On Marriage Dynamics and Fertility in Malawi: How Does Remarriage Affect Fertility Preferences and Childbearing Behaviour?

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ABSTRACT

The interplay between remarriage and fertility is among the most poorly documented subjects in sub-Saharan Africa, yet remarriage is one of the fundamental aspects of marriage dynamics in the region. Referring to classical demographic and statistical techniques, this research uses data collected since 1992 from Malawi Demographic and Health Surveys to establish the pattern and level of union dissolution and remarriage, and to assess the influence of remarriage on fertility preference and childbearing. The results reveal increasing stability of unions over time and a declining proportion of remarried women. The probability of experiencing first union dissolution within 15 years dropped from 45.9 to 40.0 per cent between 1992 and 2015, while the comparable likelihood of remarriage decreased from 36.1 to 27.7 per cent over the same interval duration. The effect of remarriage on the desire for more children is positive at advanced interval durations relative to the onset of first marriage. At shorter interval periods, where remarriage is relatively most recent, remarriage inhibits the desire for additional children. For example, in 2015, among women who first married 15-19 years before the survey, the odds of desiring another child were 4 per cent significantly higher among remarried women relative to their counterparts in intact unions. In contrast, for women who were married for 0-5 years, remarried women had 3 per cent lower olds of desiring another child. Furthermore, the childbearing pattern of remarried women is found to be distinct from that of women in intact unions. Remarried women give birth to more children sooner than their counterparts in intact unions, but eventually end up with fewer children. Indeed, the results show that in 2015, women in intact unions had 0.4 more children on average than their remarried counterparts. However, the difference in complete family size is steadily diminishing (difference of 1.5 in 2000), largely due to more marked fertility decline among women in intact unions. This trend, together with the long-term pattern of cumulated fertility differentials at younger reproductive ages, and current fertility disparities over the past two decades, strongly reveals that a new regime, where remarried women will end up with higher complete family size than those in intact unions, is emerging.

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1 INTRODUCTION

1.1 Background of the study

Fertility transition in Malawi is underway. Between 1970 and 1985, the total fertility rate (TFR) varied around 7.7 children per woman (Cleland, Onuoha and Timaeus 1994; National Statistic Office 2010), and dropped to 6.7 by the early 1990s, marking the onset of irreversible fertility decline. For the past two decades, TFR in Malawi decreased gradually before falling rapidly to 4.4 by 2015 (ICF International 2015). This fertility dynamic has long been drained by the urban population. In rural areas, fertility failed to 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 per cent decline over a period spanning almost 20 years. However, the current fertility rate in rural areas is 4.7 children per woman, illustrating that fertility transition is also occurring among the rural residents (National Statistic Office 2000, 2010; National Statistical Office [Malawi] and ORC Macro 2011, 2017).

A framework of proximate determinants of fertility developed by Bongaarts and Potter (1983) helps to understand critical factors shaping the course of fertility variation in human populations. This framework identifies marriage, contraception, abortion, and lactation as main determinants of fertility. For Malawi, the use of contraceptives and marriage dynamics are key drivers of the current fertility trends (Chintsanya 2015; Johnson, Abderrahim and Rutstein 2011; Palamuleni 2008). The influence of postpartum infecundity is trivial. Its index decreased by 4.8 per cent between 1992 and 2010, relative to a reduction of 38 and 15 per cent for an index of contraception and marriage respectively (Chintsanya 2015; Johnson, Abderrahim and Rutstein 2011; Palamuleni 2008). Abortion is alleged to have an immaterial effect on fertility on the basis that it is socially and legally prohibited (Chintsanya 2015; Palamuleni 2008). However, the practice of induced abortion appears to be prevalent and rising among Malawian women (Levandowski, Mhango, Kuchingale *et al.,* 2013; Ntoimo and Odimegwu 2014; Polis, Mhango, Philbin *et al.,* 2017). Therefore, it is likely that abortion somewhat influences fertility levels in the country.

Because of the role that marriage dynamics play in influencing fertility in Malawi, there is a growing body of studies that attempt to understand fertility behaviour and outcomes of women living in different marital states. 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 (Baschieri, Cleland, Floyd *et al.,* 2013; Chintsanya 2013; Palamuleni 2014a; Stephenson, Baschieri, Clements *et al.,* 2007); fertility preferences and age-specific fertility rates of women living in monogamous relative to those in polygamous unions (Baschieri, Cleland, Floyd *et al.,* 2013; Chintsanya 2015; Machiyama, Baschieri, Dube *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 2014b).

Largely silent from this body of literature is a systematic fertility analysis for women living in a remarried state – that is, those who have initiated more than one union. Nevertheless, union dissolutions and remarriages are common in Malawi, at least by sub-Saharan Africa (SSA) standards. For example, Clark and Brauner-Otto (2015) observe that more than half of Malawian women dissolve their first unions by the time they reach age 40-45. Reniers (2003) finds similar results using data from three districts, noting that two in every five marriages end in divorce within the first 20 years of union. Reniers also estimates that "over 40 per cent of the women remarry within two years after a divorce, and the level increases steadily to reach 75 per cent after five years and close to 90 per cent after ten years".

Reniers (2003) estimates are perhaps the most recent commonly used measures of remarriage in Malawi; nevertheless, they are not nationally representative (Anglewicz, Adams, Obare *et al.,* 2009). Therefore, it is not only the effect of remarriage on fertility that is poorly documented in Malawi but also the pattern and level of remarriage itself. This study seeks to address this research gap. Referring to classical demographic and statistical techniques, it attempts to address two primary objectives: (1) to assess the pattern and level of union dissolution and remarriage in Malawi, and (2) to estimate the effect of remarriage on fertility preference and childbearing. Regarding the second objective, this study will respond to two specific questions: First, how does remarriage influence the desire to have more children? Second, how does remarriage affect complete family size (CFS) and current fertility? The study uses data collected from Malawi Demographic and Health Surveys (MDHS) between 1992 and 2016. The use of multiple datasets is preferred because it allows assessment of trends over time.

This study is distinct from existing literature on remarriage and fertility as it uses innovative techniques to estimate the pattern and level of union dissolution and remarriage and to analyse the effect of remarriage on childbearing. These methods utilize

principles of cohort-period techniques for demographic measurement. They provide in-depth insights into the pattern and level of union dissolution and remarriage, and on the effect of remarriage on childbearing in Malawi, based on limited nuptiality histories. Extending this study to other SSA countries could help improve the quality of research on marriage dynamics and fertility in the region.

1.2 Organization of the study

The thesis is structured in five parts. Chapter 2 discusses existing literature about remarriage and fertility, starting with the observed effect of remarriage on childbearing across different studies. This section also considers various mechanisms through which remarriage affects fertility. Chapter 3 centres on describing the data and methods that have been used to address the study objectives. In Chapter 4, results based on these methods are presented and interpreted. Finally, Chapter 5 gives a detailed discussion of the results, limitations of the study and conclusion.

2 LITERATURE REVIEW

This chapter presents a review of prior research about remarriage and its relationship with fertility. It comprises three sections: section 2.1 provides the empirical effect of remarriage on childbearing as observed across different studies. The subsequent section 2.2 discusses theories that link union instability, remarriage, and reproduction. Finally, section 2.3 considers Malawi's social and demographic setting within the context of these theories. It outlines conditions that potentially decrease or increase the ability of remarried Malawian women to bear as many children as their counterparts in intact unions, before hypothesizing the possible overall impact of remarriage on fertility preference and childbearing in Malawi.

2.1 The empirical effect of remarriage on childbearing

Studies that attempted to specify whether remarried women end up with fewer or more births than their counterparts in stable unions have documented two contradicting findings. Table 2.1 below summarizes results of such research conducted across different regions and periods. Several studies illustrate that remarried women end up with fewer children. For example, Lauriat (1969) assesses the impact of union dissolution on fertility based on 1960 American census data, while controlling for the effect of age, race, and age at first marriage. On average, non-white remarried women attain 2.7 children relative to 2.9 births achieved by those in intact unions. After adjusting for age effect, fertility is higher among remarried women at all ages below 30, irrespective of race, but they have lower fertility at the end of their reproductive lifespan. Overall, remarried women attain 81 per cent of the fertility they would have realized if their first unions remained intact.

Other studies based on American data in the 1970s also reach a similar conclusion. Cohen and Sweet (1974) regress estimates of lifetime fertility on remarriage status[1] using data from 1965 American National Fertility survey. The model controls for the cause of union dissolution and other potential confounding factors. The authors conclude that, relative to women in intact unions, women who remarry following a divorce have 0.14 fewer children, and those who remarry following the death of their partner attain 0.10 fewer births. Their fertility is 0.49 and 0.59 lower respectively, after accounting for the influence of age at first union and other background characteristics.

[1] Whether an individual married once or more than once

In another study, Thornton (1978) attempts to compare standardized[2] fertility rates of remarried women to their counterparts in intact unions, at different interval duration around the dissolution period, at the time of remarriage and after 17 years since the first union. The author demonstrates that after 17 years following the first marriage, remarried white women have as many children (2.25) as those attained by women in intact unions. In the case of non-white population, women in intact unions have 1.4 more children than their remarried counterparts. The study by Downing and Yaukey (1979) uses data collected from seven Latin American capital cities, between 1964-1966, and shows that in one of the cities (Buenos Aires), women in intact unions had more children than their remarried counterparts, irrespective of the amount of lost exposure and level of education.

In West Malaysia, Palmore and bin Marzuki (1969) used data drawn from the 1966-1967 West Malaysian Family Survey and applied a regression modelling technique to assess the effect of remarriage on fertility. The authors find that, on average, a woman who marries only once bears 6.3 children relative to 4.7 children born to a remarried woman. This pattern persists despite controlling for wife's education, husband's occupation, place of residence and race, with women in intact unions still having 1.6 more children than their remarried counterparts.

Recent studies across European countries show similar findings. Using a one per cent sample of 1999 Survey of Family History in France, Beaujouan and Solaz (2008) apply descriptive methods to illustrate that, on average, women aged between 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. A similar study among French women obtains comparable results (Thomson, Winkler-Dworak, Spielauer *et al.,* 2012). The authors demonstrate that whether women dissolve their unions following the birth of the first or second child, they end up with lower CFS comparative to women in stable marriages. For example, the authors find that relative to women in intact unions, among the oldest age cohort, remarried women attain 0.77 and 0.35 fewer births if their first unions dissolve following the birth of their first and second child respectively.

[2] Standardized for race, religion, education, age at marriage, and duration of a union.

Table 2.1 Summary of the empirical effect of remarriage on fertility observed across selected studies

Source	Dependent variable	Region of study	Analytical sample	Unadjusted fertility			Adjusted fertility		
				Married Once	Remarried	Diff	Married Once	Remarried	Diff
Lauriat (1969)	Children ever born	America	White (15-19)	2.29	2.36	-0.07	2.29	2.3	-0.01
			Non-white (15-19)	2.93	2.74	0.19	2.93	2.73	0.2
Palmore and bin Marzuki (1969)	Children ever born	Malaysia	All women (35-49)	6.3	4.7	1.6	6.3	4.7	1.6
Lee and Pol (1988)	Increase in fertility over five-year period	Cameroon	All women (15-54)	3.48	3.34	0.14			0.224*
Ebanks, George and Nobbe (1974)	Children ever born	Barbados	All women (15-50)	2.6	3.2	0.6			
Chen, Wishik and Scrimshaw (1974)	Children ever born	Ecuador	All women (15-49)						14% more
Cohen and Sweet (1974)	Children ever born	America	All women (24-54)						0.14 -0.49*
Thornton (1978)	Children ever born	America	White, (< 45)				3.25	3.25	0
			Non-white, (< 45)				4.97	3.53	1.44
Downing and Yaukey (1979)	Children ever born	Urban Latin America	Buenos Aires (20-50)				1.82	1.34	0.48
			San Jose (20-50)				4.11	4.22	-0.11
			Mexico City (20-50)				4.09	4.76	-0.67
			Bogota (20-50)				3.86	3.92	-0.06
			Caracas (20-50)				3.42	4.45	-1.03
Beaujouan and Solaz (2008)	Children ever born	France	All women, (45-60)	2.25	2.17	0.08			
Meggiolaro and Ongaro (2010)	Children ever born	Italy	All women (25-64), dissolution after first child						0.77*
			All Women (25-64), dissolution after second child						0.35*
Van Bavel, Jansen and Wijckmans (2012)	Children ever born	24 European countries	Women (20-50)	1.8	1.78	0.02			
Thomson, Winkler-Dworak, Spielauer *et al.* (2012) ++	Children ever born	France	1930-1939 Birth Cohort	2.39	1.9	0.49			
			1940-1949 Birth Cohort	2.19	1.83	0.36			
			1950-1959 Birth Cohort	2.09	1.75	0.34			
			1960-1960 Birth Cohort	2.06	1.69	0.37			
			1970-1979 Birth Cohort	1.95	1.54	0.41			
Uddin and Hosain (2013)	Children ever born	Bangladesh	All women (15-49)	2.8	2.8	0	5	3.9	1.1
			All women (45-49)	3.9	2.8	1.1			

*Results based on a regression model

++The authors compare women whose their first unions dissolved before the birth of a first child with women who remained in intact unions.

In Italy, Meggiolaro and Ongaro (2010) fitted a Poisson regression model using data from 2003 Family and Social Subject, to explore the impact of union dissolution on cumulated fertility. Overall, the authors showed that union dissolution reduces individual's lifetime fertility regardless of whether divorced or widowed women initiate new partnership or not, but the impact is relatively lower for women who remarry during the post-dissolution period. The findings illustrate that when age is controlled, the fertility of women who marry only once is 28 per cent higher relative to that of separated women, but it is just 15 per cent more comparable to the fertility of remarried women. This pattern persists despite controlling for several possible confounding factors, including age at first marriage.

Van Bavel, Jansen and Wijckmans (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 between 20-50 have 0.02 fewer children than their counterparts in intact unions. Multivariate regression analysis confirms this finding by showing that remarriage, either following the divorce or death of a spouse, reduces the overall fertility. A study based on DHS data in Bangladesh provides further evidence that remarriage is associated with decreased fertility (Uddin and Hosain 2013). 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.

Contrary to the above findings, several studies, predominantly based on American data, suggest that remarried women end up with more children than their counterparts in intact unions. In the case of Barbados; Ebanks, George and Nobbe (1974) found a significant positive correlation ($r=0.26$) between the number of unions and fertility. The authors estimate a cumulated fertility of 2.6 for women who remained in first unions, 3.2 for those who married twice, 3.8 and 4.7 for women who initiated a third and at least a fourth union respectively. This pattern persists despite performing a bivariate analysis, controlling for variables such as age, age at first pregnancy and age at first union. The study by Chen, Wishik and Scrimshaw (1974) find comparable results in Ecuador, indicating that fertility of remarried individuals (both males and females) is 14 percent higher relative to those in stable unions, after adjusting for time spent in the union. The authors observed similar results after restricting the analyses to the female population. Thornton (1978) notes a net positive remarriage effect on fertility among the white

American women, finding that after 17 years since the first union, remarried white women attain 0.05 more children than their counterparts in intact unions. In the case of Latin America, Downing and Yaukey (1979) find higher fertility among remarried women in four capital cities.

This subject has attracted very little attention in sub-Saharan Africa demographic research. The study by Lee and Pol (1988) is perhaps the only work that attempted this question in the SSA region. Using data from 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. The authors obtained comparable results to those documented in the non-African literature, indicating that remarried women end up with 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. After accounting for education, age, and age at first marriage, the fertility of remarried women is significantly lower, even before the dissolution of their unions.

This section has documented the empirical effect of remarriage on fertility, indicating that remarriage either fosters or depresses fertility. In the subsequent section, the focus is shifted to the understanding of mechanisms that influence the ability of remarried women to end up with fewer or more children than their counterparts in intact unions.

2.2 Theories of fertility decline: How remarriage affects fertility

The conceptualization of the link between remarriage and childbearing traces back to a framework of proximate determinants of fertility, first proposed by Davis and Blake (1956) and modified by Bongaarts (1978) and Bongaarts and Potter (1983). This framework classifies factors that affect human reproduction into two categories; proximate and background determinants. The proximate determinants encompass biological and behavioural factors (marriage, contraception, abortion, and lactation) that provide mechanisms through which all cultural and socio-economic factors (background determinants) function to influence childbearing.

In Bongaarts and Potter (1983)'s framework, the influence of union dissolution and remarriage on childbearing is captured through marriage as a proximate determinant of fertility. The framework suggests that although menarche defines entry into

reproductive years (Van de Walle 1968), marriage marks the onset of continual exposure to regular sexual intercourse. Therefore, it assumes that marriage influences the risk of childbearing by regulating coital frequency. The authors identify the age at first marriage, union dissolution and remarriage as some of the nuptiality factors that influence the effect of marriage on fertility. The framework specifies union dissolution as a process that reduces exposure to frequent sexual contact. Hence it is associated with weak fertility intentions and outcomes, while remarriage is an offsetting process that reinstates women into an institution where sexual intercourse is regular; consequently, it is correlated with a high risk of childbearing.

Although the framework of proximate determinants by Davis and Blake (1956) and Bongaarts and Potter (1983) identifies union dissolution and remarriage as some of the factors that have a direct bearing on marriage and fertility relationship, Cohen and Sweet (1974) provide perhaps one of the pioneering works that specifically links remarriage and childbearing. The authors grouped factors that potentially determine the net fertility difference between remarried women and those in intact unions into five categories. These are (i) background characteristics (religion, race, residence, etc.), (ii) first marriage experience (coital frequency, level of fertility control that arises with marital discord, age at first marriage), (iii) remarriage selectivity, exposure to regular sexual intercourse (the extent to which union dissolution and remarriage occur during reproductive age), and (v) fertility experience in the second union (desire for second family, restricted fertility due to unstable unions). Based on this study and the literature that accumulated over the past decades (Buber-Ennser and Fürnkranz-Prskawetz 2000; Downing and Yaukey 1979; Ebanks, George and Nobbe 1974; Meggiolaro and Ongaro 2010; Stewart 2002; Thomson, Winkler-Dworak, Spielauer *et al.,* 2012; Thornton 1978), the net fertility difference between women in intact unions and their remarried counterparts appear to arise from differences in three components (1) the timing of union dissolution and remarriage, (2) childbearing motivations and behaviour in second or higher-order unions, and (3) selection effect. However, the prevailing demographic conditions, particularly the quantum and tempo of fertility, influence the ability of remarried women to achieve as much fertility as their counterparts in intact unions.

2.2.1 The timing of union dissolution and remarriage

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, Jansen and Wijckmans 2012) where fecundity is low (Leridon 2008)[3]. Thus, unions that dissolve at early ages of childbearing allow women to initiate new partnerships at ages where reproduction is predominant, and fecundity is relatively high, thereby increasing the odds that remarried women attain as much fertility as those in intact unions. For example, among the remarried French women, born between 1930-1979, who terminated their first unions following the birth of their first children, women whose marriages ended before age 30 attained nearly 0.2 more children than those whose unions dissolved after age 30 (Thomson, Winkler-Dworak, Spielauer *et al.,* 2012). For Italian women who initiated their first unions before age 40, Meggiolaro and Ongaro (2010) find that at least one-fifth of women whose union dissolved before age 30 gave birth within five years following the marital dissolution relative to 3.7 per cent of women whose first marriages dissolved between ages 35-39.

However, Wineberg (1990) illustrates that delaying union dissolution does not necessarily result in low fertility; instead, it influences high fertility among remarried women. This observation is possible because women who experience a union dissolution at advanced ages may have already attained high lifetime fertility at the time of union dissolution or remarriage. Therefore, on average, childbearing in the second union may result in excess fertility. Nevertheless, the author observes a high risk of giving birth inside the second union among women who remarry before age 22, but a lower similar risk among women who remarry at least by age 24, when their childbearing experience is compared to that of women who remarry between 21 and 23 years old.

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 (Beaujouan and Solaz 2008; Cohen and Sweet 1974; Davis and Blake 1956; Downing and Yaukey 1979; Jefferies, Berrington and Diamond 2000; Meggiolaro and Ongaro 2010; Thomson, Winkler-Dworak, Spielauer *et al.,* 2012; Thornton 1978; Van Bavel, Jansen and Wijckmans 2012). Therefore, the timing of remarriage — that is the pace at which women are remarrying following a union

[3] Leridon (2008) noted that fecundability falls rapidly with rising age of a woman, indicating that one tenth of women become sterile by age 30, and the proportion rises to 29 percent by age 40. Beaujouan and Solaz (2008) demonstrates the implications of this trend on fertility pattern of remarried women. The authors note that the odds of giving birth in second union rises linearly when sterility is accounted for, but falls with age after 29 years old when sterility is not controlled

dissolution — influence the overall fertility of remarried women by directly modulating their loss of exposure to conception. The longer the interval between successive marriages, the more likely remarried women end up with lower fertility than those in intact unions (Beaujouan and Solaz 2008; Cohen and Sweet 1974; Thomson, Winkler-Dworak, Spielauer *et al.,* 2012; Van Bavel, Jansen and Wijckmans 2012). It is therefore not surprising to note that the fertility of women who fail to initiate new unions following their marital dissolution is lower than that of remarried women (Beaujouan and Solaz 2008; Van Bavel, Jansen and Wijckmans 2012). Thornton (1978) argues that union dissolution without repartnering truncates reproduction. The author notes that 83 per cent of the total loss of fertility among non-white remarried American women occurred between the period of dissolution and remarriage.

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 disapproves 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.

2.2.2 Childbearing motivations 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 (Beaujouan and Solaz 2008; Cohen and Sweet 1974; Davis and Blake 1956; Downing and Yaukey 1979; Jefferies, Berrington and Diamond 2000; Meggiolaro and Ongaro 2010; Thomson, Winkler-Dworak, Spielauer *et al.,* 2012; Thornton 1978; Van Bavel, Jansen and Wijckmans 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, 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 adulthood status (Jefferies, Berrington and Diamond 2000; Lillard and Waite 1993). Beaujouan and Solaz (2008) confirm this proposition in the case of France, noting that childless French women are 2.15 times more likely to give birth following remarriage relative to women who had become mothers in their first unions.

The study by Wineberg (1990) estimates that the odds of giving birth inside the second union among women who had given birth in their first unions are 31-44 per cent lower relative to those who remained childless.

Second, remarried women initiate childbearing to strengthen the marriage bond. This proposition is supported by a theoretical perspective that a first child in the second union shares a unique value[4] parallel to a first child in first marriage. Vikat, Thomson and Hoem (1999) termed this proposition as a union-commitment effect. This hypothesis is commonly evaluated by considering the influence of stepchildren on second union fertility. Such studies have yielded two significant findings. Some scholars indicate that the number of children born in previous unions does not significantly affect the likelihood of having a joint child in higher older unions (Griffith, Koo and Suchindran 1985; Thomson 2004; Vikat, Thomson and Hoem 1999), thus indicating strong intentions among remarried couples to have a common biological child. In contrast, other studies conclude that the number of children from the former union(s) is inversely associated with the risk of childbearing in higher-order unions (Buber-Ennser and Fürnkranz-Prskawetz 2000; Hayford and Agadjanian 2016; Meggiolaro and Ongaro 2010; Stewart 2002). This observation is discussed within an economic framework of fertility decline, noting that parenting is closely linked to emotional, financial and opportunity costs since legal and social regulations usually demand biological parents to take full responsibility for their children irrespective of marriage order in which the children are conceived.

Finally, women in second union resume childbearing to attain desired family size or to start a new family (Thornton 1978). Women may employ marital dissolution as an empowerment strategy during the life course, mainly to mitigate undesirable social and reproductive health conditions such as exposure to the risk of HIV/AIDS (Grant and Soler-Hampejsek 2014; Reniers 2003, 2008). Consequently, women may dissolve their first unions before realizing their fertility goals. Hence, remarriage may be regarded as a machinery of accomplishing their "*unfinished agenda of childbearing"* within a socially sanctioned institution. The fact that some studies (Beaujouan and Solaz 2008; Wineberg 1990) suggest that at least 30 per cent of children born to remarried women are conceived in the second union provide empirical support for this hypothesis.

[4] Most importantly, cementing the couple's relationship, since a first child may be regarded as a symbol of the couple's commitment towards each other

2.2.3 Selection effect

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 (Cohen and Sweet 1974; Coppola and Di Cesare 2008; Lauriat 1969; Leone and Hinde 2007; Lillard and Waite 1993). In Italy, Coppola and Di Cesare (2008) simultaneously modelled union disruption and childbearing processes using data from 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 with high family values 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.

In contrast, Leone and Hinde (2007) applied a similar approach of multi-process modelling of union dissolution and fertility to data from 1996 Brazil Demographic and Health Survey and observed a significant positive correlation ($r=0.659$) between unobserved heterogeneity of union dissolution and fertility. This finding suggests that, in Brazil, unobserved women's characteristics simultaneously increase the risk of both women's union dissolution and childbearing, i.e. women with high risk of union dissolution are also more likely to have higher fertility. Because this unobserved heterogeneity is primarily associated with values, culture, ambitions, and emotions which themselves vary with space and time, these contradicting findings should be inevitable.

Some factors that simultaneously influence women's risk of union dissolution and childbearing are observable, but not always captured in research. These include but are not limited to age at first marriage, fecundity, parity, education, the area of residence, employment status and income level (Coppola and Di Cesare 2008; Griffith, Koo and Suchindran 1985; Jefferies, Berrington and Diamond 2000; Lee and Pol 1988; Meggiolaro and Ongaro 2010). Lauriat (1969), for example, demonstrates selectiveness of women who postpone their first unions, for lower fertility and high union stability. The study finds that, for American women, the higher fertility observed among white remarried women compared to those in intact unions is mostly due to their early ages at first marriage. Similarly, Cohen and Sweet (1974) identify the age at first marriage as the primary factor that explains substantial fertility heterogeneity between women in stable unions and those who remarry. However, in Bangladesh, Uddin and Hosain (2013) failed

to find a significant correlation between age at first union and the odds of union dissolution.

In the case of women's self-selection for remarriage contingent on parity, Thornton (1978) suggests that women who have more children at the time of union dissolution have a high propensity to remarry for monetary gains thereby positively influencing fertility in the second union. However, other scholars suggest that women with high parity are less likely to be attractive for new partnerships thus making women with low fertility self-selected for remarriage (Cohen and Sweet 1974; Lee and Pol 1988).

2.2.4 The fertility regime

The way remarriage affects fertility may depend on the fertility regime within the country or among different population groups. The quantum and tempo of fertility in a population influence the ability of remarried women to make up for the lost fertility. Downing and Yaukey (1979) argue that in countries where fertility is low, women are more likely to have attained their desired family size at the time of union dissolution or remarriage. Thus, on average, childbearing in the second union result in excess fertility because children born within new union could have been avoided if the first union remained intact. In the context of high fertility, the authors suggest that childbearing may have extended over the period of separation. Thus, children born within the second union may only compensate for the lost fertility during the dissolution period; hence, remarried women may attain as much as or less fertility than what would have been realized if they remained in intact unions. This line of argument was formerly advanced by Thornton (1978) in a study that observed a positive effect of remarriage on childbearing for white American women, but a negative effect for non-white American women. The author explains this difference by stating that:

> "Since non-white fertility was so high, the interruption of the pattern by disruption and remarriage can be important. Between marriages, these women 'lose' a lot of childbearing since the potential fertility to be 'lost' is great. Similarly, it is difficult for them to 'make up' for 'lost' fertility after remarriage since the tempo of childbearing is high for stable marriages. Remarried white women find it much easier to 'make up' for lost fertility. They 'lose' fewer children between marriages, and, with fairly low fertility, it is not difficult to 'make up' for 'lost' time after they remarry" (page 378).

Extended birth intervals enhance the ability of remarried women to make up for the lost fertility (Thomson, Winkler-Dworak, Spielauer *et al.,* 2012). In populations where

birth intervals are prolonged, and remarriage following union disruption is very rapid, the length of the interval that combines the lag between successive marriages and the duration from the second union to first shared child may equally correspond to the birth intervals among women in intact unions.

2.3 Conceptualization of remarriage effect on fertility in Malawi

The previous section discussed theories that link remarriage and childbearing, based on research primarily documented in non-African regions. The application of these studies to the SSA context is not straightforward due to different demographic, social and cultural conditions. However, this body of research provides a framework for understanding the effect of union dissolution and remarriage on fertility preference and childbearing in the region. This section considers the Malawi social-demographic conditions within the context of these theories. Subsequently, it attempts to hypothesize the possible effect of remarriage on fertility preference and childbearing in Malawi.

2.3.1 The timing of first marriage, union dissolution and remarriage

Malawi has a history of early marriages. 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 2015). These medians accurately reflect the pattern of first unions across all three regions of Malawi. However, women in the southern region initiate their first unions sooner than those in the central and northern regions. For example, in 2015, their median age at first marriage was 0.8 and 0.4 years lower relative to that of women in the central and northern region respectively (National Statistical Office [Malawi] and ORC Macro 2017).

The pattern of union dissolution and remarriage presented by Reniers (2003)[5] illustrates 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 shows 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 where fecundity is relatively high and childbearing is still

[5] Although the pattern of union dissolution and remarriage presented by Reniers (2003) based on data from three districts (Balaka, Rumphi and Mchinji) is not nationally representative; it perhaps reflects reasonably well the marriage dynamics associated with the dominating marriage systems across the country. Balaka is mainly matrilineal; thus, it mirrors the governing marriage system in the southern region of Malawi, while Rumphi with patrilineal marriage system reflects well the marriages that are common in the northern region. The central region is a mixture of matrilineal and patrilineal marriage systems, as reflected by Mchinji.

predominant. This trend suggests that remarried Malawian women do not lose substantial exposure to regular sexual intercourse.

2.3.2 High moral and social stigma towards pre- and intra-marital childbearing

The effect of union dissolution on fertility is weakened when childbearing persists during the period of dissolution (the interval between two unions). 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 SSA region are emotionally victimized as a gesture of disapproving such behaviour. The authors specify that in Malawi children born outside of marriage system are called by names that reflect woman's lack of dignity, such as "children without fathers" or "children of the bush". These norms most likely influence women with disrupted unions to avoid childbearing despite the desire to do so, as a means of preserving value on the marriage market. Consequently, conscious fertility control most likely dominates the dissolution period. Thus, although remarriage is rapid, the likely fertility practices of remarried women during the dissolution period potentially inhibit their ability to achieve as much fertility as those in intact unions.

2.3.3 Childbearing motivations and behaviour in second unions

In Malawi, childbearing is fundamental to any form of marriage arrangement. Thus, the desire to have a common biological child in second or higher-order unions (union-commitment effect) (Griffith, Koo and Suchindran 1985; Thomson 2004; Vikat, Thomson and Hoem 1999) is likely to be prevalent among remarried women.

Besides, traditional societies of Malawi are characterized by kinship and marriage configurations that potentially motivates childbearing in second or higher order unions. Malawian women mostly marry under a patrilineal or matrilineal form of marriage system. In matrilineal marriages, couples reside with the wife's family after marriage, and children are regarded as belonging to the wife's clan. Traditionally, men are not obliged to maintain their children in the event of a union dissolution. While in patrilineal marriages, children belong to the husband's clan. When a union dissolution occurs, custody of children remains with the husband (Chae 2013, 2016; Grant and Yeatman 2014; Mwambene 2012a, b). Maternal remarriage is closely associated with child out-fostering, and the risk of out-fostering among children born from the former unions become much higher when there is a birth of a new child following remarriage (Grant and Yeatman 2014). This practice suggests that stepchildren are less likely to diminish remarried couple's intentions to have

more children since the finical, emotional, and social cost associated with children born from previous unions is shifted to other individuals, consequently creating a 'space' for additional childbearing.

However, since 1994, there have been social and legal advancements in Malawi, that promote parental duties towards their biological children regardless of marriage system and order in which the children are conceived. Mwambene (2012a) notes that the Malawi child care, protection, and justice act of 2010 "assigns full duties and responsibilities of both parents and whose rights include care, guardianship and maintenance, custody and contact". Ideally, these legal demands potentially limit fertility of couples in higher-order unions as they implicitly raise the emotional and financial cost associated with childbearing. In other words, these legal advancements most likely induce low fertility intentions and outcomes among remarried women. Thus, they potentially operate to inhibit their ability to achieve as much fertility as those in intact unions. However, the associated influence should be minimal if any, since these advancements are relatively recent and their enforcement may not be necessarily effective in typical traditional communities.

2.3.4 The fertility regime

The falling of fertility levels in Malawi has been accompanied by declining family size ideals and lengthening of birth intervals (ICF International 2015; Moultrie, Sayi and Timæus 2012). The ideal family size for women aged 15-49 dropped from 5.1 to 3.7 children between 1992 and 2015, while the median births intervals increased from 32.7 to 40.1 months over the same period (ICF International 2015).

The fact that TFR and family size ideals have declined suggests that remarried women can merely attain as much or more fertility as that of women in intact unions. However, because union dissolutions dominate at early ages of childbearing and the average ideal family size is still somewhat higher, it is most likely that most Malawian women whose first unions dissolve, most likely do so before attaining their fertility goals. Thus, new partnerships are probably engaged not only for financial reasons but also as a strategy to accomplish their 'unfinished agenda of childbearing'.

In summary, one can make the following hypotheses concerning childbearing in Malawi:

Hypothesis 1: Desire for more children is higher among the remarried women relative to women in intact unions.

Hypothesis 2: Remarried women end up with fewer children than those in stable unions, but the difference will decrease over time as the fertility falls in the country.

3 DATA AND METHODS

3.1 Data

This study is based on data from five rounds of Demographic and Health Survey (DHS) conducted between 1992 and 2016 in Malawi. DHSs are nationally representative cross-sectional studies that are widely undertaken in SSA. In Malawi, DHS has collected fertility, nuptiality and socio-economic information from a representative sample of women aged 15-49, ranging from 4 849 in 1992 to 24 562 in 2015/16 round of data collection. The fertility data that are collected include but are not limited to fertility preferences and birth histories, while the routine nuptiality data include age at first marriage, current marital status, and the number of unions a woman has ever had. The DHS collects two forms of birth history data. First, summary birth histories, which are reports of lifetime fertility that provide the aggregate numbers of children ever born to a woman during reproductive ages; second, full birth histories, which are comprehensive fertility reports that specify, among other aspects, the date of birth for each child.

The analyses in this study use nuptiality data of ever-married women who are not sterilized or have been declared infecund to measure the pattern and level of first union dissolution and remarriage. Nuptiality reports are considered together with fertility preference information to explore remarriage effect on desire for additional children, while they are combined with full birth history records to examine remarriage effect on childbearing. However, they exclude data from the 1992 DHS because it does not capture some of the covariates that have been used to perform regression modelling. Except for cases where regression models are fitted to data from the most recent survey, the models are specified using a pooled dataset that merges records from the most recent four surveys into a single exposure file, thus allowing assessment of the pattern of remarriage effect on fertility preference and childbearing over time. This pooled data set maintain the sampling characteristics of each data set by retaining the sampling weights of each record. Table 3.1 below summarizes the data and analytical sample used to address the study objectives.

Table 3.1 Description of data and analytical sample used to address the study objectives

Study objective	Analysis	Data description	Analytical sample	Sample size				
				1992	2000	2004	2010	2015/16
To define the pattern and level of first union dissolution and remarriage	Estimating the pattern and level of first union dissolution and remarriage	Nuptiality variables – current marital status, number of unions, and date of first marriage	Ever-married non-sterilized fecund women aged 15-49, 1992-2015/16 MDHS.	3 700	10 023	9 088	16 423	16 977
To analyse the effect of remarriage on fertility preference and childbearing	Estimating remarriage effect on fertility preference	Nuptiality variables-current marital status, number of unions and date of first marriage Fertility variables – fertility preference data – desire for more children	Ever-married non-sterilized fecund women aged 15-49, 2000-2015/16 MDHS.		10 023	9 088	16 423	16 977
	Estimating remarriage effect on childbearing	Nuptiality variable-current marital status, number of unions and date of first marriage Fertility variables – full birth histories	Ever-married non-sterilized fecund women aged 15-49, 2000-2015/16 MDHS.		10 023	9 088	16 423	16 977

3.2 Measures

DHS and other studies in SSA classify 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). 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.

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. For ease of exposition, these measures are denoted as the probability of first union dissolution and remarriage respectively.

To assess the effect of remarriage on fertility preference and childbearing, a main explanatory variable, *remarriage status*, is defined. It 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 referred to as "women in intact unions".

This study uses three primary dependent variables. The relationship between remarriage and fertility preference is analysed based on the DHS question that enquires whether a woman "would like to have another child or would prefer not to at all?" This question is used to define a variable "*Desire for another child"* that captures values of *1* for women who want additional children and of *0* for women who intend to cease childbearing.

The relationship between remarriage and childbearing is considered in two dimensions: lifetime and current fertility. The measure for lifetime fertility is the ratio of the total number of children ever born to the total number of their mothers, denoted as the mean number of children ever born (MCEB). The age-specific and total fertility rate is used to measure the current fertility. Age-specific fertility rate (ASFR) at age x is defined as a ratio of the number of births of women aged x to total personal-years of exposure to the risk of giving birth contributed by all women aged x. Summation of ASFRs across the reproductive age range (15-49) yield TFR, which is interpreted as the average number of children a woman

would have at the end of her reproductive age if she were to experience the currently observed ASFRs throughout her childbearing lifespan.

For multivariate analysis of remarriage effect on current fertility, a binary variable that captures values of *1* if a woman had given birth within three years before the survey, and *0* otherwise, is constructed. Unless specified, all the multivariate analyses account for the most important predictors of fertility which include age, parity, education, income, occupation, residence, religion, ethnicity, current pregnancy status and age (or duration since the first union) and age at first marriage.

3.3 Descriptive methods

3.3.1 Pattern and level of first union dissolution and remarriage

This study estimates duration-specific cumulative probabilities of first union dissolution by defining the pattern and level of first union dissolution using cohort and period estimates of the proportion of women in intact unions respectively. Given the availability of multiple DHSs, 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 3.1 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.

In Figure 3.1, j denotes a five-year marriage cohort of women, and $t_k (k = 0,1,2,3)$ 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 $\rho^*_{jt_k} = 1 - \rho_{ji_k}$ 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 linearly, 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 $d_{jt_k} = t_k - (j + 2.5).$

Figure 3.1 Diagrammatic representation of follow-ups of ever-married women across different surveys

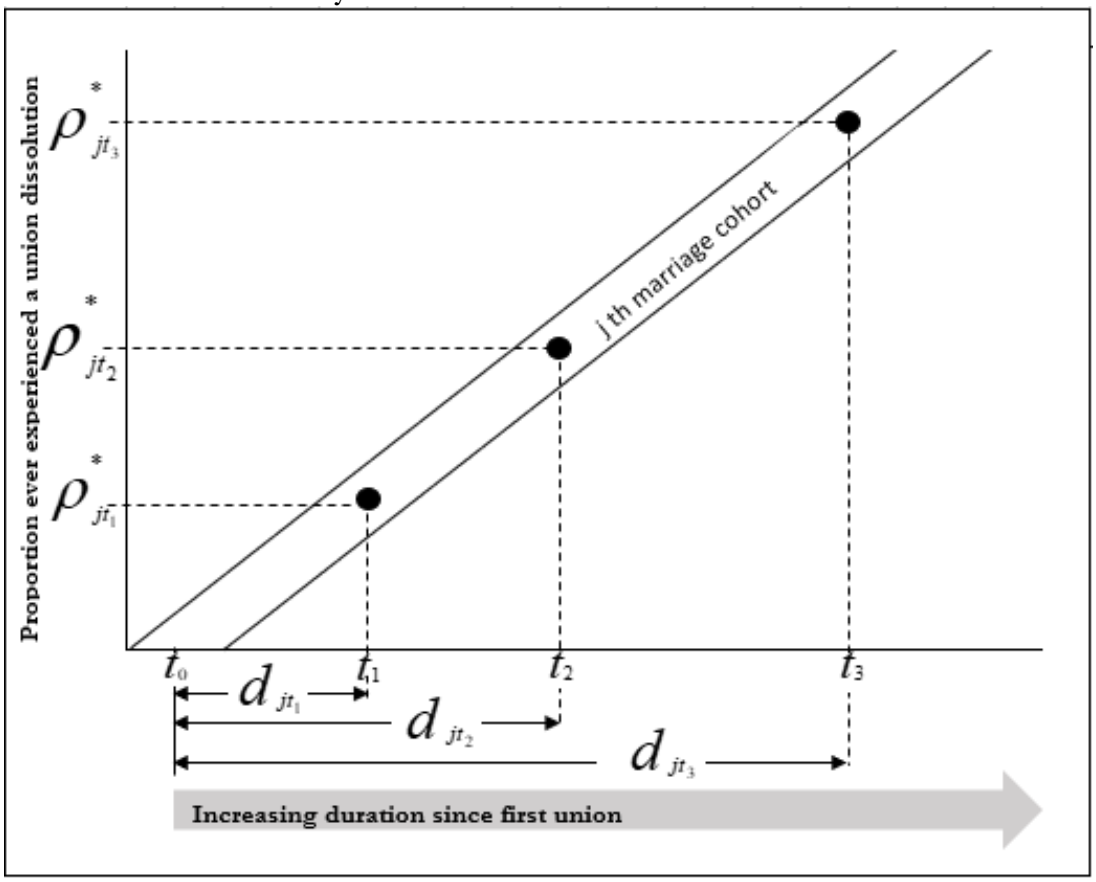


Table 3.2 below displays a matrix of raw data and d_{jt_k} used to derive the pattern and level of union dissolution in Malawi. Reading from left to right in panel B, for example, the table shows the number of women of the same marriage cohort who are in intact unions as time elapses following the onset of their first marriage, while reading the columns in descending order shows the count of women who are in intact unions across different marriage cohorts at a specific date. Thus, the estimate of $\rho^*_{jt_k}$ in 2010 corresponding to women who first married between 1985 and 1989 is 0.5 (1-(675.1/1340)). Because DHS interviewed women aged between 15-49, women of the oldest marriage cohorts are truncated in the most recent surveys. Similarly, women of the most recent marriage cohorts are truncated in the early surveys. The date of the survey in Table 3.2 is approximated as a weighted sum of dates of interviews, the weights being proportions of women who were interviewed on the dates in question.

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 polynomial function that best describes

the distribution of $\rho^*_{jt_k}$'s is identified. The selected polynomial function minimizes 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 maximum number of k.

Table 3.2 Matrix of raw data and durations since first marriage, according to marriage cohort, for deriving the pattern and level of first union dissolution in Malawi

Marriage		Date of survey				
cohort, j	j+2.5	1992.72	2000.64	2004.87	2010.53	2015.89
Panel A	**Total number of ever-married women**					
1960(j=1)	1962.5	159				
1965(2)	1967.5	369	224			
1970(3)	1972.5	497	680	234		
1975(4)	1977.5	584	895	564	412	
1980(5)	1982.5	709	1238	837	934	256
1985(6)	1987.5	810	1554	1039	1340	728
1990(7)	1992.5	524	2259	1533	2184	1504
1995(8)	1997.5		2841	2446	3277	2331
2000(9)	2002.5			2391	4162	3374
2005(10)	2007.5				3711	3675
2010(11)	2012.5					4201
Panel B	**Total number of women still in intact unions**					
1960(j=1)	1962.5	57.3				
1965(2)	1967.5	164.7	88.3			
1970(3)	1972.5	242.0	308.0	105.8		
1975(4)	1977.5	323.6	458.2	266.4	144.9	
1980(5)	1982.5	410.7	656.7	411.0	406.9	98.1
1985(6)	1987.5	567.4	953.5	596.7	675.1	342.4
1990(7)	1992.5	415.9	1534.1	943.8	1173.7	757.9
1995(8)	1997.5		2260.9	1705.1	1967.2	1314.2
2000(9)	2002.5			2087.3	2985.7	2129.9
2005(10)	2007.5				3082.0	2628.1
2010(11)	2012.5					3350.4
Panel C	**Time elapsed since the first union**					
1960(j=1)	1962.5	30.2				
1965(2)	1967.5	25.2	33.1			
1970(3)	1972.5	20.2	28.1	32.4		
1975(4)	1977.5	15.2	23.1	27.4	33.0	
1980(5)	1982.5	10.2	18.1	22.4	28.0	33.4
1985(6)	1987.5	5.2	13.1	17.4	23.0	28.4
1990(7)	1992.5	0.2	8.1	12.4	18.0	23.4
1995(8)	1997.5		3.1	7.4	13.0	18.4
2000(9)	2002.5			2.4	8.0	13.4
2005(10)	2007.5				3.0	8.4
2010(11)	2012.5					3.4

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 minimized, where l_k is the possible maximum number of marriage cohorts observed in years 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.

3.3.2 Differentials in the pattern of desire for more children according to time elapsed since the first union

The differentials in the pattern of desire for another child, according to duration since the first union, between remarried women and those in intact unions, is assessed by partially applying the procedure described in the preceding section. The method is applied to remarried women and those in intact unions separately while replacing the proportions of women in intact unions with the proportions of women desiring to cease childbearing. The derived estimates are plotted on the same axis to compare the patterns between these two population groups.

3.3.3 Cohort-period lifetime fertility differentials

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 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 3.3 below shows the structure of the distribution of births and women that is used to calculate cohort-period fertility rates. In this table, N_i represents the number of women in 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 age group i. Thus, the cohort-period fertility rates are defined as:

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

Table 3.3 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.

This study replaces the $B_{i,j}$'s in Table 3.3 with $Z_{i,j}$'s, where $Z_{i,j}$ denotes the total number of children ever born j years ago to women in 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 3.3 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:

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

To facilitate a comparison of $MCEB_{i,j}$'s between remarried women and those in intact unions, the study calculates indices of fertility difference, $I_{i,j}$, as a ratio of $MCEB_{i,j}$ for women in intact unions to $MCEB_{i,j}$ for remarried women. The resulting series of $I_{i,j}^{'}s$ are used to assess long-term trends in cumulated fertility differentials at younger and middle reproductive ages by plotting the $I_{i,j}^{'}s$ which corresponds to early childbearing ages, from women of different birth cohorts, against their reference period.

To define the reference period of $I_{i,j}$'s, the study assumes that births occur linearly over an interval duration of five years. Thus, the reference period for each $I_{i,j}$ is determined by subtracting j years from the approximated date of the survey.

3.3.4 Current fertility differentials

The assessment of remarriage effect on childbearing is extended by considering differentials in age-specific and total fertility rates between remarried women and those in intact unions. Two distinct techniques are used in practice to estimate age-specific and total fertility rates. First, indirect estimation of fertility involves the use of summaries of most recent births reported in a survey to derive the shape of the fertility distribution, while using reports of lifetime fertility of younger women to define appropriate fertility level. This approach follows the assumption that summaries of recent fertility are equally underreported at all ages, but the shape of the fertility distribution is accurate, and reports of lifetime fertility are accurately reported among young women. Second, direct estimation of fertility is employed where the number of births and duration of exposure to the risk of giving birth can be estimated with precision from available data. Fertility reports collected in DHS allows the application of both techniques. However, given the reliability and comprehensiveness of full birth history data collected in DHSs, the use of the direct method is more desirable. Thus, the study directly estimates age-specific and total fertility rates for remarried and non-remarried women. The analyses are performed using a Stata module for computing age-specific and total fertility rates (Schoumaker 2013).

3.4 Regression methods

Two regression methods are employed to adjust the estimates of fertility differentials for observable composition heterogeneity. Regression analyses are performed to examine remarriage effect on fertility outcomes.

3.4.1 Logistic regression modelling

Logistic regression method is employed to estimate the effect of remarriage on fertility preferences and childbearing (current fertility) by modelling the log-odds of desiring for another child and the log-odds of giving birth within three years before the survey respectively. Logistic regression analysis is one of the widely used approaches in social sciences for accounting variation in a binary response variable. If we let π_i denote the probability of observing an outcome of interest for the individual i, and $x_1, x_2, x_3 ....., x_j$ to represent a series of j covariates associated with the individual i, then a multivariate

logistic regression model is specified as a function that expresses the log-odds of observing the outcome of interest as a linear combination of x_{ji}'s:

$$\ln\left(\frac{\pi_i}{1-\pi_i}\right) = \alpha + \sum_{k=1}^{j} \beta_k x_{k,i},$$

where, $\beta_k^{'}s$ are regression coefficients estimated using maximum likelihood and α is a constant. Each β_k represents the expected change in the log-odds of observing the outcome that is associated with a unit change in the predictor x_k, exponentiating the $\beta_k^{'}s$ yield corresponding odds ratios of observing the outcome given a unit change in the predictor x_k.

3.4.2 Poisson regression modelling

The Poisson regression model is employed to further examine trajectories of the mean number of CEB during childbearing years. Poisson regression analysis is a standard technique used to model count response variables with a Poisson distribution. A positive integer random variable Y is said to have a Poisson distribution with parameter λ if the mean and variance of Y is λ and the probability of observing Y=y is defined as:

$$p(Y=y) = \frac{e^{-\lambda}\lambda^{y}}{y!} \quad ;\lambda \geq 0,\ y = 0,1,2,3.....$$

If $x_1, x_2, x_3....., x_j$ represent a series of j covariates associated with the individual i, then a multivariate Poisson regression model is specified as the function that expresses the log of the mean λ_i as a linear combination of independent variables x_{ji}'s:

$$\ln(\lambda_i) = \alpha + \sum_{k=1}^{j} \beta_k x_{ki},$$

where, $\beta_k^{'}s$ are Poisson regression coefficients estimated using maximum likelihood and α is a constant. Each β_k represents the expected change in the log of λ_i that is associated with a unit change in the predictor x_k. Consequently, the exponentiated β_k represents the multiplicative effect of λ_i that corresponds to a unit change in the predictor x_k. The exponentiated β_k is conventionally denoted as Incidence Rate Ratio (IRR). All regression analyses based on a pooled dataset includes an interaction variable between years of survey and remarriage status, among other interactions terms. Therefore, the results documented for these interaction models are derived using the post-estimation command *margins* in Stata.

4 RESULTS

This chapter presents the findings of this research in four parts. Section 4.1 provides the pattern and level of union dissolution and remarriage in Malawi. Section 4.2 compares the socioeconomic and demographic profile of women in intact unions relative to their remarried counterparts. The subsequent section 4.3 focuses on results of remarriage effect on desire for more children. Finally, section 4.4 documents the findings of the remarriage effect on childbearing.

4.1 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 4.1 below as the cumulative density functions (Figure 4.1a) with corresponding hazard distributions (Figure 4.1b). The probability of first union dissolution 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 4.1b, 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 4.1b illustrates this pattern. The fact that there is a sharp increase in the risk of union dissolution at advanced interval duration in Figure 4.1b is indicative of the high prevalence of widowhood since divorce is less likely to dominate over this period.

The pattern of remarriage is moderately 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 low value on the marriage market.

Figure 4.1 suggests that first union dissolutions and remarriages are frequent within the early years of marriage. For women whose first unions dissolve within 20 years, 49.6 per cent do so within five years. This proportion increases to 74.8 per cent at the end of ten years. Moreover, 67.6 per cent of women who remarry within 20 years initiate such unions over the first ten years.

Figure 4.1 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

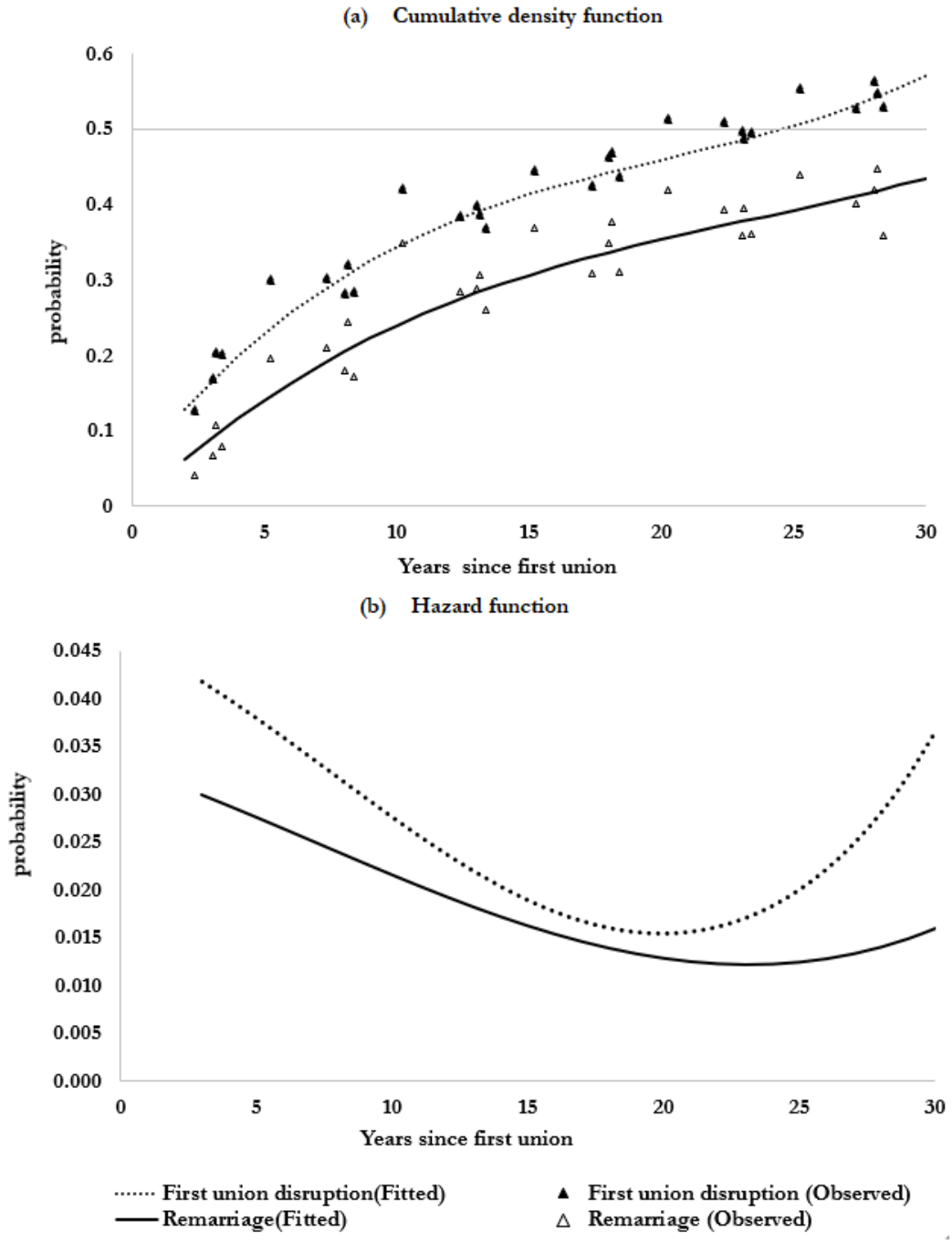


Table 4.1 below presents the probability of first union dissolution and remarriage according to time elapsed since the onset of first marriage, between 1992 and 2015. The most recent estimates, shown in the last column, indicate that over one-fifth of first marriages dissolve within five years. This 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.

Table 4.1 Cumulated probabilities of first union dissolution and remarriage according to time (years) elapsed since the onset of first union, 1992-2015/16 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

Results in Table 4.1 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.

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.

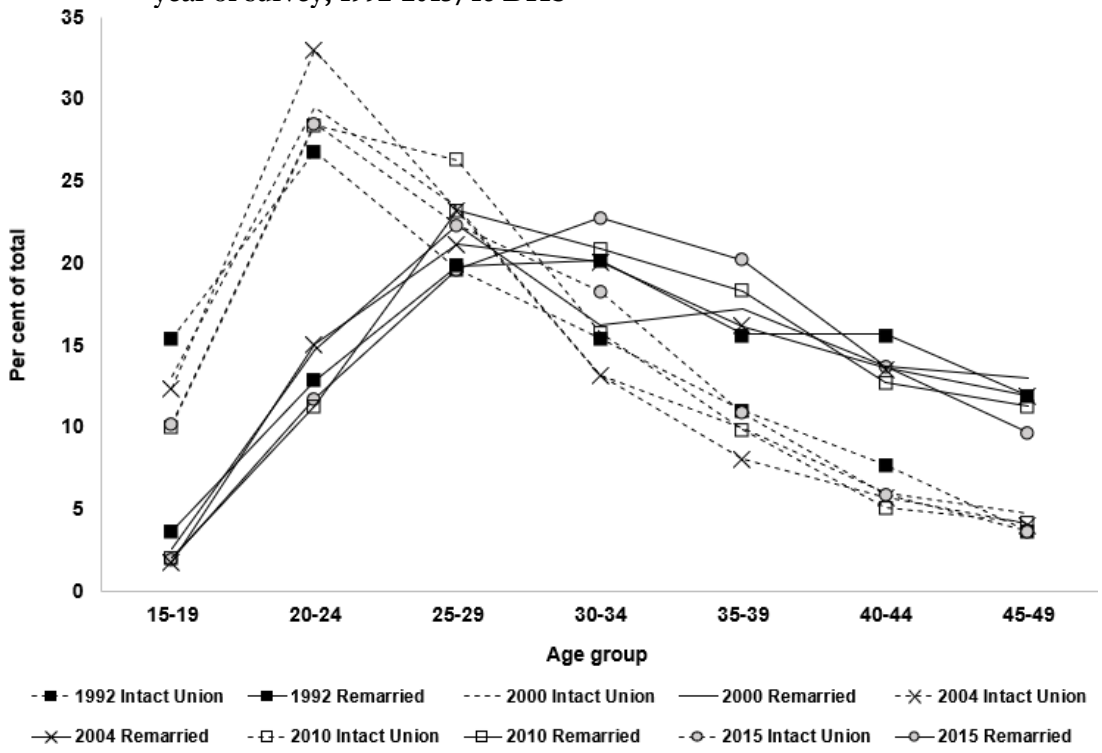
4.2 Socio-economic and demographic profile differentials

This section explores the composition heterogeneity between remarried women and those in intact unions. It centres on assessing the structural differences regarding age, the timing of first marriage, residence, education level, occupation, ethnicity, income level and religious affiliation.

4.2.1 Age

The mean age of remarried women is 33.3. On average, they are approximately 5.5 years older relative to women in intact unions. The age structure differentials are more apparent in Figure 4.2 below, that plots the per cent composition of women according to age. The bulk of women in intact unions are aged below 30, while remarried women dominate in the middle ages (25-39). The age pattern is reasonably consistent across surveys.

Figure 4.2 Per cent distribution of women according to age, by remarriage status and year of survey, 1992-2015/16 DHS

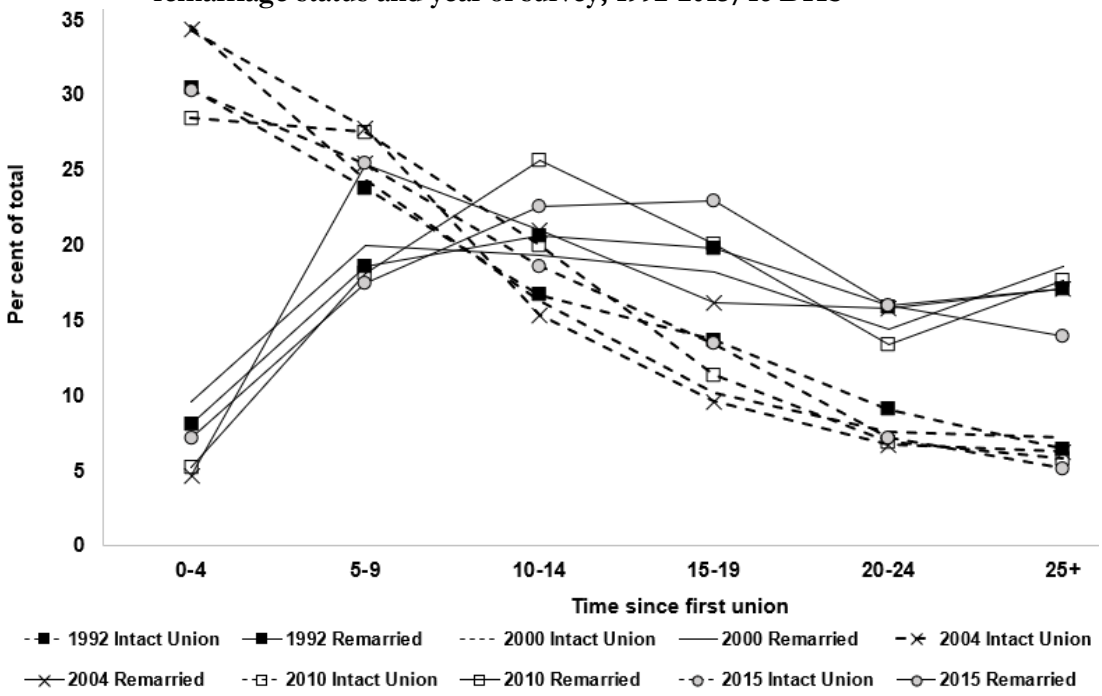


4.2.2 Timing of first marriages

Women in intact unions are relatively older at first marriage than their remarried counterparts. On average, a remarried woman initiates first union 0.3 - 0.7 years sooner. Figure 4.3 below shows per cent composition of women who have attained different interval duration relative to the first union, classified by remarriage status and year of survey. This schedule largely reflects the interaction between age structure and age pattern of first marriages. Therefore, it is not surprising that remarried women exhibit a unimodal

downward concave distribution, while the proportion of women with intact unions decline linearly with increasing duration. The median time elapsed since the first union is 7-8 years more among remarried women relative to those in stable unions.

Figure 4.3 Per cent distribution of women according to time since first marriage, by remarriage status and year of survey, 1992-2015/16 DHS



4.2.3 Residence

Table 4.2 below presents the per cent distribution of remarried women and those in intact unions according to background characteristics, based on the most recent survey. Data from previous surveys yield similar pattern. Table 4.2 suggests that majority of both remarried women and those in intact unions live in rural areas. However, remarried women are less urbanized.

4.2.4 Region of residence

Over half of remarried women live in the southern part of Malawi, where the corresponding estimate for women in intact unions is around 45 per cent. The northern region contains the lowest population of women compared to the other regions but the composition of remarried women is much smaller than that of women in intact unions. The estimates for the central region lies between those of the southern and northern regions.

4.2.5 Education

Remarried women are relatively less educated, with only 11 percent having secondary school training, and almost one-fifth of their population having no formal schooling at

all. In contrast, 22.7 per cent of women in intact unions have secondary school training, and 11.5 per cent have never achieved any form of education.

4.2.6 Income level

Over half of remarried women are relatively poor, and only 12.7 per cent are classified as rich, while most of the women in intact unions (60.6 per cent) are non-poor.

Table 4.2 Per cent distribution of women according to background characteristics by remarriage status, 2015/16 DHS

Background characteristic	Intact Union		Remarried		Ever married women	
	Weighted %	*Unweighted N*	*Weighted %*	*Unweighted N*	*Weighted %*	*Unweighted N*
Type of place of residence						
Urban	17.2	2298	12.0	461	16.3	2759
Rural	82.8	9207	88.0	2916	83.7	12123
Region of residence						
Northern region	13.0	2338	10.1	569	12.1	2907
Central region	42.2	3916	37.9	1029	40.6	4945
Southern region	44.9	5251	51.9	1779	47.2	7030
Highest educational level						
No education	11.5	1263	19.2	609	13.4	1872
Primary	63.0	7202	69.1	2363	64.1	9565
Secondary	22.7	2721	10.9	383	20.2	3104
Higher	2.8	319	0.8	22	2.3	341
Occupation						
Not working	30.4	3571	22.5	788	27.7	4359
Professional	5.8	706	3.6	133	5.3	839
Clerical/ sales	5.7	696	4.5	176	5.7	872
Agricultural/domestic	42.5	4781	51.1	1697	44.5	6478
Services/manual/others	15.5	1751	18.2	583	16.8	2334
Wealth index						
Poorest	18.5	1916	28.6	913	22.0	2829
Poorer	20.9	2274	22.1	726	20.8	3000
Middle	19.3	2195	19.7	686	19.1	2881
Richer	18.8	2284	16.9	610	17.9	2894
Richest	22.6	2836	12.7	442	20.3	3278
Religion						
No/other religion	0.6	65	1.3	40	0.7	105
Christian	86.3	10124	81.7	2836	85.2	12960
Muslim	13.1	1316	17.0	501	14.1	1817
Ethnicity						
Chewa	34.6	3471	30.6	875	33.1	4346
Tumbuka	10.4	1330	7.0	291	9.3	1621
Lomwe	17.3	1890	24.0	773	19.2	2663
Tonga	1.5	382	2.0	145	1.7	527
Yao	13.5	1287	17.3	497	14.7	1784
Sena	4.5	659	2.8	131	4.0	790
Nkhonde	0.8	154	0.6	36	0.8	190
Ngoni	12.0	1464	9.9	379	11.6	1843
Others	5.4	868	5.8	250	5.5	1118

4.2.7 Occupation

Remarried women are more likely to be employed than women in intact unions. However, the majority are hired in agriculture or domestic sector. Women in intact unions are more likely to have a professional employment than their remarried counterparts.

4.2.8 Religion and ethnicity

Majority of all women are Christians, but Muslims are relatively more frequent among remarried women. The Chewa are the most significant ethnic group, accounting for almost 30 per cent of the population in each subgroup. However, union dissolutions and remarriages are more common among the Lomwe and Yao ethnic groups (results not shown).

Overall, remarried women have a distinct social economic and demographic profile. They are less educated, relatively older, predominantly poor, and marry before their counterparts. Their population is less urbanized, with a high likelihood of belonging to the Muslim religion. Based on general demographic reasoning and some little understanding of fertility dynamics in Malawi, the social economic and demographic profile of remarried women relatively describes a population with favourable conditions for high fertility rate. The following section investigates how remarriage affects desire for more children in Malawi before assessing fertility differentials between these two groups.

4.3 The effect of remarriage on desire for more children

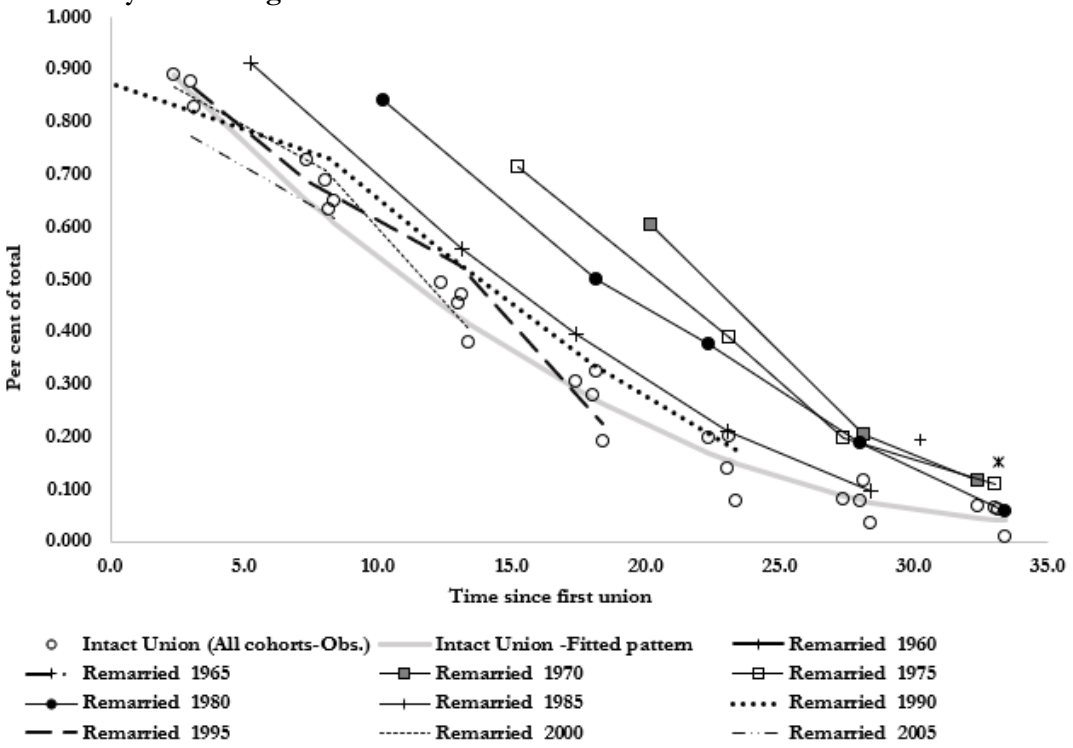
This section considers the relationship between remarriage and the desire for more children. Table 4.3 below shows the per cent composition of women who want another child, by remarriage status, at different periods. Results show that more than half of women in intact unions wanted another child in 2015 compared to 36.6 per cent of remarried women. The per cent composition difference was 5.6 in 2000; this figure increased to 14.6 in 2004 and reached 20.3 in 2015. Between 2000 and 2015, the proportion of women with the desire for more children consistently declined among remarried women, while it increased before falling among women in intact unions. Notably, the reduction is more substantial among remarried women (17.1 per cent points) than those in intact unions (2.4 per cent points).

Table 4.3 Per cent composition of women with desire for more children, by remarriage status, 2000-2015/16 DHS

	2000	2004	2010	2015
Intact Union	59.2	62.8	59.6	56.8
Remarried	53.6	48.2	44.1	36.5

Figure 4.4 below illustrate the differentials in the pattern of desire for more children, between remarried women and those in intact unions, according to duration relative to the onset of first marriage.

Figure 4.4 Reconstructed pattern of the desire for more children, according to years elapsed since the first union, by remarriage status, based on 1960-2015 five-year marriage cohorts of women



As expected, the proportion of women with the desire for more children falls as time elapses following the onset of the first union. However, more remarried women appear to desire more children at each interval duration, except for the early five years where the preference for another child is seemingly identical, mainly among the most recent marriage cohorts.

A trend of fertility intentions over time comparable to that in Table 4.3 is apparent in Figure 4.4. The results in Figure 4.4 reveal that the desire for more children does not vary markedly across different marriage cohorts among women in intact unions. The observed proportions of women who prefer another child reasonably cluster around the same level (fitted pattern). In contrast, the corresponding per cent composition of remarried women shows an apparent dissimilarity between women who first married before 1985 and those who formed new unions between 1985 and 2015, with the estimates based on the most recent marriage cohorts consistently falling below those

derived from older marriage cohorts, thus confirming that the desire for more children has declined more substantially among remarried women than those in intact unions.

The differentials and trends in fertility intentions, observed in both Table 4.3 and Figure 4.4, are prone to be confounded by structural heterogeneity and other reproductive factors describe in section 4.2. Thus, regression models are considered to account for the most important predictors of fertility preferences. Table 4.4 below presents results of regressions based on the most recent survey. Model 1 (baseline model) considers remarriage status only. This model is extended to Model 2 by controlling several variables. Model 2 is adjusted by replacing age with duration since the first union; the results are presented as Model 3.

The baseline model indicates that the 2015 unadjusted difference in desire for more children between remarried women and those in intact unions is significantly different, with remarried women having 64 percent lower odds of desiring another child compared to women who are in intact unions. However, when several potential predictors of fertility preferences (Model 2 and Model 3) are taken into consideration, the effect of remarriage on the desire for more children disappears. The results show that the odds of desire another child among woman whose first union remained stable are comparable to that of remarried woman (OR=1), suggesting that much of the difference observed in Model 1 is mainly due to composition disparities. Model 3 yields comparable results to Model 2. This finding is not surprising since age and duration since first marriage are strongly correlated.

The effects exhibited by the control variables in Table 4.2 conform to existing literature. Increasing age, duration since the first union, and the number of living children have a negative effect on desire for more children. Residing in the urban areas, being pregnant and having a birth in the year preceding the survey also displays the expected negative effect. While maternal education and income levels show less predictive power, the direction of the impact is likely. Increasing education and income level are associated with lower odds of desiring for another child. Relative to not working, being employed as a domestic or agriculture or a manual worker significantly raises the odds of desiring another child. The results show extensive variation among ethnic groups. By and large belonging to an ethnic group which is predominantly patrilineal has a positive effect on desiring another child relative to an ethnic group (Chewa) that practices both patrilineal and matrilineal marriage system.

Table 4.4 Logistic regression estimates of odds ratios of desiring for another child, 2015/16 DHS

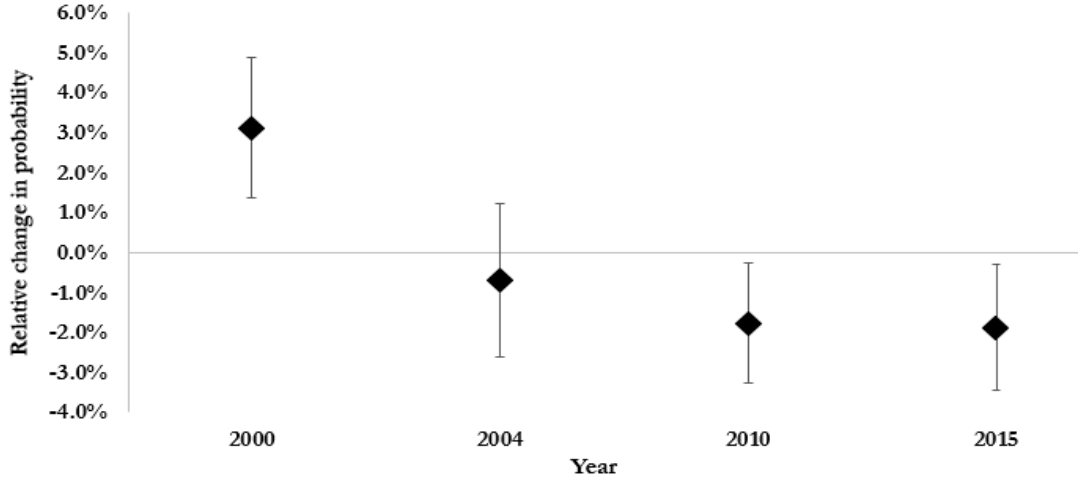
	Model 1	Model 2	Model 3
Remarriage (Intact Union) [ref]			
Remarried	0.46***	1.01	1.02
Age at the time of the survey (15-19) [ref]			
20-24		1.07	
25-29		0.74	
30-34		0.35***	
35-39		0.17***	
40-44		0.07***	
45-49		0.03***	
Time since first union (0-4) [ref]			
5-9			0.64***
10-14			0.36***
15-19			0.17***
20-24			0.08***
25+			0.02***
Age at first marriage (< 15) [ref]			
15-19		1.27***	0.79**
20-24		1.87***	0.69***
25-29		2.02***	0.37***
30-34		1.83*	0.17***
35+		2.13	0.08***
Number of living children (none)[ref]			
1		0.34***	0.33***
2		0.10***	0.11***
3-4		0.04***	0.04***
5+		0.02***	0.02***
Education (None)r[ef]			
Primary		1.10	1.10
Secondary		0.86	0.84
Higher		0.76	0.79
Residence (Urban)[ref]			
Rural		1.54***	1.53***
Ethnicity (Chewa)[ref]			
Tumbuka		1.18	1.190*
Lomwe		0.76***	0.77***
Tonga		1.30	1.30
Yao		0.88	0.88
Sena		2.16***	2.17***
Nkhonde		1.73*	1.77**
Ngoni		0.89	0.90
Others		1.39***	1.43***
Religion (None/others) [ref]			
Christian		1.23	1.15
Muslim		2.10*	2.00*
Occupation (Not working) [ref]			
Professional		0.87	0.85
Clerical/ sales		0.92	0.95
Agricultural/domestic		1.29***	1.29***
Services/manual		1.16*	1.16
Wealth index (Poor)			
Middle		0.93	0.96
Rich		0.94	0.96
Had a birth in last year (No)[ref]			
Yes		0.59***	0.59***
Constant	1.26***	16.49***	36.85***
R-Square	0.02	0.36	0.36

* p<0.05, ** p<0.01, *** p<0.001 () ref indicates the reference category

At first, the contradicting effect of age at first marriage observed in Model 2 and Model 3 was confusing. However, this arises from the fact that in Model 2, where age is accounted for but duration since the first union is not considered, age at first marriage largely mirror the effect of duration of the union relative to the onset of the first union. In this model, women who first married at a younger age correspond to those who have stayed in the union for a longer duration relative to those who married at older ages. Thus, they are more likely to have achieved their ideal number of children hence less likely to desire additional children. In contrary, Model 3 does not account for age but duration since the first union. Therefore, age at first marriage reflect different subgroup of women with different values towards family building process and family size. Women with younger age at marriage are likely to be those who are self-selected for large family size ideals than those who delay their union. Consequently, lower age at first marriage is associated with increased risk of desiring another child relative to higher age at marriage.

A model[6] (Model 4) analogous to Model 2 is fitted to a pooled dataset, comprising the last four surveys, while allowing remarriage to interact with year of survey. Results are presented in Figure 4.5 below in terms of the relative change in predicted probabilities of desiring another child if a woman in intact union attain a remarried state.

Figure 4.5 Relative change in the probability of desiring another child (with 95% CI), comparing remarried relative to those in intact unions, 2000-2015/16 DHS



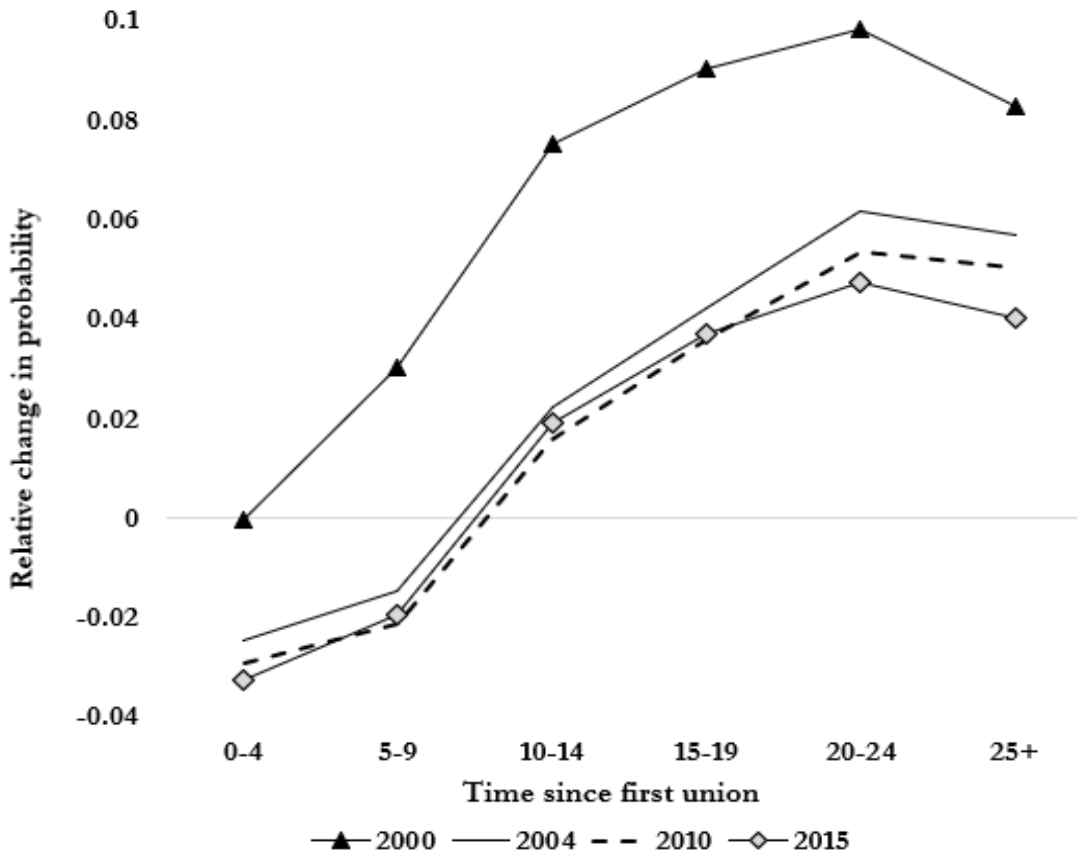
The results in Figure 4.5 reveal that there has been a shift in the relative difference in desire for more children between remarried women and those in intact unions over the years. In 2000, being remarried was significantly associated with 3.1 per cent increase in

[6]This model excludes the variable wealth index because it is not available for 2000 MDHS data. The information we gain by comparing four datasets is more robust than comparing three datasets with this variable included.

the probability of desiring another child. In contrast, remarriage has a protective effect on desire for more children in the most three recent surveys (the effect is found to be insignificant only in 2004 survey). This trend is consistent with the results observed in Table 4.4, except for 2000 where remarriage effect is seen to be positive. Given the trend of desire for more children, between remarried and those in intact unions, across different marriage cohorts in Figure 4.4, it is apparent that the dynamic of change shown in Figure 4.5 is drained by the weakening of fertility intentions among remarried women.

To further explore the pattern of the effect of remarriage on the desire for more children as time elapses following the onset of the first union. Model 3 is extended to Model 5 by using a pooled dataset, while allowing remarriage to simultaneously interact with duration since the first marriage and year of survey. The results are presented in Figure 4.6 below in the form of predicted probabilities.

Figure 4.6 Relative change in the probability of desiring another child, comparing remarried relative to women in intact unions, according to duration since the first union. 2000-2015/16 DHS



The pattern in Figure 4.6 is reasonably identical across the surveys. Within five years relative to the first union, remarriage has a negative effect on desire for more children. Except for 2000, remarriage inhibits the desire for another child even at interval duration

of 5-9 years. Beyond ten years following the first union, remarriage is associated with high likelihood of wanting another child across all the surveys. This pattern is consistent with the pattern reconstructed from the marriage cohorts, shown in Figure 4.4. However, it evidently reveals the divergence in the desire for more children between remarried women who are at shorter interval duration relative to the first union and those who are at advanced interval duration.

Two potential explanations may account for this pattern. First, at shorter interval duration relative to the first union such as 0-4 and 5-9 years, remarriage is likely to be most recent. Thus, the psychological trauma of first union dissolution, which may include an economic burden of raising children born from previous marriage 'singlehanded', may induce fear of having additional children while the stability of the existing union and the reliability of the current spouse are uncertain. The fact that women at advanced interval duration have a higher risk of desiring for more children suggest that remarried women at shorter interval duration most likely indicate a desire to cease childbearing as they mean postponing. Second, the positive remarriage effect at advanced duration relative to the first union could be indicative of the intentions to catch up on lost fertility among remarried women.

4.4 The effect of remarriage on childbearing

4.4.1 Cohort-period lifetime fertility differentials

This section assesses whether remarried women have fewer or more births than those in intact unions. This investigation begins with a comparison of lifetime fertility attained by women (remarried women and those in intact unions) of the same birth cohort, at the end of each five-year childbearing age group. Table 4.5 below 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.

The differentials in CFS reveal that remarried women end up with fewer children than those in stable unions; however, the difference is diminishing over time. In 2000, remarried women had given birth to 1.48 fewer children on average. 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.

Table 4.5 Cohort-period cumulated fertility differentials (women in intact unions – remarried women) by age group of a mother at survey, classified by timing of births, 2000-2015/16 DHS

Age group of a mother at survey (i)	0-4 (j=0)	5-9 (j=1)	10-14 (j=2)	15-19 (j=3)	20-24 (j=4)	25-29 (j=5)	30+ (j=6)
2000							
15-19	-0.39						
20-24	-0.33	-0.31					
25-29	0.05	-0.23	-0.21				
30-34	0.88	0.59	0.18	-0.11			
35-39	1.13	0.9	0.44	0.08	-0.06		
40-44	1.36	1.12	0.75	0.32	0.05	-0.12	
45-49	1.48	1.43	1.16	0.69	0.43	0.21	-0.03
2004/05							
15-19	-0.39						
20-24	-0.42	-0.32					
25-29	-0.11	-0.26	-0.16				
30-34	0.52	0.31	0.08	-0.1			
35-39	0.62	0.38	0.14	-0.17	-0.15		
40-44	0.87	0.64	0.48	0.19	-0.09	-0.12	
45-49	0.97	0.94	0.84	0.66	0.47	0.29	-0.02
2010							
15-19	-0.48						
20-24	-0.48	-0.53					
25-29	-0.07	-0.24	-0.19				
30-34	0.04	-0.03	-0.17	-0.15			
35-39	0.76	0.61	0.33	0.04	-0.05		
40-44	0.92	0.77	0.56	0.27	-0.03	-0.15	
45-49	1.17	1.05	0.8	0.52	0.09	-0.1	-0.17
2015/16							
15-19	-0.29						
20-24	-0.49	-0.36					
25-29	-0.46	-0.47	-0.32				
30-34	-0.28	-0.21	-0.33	-0.2			
35-39	0.05	0.03	-0.11	-0.24	-0.08		
40-44	0.45	0.27	0.09	-0.16	-0.21	-0.15	
45-49	0.33	0.31	0.17	0.11	0.03	-0.1	-0.18

Table 4.5 can be restructured to display the trajectory of lifetime fertility differentials among women of the same birth cohort as they advance in age, as shown in Table 4.6 below. Reading the columns in descending order illustrates the cumulated fertility differences at the end of each five-year childbearing age group. Results in Table 4.6 suggest that remarried women have higher cumulated fertility than those in intact unions at early ages of childbearing. 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. This estimate is 0.02, 0.17 and 0.18 for 2004, 2010 and 2015 respectively. For the most recent birth cohorts (women interviewed in 2010 and 2015),

remarried women have more children sooner 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 4.6 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

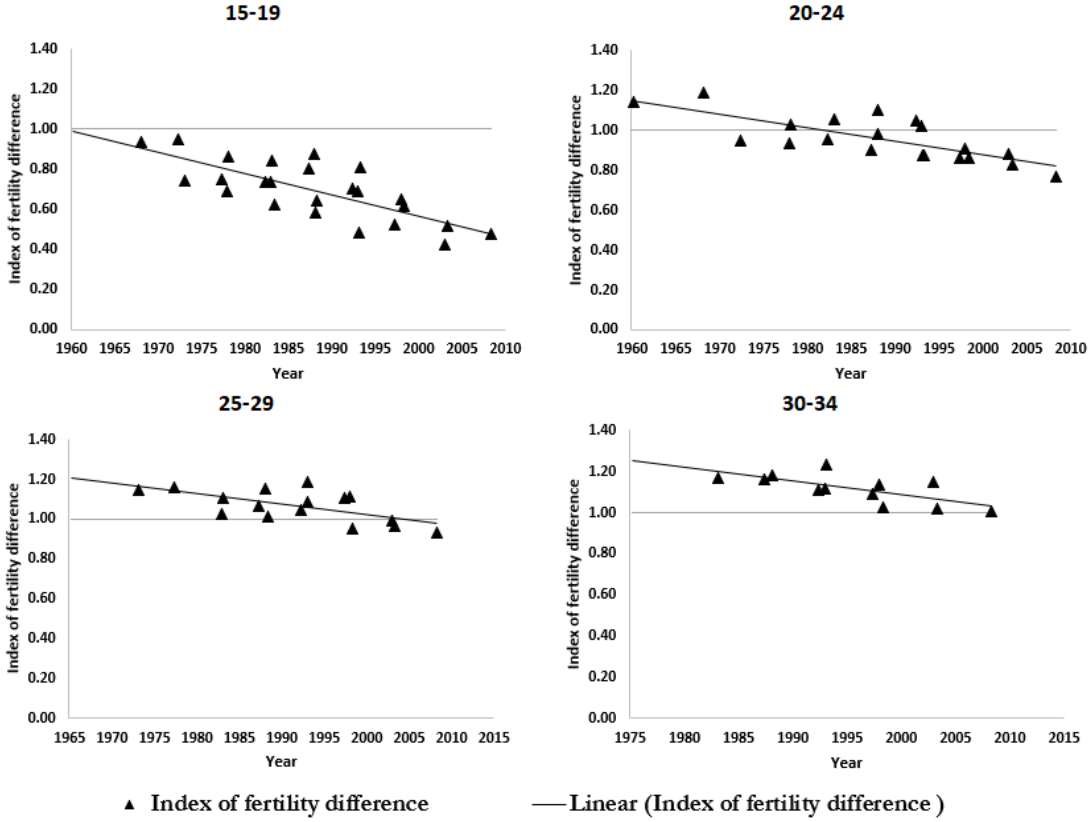
Age group of a mother at the end of each period (j)	Age group of a mother at survey (i)						
	15-19 (i=1)	20-24 (2)	25-29 (3)	30-34 (4)	35-39 (5)	40-44 (6)	45-49 (7)
2000							
15-19 (j=0)	-0.39	-0.31	-0.21	-0.11	-0.06	-0.12	-0.03
20-24(1)		-0.33	-0.23	0.18	0.08	0.05	0.21
25-29(2)			0.05	0.59	0.44	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

The lifetime fertility difference in Table 4.6 increasingly becomes more pronounced as women progress towards the end of childbearing lifespan. In 2000, the fertility difference among women aged 45-49, at the time they were turning exact age 30, was 0.43 children. This difference increased to 1.16 as they were attaining age 40, and 1.43 at exact age 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.

The current pattern of fertility differentials at lower reproductive ages appears to be distinct from the one that prevailed before the 1970s. This finding is illustrated in Figure 4.7 below, that shows long-term trends in cumulated fertility differentials, between remarried women and those in intact unions, at early and middle ages of childbearing. This figure reconstructs the pattern of indices of fertility difference at the end of 15-19, 20-24, 25-29 and 30-34 reproductive years, based on women of different birth cohorts.

Figure 4.7 Long-term trends in indices of fertility differences, comparing women in intact unions relative to remarried women, at the end of 15-19, 20-24, 25-29, and 30-34 childbearing age, 1960-2015



The indices of fertility difference in Figure 4.7 have steadily declined at all ages, from indices that are relatively far above unity, to indices that are close to 1 at middle ages and that are much below 1 at the youngest ages. For example, during the early 1960s, women in intact unions had, on average, 16 per cent more CEB as they turned age 25, while in the 2000s, they had almost 18 per cent fewer children as they reached the same age. For women attaining exact age 35, on average, women in intact unions had given birth to 17 per cent more children in the 1980s, but only 6 per cent more births in the 2000s.

4.4.2 Adjusted lifetime fertility differentials

Table 4.7 below presents results of Poisson regressions based on the most recent survey.

Table 4.7 Incidence rate ratio of mean number of CEB, comparing remarried women with women in intact unions, 2015/16 DHS

	Model 1	Model 2	Model 3	Model 4
Remarriage (Intact Union) ref				
Remarried	1.42***	1.38***	0.98	0.98
Age (15-19) ref				
20-24			2.392***	
25-29			4.335***	
30-34			6.105***	
35-39			7.611***	
40-44			8.806***	
45-49			9.482***	
Time since first union (0-4) ref				
5-9				2.15***
10-14				3.26***
15-19				4.28***
20-24				5.13***
25+				5.91***
Age at first marriage (< 15) ref				
15-19		0.81***	0.87***	1.04**
20-24		0.71***	0.70***	1.08***
25-29		0.75***	0.63***	1.30***
30-34		0.81***	0.58***	1.56***
35+		0.97	0.65***	2.76***
Education (None)ref				
Primary			0.93***	0.94***
Secondary			0.76***	0.82***
Higher			0.60***	0.69***
Residence (Urban)ref				
Rural			1.11***	1.11***
Ethnicity (Chewa)ref				
Tumbuka			1.05**	1.03
Lomwe			0.98	0.97**
Tonga			0.97	0.96
Yao			0.99	0.98
Sena			0.98	0.96
Nkhonde			1.07	1.08
Ngoni			0.99	0.98
Religion (None/others) ref				
Christian			1.03	1.06
Muslim			1.07	1.1
Occupation (Not working) ref				
Professional			0.93**	0.93**
Clerical/ sales			1.00	0.99
Agricultural/domestic			1.01	1.02
Services/manual			0.99	0.99
Wealth index (Poor)ref				
Middle			0.98	0.98
Rich			0.94***	0.95***
Constant	2.99***	3.71***	0.80***	1.01
R-Square	0.02	0.03	0.24	0.23

* p<0.05, ** p<0.01, *** p<0.001,

The baseline model (Model 1) shows the ratio of mean number of children ever born to remarried women comparative to the average number of children ever born to women in intact unions. Model 2 shows this ratio when age at first marriage is taken into consideration. More variables including age are added to Model 2, and the results are presented as Model 3. Age, in Model 3, is replaced with duration since the first union to yield Model 4.

The baseline model illustrates that the overall lifetime fertility of remarried women differs significantly from that of women in intact unions by 41.5 per cent, with remarried women having more children on average. Controlling age at first marriage slightly reduces the remarriage effect on lifetime fertility, but the effect remains significant and in the same direction. Adding age at first birth to Model 1 yields parallel results to Model 2; however, age at first marriage appears to account for more variation than the age at first birth (results not shown). Accounting for more composition factors (Model 3 and Model 4) erode the positive effect of remarriage on lifetime fertility. The results show that the average number of children ever born to remarried women is 2 per cent less, relative to the cumulated fertility attained by women in intact unions. While this difference is not statistically significant, it confirms that in 2015 remarried women were associated with lower cumulated fertility.

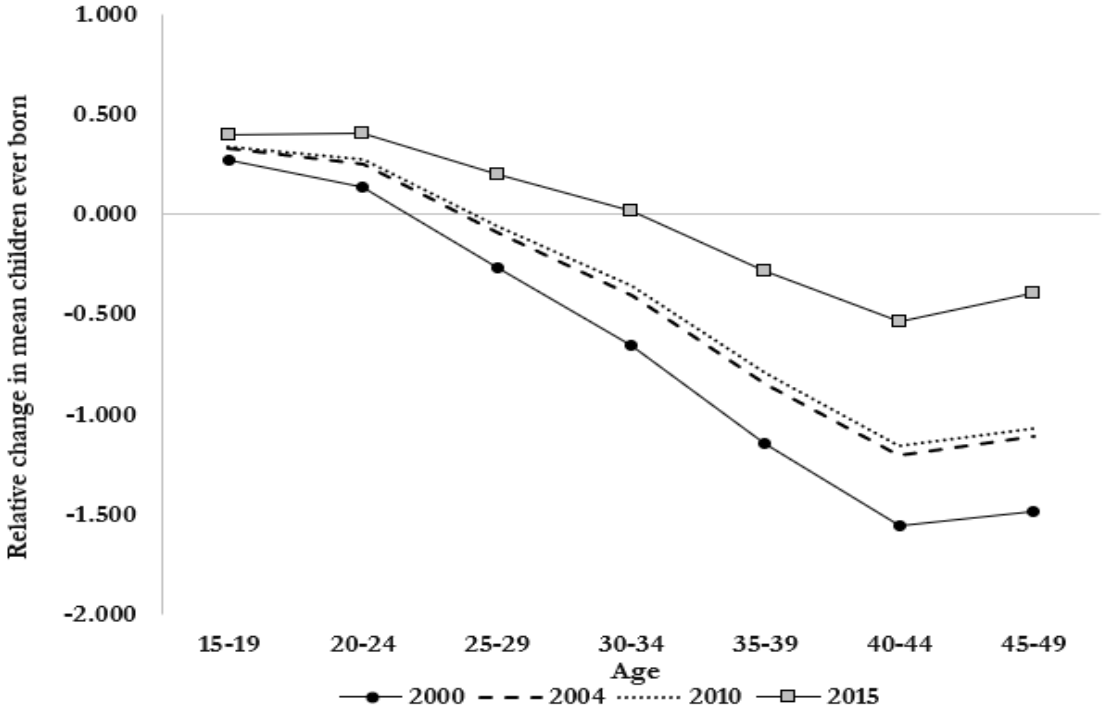
The results of a Poisson regression[7] model that allows interaction between years of survey and age suggest that the observed pattern of fertility differentials in section 4.4 is not an artefact of structural differences between remarried women and those in intact unions. The trend persists despite controlling for observable composition heterogeneity. This finding is shown in Figure 4.8 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 4.8, all curves fall 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 age confirms that the lifetime fertility inequality between remarried women and

[7] Poisson regression modelling that controlled for time elapsed since the first marriage, age, education level, residence, ethnicity, occupation, religion, year of survey and current pregnancy status. The model included interaction terms. The plotted estimates are the contrast of margins.

those in intact unions gradually becomes pronounced as women advance in age. The fact that estimates based on the most recent surveys lay above those obtained from the previous surveys is an indication of 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.

Figure 4.8 Relative change in mean number of CEB, comparing remarried relative to women in intact unions, according to age, 2000-2015/16 DHS



These findings, taken together with the pattern of cohort-period lifetime fertility differential (section 4.4.1), suggest that the diminishing of CFS differentials between women in intact unions and their remarried counterparts are merely a progression of the changes in their lifetime fertility disparities, which started among younger cohorts in the 1970s. Thus, they reveal that an era, where remarried women will end up having higher CFS than those in intact unions, is emerging.

4.4.3 Current fertility differentials

The trends of current fertility differentials, among remarried women and those in intact unions, provide further evidence supporting the finding that a new pattern, where remarried women will end up having higher CFS, is emerging. Table 4.8 below displays the differences in age-specific and total fertility rate, between women in intact unions and remarried women between 2000 and 2015. It is found that until 2010, TFR remained

higher among women in intact unions, while the recent trend reveals higher TFR among remarried women. In 2000, the TFR difference was one child per woman. It declined over the years and reached -0.20 by 2015. Fertility estimates for the middle ages (25-35) also show a similar pattern. For women aged 15-19, fertility consistently remained higher among remarried women.

Table 4.8 Current fertility differentials (women in intact unions – remarried women) by age groups of a mother at survey and total, 2000-2015/16 DHS

	2000	2004	2010	2015
15-19	-0.02	-0.02	-0.02	-0.01
20-24	0.07	0.03	0.05	0.01
25-29	0.02	0.04	0.02	-0.03
30-34	0.06	0.03	0.01	-0.01
35-39	0.04	0.02	0.02	-0.01
40-44	0.02	0.02	0.02	0.01
45-49	0.02	-0.01	0.01	0.01
TFR	1.00	0.50	0.50	-0.20

4.4.4 Adjusted current fertility

Table 4.9 below shows the relative risk (RR) of giving birth within three years before the survey, according to age and duration since the first union.

Table 4.9 Relative risk of giving birth within three years preceding the date of the survey, comparing remarried women relative to women in intact unions, according to age and duration since first marriage, 2000-2015/16 DHS

	2000	2004	2010	2015
Model 1: Time since the first union excluded				
All women	0.96**	0.97*	0.99	1.02
Age				
15-19	1.05	1.06	1.06	1.09*
20-24	0.92***	0.92***	0.93***	0.92***
25-29	0.97*	0.96	0.99	1.03
30-34	0.98	1.00	1.02	1.09**
35-39	1.00	1.01	1.05*	1.13***
40-44	0.90*	0.93	0.97	1.05
45-49	0.89	0.93	0.99	1.10
Model 2: Age excluded				
All women	0.96**	0.96*	0.99	1.02
Time since the first union				
0-4	0.90***	0.90***	0.91***	0.90***
5-9	0.97*	0.97*	0.98	1.01
10-14	1.01	1.01	1.04*	1.10***
15-19	1.00	1.01	1.04	1.11***
20-24	1.02	1.02	1.07	1.17**
25+	0.87	0.88	0.94	1.03

* p<0.05, ** p<0.01, *** p<0.001,

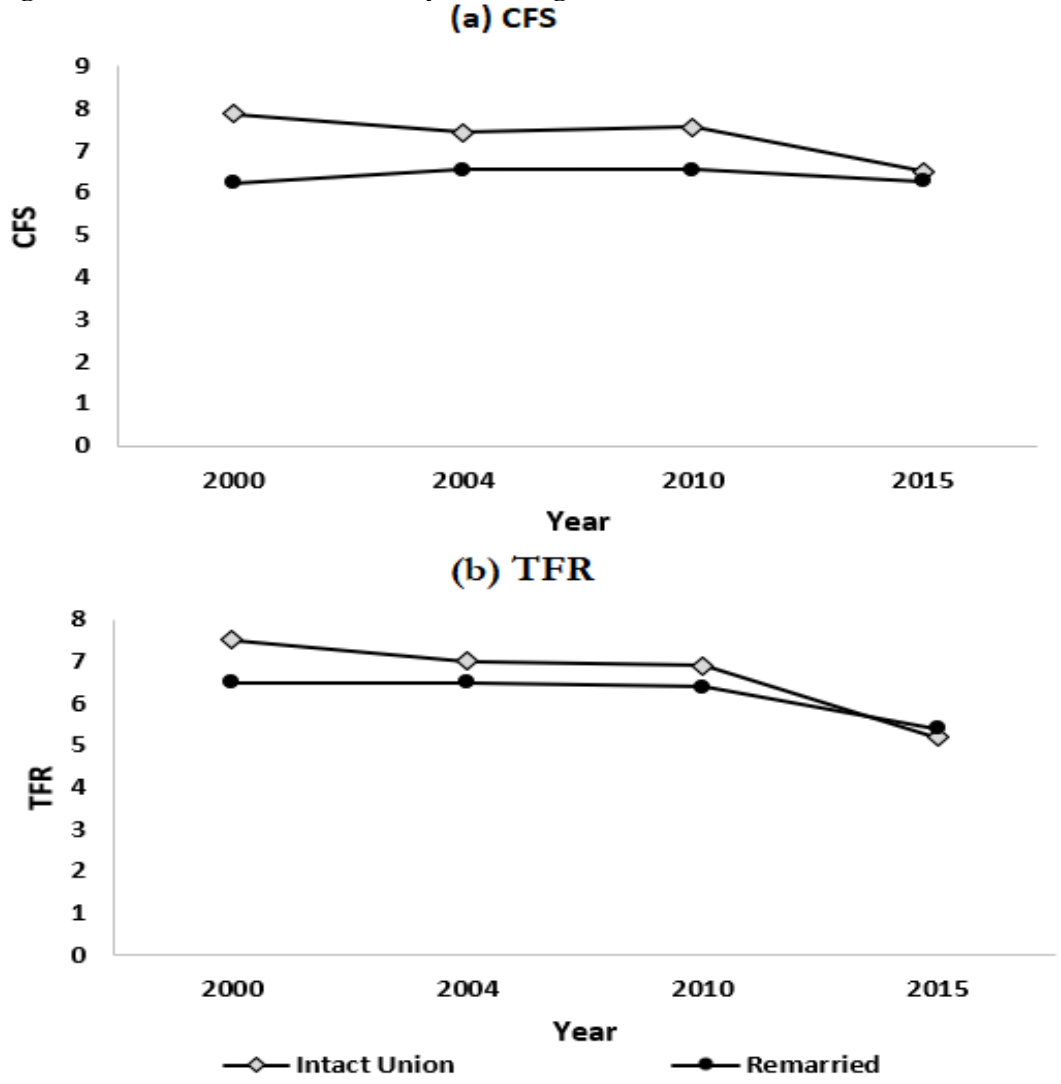
Note: Estimates computed from predicted marginal probabilities. The regression model included the following explanatory variables: time elapsed since the first marriage, age, age at first marriage, education level, residence, number of living children, ethnicity, occupation, religion, year of survey and current pregnancy status.

Table 4.9 illustrate that controlling for composition heterogeneity yields results that are consistent with the unadjusted current fertility differentials. In 2000, remarried women were 4.2 per cent significantly less likely to give birth within three years before the survey relative to those in intact unions, while in 2015 they were almost 2 per cent more likely to give birth over the same interval duration. Besides, the results show that a sequence of low relative risk estimates in each year is consistently followed by a series of much higher relative risk almost at all ages and marriage duration.

4.4.5 Fertility trends differentials

The pattern of the fertility differentials between remarried women and those in intact unions, observed in the previous section, is mainly due to marked fertility decline among the latter group. This finding is observed in Figure 4.9 below, that plots CFS and TFR trends for remarried women and their counterparts in intact unions.

Figure 4.9 CFS and TFR trends by remarriage status, 2000-2015



CFS of women in intact unions steadily declined over the years, but it relatively 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. In the case of current fertility, TFR for remarried women remained around 6.5 children per woman, at least until 2010. It dropped by 1.1 children by 2015. In contrast, TFR gradually declined by 2.3 children among women in intact unions.

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. However, the observed trend suggests that if remarried women had experienced similar fertility trends as those of women in intact unions, their TFR would have potentially remained lower, and we would not have anticipated the emerging of a new era where remarried women end up with higher CFS.

Overall, this section has documented that remarried women give birth to more children sooner than their counterparts in intact unions, but eventually end up with fewer children. The net fertility difference at the end of reproductive lifespan is increasingly diminishing with time, suggesting that a new era, where remarried women will end up with higher CFS than those in intact unions, is emerging. Trends of current fertility illustrate that TFR is already higher among remarried women than those in intact unions. Much of the fertility differentials appear mainly to arise from marked fertility declines among women in the intact union than their remarried counterparts.

5 CONCLUSION

This research sought to define the pattern and level of union dissolution and remarriage in Malawi and to investigate how remarriage affects fertility preference and childbearing. The study applied a technique that established the pattern and level of union dissolution and remarriage using cohort and period measures of the proportion of women in intact unions and never-remarried women respectively, to data from Malawi Demographic Health Surveys. The pattern of both union dissolution and remarriage defined in this study fits reasonably well with the data obtained from each survey (results shown in the Appendix). The correlation between the fitted and observed estimates of union dissolution is above 0.97 across all the surveys. A similar correlation for the estimates of remarriage is observed in the last four surveys. It is 0.94 for 1992 estimates. This deviation should be expected, given the increase in HIV and AIDS prevalence that prevailed in the early 1990s.

This study makes two key contributions towards our understanding of marriage dynamics in Malawi. 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 imply declining prevalence of child out-fostering and 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, Ahmed, Gray *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. However, the fact that over two-fifths of women dissolve their first unions within 15 years and one-fifth of women remarry over the same interval, is indicative that marital instability and remarriage and its associated consequences still require public attention.

Regarding the second objective, the research set out to address two specific questions. First, how does remarriage affect fertility preference? This question was responded to by using a logistic regression technique to model the effect of remarriage

on desire for more children. The results provide new insights into the relationship between remarriage and fertility preference. It is shown that women's intentions to have additional children do not differ between remarried women and those in intact unions. However, at shorter interval duration relative to the onset of the first union, where remarriage is relatively most recent, remarriage inhibits desire for more children. While at advanced interval duration, remarriage has a positive effect on intentions to have another child. This apparently implies that women in Malawi possibly postpone childbearing following the initiation of second order unions, most likely to ensure the stability and reliability of the current spouse.

Theory suggests that if childbearing motivations are weak in higher-order unions, then remarried women are less likely to have as many children as their counterparts in intact unions. Therefore, the protective effect of remarriage on the desire for more children, observed at shorter interval duration (0-9) relative to the onset of the first union, signifies that the fertility restriction, which arises voluntarily or inevitably due to union dissolution, extends to some periods within new partnerships. Thus, although remarriage appears to be rapid in Malawi, the union dissolution effect on overall fertility is aggravated by the act of postponing intentions to have children immediately following the remarriage. This pattern has the potential of inhibiting the ability of remarried women to attain as much fertility as that of women in intact unions.

Overall, the observed pattern of the effect of remarriage on the desire for more children is most supportive of the emerging literature in SSA, that suggest lower fertility intentions among newly remarried women, citing uncertainty of the prevailing union as one of the underlying causes (Towriss 2014). This emerging literature appears to contradict the theory that remarried women initiate childbearing to solidify new unions (Agadjanian 2005; Griffith, Koo and Suchindran 1985; Thomson 2004; Vikat, Thomson and Hoem 1999). Given this disparity, future studies should consider exploring whether fertility desires of newly remarried women are mirrored in their fertility control practices.

The second question – How does remarriage affect childbearing? – sought to understand the interplay between remarriage and childbearing. Given the recent rapid fertility decline in Malawi, the findings of this analysis provide novel insights into the overall assessment of fertility trends in the country. 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 it appears that a new regime, where remarried women will eventually end up with more children than those in intact unions, is emerging. Given these childbearing dynamics, 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 in general.

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 1.5 in 2000 and 0.4 in 2015 between remarried women and their counterparts in intact unions. This difference falls within a range of -1.03 to 1.6 observed across European, Asian, and American societies. Moreover, these findings provide evidence that confirms the hypothesis that the quantum of fertility in a population plays a critical role in determining whether remarried women end up with as much or more children as their counterparts in intact unions (Downing and Yaukey 1979; Thornton 1978).

At population level and concerning future fertility trends in Malawi, the current and the future pattern of fertility differentials between remarried women and those in intact unions is likely to have little if any implications. This hypothesis follows the fact that the level of remarriage is declining and remarried women currently constitute one-fifth of the ever-married population (results not shown). Consequently, the fertility contribution of remarried women to the overall fertility of the ever-married population will remain immaterial even if remarried women exhibit stable and high fertility pattern. In principle, if the current level of remarried population and their fertility remain constant, their contribution to the overall fertility of ever-married women will still be less than 50 per cent even if the fertility of women in intact unions falls to replacement level.

However, at the individual level, 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 generalizable, 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 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, it is possible that unobserved heterogeneity may render these two population groups incomparable.

Third, the analyses are restricted to ever-married women who are not sterilized or have been declared infecund. It is based on the assumption that sterilization is evenly distributed among women with intact union and those who have remarried. While this exclusion is desirable for the assessment of the effect of remarriage on fertility preferences, it 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..

Third, 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[8].

Nevertheless, the methods used in this study are robust enough to provide reliable insights on remarriage and fertility based on limited nuptiality histories. For example, the regression models of desire for more children and current fertility are based on reports of recent fertility intentions and childbearing, thus, given the wide range of observable heterogeneity that was accounted for, the findings provide a reasonable understanding of how remarriage affects desire for more children and childbearing in Malawi. Besides, 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. This should be possible because the study is based on DHS data, which is commonly available in many SSA countries. Extending this study to other SSA countries could help improve the quality of research on marriage dynamics and fertility in the region, which currently can be described as scanty and scarce.

[8] Well-known longitudinal studies that have collected fertility and nuptiality reports in Malawi include Fertility Intention Study under Karonga Prevention Studies, conducted between 2008-2009. Because of limited length and low level of divorce across wave (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 through 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.

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APPENDICES

Appendix A1. Pattern of union dissolution and remarriage in Malawi

Table A1.1 Pattern 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 A1.2 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

Appendix A2: Socio-economic profile of remarried women relative to women in intact unions, 1992-2010 MDHS

Table A2.1. Socio-economic profile of remarried women relative to women in intact unions, 1992-2010 MDHS

	1992		2000		2004		2010	
	Intact Union	Re-married	Intact Union	Re-married	Intact Union	Re-married	Intact Union	Re-married
Type of place of residence								
Urban	12.7	8.7	15.4	9.8	17.9	8.3	18.1	12.2
Rural	87.3	91.3	84.6	90.2	82.1	91.7	81.9	87.8
Region								
Northern region	14.8	6.8	12.2	9.2	14	8.2	13.2	7.5
Central region	41.2	36.8	44.6	32.1	41.6	33.5	43.1	37
Southern region	44	56.4	43.2	58.7	44.4	58.3	43.8	55.5
Highest educational level								
No education	47.8	60.6	28.3	41.1	21.9	38.8	14.4	27.2
Primary	48.5	38.4	62.8	55.8	64.4	58.6	66.5	65.6
Secondary	3.6	0.9	8.8	3.2	13.2	2.5	17.7	6.9
Higher	0.1	0	0.1	0	0.5	0.1	1.4	0.3
Occupation								
Not working	75.9	73	38.3	31.5	40.1	33	25.3	19.5
Professional	0.8	0.5	1.9	1.3	1.4	0.9	1.6	0.6
Clerical/ sales	5.3	6.8	13.7	14.6	11	12.7	18	17.9
Agricultural/domestic	6.7	7.4	43.1	48.6	45.6	49.9	45.6	48.1
Services/manual/others	11.3	12.4	3	4	2	3.5	9.5	13.8
Religion								
No/other religion			1.6	2.4	1.3	1.7	0.9	2.2
Christian			86.7	78.5	87.4	79.6	86.2	77.8
Muslim			11.7	19.1	11.3	18.7	12.9	19.9
Ethnicity								
Chewa			34.9	26.9	35.1	30.2	34.3	30.1
Tumbuka			8.5	5.8	10.1	5.5	10.5	4.9
Lomwe			15.8	24.3	16.1	21.6	14.9	21
Tonga			1.8	1.6	2	2.2	1.9	1.6
Yao			12	18.2	11.5	19.4	12.7	19
Sena			4.4	4.2	5.2	3.8	4.9	4.5
Nkhonde			1.3	1.3	1.1	1	1.2	0.6
Ngoni			12.4	10.2	11.6	8.8	12.8	10.4
Amang'anja/Anyanja			8.9	7.4	7.3	7.4	6.9	7.9
Wealth index								
Poorest					14.2	25.3	16.2	26.6
Poorer					21.3	23	19.6	22.8
Middle					22	23.6	21.4	20.4
Richer					21.3	18.1	20.6	17.9
Richest					21.3	10	22.2	12.3