On Marriage Dynamics and Fertility in sub-Saharan Africa: Evidence from Malawi

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Abstract:

Background: The interplay between remarriage and fertility is among the most poorly documented subjects in sub-Saharan Africa (SSA), yet remarriage is one of the fundamental aspects of marriage dynamics in the region.

Objective: This research attempts to assess the pattern and level of union dissolution and remarriage, and to document how the association between remarriage and fertility changes over the course of the fertility transition.

Methods: Referring to innovative approach that utilises principles of cohort-period demographic measurement and classical statistical methodologies, this research uses Malawi as a case study to respond to these objectives.

Results: The results reveal that the probability of experiencing first union dissolution within 15 years dropped from 45.9% to 40.0% between 1992 and 2015, while the comparable likelihood of remarriage decreased from 36.1% to 27.7% over the same period. On childbearing, remarried women end up with fewer children than their counterparts in intact unions, but the fertility gap is diminishing overtime. In 2015, women in intact unions had 0.33 more children on average than their remarried counterparts, a decreased from 1.48 in 2000.

Conclusions: This research shows that remarried women close the fertility gap with those in intact unions and may end up with higher complete family size.

Contribution: In this study, we contribute to a new methodology to study remarriage patterns and dynamics from an incomplete marriage data. We also reveal the role that fertility in remarriage might play in understanding country-level fertility decline, which is an understudied issue.

1. Introduction

Fertility transition is underway in many countries in sub-Saharan Africa but many of its aspects are still understudied or overlooked. Recent debates have turned around the economic benefit of this transition while others have presented new dynamics of this transition based on the observation of stalling fertility declines in the region. For instance, studies by Ezeh and others have explained the fertility stalling by the decrease interest on family planning projects and marriage dynamics (age at marriage, start of motherhood, out-of-wedlock childbearing) across the continent (Ezeh *et al.* 2009). Because of the role that marriage dynamics play in influencing fertility transition (Bongaarts and Potter 1983), there is a growing body of studies that attempt to understand fertility behaviour and outcomes of women living in different marital status. Scholars have compared pre and post-marital fertility (Harwood-Lejeune 2001; Palamuleni and Adebowale 2014); dynamics of modern contraceptive use among never married, cohabiting, married, formerly married, and polygamous women (Stephenson *et al.* 2006; Baschieri *et al.* 2013; Chintsanya 2013); fertility preferences and age-specific fertility rates of women living in monogamous relative to those in polygamous unions (Baschieri *et al.* 2013; Chintsanya 2015; Machiyama *et al.* 2015); and variation of lifetime fertility among never married, married, formerly married, and women living in monogamous and polygamous unions, across different ethnic groups (Palamuleni 2014).

Largely absent from this body of literature is a systematic fertility analysis for women living in a remarried state, although union dissolutions and remarriages are very common in sub-Saharan Africa (Westoff 2003; Manda and Meyer 2005; Clark and Brauner-Otto 2015; Indongo and Pazvakawamba 2015; Hertrich 2017). Several studies have provided estimates of the level of divorce in different parts of SSA: Locoh and Thiriat (1995) observed high rates of divorce with about half of women in the 1988 Togo DHS ending their first marriage by the age of 45; Reniers (2003) found that close to half of the marriages in three rural areas in Malawi ended in divorce within 20 years; (Grant and Soler-Hampejsek 2014) used prospective data to examine marriage outcomes among young women in two districts of Malawi and found that only 58% of first marriage remains intact by the fifth year of marriage; Tilson and Larsen (2000) observe that only 60% of Ethiopian first marriages persist after 20 years; Clark and Brauner-Otto (2015) presents a thorough and broad investigation on divorce (and union dissolved through widowhood) in 33 countries in sub-

Saharan Africa, and found that, on average, 25% of the first marriage ended in divorce 15-19 years after first union. These studies have also indicated that most of these women will enter in a new relationship very quickly. The study by de Walque and Kline (2012) found that in 9 out of 13 countries studies in sub-Saharan Africa, the proportion of remarried women among currently married women is above 15%; with the highest proportion in Ethiopia (24%), Cameroon (23,6%) and Malawi (23,3%). From the few studies that have assessed the rate of remarriage, the study by Locoh and Thiriat (1995) in Togo found that more than 67% of the women remarried within three years after their divorce/separation whereas Reniers (2003) showed that 40% of women remarry within two years of divorce, 70% after 5 years and 90% after 10 years.

Reniers (2003) estimates that shows the pattern of remarriage in Malawi is the most recent measures of remarriage dynamics one could find at least in published demographic literature for sub-Saharan Africa. Therefore, it is not only the effect of remarriage on fertility that is poorly documented in sub-Saharan Africa but also the pattern and level of remarriage itself. Hence, this study seeks to address both research gaps, of remarriage patterns and their effect on fertility. Applying an innovative approach that utilises principles of cohort-period demographic measurement and classical statistical methodologies, it attempts to address two primary objectives: (1) to assess the pattern and level of union dissolution and remarriage, and (2) to estimate the effect of remarriage on childbearing (completed family size, CFS) and assess how this relationship varies over time. This analysis is conducted on the case of Malawi, where union dissolutions and remarriages are very common, at least by sub-Saharan Africa (SSA) standards (Clark and Brauner-Otto 2015). The methodology employed in this study provides in-depth insights into the pattern and level of union dissolution and remarriage, and on the effect of remarriage on childbearing based on limited nuptiality histories data.

2. How remarriage affects fertility: empirical and theoretical appraisal

Studies on remarriage and fertility have attracted very little attention in sub-Saharan Africa. A study by Lee and Pol (1988) is the best known work that attempted this question in the SSA region. Using data from the 1978 Cameroon World Fertility Survey, Lee and Pol (1988) estimated the effect of union disruption and remarriage on childbearing by applying a multivariate regression model, with fertility increments during the successive five-year period before the survey as the depended variable. They found that remarried women have fewer children compared to those in intact unions: the mean number of children ever born

(CEB) to women in stable unions is 3.48, relative to 3.34 for those who marry twice, 2.67 for women who initiate three marriages and 1.83 for women who marry 4 to 5 times. Similar findings were observed in other studies conducted around the same periods in other parts of the world (Chen *et al.* 1974; Ebanks *et al.* 1974; Thornton 1978). However, Studies by Lauriat (1969) on 1960 American census data, Downing and Yaukey (1979) in Buenos Aires, and Palmore and Marzuki (1969) in West Malaysia highlighted a net negative effect of remarriage on fertility.

Recent studies mostly across European countries, where fertility transition is at advanced level, shed new light on this relation while revealing the changing pattern of this association. Using a one per cent sample of the 1999 Survey of Family History in France, Beaujouan and Solaz (2008) apply descriptive methods to illustrate that, on average, women aged 45-60 who remain in intact unions attain 2.25 births. In the event of a union dissolution, remarried women achieve a CFS of 2.17 children per woman, compared to a CFS of 2.02 reached by women who remain separated. In Italy, Meggiolaro and Ongaro (2010) fitted a Poisson regression model using data from the 2003 Family and Social Subject, to explore the impact of union dissolution on cumulated fertility. The findings illustrate that when current age is controlled for, the fertility of women who marry only once is 15% higher relative to remarried women. Van Bavel *et al.* (2012) used data like those collected in DHSs (that is, with unknown timing of union dissolution and initiation of higher-order unions) to investigate the effect of remarriage on childbearing across 24 European countries. The authors found that remarried European women aged 20-50 have 0.02 fewer children than their counterparts in intact unions. Finally, a study based on DHS data in Bangladesh support the same trend although showing a stronger effect: the study documents the net CFS difference of 1.1 children between remarried women and those in intact unions, with those married more than once having 3.9 children on average (Uddin and Hosain 2013).

This review showed different patterns of the effect of remarriage on fertility, with lower effects observed in countries more advanced in their fertility transition, and a stronger effect elsewhere. A theoretical appraisal of this relationship helps to better understand such results. Although this relationship can be traced to the framework of proximate determinants by Davis and Blake (1956) and Bongaarts and Potter (1983) that identifies union dissolution and remarriage as some factors that have a direct bearing on marriage and fertility relationship, Cohen and Sweet (1974) provide one of the pioneering works that specifically link remarriage and childbearing. Based on this study and the literature accumulated over the past decades, the net fertility difference between women in intact unions and their remarried counterparts appear to arise from differences in three components (1) the timing (the age at

union dissolution and the gap between dissolution and remarriage) of union dissolution and remarriage, (2) childbearing motivations and behaviour in second or higher-order unions, and (3) selection effect.

According to the first argument, the timing of union dissolution and remarriage is an essential mechanism in the whole framework of understanding fertility differentials between remarried women and those in intact unions, mainly because age constrains human reproduction. Two pathways can be considered through which the timing of union dissolution and remarriage influence the ability of remarried women to attain as much fertility as women in intact unions. First, marital dissolution shifts childbearing to older ages (Van Bavel *et al.* 2012) where fecundity is low (Leridon 2008). Thus, unions that dissolve at early ages of childbearing allow women to initiate new partnerships at ages when reproduction is predominant, and fecundity is relatively high, thereby increasing the odds that remarried women attain as much fertility as those in intact unions (Thomson *et al.* 2012). However, Wineberg (1990) illustrates that delaying union dissolution does not necessarily result in low fertility because women who experience a union dissolution at advanced ages may have already attained high lifetime fertility during union dissolution or remarriage. Second, union dissolution removes women from a socially sanctioned institution of childbearing that in turn reduces their exposure to regular sexual intercourse, hence depressing their risk of pregnancy (Davis and Blake 1956; Cohen and Sweet 1974; Thornton 1978; Downing and Yaukey 1979; Jefferies *et al.* 2000; Beaujouan and Solaz 2008; Meggiolaro and Ongaro 2010; Thomson *et al.* 2012; Van Bavel *et al.* 2012). Therefore, the timing of remarriage—that is the pace at which women are remarrying following a union dissolution— influences the overall fertility of remarried women by directly modulating their loss of exposure to conception. Nevertheless, the degree to which duration between two successive marriages affects fertility is contingent on prevailing social and religious norms. In societies where women strictly follow traditional customs that disapprove of out-of-wedlock childbearing, this effect is likely to be stronger than in communities where out-of-wedlock childbearing is acceptable (Cohen and Sweet 1974). In the later societies, the effect may be offset because there may be less or no loss of reproductive years due to union dissolution.

The second argument that aids understanding of the link between remarriage and fertility is related to childbearing motivation and behaviour in second or higher-order unions. Remarriage returns a divorced or widowed woman into an institution where sexual intercourse is regular and childbearing is socially acceptable. This process increases a woman's chance of conception; therefore, remarriage has a pro-natalist effect (Davis and Blake 1956; Cohen and Sweet 1974; Thornton 1978; Downing and Yaukey 1979; Jefferies et

al. 2000; Beaujouan and Solaz 2008; Meggiolaro and Ongaro 2010; Thomson et al. 2012; Van Bavel et al. 2012). However, the fertility differentials between remarried women and those in intact unions depend on the actual childbearing practices following remarriage. At least three key motivations directly influence childbearing behaviour in higher-order unions. First, the parenthood-effect hypothesis suggests that individuals who remain childless in their first marriage are more inclined to engage in childbearing following remarriage in an attempt to attain parenthood status (Wineberg 1990; Lillard and Waite 1993; Jefferies et al. 2000; Beaujouan and Solaz 2008). Second, remarried women may initiate childbearing to strengthen the marriage bond (Griffith et al. 1985; Vikat et al. 1999; Buber-Ennser and Fürnkranz-Prskawetz 2000; Stewart 2002; Thomson 2004; Meggiolaro and Ongaro 2010; Hayford and Victor 2016). Finally, women in second unions may resume childbearing to attain a desired family size or to start a new family (Thornton 1978), especially in the case where the first marriage was dissolved before achieving the desired family size to mitigate undesirable social and reproductive health conditions such as exposure to the risk of HIV/AIDS (Reniers 2003; 2008; Grant and Soler-Hampejsek 2014). In this case, remarriage may be regarded as a machinery of accomplishing their "unfinished agenda of childbearing" within wedlock.

Finally, a selection process may explain the differential fertility between never-remarried women and remarried women. At the onset of the first union, some women are selected for demographic and social economic characteristics that simultaneously influence their risk of union disruption and childbearing (Lauriat 1969; Cohen and Sweet 1974; Lillard and Waite 1993; Leone and Hinde 2007; Coppola and Di Cesare 2008). For instance, in Italy, Coppola and Di Cesare (2008) simultaneously modelled union disruption and childbearing processes using data from the 1996 Fertility and Family Survey. The authors illustrate that women with high risk of childbearing also have a lower probability of union dissolution. They argue that women who desire larger families are pre-disproportionately self-selected for high fertility and stable unions. This finding is comparable to results observed by Lillard and Waite (1993) who found a significant negative correlation between unobserved heterogeneity of union dissolution and fertility, suggesting that women with a low likelihood of union dissolution also have a higher risk of childbearing.

At the population level, the interplay of these factors is related to the stage of the fertility transition in the country. As the fertility transition happened, and fertility decreased, the fertility gap between never-remarried women and remarried women decreased and in some places becomes negative (Downing and Yaukey 1979). This transition also brings some changes in the behaviour and in social norms (Reher 2004); specifically, norms around repartnering after divorces, post-partum infecondity, birth interval… The fertility transition

in Malawi is still in its infancy as in many other countries in SSA, and provides an interesting setting to understand remarriage and fertility within the continent.

3. Context of the study

Between 1970 and 1985, the total fertility rate (TFR) in Malawi varied around 7.0 children per woman (United Nations *et al.* 2017), and dropped to 6.6 by the early 1990s. For the past two decades, TFR in Malawi decreased gradually before falling rapidly to 4.4 by 2015 (ICF International 2015b). This fertility dynamic has long been driven by the urban population. In rural areas, fertility didn't drop beyond 10 per cent until the early 2000s; the TFR was 7.4 in 1987 and 6.9 in 1992. It fell to 6.4 by 2004, representing a 13.4% decline over a period spanning almost 20 years. However, by 2015, the fertility rate in rural areas was 4.7 children per woman, illustrating that fertility transition is also occurring among the rural residents (National Statistic Office [Malawi] 2000; 2010; National Statistical Office - NSO/Malawi and ICF Macro 2011; National Statistical Office/Malawi and ICF 2017). The falling of fertility levels in Malawi has been accompanied by declining family size ideals and lengthening of birth intervals (Moultrie *et al.* 2012; ICF International 2015a). The ideal family size for women aged 15-49 dropped from 5.1 to 3.7 between 1992 and 2015, while the median births intervals increased from 32.7 to 40.1 over the same period (ICF International 2015a).

Malawi has a history of early and universal marriages, higher divorce rate and remarriage (Chae 2016). The median age at first union among women aged 25-49 was as low as 17.8 years in 1992, it increased slightly by 0.4 years over a period of 23 years, reaching 18.2 in 2015 (ICF International 2015a). The patterns of union dissolution and remarriage presented by Reniers (2003) illustrate that union dissolutions are more frequent within early years of first marriage. Reniers notes that over half of women who dissolve their first unions within 20 years do so over the first ten years. Thus, given the early pattern of first marriages in Malawi, this trend suggests that union dissolutions dominate at younger reproductive ages, potentially at ages below 30. Reniers also show that remarriage is rapid in Malawi. Thus, although women dissolve their first unions at prime ages of childbearing, the majority return to a high risk of conception at ages when fecundity is relatively high and childbearing is still predominant. This trend suggests that remarried Malawian women do not lose substantial exposure to regular sexual intercourse.

In Malawi, most women live in rural areas where the cultural grip to the role of childbearing within a socially sanctioned system (marriage) is still strong and norms that condemn premarital and out-of-wedlock fertility dominates. Palamuleni and Adebowale

(2014) note that women who give birth out-of-wedlock in the SSA region are emotionally victimised as a gesture of disapproving such behaviour. The authors specify that in Malawi children born out of marriage system are called by names that reflect women's lack of dignity, such as “children without fathers” or “children of the bush”. These norms likely influence women with disrupted unions to avoid childbearing despite the desire to do so, to preserving value on the marriage market. Consequently, conscious fertility control likely dominates the dissolution period.

4. Data

This study is based on data from five rounds of Demographic and Health Survey (DHS) conducted between 1992 and 2016 in Malawi. The analyses in this study use nuptiality data of ever-married women who are not sterilised and have not been declared infecund. Nuptiality reports are considered together with full birth history records to examine the effect of remarriage on childbearing. The regression model is specified using a pooled dataset that merges records from the most recent four surveys (2000, 2005, 2010, and 2016) into a single exposure file, thus allowing assessment of the pattern of remarriage effect on childbearing over time.

DHS classifies women in both formal and informal unions as married. This specification is desirable because it addresses the challenge of identifying legitimate married women in a region where union formation is a process rather than an event (Meekers 1992; Chae 2016). This study follows this practice by identifying ever-married women as those who reported having been married or lived with a man at least once. Again, union dissolution refers either to marriage that is terminated by formal divorce, separation or widowhood, as it is not always possible to disentangle between them from the DHS data.

5. Method

Two approaches are used in this study. First, descriptive method to assess the pattern and level of first union, and the fertility differentials between remarried women and those in intact union at a population level. Second, a multivariate analysis is applied to examine the relationship between remarriage and fertility at an individual level.

5.1. Pattern and level of union dissolution and remarriage

Two measures are used to assess the pattern and level of first union dissolution and remarriage. First, the duration-specific cumulative probability of first union dissolution defined as the probability of ever having experienced a first union dissolution at time *t* following the onset of the first union. Similarly, the duration-specific cumulative probability

of the first remarriage is defined as the likelihood of ever been remarried at time *t* relative to the first union. These probabilities of remarriage do not account for the likelihood of union dissolution. That is, they are not conditional probabilities. Ideally, one would estimate the probability of remarriage conditional upon having a union dissolved. However, the DHS data do not allow us to perform this type of analysis as it does not specify the date of the union dissolution or when the later marriages were formed. For ease of presentation, these measures are denoted as the probability of first union dissolution and remarriage respectively.

This study estimates duration-specific cumulative probabilities of first union dissolution by using cohort and period estimates of the proportion of women in intact unions respectively. Given the availability of multiple DHSs, a cohort of women who first married at a specified period can be followed across different surveys and the proportion of those who remained in intact unions observed. Figure 1 below helps to illustrate the follow-up of women of the same marriage cohort at different periods relative to the onset of their first union.

[Figure 1]

In Figure 1, j denotes a five-year marriage cohort of women, and t_k represents the date of the survey conducted in the year *k*. Women of the same marriage cohort *j* are followed at different interval duration relative to the onset of their first union d_{jt_k}. At each date of the survey, the proportion of women who are in intact unions is observed. If we let ρ_{jt_k} denote this ratio, then $\rho^*_{jt_k} = 1 - \rho_{jit_k}$ corresponds to the percentage of women who ever experienced first union dissolution d_{jt_k} years since the first union. By assuming that first marriages of cohort j occurred uniformly, d_{jt_k} is estimated as the difference between the date of the survey t_k and the mid-point of the period for which women of marriage cohort j initiated their first unions, that is $d_{jt_k} = t_k - (j + 2.5)$.

To define the pattern of the first-union dissolution, the $\rho^*_{jt_k}$'s are plotted against their corresponding d_{jt_k}'s on the same axis, and a third-degree polynomial function that best describes the distribution of $\rho^*_{jt_k}$'s is identified. The selected polynomial function minimises the objective function $O = \sum_{k}^{w} \sum_{j=1}^{l} \left| \rho^{*s}_{jt_k} - \rho^{*}_{jt_k} \right|$ where $\rho^{*s}_{jt_k}$ is the proportion of women who ever experienced a union dissolution at interval duration d_{jt_k} relative to the first union,

derived from the polynomial function under consideration, ℓ is the maximum number of the marriage cohorts and *w is* the number of surveys.

Once the pattern of first union dissolution has been established, the appropriate level of duration-specific cumulative probabilities of first union dissolution in year k is derived by adjusting the fitted pattern by a scalar factor to fit the series of $\rho^{*}_{jt_k}$'s corresponding to the year in question. In other words, the level of union dissolution in a calendar year k is obtained by adjusting the fitted pattern such that the objective function $O = \sum_{j=i}^{l_k} \left| \rho^{*s}_{jt_k} - \rho^{*}_{jt_k} \right|$ is minimised, where ℓ_k is the possible maximum number of marriage cohorts observed in year k. The process of minimizing the objective function, *O*, is performed using a solver function in Microsoft Excel. For each year of survey, the adjusted function is evaluated at interval duration of 5, 10, 15, 20 and 25 years relative to the onset of first marriage.

The study estimates probabilities of remarriage using a similar procedure while replacing the proportion of women in marriage cohort *j* who are in intact unions with the percentage of those who never initiated second order union.

5.2. Cohort-period lifetime fertility differential

The analyses of remarriage effect on childbearing begin with a comparison of lifetime fertility attained by remarried women relative to those in intact unions at the end of each five-year childbearing age group. This study adapts a technique for estimating cohort-period fertility rates to perform this investigation (Moultrie *et al.* 2013). Cohort-period fertility rates are derived from the distribution of births by the age of mother and period before the survey, and the number of women by age at the survey date. Table A.1 (in appendix) shows the fertility rates. In this table, N_i represents the number of women in the age group i at the survey date and $B_{i,j}$ denotes the total number of births j years before the survey to women in the age group i. Thus, the cohort-period fertility rates are defined as:

$$f_{i,j} = \frac{1}{5}\left(\frac{B_{i,j}}{N_i}\right)$$

This study replaces the $B_{i,j}$'s in Table A.1 with $Z_{i,j}$'s, where $Z_{i,j}$ denotes the total number of children ever born j years ago to women in the age group i. This approach allows that all children who were born before their mothers were aged 15, particularly among the oldest age cohort, are considered. Alternatively, one can cumulate the $B_{i,j}$'s within each age group, starting from the furthest period of childbearing. In such a case, the

matrix in Table A.1 needs to be extended to include the interval duration of 35-39 years before the survey. The cohort-period mean number of CEB to women in the age group i is then defined as:

$$MCEB_{i,j} = \left(\frac{Z_{i,j}}{N_i} \right).$$

5.3. Multivariate analysis

The Poisson regression model is employed to further examine the effect of remarriage status on the mean number of CEB during childbearing years. Thus, we define a variable *remarriage status* that captures lifetime union dissolution and remarriage experience among ever-married women, based on reports of current marital status and number of unions a woman has ever had. The variable identifies women who married or lived with a man more than once as "remarried". The comparison group consists of women who remained in their first unions until the date of the survey. This group is called "women in intact unions".

Poisson regression analysis is a standard technique used to model count response variables with a Poisson distribution. We fit a regression model on the pooled data from 2000 to 2015/16 that includes an interaction variable between years of survey and remarriage status. Therefore, the results documented based on these interaction models are derived using the post-estimation command margins in Stata (Buis 2010; Williams 2012). The regression model controls for potential observable predictors of childbearing including time elapsed since the first marriage, age, education level, income status, and residence, number of living children, ethnicity, occupation, religion and year of survey.

6. Results

6.1. Pattern and level of union dissolution and remarriage in Malawi

The pattern of first union dissolution and remarriage according to duration relative to the first marriage is displayed in Figure 2 below as the cumulative density functions (a) with corresponding hazard distributions (b).

[Figure 2 here]

The probability of first union dissolution, in Figure 2a, rises rapidly at an early and advanced interval duration. This pattern principally illustrates the dynamic of change in the underlying cause of union dissolution, from divorce to widowhood, as time increases following the first marriage. The high risk of union dissolution at shorter interval duration in Figure 2b, mainly reflects high divorce rates during the early years of first marriage, because women are less likely to dissolve their unions due to death of a spouse over this period. As time elapses since the first union, marriages become more stable; the falling risk of union

dissolution in Figure 2b illustrates this pattern. The fact that there is a sharp increase in the risk of union dissolution at advanced interval duration in Figure 2b is indicative of the high prevalence of widowhood since divorce is less likely to dominate over this period.

The pattern of remarriage is reasonably identical to that of first union dissolution. The risk of remarriage is high at an early interval duration; it gradually decreases as time elapses and slightly rises at advanced interval duration. The absence of a substantial rise in the risk of remarriage between 25-30 years after the first marriage should be expected. Women whose first unions dissolve during this period or few years before this interval are more likely to be older, hence more likely to have a lower risk of remarriage.

Table 1 below presents the probability of first union dissolution and remarriage according to time elapsed since the onset of first marriage, between 1992 and 2015. The most recent estimates, shown in the last column, indicate that over one fifth of first marriages dissolve within five years. This proportion steadily rises to 40 per cent by 15 years and reaches 44.5 per cent after 20 years. The corresponding probability of remarriage is 12.7, 27.7 and 32 per cent respectively.

The results in Table 1 reveal also a declining trend of union dissolution and remarriage in Malawi. In 1992, the probability of dissolving the first union within 15 years was 0.46. This figure dropped to 0.43 by 2000 and to 0.40 in 2015. Similarly, the likelihood of remarrying within 15 years relative to the first union fell from 36.1 per cent in 1992 to 27.7 per cent in 2015. This trend represents a 5.8 and 8.4 per cent points reduction in the level of union dissolution and remarriage respectively. However, between 2004 and 2010, the level of union dissolution slightly increased at all interval duration relative to the first marriage, while the level of remarriage consistently declined. This suggests that the observed decline in the probability of remarriage cannot be exclusively attributed to a falling level of union dissolution, but also to a decrease in the risk of remarriage following a divorce or death of a spouse. This could largely be attributed to increased women's autonomy and participation in economic activities over the years, such that women are increasingly becoming less depending of marriage formation for survival.

At the onset of first marriage, both union dissolution and remarriage is zero. Thus, the ratio of the cumulative probability of remarriage to that of union dissolution, at shorter interval duration since the first union, reflects the pace of remarriage following a union dissolution. Within five years, this ratio remained around 0.65 between 1992 and 2004. It dropped to 0.61 in 2010 before reaching 0.58 in 2015. This downward trend indicates the rising time lag between first union dissolution and remarriage in Malawi.

[Table 1 here]

6.2. Cohort-period lifetime fertility differentials

[Table 2 here]

Table 2 displays the cohort-period cumulated fertility differentials across different periods. It presents the differences in the mean number of children ever born to women in intact unions relative to their remarried counterparts. Reading the columns in descending order illustrates the cumulated fertility differences at the end of each five-year childbearing age group for a given birth cohort of women. The results reveal that remarried women have more children at younger ages but end up with fewer children than those in stable unions. For example, in 2000, remarried women aged 45-49 reported having attained 0.03 more children than their counterparts in intact unions during the adolescent years but they have 1.48 fewer children at the end of their childbearing. This trend is also observed among women aged 45-49 in the most recent surveys. Note that for the most recent birth cohorts (women interviewed in 2010 and 2015), remarried women have more children than their counterparts in intact unions at least until age 25. This pattern can be linked to the fact that remarried women initiate their first unions at younger ages, which potentially influences their early childbearing behaviour (Table A2 (Appendix))

The lifetime fertility difference in Table 2 increasingly becomes more pronounced as women progress towards the end of childbearing lifespan. For example, In 2000, the fertility difference among women aged 45-49 at the time of the survey, when they were aged 25-29, was 0.43 children. This difference increased to 1.16 as they were aged 35-39, and 1.43 between ages 44 and 45. A similar trend is apparent in the most recent surveys and among younger birth cohorts. Overall, this pattern suggests that fertility of women who remarry quickly slows down with age, compared to that of women in intact unions.

Table 2 also suggest that the difference in CFS between remarried women and those in intact unions is diminishing over time. In 2000, remarried women aged 45-49 had given birth to 1.48 fewer children on average than women of the same age in intact unions. This figure dropped to 0.33 in 2015, representing 77.6 per cent reduction in the CFS difference over a period of nearly 15 years.

The pattern of the CFS differentials between remarried women and those in intact unions, observed in Table 2, is mainly due to marked fertility decline among the latter group. This finding is observed in Figure 3 that plots CFS trends for remarried women and their counterparts in intact unions. CFS of women in intact unions steadily declined over the years, but it remained constant among remarried women. Overall, CFS dropped by 1.2 children among women in stable unions, while it decreased by 0.04 children for remarried women. The fact that fertility of remarried women did not fall comparable to that of women

in intact unions is indicative of the potential influence of remarriage to sustain fertility at high levels.

[Figure 3 here]

6.3. Adjusted effect of remarriage on childbearing

[Figure 4 here]

The results of a Poisson regression model that allows interaction between years of survey and age suggest that the observed pattern of fertility differentials in the previous section is not an artefact of structural differences between remarried women and those in intact unions. The trend persists despite controlling for observable composition heterogeneity. This finding is shown in Figure 4 below that presents the pattern of the adjusted fertility differences with increasing age across different periods. It plots the relative change in the predicted mean number of children ever born if a woman in intact union initiates a second-order union.

In Figure 4, all curves lie above zero at younger reproductive years but under zero at advanced childbearing ages. Thus, controlling for structural differences does not change our initial observation that remarried women have more children at early ages of childbearing but eventually end up with fewer children than those in intact unions. The downward trend of the relative change in the mean number of children ever born with increasing confirms that the lifetime fertility inequality between remarried women and those in intact unions gradually becomes pronounced as women advance in age. The fact that estimates based on the most recent surveys lie above those obtained from the previous surveys indicate a diminishing fertility difference over the past decades. Interestingly, in 2000, remarried women had higher cumulated fertility than those in intact unions at ages below 25, while in 2015 their adjusted lifetime fertility was higher up to the age of 30-34.

7. Discussions and conclusion

This research sought to define the pattern and level of union dissolution and remarriage in Malawi and to investigate how remarriage affects childbearing. The study makes two key contributions towards our understanding of marriage dynamics and its association with childbearing. First, it provides the first nationally representative estimates of remarriage over a period spanning almost 20 years. Second, the findings validate Clark and Brauner-Otto (2015) observation that union dissolutions are becoming less frequent in Malawi. Indeed, it is found that the likelihood of experiencing the first-union dissolution within 15 years dropped by 5.8 per cent points between 1992 and 2015. The comparable likelihood of remarriage decreased from 36.1 to 27.7 per cent over the same interval duration. These trends could imply declining formation of complex family structures, such as stepfamilies (Chae 2013;

Adjiwanou 2017). Such living arrangements have adverse health and social effects on child and adolescent welfare (Grant and Yeatman 2014; Ntoimo and Odimegwu 2014; Pilgrim *et al.* 2014; Adjiwanou 2017). Thus, the observed downward trend of both union dissolution and remarriage is a positive development as far as adolescent and child well-being is concerned.

Regarding the second objective, the research set out to assess the effect of remarriage on childbearing. Given the recent rapid fertility decline in Malawi, the findings of this analysis provide novel insights into the role that fertility in remarriage might play in understanding country-level fertility decline. It is found that remarriage is associated with lower CFS. However, the fertility level of remarried women remained relatively stable over the past two decades, while that of women in intact unions steadily declined. Consequently, the difference in CFS between remarried women and those in intact unions is diminishing, and in terms of current fertility as measured by the TFR (Figure A1: (Appendix)), remarried women now have higher fertility than women in intact union as opposed to the trend that persisted until 2010. This could be suggesting that a new regime, where remarried women will eventually end up with more children than those in intact unions, is emerging. Given the observed strong stability of fertility trends for remarried women as compared to those in intact union , one may speculate that the high proportion of remarried women in the early 1990s and in rural areas, partially explain the slow pace of fertility decline that dominated among the rural residents during this Period. Similarly, the observed falling level of union dissolution and remarriage, partially account for the recent fertility decline in rural areas and Malawi generally.

The fertility disparities between remarried women and their counterparts in intact unions, that persisted over the past two decades are comparable to findings observed in several studies across non-African regions, in terms of not only the direction of the effect but also the magnitude of the fertility difference. The study has documented the adjusted CFS difference of 1.48 in 2000 and 0.33 in 2015 between remarried women and their counterparts in intact unions.

The results indicate that remarriage is increasingly becoming a significant positive predictor of individual childbearing behaviour. Therefore, future models that seek to explain childbearing and fertility limitation in human population should not only account for marital status in terms of whether one is single or married but should also control for remarriage heterogeneity.

While this research is based on a nationally representative sample, implying that the findings are generalisable, and the methods that have been used are robust enough to produce reliable estimates, the study faces four limitations. First, the techniques that have been used

to define the pattern and level of union dissolution and to derive the cohort-period mean number of children ever born are grounded on principles of cohort approaches to demographic estimation. Thus, the level of precision of results obtained from these techniques depends largely on the validity of the assumption that women who survived to the date of the survey do not differ from those who died or emigrated. While migration is less likely to influence the estimates produced in this study, the impact of mortality cannot be wholly disregarded, primarily because of HIV/AIDS-related deaths that dominated until the mid-2000s. Women whose first unions dissolved because their partners died from HIV/AIDS-related diseases are more likely to have been underrepresented at the time of the survey as they might have died from similar conditions. Therefore, the estimated level of union dissolution corresponding to the periods of high HIV prevalence may be understated.

Second, the study used women in intact unions as a comparison group. This approach assumes that remarried women would have attained fertility comparable to that of women in intact unions if they had not experienced a remarriage and their composition structure was identical to their counterparts in intact unions. While there is no apparent reason to reject this assumption, unobserved heterogeneity may render these two population groups incomparable.

Third, the analyses are restricted to ever-married women who are not sterilised or have been declared infecund. It is based on the assumption that sterilisation is evenly distributed among women with intact union and those who have remarried. This exclusion potentially biases the childbearing results at older ages in an unspecified way. The fertility difference observed at older ages could be understated if sterility or infecundity of remarried women rises more quickly with age relative to that of women in intact union. In-depth analysis of this issue is beyond the scope of this study. Thus, future research on sterility or infecundity patterns across different marital states could help shade more understanding on the observed fertility differentials at older ages.

Finally, the nuptiality data collected in DHS are insufficient to ascertain the causal effect of remarriage on fertility preference and childbearing. To infer causation, the study would ideally use longitudinal data that allow follow-up of women before and after initiating higher order union to determine how such transitions influence childbearing and fertility intention dynamics. However, such data are rare in Malawi, and if available, they are often not representative of the national population or inappropriate for this subject. Well-known longitudinal studies that have collected fertility and nuptiality reports in Malawi include Fertility Intention Study under Karonga Prevention Studies, conducted between 2008 and 2009. Because of limited length and low levels of divorce across waves estimated at 4 per cent (Machiyama, Baschieri, Dube et al. 2015), these data are not suitable for analyses of

remarriage effect on fertility. Malawi Longitudinal Study of Families and Health covered three of the 28 districts in Malawi and conducted six waves of data collection spanning years between 1998 and 2012. Exploration of these data concerning their suitability for the subject of remarriage and childbearing suggest that they are inappropriate for this study. Tsogolo la Thanzi longitudinal study was conducted in Balaka between 2009-2011 (Yeatman and Sennott 2014). The survey collected fertility intentions among young couples. The duration of the study limits its applicability for this subject.

Nevertheless, the methods used in this study are robust enough to provide reliable insights on remarriage and fertility based on limited nuptiality histories. The cohort approach to the assessment of pattern and level of union dissolution and remarriage, and for the analysis of lifetime fertility differentials between remarried women and those in the intact union, is appealing because it draws a longitudinal perspective based on cross-sectional data. Therefore, future research could consider extending the application of these methods to other SSA countries. Extending this study to other SSA countries could help improve the quality of research on marriage dynamics and fertility in the region, and provide a new assessment of the fertility transition in the region.

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FIGURE IN THE TEXT

Figure 1: Diagramatic representation of follow-ups of ever-married women across different surveys

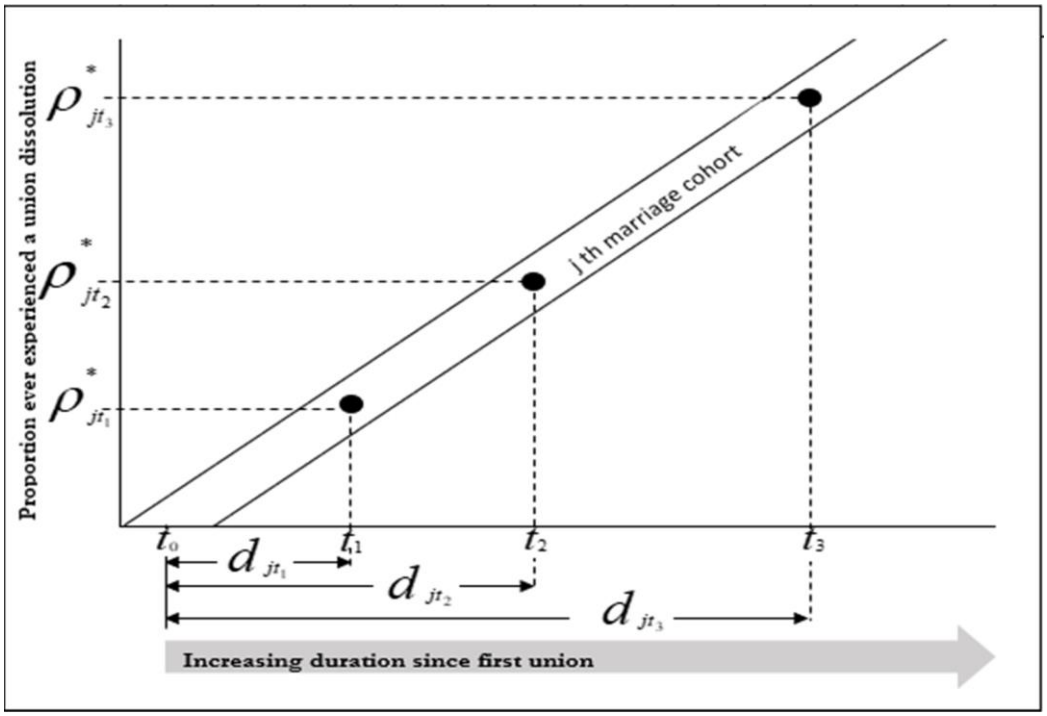


Figure 2: Reconstructed pattern of first union dissolution and remarriage according to time (years) elapsed since the first union, based on 1960-2015 five-year marriage cohorts of women

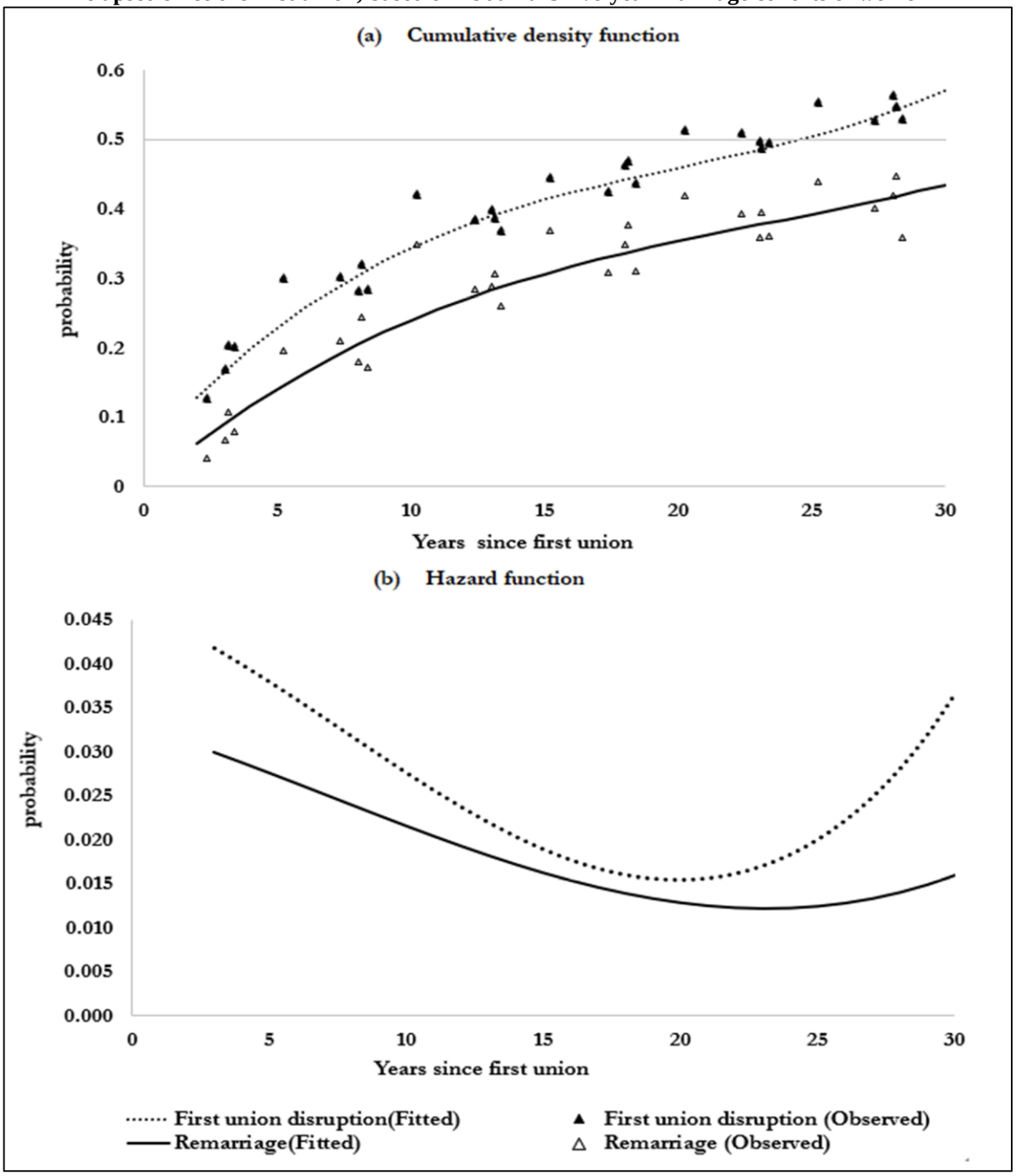


Figure 3: Completed Family Size (CFS) trends by remarriage status, 2000-2015

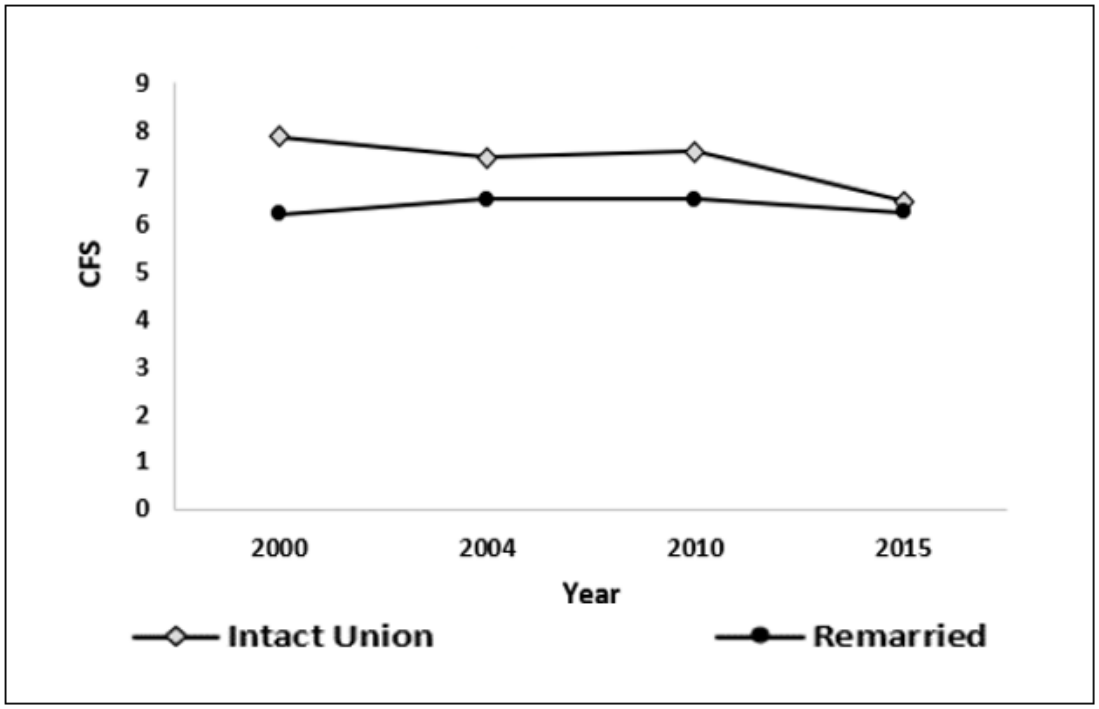
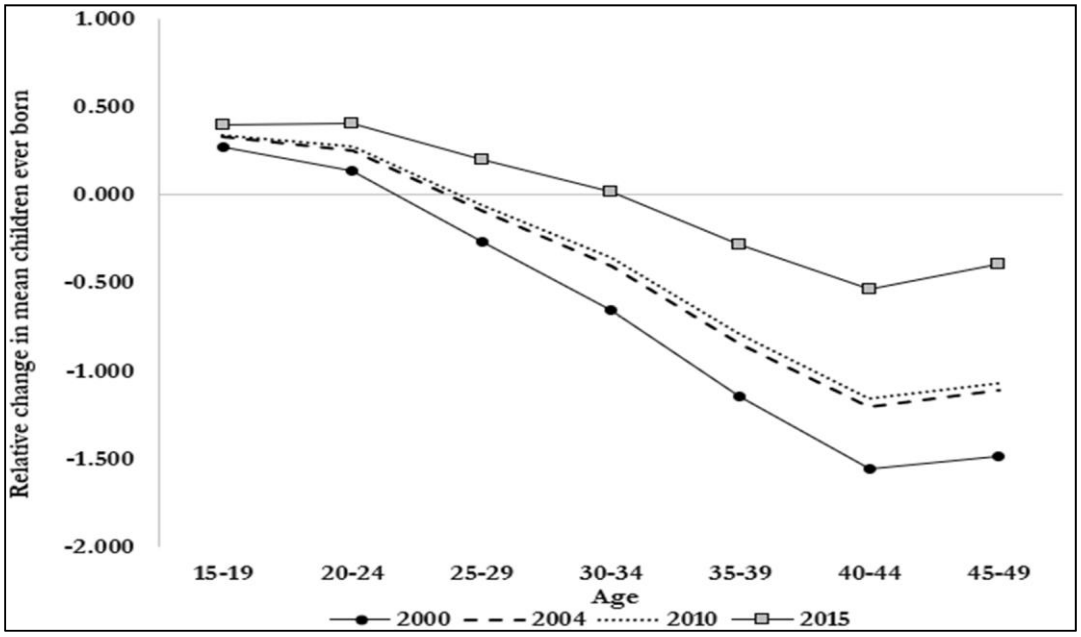


Figure 4: Relative change in mean number of CEB, comparing remarried relative to women in intact unions, according to age, and periods of study, Demographic and Health Survey



Note: The graph is based on a regression model that used pooled data from the DHS from 2000 to 2015. The Model controlled for time elapsed since the first marriage, age, education level, income status, and residence, number of living children, ethnicity, occupation and religion

TABLES IN THE TEXT

Table 1. Cumulated probabilities of first union dissolution and remarriage according to time (years) elapsed since the onset of first union, 1992-2015/16 Malawi DHS

	1992	2000	2004	2010	2015
First union dissolution (FUD)					
5	25.4	23.5	23.0	23.1	22.2
10	38.1	35.4	34.6	34.7	33.3
15	45.9	42.5	41.5	41.7	40.0
20	51.0	47.3	46.2	46.4	44.5
25	56.0	52.0	50.7	50.9	48.9
Ever remarried (ER)					
5	16.6	15.2	14.6	14.2	12.7
10	28.2	25.8	24.8	24.1	21.6
15	36.1	33.1	31.8	30.8	27.7
20	41.7	38.2	36.7	35.6	32.0
25	46.3	42.4	40.7	39.5	35.5
Ratio (ER/FUD)					
5	0.65	0.65	0.64	0.61	0.58
10	0.74	0.73	0.72	0.69	0.65
15	0.79	0.78	0.77	0.74	0.69
20	0.82	0.81	0.79	0.77	0.72
25	0.83	0.82	0.80	0.78	0.73

Table 2: Cohort-period cumulated fertility differentials (women in intact unions - remarried women) by age group of a mother at the end of each period (j), classified by age groups of a mother at survey (i), 2000-2015/16 DHS

Age group of a mother at the end of each period (j*)	Age group of a mother at survey (i)						
	15-19 (i=1)	20-24 (2)	25-29 (3)	30-34 (4)	35-39 (5)	40-44 (6)	45-49 (7)
2000							
15-19 (j=0)	-0.39	-0.31	-0.21	-0.11	-0.06	-0.12	-0.03
20-24(1)		-0.33	-0.23	0.18	0.08	0.05	0.21
25-29(2)			0.05	0.59	0.44	0.32	0.43
30-34(3)				0.88	0.90	0.75	0.69
35-39(4)					1.13	1.12	1.16
40-44(5)						1.36	1.43
45-49(6)							1.48
2004/05							
15-19 (j=0)	-0.39	-0.32	-0.16	-0.10	-0.15	-0.12	-0.02
20-24(1)		-0.42	-0.26	0.08	-0.17	-0.09	0.29
25-29(2)			-0.11	0.31	0.14	0.19	0.47
30-34(3)				0.52	0.38	0.48	0.66
35-39(4)					0.62	0.64	0.84
40-44(5)						0.87	0.94
45-49(6)							0.97
2010							
15-19 (j=0)	-0.48	-0.53	-0.19	-0.15	-0.05	-0.15	-0.17
20-24(1)		-0.48	-0.24	-0.17	0.04	-0.03	-0.10
25-29(2)			-0.07	-0.03	0.33	0.27	0.09
30-34(3)				0.04	0.61	0.56	0.52
35-39(4)					0.76	0.77	0.80
40-44(5)						0.92	1.05
45-49(6)							1.17
2015/16							
15-19 (j=0)	-0.29	-0.36	-0.32	-0.20	-0.08	-0.15	-0.18
20-24(1)		-0.49	-0.47	-0.33	-0.24	-0.21	-0.10
25-29(2)			-0.46	-0.21	-0.11	-0.16	0.03
30-34(3)				-0.28	0.03	0.09	0.11
35-39(4)					0.05	0.27	0.17
40-44(5)						0.45	0.31
45-49(6)							0.33

j* j=0 refers to a period of 0-4 years before the survey, j=1 , 5-9 ; j=3, 10-14; …… j=6, 30-34 years before the survey

Appendices

Figure A1: Total fertility Rate (TFR) trends by remarriage status, 2000-2015

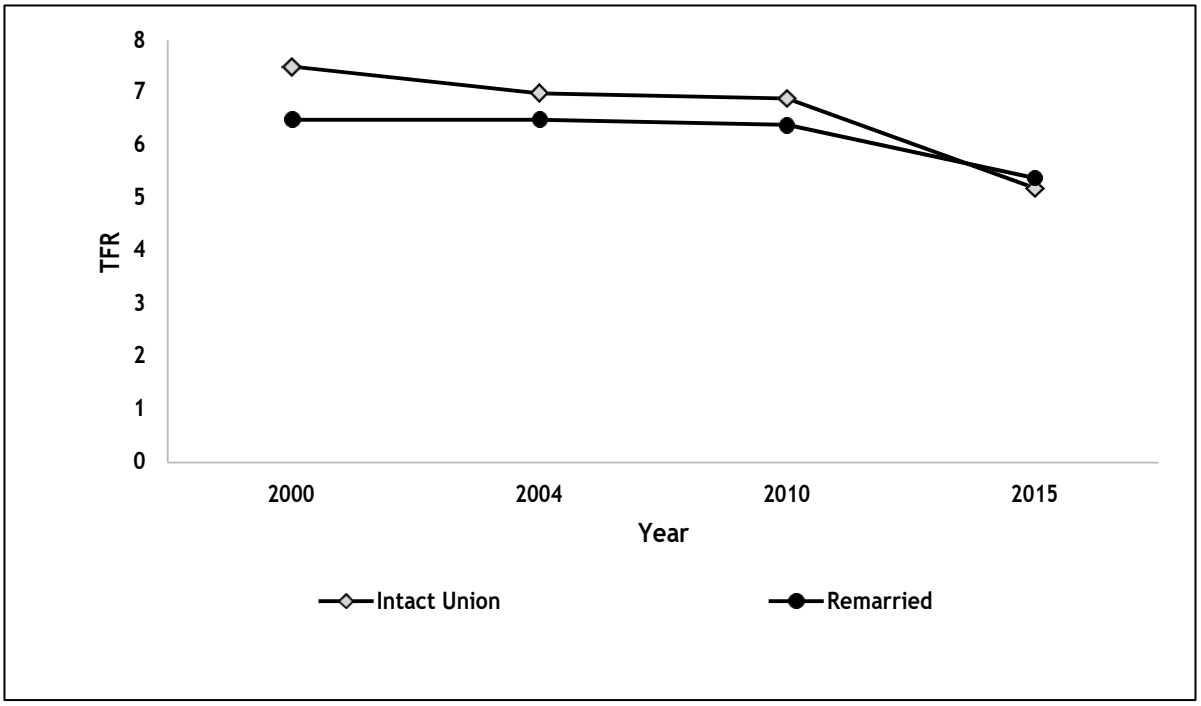


Table A1: Data structure for deriving cohort-period fertility rates

Age group of cohort at survey (i)	Number of Women	Births by period before the survey (j)						
		0-4	5-9	10-14	15-19	20-24	25-29	30-34
		j=2.5	j=7.5	j=12.5	j=17.5	j=22.5	j=27.5	j=32.5
15-19 (i=1)	N_1	$B_{i,j}$	$B_{i,j}$					
20-24 (2)	N_2	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$				
25-29 (3)	N_3	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$			
30-34 (4)	N_4	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$		
35-39 (5)	N_5	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	
40-44 (6)	N_6	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$
45-49 (7)	N_7	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$	$B_{i,j}$

Source: (Moultrie 2013)

Note: The j's are taking the values of the mid-point of the period before the survey, in Moultrie (2013) the j's are given values of 1, 2, 3,……, 7.

Table A2: Mean age at first marriage, by remarriage status

	1992	2000	2004/5	2010	2015/16
Intact Union	17.4	17.5	17.5	17.6	18.0
Remarried	17.3	17.1	17.1	16.9	17.6

Table A3: Pattern (cumulative probabilities) of union dissolution and remarriage in Malawi

Duration since the first union(years)	Union dissolution	Remarriage
0		
1		
2	0.1280	0.0621
3	0.1645	0.0902
4	0.1979	0.1163
5	0.2284	0.1407
6	0.2561	0.1634
7	0.2814	0.1845
8	0.3042	0.2040
9	0.3249	0.2221
10	0.3435	0.2389
11	0.3603	0.2545
12	0.3755	0.2689
13	0.3892	0.2822
14	0.4016	0.2945
15	0.4129	0.3060
16	0.4232	0.3167
17	0.4329	0.3267
18	0.4419	0.3361
19	0.4506	0.3449
20	0.4590	0.3534
21	0.4674	0.3615
22	0.4760	0.3693
23	0.4849	0.3771
24	0.4943	0.3847
25	0.5044	0.3924
26	0.5153	0.4002
27	0.5274	0.4082
28	0.5406	0.4165
29	0.5553	0.4252
30	0.5715	0.4344

Table A4: Adjustment factors and corresponding R-square for level of union dissolution and remarriage in Malawi, MDHS 1992-2015

	Fitted level				
	1992	2000	2004	2010	2015
Adjustment Factor					
Union dissolution	1.111	1.030	1.006	1.010	0.970
Remarriage	1.179	1.080	1.039	1.007	0.906
R-Square					
Union dissolution	0.981	0.991	0.989	0.992	0.978
Remarriage	0.938	0.993	0.976	0.990	0.984