration are higher for females than for males. The age profiles of male and female migration show a distinct difference. The high peak of the female schedule is a little higher and precedes that of the male schedule. The female migration schedule had a higher age at the labor force peak than the male migration schedule. When migration was at its low point, the pre-labor force age was higher for the males than for the females. The same scenario played out when the labor force migration was at its peak. Migration rates for the male children decreased faster than their female counterparts as they approached the teenage years. Out-migration rates for males in the labor force age were higher than the females.

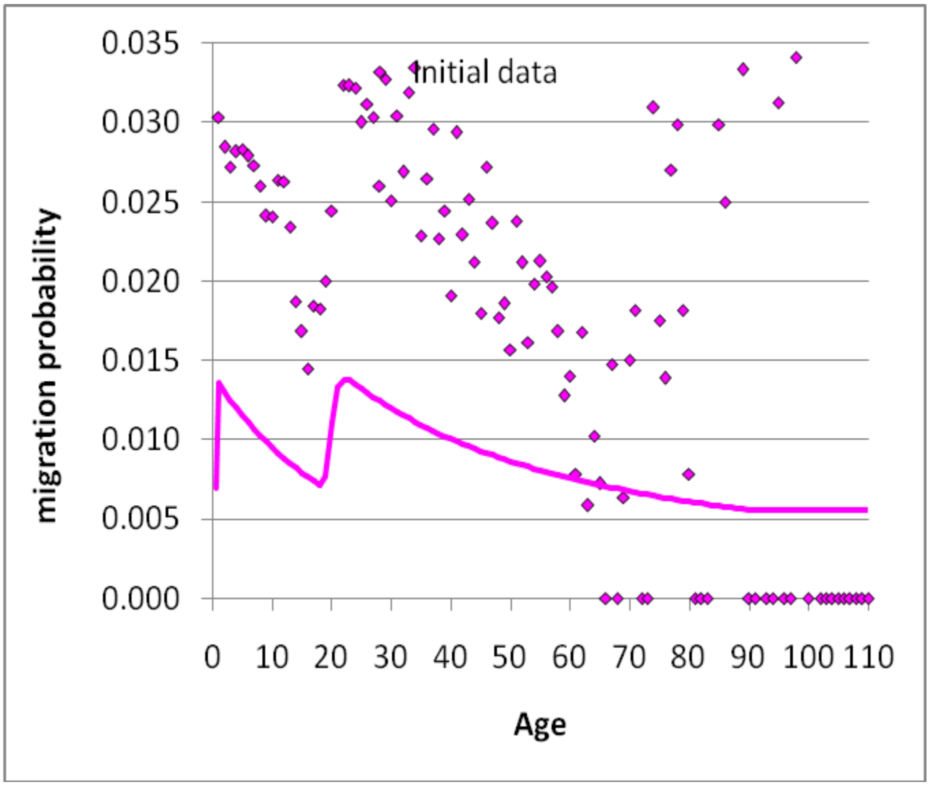

Figure 2a: Nairobi Out-migration of Male
Source: computed by authors

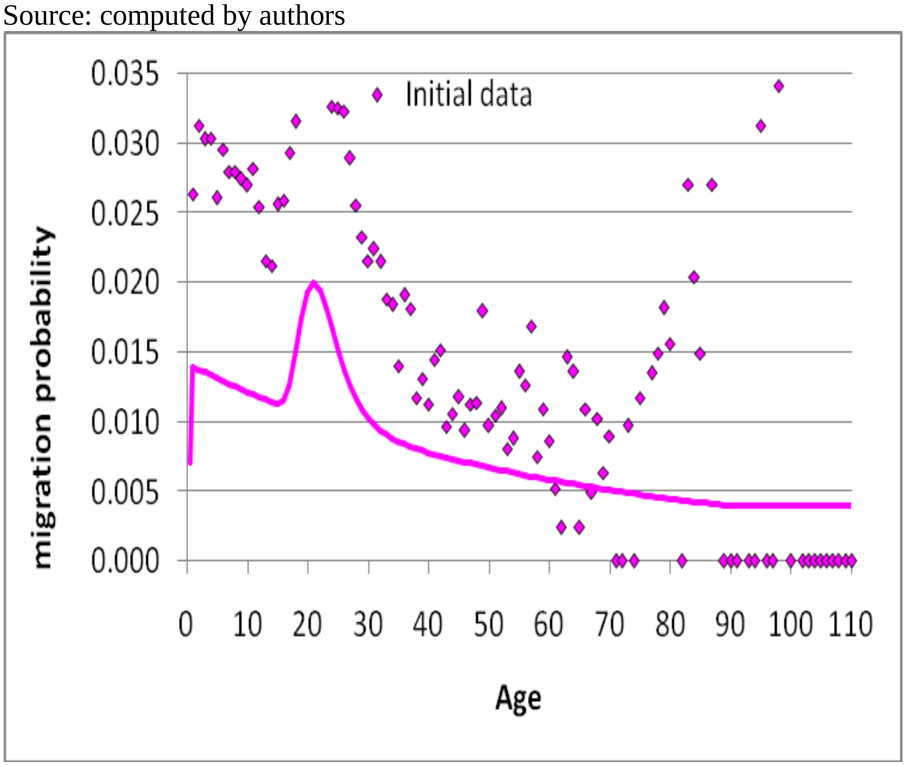

Figure 2b: Nairobi Out-migration of Ffemale
Source: computed by authors

- **Coast Region**

Figure 3a and 3b describes migration schedules for Coast region for males and females, respectively. Compared to Nairobi region, Coast region had higher labor force age peaks and lower peaks at infancy in their out-migration schedules with near perfect fits. This implies that the tendency to migrate during the labor force ages was higher in Coast than in Nairobi while lower during infancy in Coast than in Nairobi. The height of the childhood curve was higher among females than males in Coast indicating the increased migration among females than males within this age category. The height of the labor force curve was higher among females than males in Coast region an indication of the propensity of increased female migration during the labor force ages. The ages at labor force peak were roughly the same at 19 years.

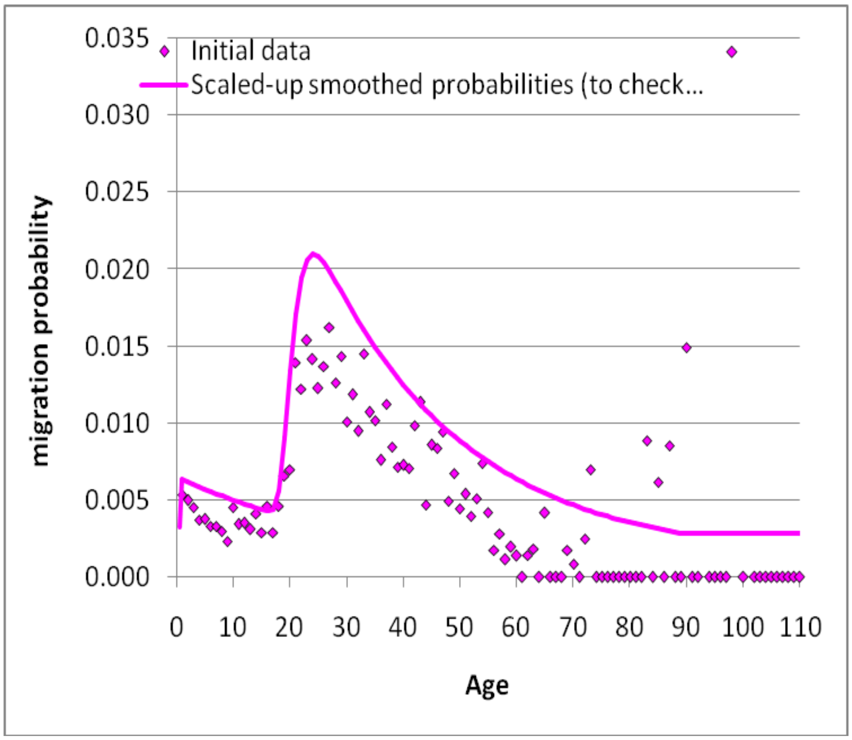

Figure 3a: Coast Out-migration of Male
Source: computed by authors

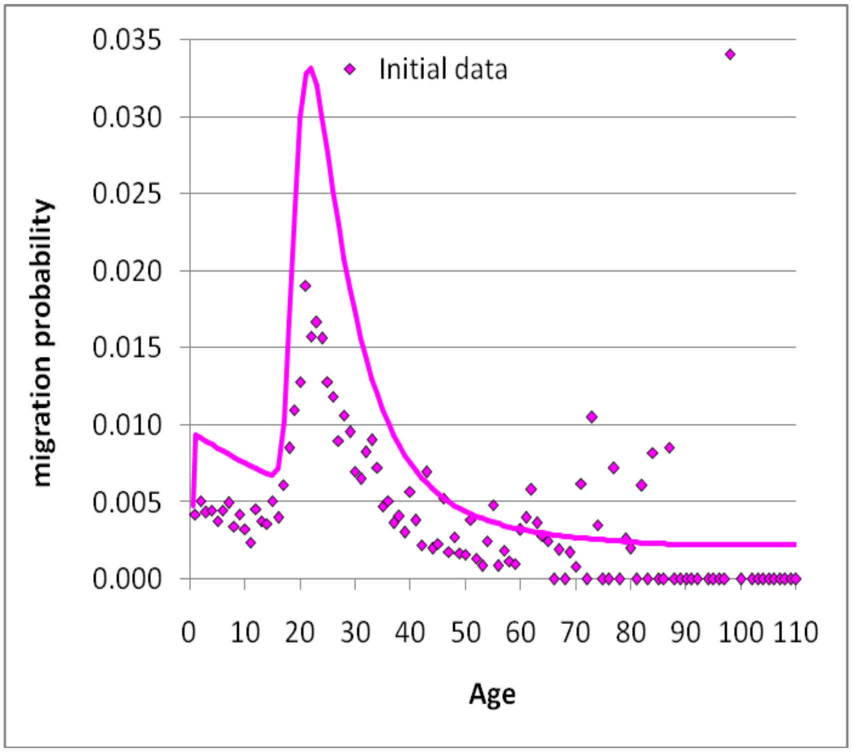

Figure 3b: Coast Out-migration of Female
Source: computed by authors

- **Nyanza Region**

Figure 4a and 4b describes migration schedules for Nyanza region for males and females, respectively. Nyanza region model migration schedules exhibited relatively good fits compared to others. The height of the childhood curve was higher in the female out migration schedule an indication that more female infants migrated with their parents as opposed to their male counterparts. The rate of descent of the childhood curve was higher among males than females. This means that males migrated less as they approached teenage years. In contrast, the rate of ascent of the labor force curve among males was higher indicating that the males migrated more as they approached the labor force peak ages. The rate of descent of the labor force curve is higher among females than the males. This implies that with increasing post-labor ages, males tend to migrate less.

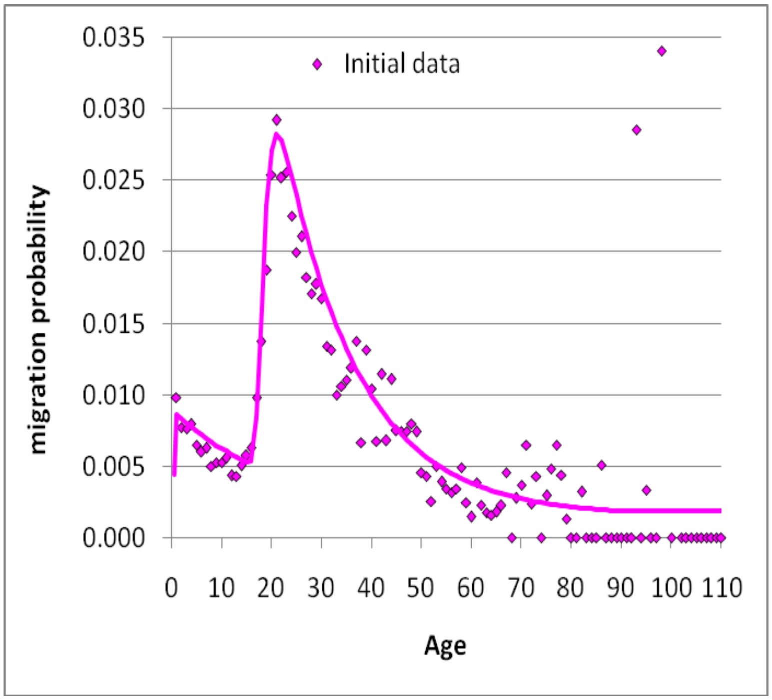

Figure 4a: Nyanza Out-migration of Male
Source: Computed by authors

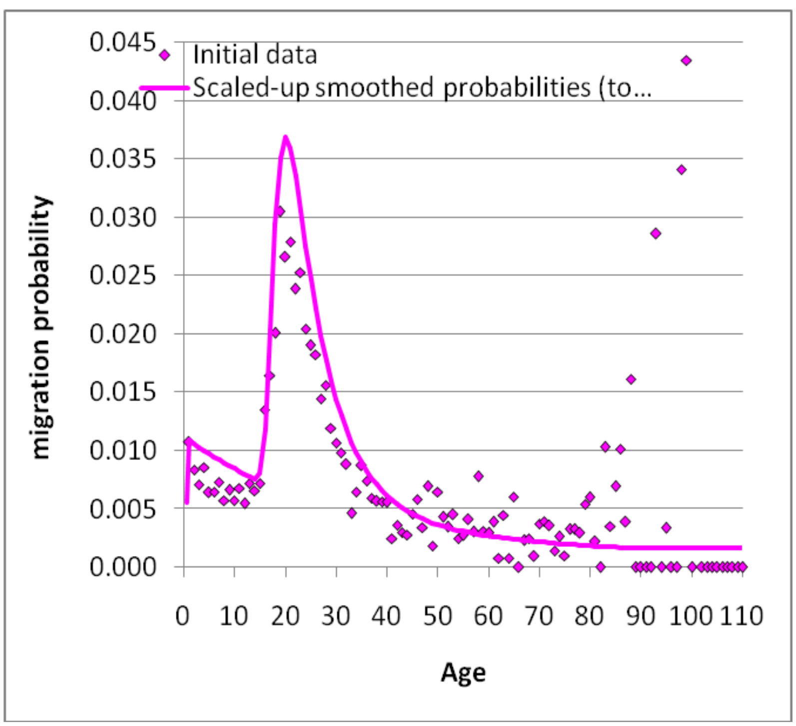

Figure 4b: Nyanza Out-migration of Female
Source: computed by authors

- **North Eastern Region**

Figure 5a and 5b describes migration schedules for North Eastern region for males and females, respectively. Out-migration schedules for North Eastern region showed that the female peaks at infancy were higher compared to the male peaks at infancy. Males had higher peaks at the labor force ages compared to the females. Here also the females tended to migrate more as they approached the low point which is usually the teenage years. The reverse was true as more males tended to out migrate as they approached the labor force ages. North Eastern also appears to have a poor fit. This brings into question the quality of age data collected.

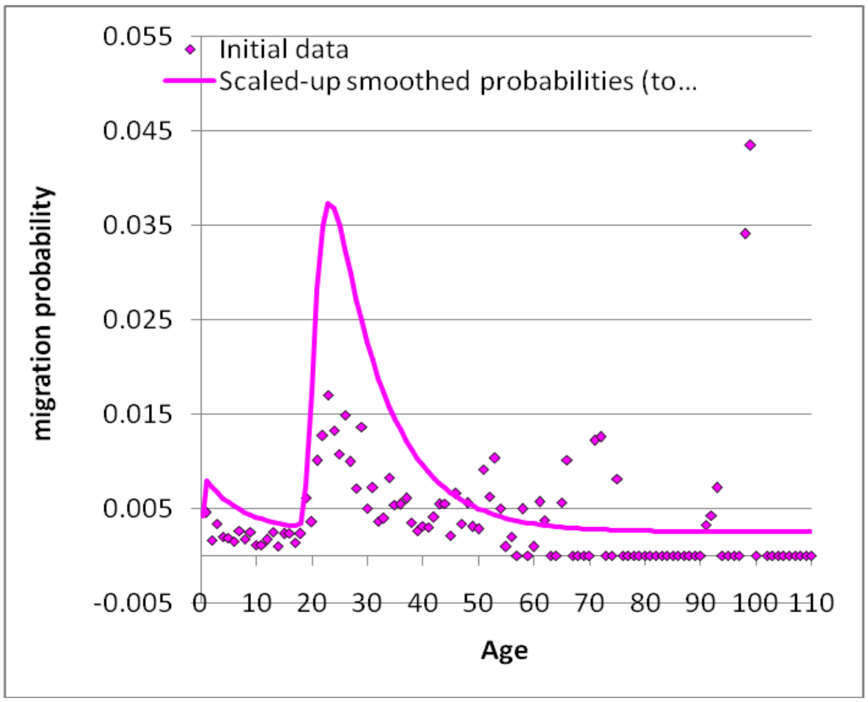

Figure 5a: North Eastern Out-migration of Male
Source: computed buy authors

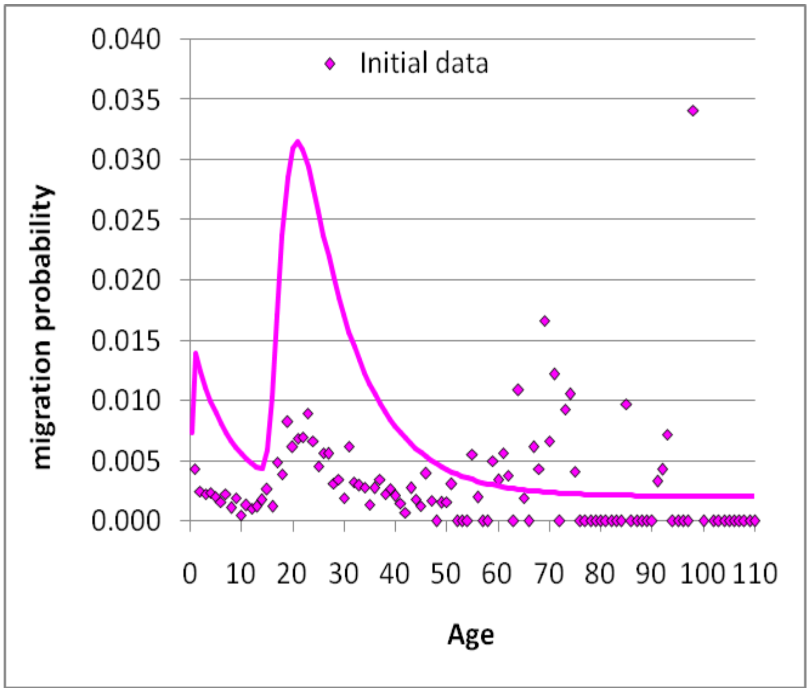

Figure 5b: North Eastern Out-migration of Female
Source: computed by authors

- **Western Region**

Figure 6a and 6b describes migration schedules for Western region for males and females, respectively. Western region also depicted good fits with peaks at both infancy and young adult years. Peaks at infancy were slightly higher for males than for females while the female schedule exhibited higher peaks at the labor force ages as compared to the males. The rate of descent of the childhood curve and the rate of ascent of the labor force curve were both higher in the male schedules while the rate of descent of the labor force curve was higher in the female model migration schedule.

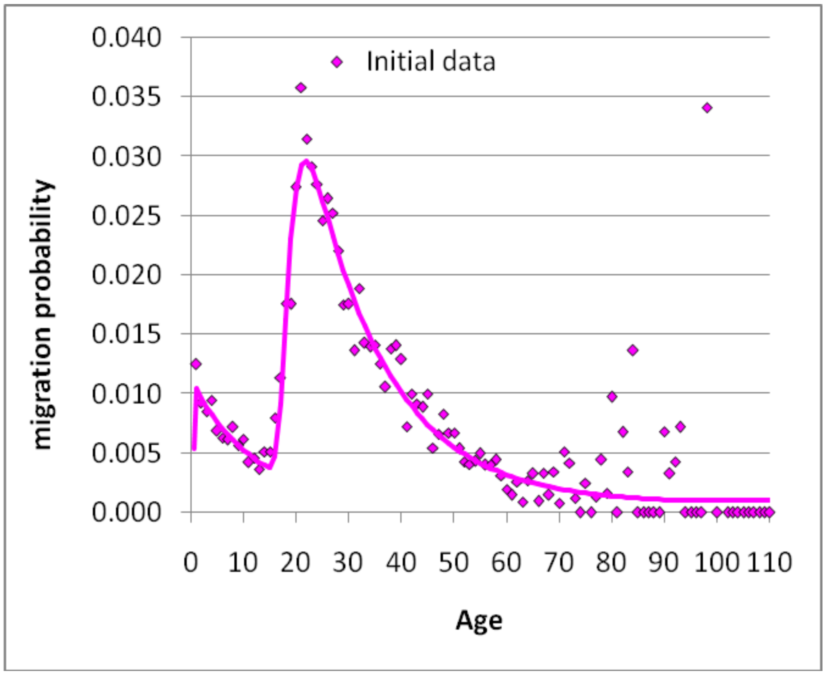

Figure 6a: Western Out-migration of Male
Source: Computed by Authors

Figure 6b: WESTERN OUT-MIGRATION OF FEMALE

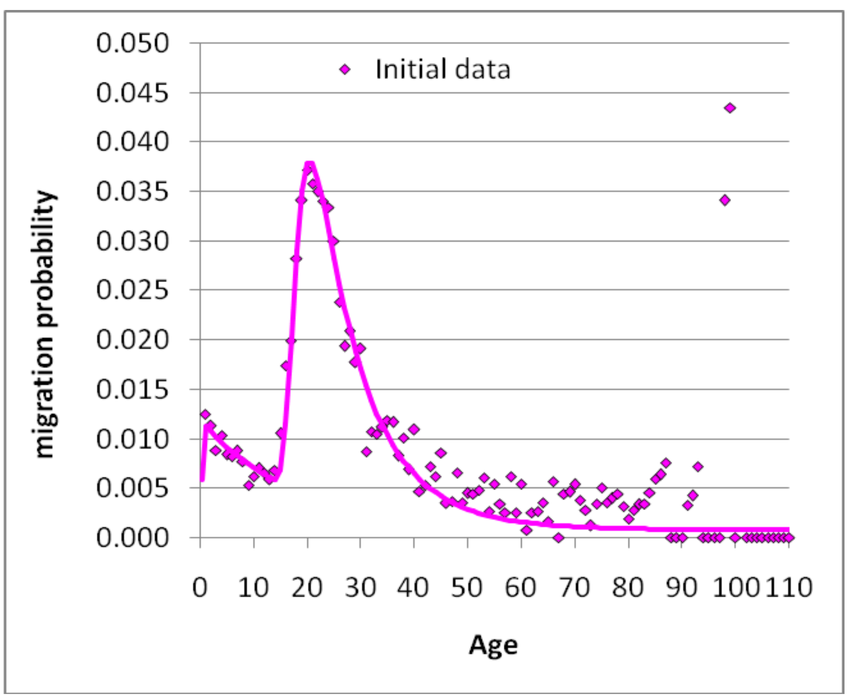

Figure 7a: Central Out-migration of Male
Source: computed by Authors

- **Central Region**

Figure 7a and 7b describes migration schedules for Central region for males and females , respectively. The model schedules for Central region also exhibited peaks at infancy and at the labor force ages as espoused in the standard model schedule. This is a clear indication that children mirror the migration rates of their parents. The male schedule had a higher peak at infancy than the female schedule while the female schedule had a higher peak at the labor force ages. The rate of descent of the childhood curve was slightly higher among the males than the females. The rate of ascent of the labor force curve was also higher among the males. Females migrated less after attaining labor force peak ages.

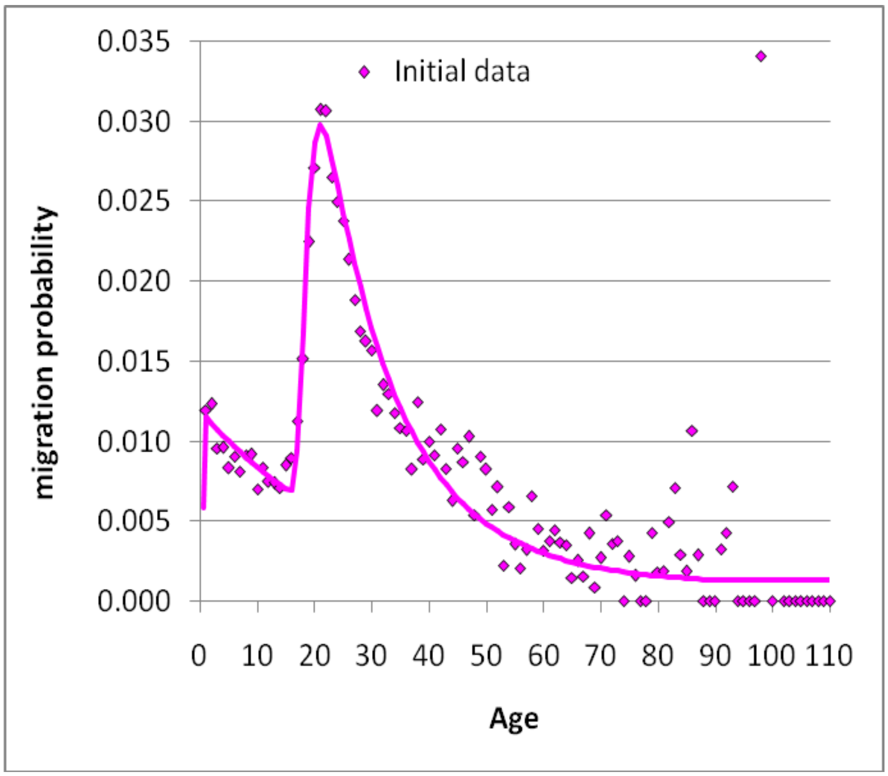

Figure 7a: Central Out-migration of Male
Source: Computed by authors

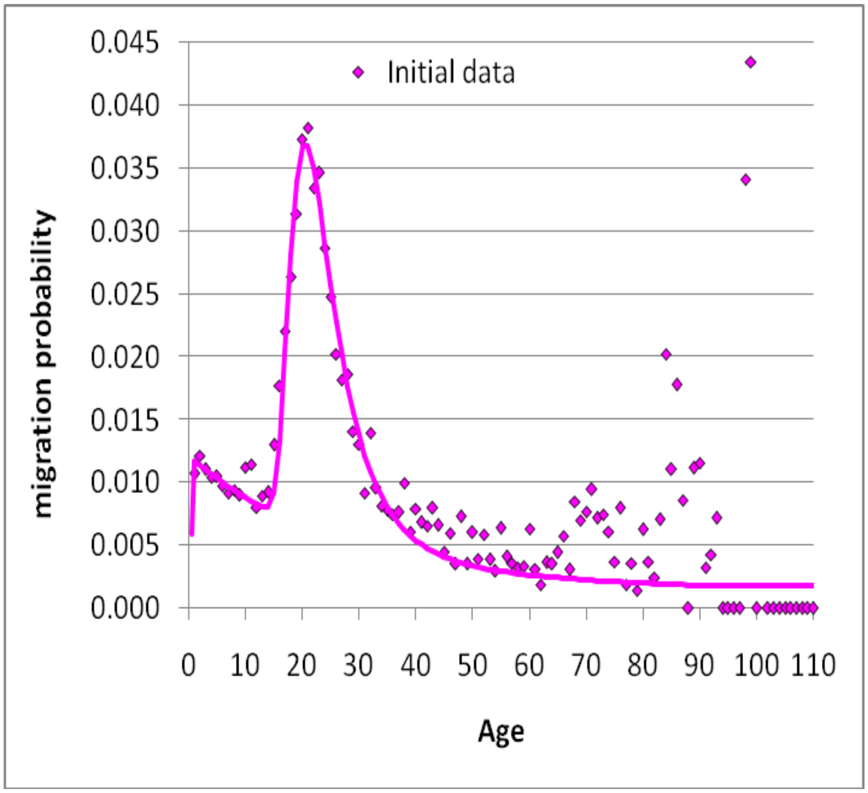

Figure 7b: Central Out-migration of Female
Source: Computed by authors

- **Eastern Region**

Figure 8a and 8b describes migration schedules for Eastern region for males and females, respectively. Eastern region exhibited a relatively better fit of the model with peaks at infancy and at the young adult ages. The male schedule produced a higher peak at infancy while the female schedule produced a higher peak at the labor force ages. The rate of descent of the childhood curve and rate of ascent of the labor force curve are both high for the male schedule while the rate of descent of the labor force curve depict a higher value for the female schedule.

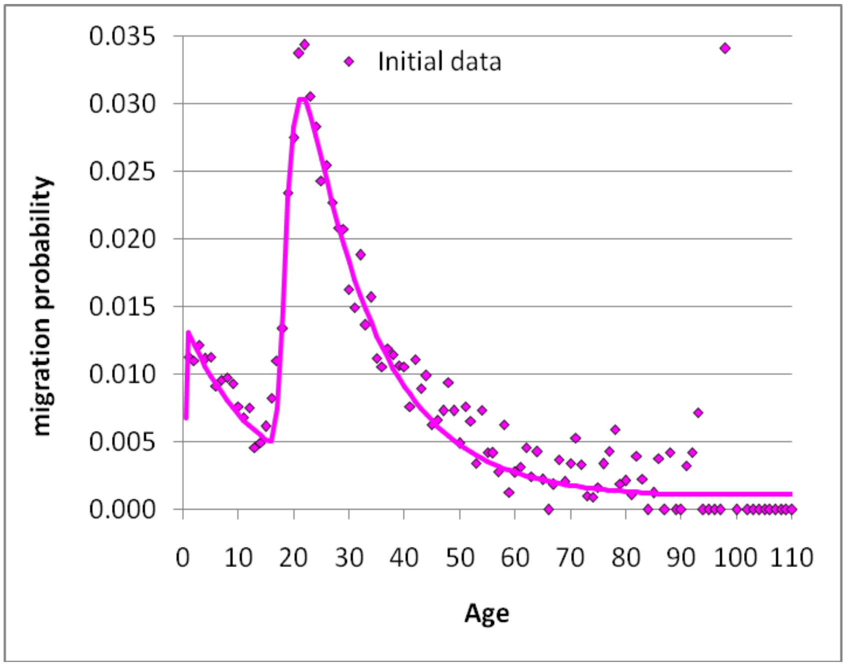

Figure 8a: Eastern Out-migration of Male
Source: computed by authors

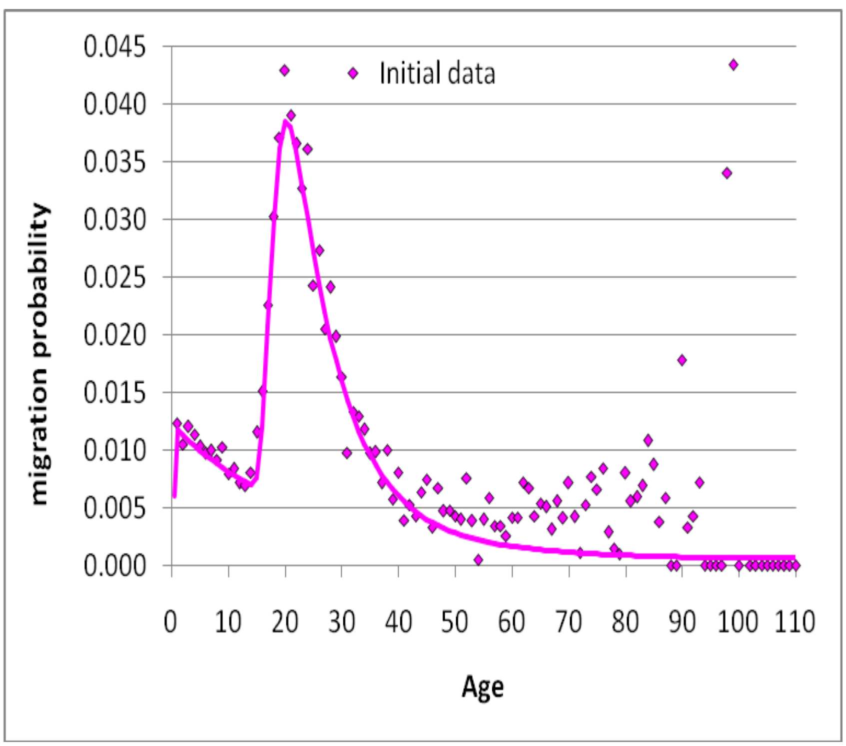

Figure 8b: Eastern Out-migration of Female
Source: Computed by authors

- **Rift Valley Region**

Figure 9a and 9b describes migration schedules for Rift Valley for males and females, respectively. Out migration schedules for Rift Valley region also resemble the standard model schedule with peaks at infancy and at the labor force ages. The height of the childhood curve is higher among the males than the females while the height of the labor force curve is higher among the females than the males. The ages at the labor force peak are slightly higher for the males than the females. The rate of descent of the childhood curve and the rate of ascent of the labor force curve are higher in the male schedule while the rate of descent of the labor force curve in the female schedule is higher than that of the male schedule.

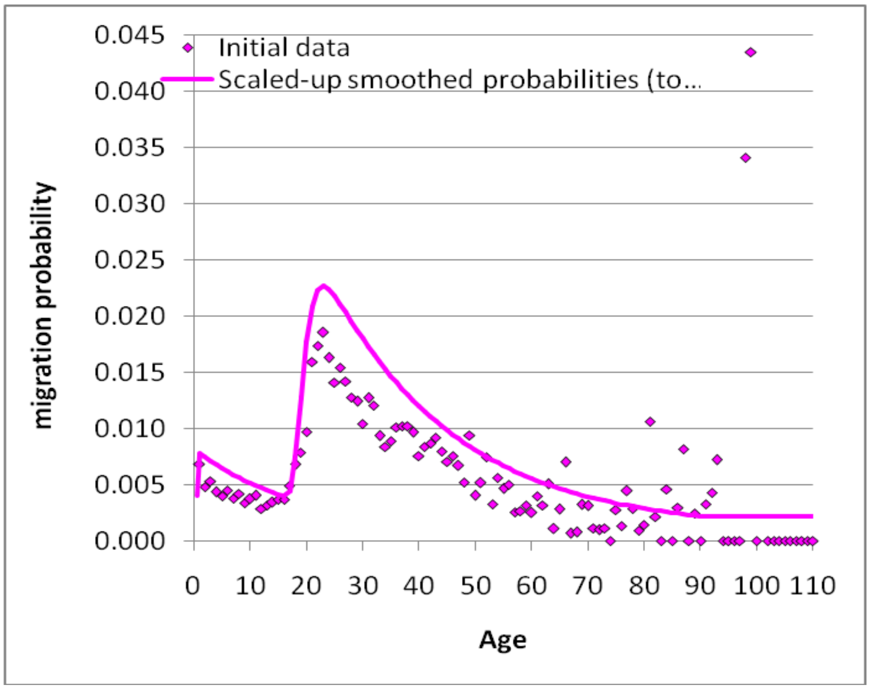

Figure 9a: Rift Valley Out-migration of Male
Source: Computed by authors

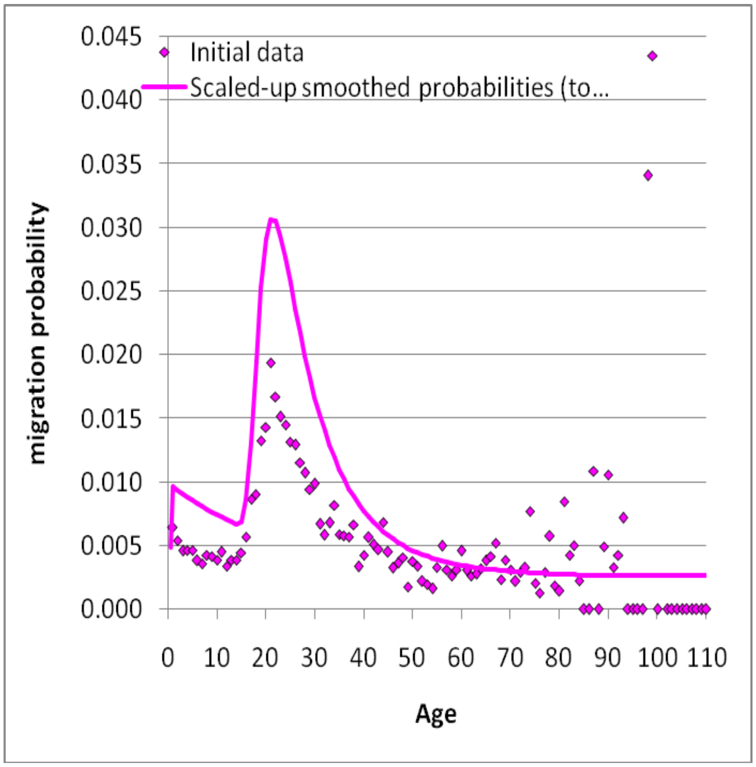

Figure 9b: Rift Valley Out-migration of Female
Source: Computed by authors

Discussion

With respect to Kenyan regional out-migration patterns, the above findings seem to support the general pattern as illustrated by the Rogers-Castro Model Migration Schedule with parameters labeled according to Rogers and Castro (1981). The age profiles of migration schedules in Kenya as measured by different sizes of regions were remarkably similar and indicated that the regularity in age patterns persist across areal delineations of different size.

An analysis of the aggregated age patterns of out-migration from each of the 8 regions to the rest of Kenya revealed that the lowest values of the parameter $a_{2,}$ describing the level of the labor force component, are characteristic of areas of high rates of in-migration. The highest values of the "index of child dependency" (δ_{12}) in these regions also reflected migration of the families. Regions of high rates of out migration were characterized by high values of the parameter a_2. These regions include Western, Eastern, Central and Nyanza.

Migration rates among young children reflected the relatively high rates of their parents, who are young adults in their late twenties. This affirms the widely recognized fact that a large fraction of total migration is accounted for by individuals whose moves are dependent on those of others, for example, children migrating with their parents, wives with their husbands, grandparents with their children. Young teens reveal a local low point around age 16 for males and 14 for females. Young adults in their early twenties generally have the highest migration rates, attaining a high peak at about 22 for males and 21 for females. After this age the migration rate as a function of age declines monotonically.

The male rates are higher from the mid-twenties to the mid-forties. Migrations due to marriage and education are concentrated between the ages of 10 and 30 years and are essentially unimodal in age profile. Migrations caused by change of employment and moving closer to the place of work have profiles that are bimodal, with local peaks during infancy and during the early years of labor-force participation. In all the regions, males exhibit higher low points and higher peaks than their female counterparts. The labor force shift, X, which gives an indication of the speed at which the work force settles down is lower in Nairobi region and highest in Coast region.

Rogers and Castro (1981) highlighted a detailed analysis of the parameters defining the various classes of over 500 schedules among national average age profiles. An examination of the labor force component defined by the four parameters a_2, μ_2, α_2, and λ_2 revealed that the national average values for these parameters generally lie within the following ranges:

$0.05 < a_2 < 0.10$

$17 < \mu_2 < 22$

$0.10 < \alpha_2 < 0.20$

$0.25 < \lambda_2 < 0.60$

When we compare these to the Kenyan schedules, we realize that in all instances apart from the parameter μ_2 which indicate that both male and female values lie within the given range; the male parameter values do not lie within the range given while the average female values do lie within the given range for the other parameters. Also, according to Rogers and Castro, the female values for a_2, α_2, and λ_2 were larger than those for males and the reverse was the case for μ_2. In this study, the same applies for a_2, α_2, and μ_2.

The two parameters defining the pre-labor force component, a_1 and α_1 generally lie within the ranges of 0.01 to 0.03 and 0.08 to 0.12, respectively. The exception with the Kenyan Schedule is α_2 which exhibits low average values for both male and female. The ratio of the two basic vertical parameters, a_1 and a_2, is a measure of the relative importance of the migration of children in a model migration schedule.

According to Rogers and Castro, the index of child dependency, $\delta_{12} = a_1/a_2$, tends to exhibit a mean value of about one-third with 80% of the values falling between one-fifth and four-fifths. The average values for the Kenyan Schedule fall within this range. Apart from Nairobi Province, female schedules in the rest of the provinces exhibit a tendency of being labor dominant, while Nairobi Province Schedule's of above two fifth's characterizes it as child dependent. Average values of the index of parental-shift regularity fall within the examined range of between one-third and four-thirds.

The above findings affirm that one of the most important regularities observed in human migration is its relationship to age. This may be attributed to the relationship of age to other characteristics of migrants and to other aspects of family life cycle and work. This explanation is beefed up with the expression of infants moving with their parents, low migration rates towards teenage years because these are compulsory school going ages, after school around ages 18 one has to migrate to join college, enter into marriage, look for a job including multiple entries into and withdrawals from the labor force and migrate as a result of divorce or remarriage.

Conclusions

The outputs made the convincing argument that migration in Kenya has strong regularities in age patterns, much like fertility and mortality. From the foregoing, it seems evident, in consequence that the model migration schedule which is the standard schedule, attempts to describe the regularities in age profile exhibited by out-migration flows in the Kenya.

The two peaks and lack of the third and fourth peaks indicate that the dominant force of out-migration in Kenya is schooling and labor force followed by associational moves. There seems to be no evidence of retirement or ill-health induced migration. The analysis of the regional out-migration age patterns reported in this study demonstrates the utility of examining the regularities in age profile exhibited by empirical schedules of interregional migration.

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