Transitions to adulthood in rural Malawi in the 21st century using sequence analysis

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Introduction

Adolescence and young adulthood are important stages of development; events and decisions made during these periods can have far-reaching effects into later life. Most sub-Saharan African countries have young populations, and with increasing urbanisation and access to schooling and the internet, young people now may expect, and have, very different lives to their parents. There is some evidence that young people's definition of adulthood is changing, with more of a focus on education and employment, as more traditional indicators such as marriage and children become increasingly delayed(1). While these delays may be viewed in a 'positive' light relating to improved access to education and reduced child marriage, in many countries, however, the economic situation has made it hard for young people to take the traditional steps towards adulthood(2).

Many studies in sub-Saharan Africa have examined 'early' sexual debut, school-leaving, pregnancy and marriage(3), and a few have also looked at leaving home(4). Most have assessed each event singly by calculating the proportion who have experienced the events by a certain age, others have collected retrospective data on age/date of events, and some have examined the order and timing of events. Few studies in sub-Saharan Africa have examined different trajectories to adulthood people can take, though it has been shown to be associated with future health(7). The aim of this analysis is to use existing prospectively collected data from Northern Malawi to explore transitions to adulthood in rural sub-Saharan Africa including examining individual trajectories to adulthood in detail and assess whether there is evidence for change over time.

Methods

The Karonga Health and Demographic Surveillance Site (HDSS) was established in 2002 in northern Malawi(8). It covers an area of 150km^2 and by 2016 had over 40,000 people under surveillance. Births and deaths are captured monthly, and migrations annually. The area is largely rural and the majority of the population engage in subsistence farming or fishing. The main ethnic group are Tumbuka, who have followed patrilineal and patrilocal custom since the 19th century: women tend to move to their husband's village when they marry(9). Polygyny is widespread: at the end of 2016 about 15% of households in the HDSS were headed by men with more than one wife. Both men and women tend to stay living with their parents/guardian until they marry, though young men may decide to move out earlier to get some freedom, this is not very culturally acceptable.

The longitudinal HDSS data were reduced to one record per person per year (on 15 June each year) including 4 binary markers of adulthood: left school, moved out (living in household with self, spouse or in-law as head), married (or divorced or widowed), and had a child. The proportion of the population who had experienced each marker was examined by age (between 10 and 34) and year. The age where over 50% (and 25, and 75%) of the sample each year had experienced the transition was used to estimate the median age and inter-quartile range (IQR) for each event by sex and calendar year. To assess for very delayed transition to adulthood, the proportion in the 30-34 year age group who had never married was calculated for each year.

To examine trajectories to adulthood, the longitudinal data were also reduced to one record per person per quarter (15th of the middle month of each quarter) and converted to 3 sequences relating to transition to adulthood: (home, with categories 'with parent', 'with other relative', 'with non-relatives' and 'moved out' [household head is self, spouse or in-law]; school, with categories 'in primary', 'in secondary', 'left with primary' and 'left with secondary'; and marriage/children, with

categories ‘never married’, ‘married with no children’, ‘married or unmarried with children’ [the marriage and children variable was combined as few people had children without being married]). For example:

Home sequence	…	*P*	*P*	*P*	*O*	*O*	*M*	*M*	*M*	*M*	…
School sequence	…	*P*	*P*	*S*	*S*	*Ls*	*Ls*	*S*	*S*	*S*	…
Marriage/children sequence	…	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*M*	*M*	…

In the above sequence excerpt example, the individual spent three segments living with parents (P), two with other relatives (O) and four having moved out (M); they moved from primary school (P) to secondary (S), had two segments out of school (Ls) and then returned to secondary; they started non married (N) and married (M) at the end of the sequence excerpt.

Only participants with data on at least 34 out of 40 quarters between the age of 14 and 23 for females, and 17 and 26 for males (as the previous analyses had showed that most transitions happen in these periods) were included. To reduce each person’s sequences into a manageable variable for analysis, multi-channel sequence analysis, followed by cluster analysis of the sequences, was carried out using the TraMineR(10) and mclust(11) packages in R. The former uses the ‘Longest Common Sequence’ approach to create a dissimilarity matrix between all pairs of sequences: this is done for each of the home, school and marriage/children sequences and then combined into one. A hierarchical clustering method (Wards) is then used on this matrix which produces a dendrogram of relatedness between the sequence sets. The dendrogram was ‘cut’ into 5-10 clusters and 2 sets of graphs produced for each cluster set: firstly, graphs showing the proportion of each cluster in each variable category at each time point and secondly, graphs plotting the actual sequences of each cluster member. Choosing the ‘optimal’ cluster solution is subjective: as each single increase in number of clusters is the result of one cluster being split into 2, the smaller cluster solution was compared by eye to the next largest one to identify which cluster had been split: if the resulting 2 clusters were considered to be different enough from each other for at least one of the variables, and the 2 groups included enough participants, the smaller cluster solution was rejected and the larger one compared to the next one. Once it was felt that the 2 new clusters were not different enough, or the split produced a group that was too small for meaningful analysis, the larger cluster solution was rejected and the smaller one kept. The groups were described and the proportions among participants starting the periods earlier (2004-6) compared with those starting later (2007-8).

Results

Over the period of the study, the average female age in almost all markers has increased. From 2004 to 2016, the female median age for school leaving increased from 18 (IQR: 17-20) to 19 (18-21); for leaving home from 19 (17-22) to 20 (18-24); for getting married from 18 (17-20) to 19 (18-23) and for having a child it was increased from 19 (18-22) to 20 (18-23). The male median age for leaving school increased from 21 (IQR: 19-24) to 22 (20-24), for leaving home it decreased from 25 (22-27) to 24 (21-27); for getting married it increased from 23 (21-26) to 24 (22-27) and for having a child it was stable at 25. The percentage of female late transitioners to marriage was small (less than 2%) and showed no clear pattern over time., while for men, the percentage was higher and increased from 2006 (5.7%) to 2016 (8.6%).

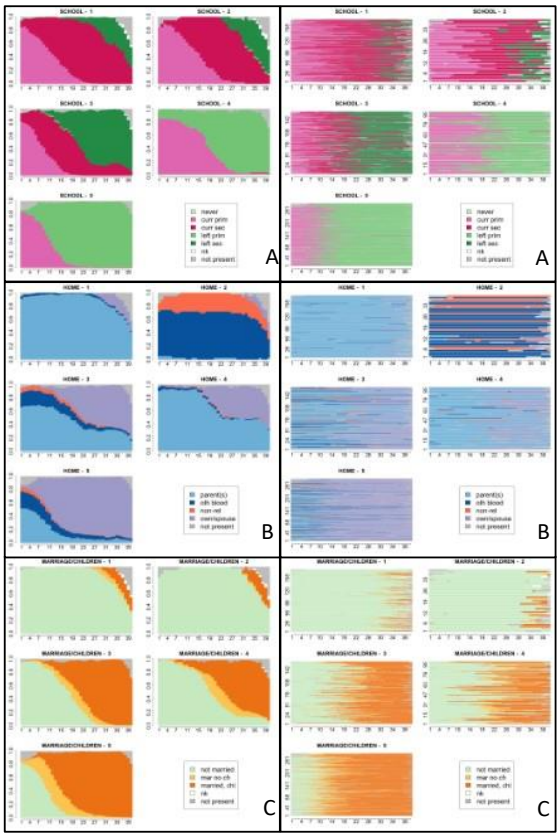
For both the female and male sequence analyses, the 5-cluster solution was chosen as the best way to describe the data. The groups are shown in figure 1 and described below.

Female

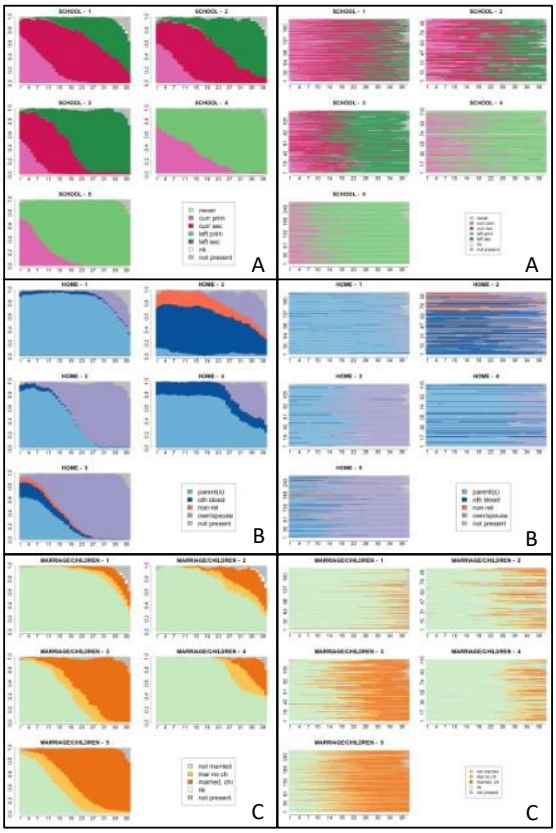
1: Parents, unmarried, secondary: This group had the latest transitions to adulthood, most progress to secondary school, spend the majority of the period unmarried and living with parents, by the end of the period about 50% are still with parents. This is the second largest group with 184 (23.6%) members, and this proportion increased over time from 20.1% to 27.7%.

2: Non-parents, unmarried, secondary: This group was similar to group 1, except that they tended to live with adults other than their parents before starting their transition to adulthood. This is the smallest group, with 39 (5%) members.
3: Married/children, secondary: This group was similar to group 1, except that all events happened earlier. There were 165 (21.1%) in this group.
4: Married/children, primary: This group did not progress to secondary school; they also experienced relatively early transitions across all types of transition. There were 100 (12.8%) in this group.
5: Married/children early, primary: The distinguishing feature of this group is in how early they made all transitions to adulthood; most group members have left primary school, left home and married/had children in the first half of the period. This was the largest group, with 293 members (37.5%): although the proportion decreased from 39.3% to 35.3% the p-value was over 0.05.

Figure 1: sequence analysis clusters, female and male, frequency in each category (L) individual sequences (R) for a. school; b. home and c. marriage/children



FEMALE



MALE

Male
1: Parents, unmarried, secondary: This group either do not experience the transitions or experience them the latest. Almost all attend secondary school with some still attending by the end, most live with parents most of the time and are unmarried. This was the second largest group with 211 (25.2%) members and the proportion increased over time from 21.5% to 30.9%.
2: Non-parent, unmarried: This group was similar to group 1 except they mostly do not live with their parents. This was the smallest group with 101 (12.2%) members.
3: Married/children, secondary: This group tend to experience all the transitions in a traditional way after having received some secondary education, some transition quite early but most do so in the mid-period. There were 127 (15.4%) members.

4: Unmarried or married/children late, primary: This group transition late out of home/to marriage, but only attend primary school. There were 117 (14.2%) in this group.
5: Marries, primary: This group also only attends primary school and leaves school relatively early, but as opposed to group 4, tends to experience the other transitions at a similar time. This was the largest group with 270 (32.7%) members and the proportion decreased from 36.8% to 27.2%.

The sequence analysis performed well with these data, producing distinct groups that would be expected given the context. It revealed that certain transitions seem firmly linked, such as continuing to secondary school and remaining living at home, plus a distinct group living without their parents but attending secondary school. The pathway groups were similar for girls/women and boys/men, though for girls/women transitions tended to happen at similar times in all groups, while for males leaving school tended to be the first transition.

Conclusions

Transition to adulthood remains quite traditional in rural Malawi, though over more than a decade hallmarked by changes in legislation and campaigns to keep girls in school there are some indications of change in terms of access to schooling and delayed marriage. However, there are still young women who are entering marriage young and with only some primary education and young men dropping out of school. There does appear to be a difference in the way that transition to adulthood is changing for men and women: further follow-up would be required to assess this. Finally, while this analysis shows little evidence of delayed adulthood in this community so far, further analysis may be required to assess whether it becomes a feature of adolescence in rural Malawi as it has been suggested to be in other parts of sub-Saharan Africa.

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