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The marriage squeeze: Measuring and explaining marriage market dynamics in Sub-Saharan Africa

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**The Marriage Squeeze: Measuring
and Explaining Marriage Market Dynamics
in Sub-Saharan Africa**

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Christiaan De Swardt and Renate Hartwig*

The Marriage Squeeze: Measuring and Explaining Marriage Market Dynamics in Sub-Saharan Africa

Abstract

Marriage market imbalances have been linked to social instability, crime, and reduced welfare in both developing and developed countries. We revisit this issue in the context of Sub-Saharan Africa, where high population growth and the prevalence of polygyny shape partner availability in structurally significant ways. Building on a dynamic model of the marriage market, we introduce a novel measure that accounts explicitly for the intensity of polygyny and apply it to Demographic and Health Survey data from 1991 to 2023. We show that conventional marriage ratios, which ignore polygyny, understate the extent of male-biased competition in the marriage market. When polygyny is incorporated, we find that marriage imbalances have persisted at structurally high levels since 2006, especially in rural areas and among Muslim populations. These patterns are driven by demographic transitions—declining population growth and narrowing partner age gaps—that amplify the impact of polygyny on male surplus. Our findings highlight the importance of accounting for marriage market dynamics in the design of policies related to demographic change, family formation, and social stability in low-income settings.

JEL-Codes: J11, J12, N37

Keywords: Africa; age gap; marriage market; marriage ratio; polygyny; population growth; sex ratio

July 2025

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1 Introduction

Bride abductions, the process by which young women are kidnapped and forcibly married, were vividly propelled into international news when the terror group Boko Haram kidnapped 276 girls from a school in Nigeria in 2014 (Kimeu and Adetayo, 2024). However, this has not been the only case of girls being abducted in Nigeria (Hudson and Matfess, 2017; Rexer, 2022) and local bride abduction traditions have also been reported in settings as diverse as Ethiopia (García-Hombrados and Novak, 2024), South Africa (Karimakwenda, 2020; Nkosi and Buthelezi, 2013; Rice, 2018), and Uganda (Achen et al., 2021). This practice has frequently been linked to unbalanced (squeezed) marriage markets, a situation in which it is impossible for all men who want to marry to find a partner due to structural constraints (den Boer et al., 2024).¹

Polygyny and bride price, two marriage institutions prevalent in many Sub-Saharan African (SSA) countries, represent such structural restrictions, creating an artificial shortage of marriageable women (García-Hombrados and Novak, 2024; Hudson and Matfess, 2017; Koos and Neupert-Wentz, 2020; Krieger and Renner, 2020; Rexer, 2022). Polygyny refers to the practice in which one man takes more than one wife, thereby depriving other men of potential brides. Bride price refers to the practice in which marriage is associated with a transfer of wealth from the groom to the bride's family. In SSA, bride prices can range from symbolic amounts to substantial transfers of wealth, depending on local customs and socioeconomic context (Anderson, 2007). Armed groups in SSA often use the allure of providing brides or bride price money to recruit young, unmarried men, notably in Nigeria (Hudson and Matfess, 2017; Rexer, 2022), and Sierra Leone (Mokuwa et al., 2011).

Beyond bride abductions, scholars argue that unbalanced marriage markets in SSA and elsewhere may contribute to broader societal instability. When women are in short supply, they gain greater bargaining power, leaving economically disadvantaged young men—those least likely to afford bride prices or secure partners—at a structural disadvantage. These men, often referred to as society's 'bare branches', are more prone to frustration, social exclusion,

¹We use the terms marriage market squeeze and marriage market imbalance interchangeably. The former is a standard term in the demographic literature, while the latter is more intuitive and descriptive of the phenomenon we study.

and violence (Hudson and den Boer, 2002, 2004; Hudson and Matfess, 2017; Rexer, 2022). Their marginalisation can reinforce local inequalities and make them especially susceptible to recruitment by armed groups offering promises of brides or bride price payments (Hudson and Matfess, 2017; Mokuwa et al., 2011; Rexer, 2022).

In societies without practices like polygyny or bride price, high adult sex ratios—where significantly more men than women exist within a given age group—are often cited as a more *natural* structural constraint on marriage markets. These demographic imbalances have been associated with rising crime rates across both developing (Bhalotra and Amaral, 2017; Cameron et al., 2017; Edlund et al., 2013; South et al., 2022) and developed countries (Baranov et al., 2023; Dancygier et al., 2022; Filser et al., 2021). In contrast, *artificial* constraints—such as polygyny and bride price—are socially constructed institutions that similarly limit access to marriage, particularly for socio-economically disadvantaged men. Despite their different origins, both types of constraints contribute to a common outcome: the exclusion of large groups of men from marriage, which research has linked to heightened social tension and conflict (Hudson and den Boer, 2002; Koos and Neupert-Wentz, 2020; Krieger and Renner, 2020; Renner and Krieger, 2023; Rexer, 2022). This parallel is captured in claims that polygyny functions as the “equivalent of a high sex ratio” (Hudson and den Boer, 2002, p. 25) and that high sex ratios, polygyny, and bride price all serve as marriage market obstructions (Hudson and Hodgson, 2022).

In this paper, we argue that both approaches to characterising the (im)balanced or squeezed nature of marriage markets have shortcomings. As discussed in past research (Neelakantan and Tertilt, 2008), adult sex ratios do not account for dynamic factors like population growth rates, partner age differences, and sex-specific mortality rates’ impact on marriage ratios, thereby likely underestimating the true marriage ratio. Simultaneously, characterising marriage markets by the prevalence of polygyny and bride prices alone often does not account for the intensity of polygyny, or its impact on the actual number of available marriageable women, given its place within the broader context of the marriage market. For example, the popular conception of polygyny is that one man having two wives implies that another man will go without any (Koos and Neupert-Wentz, 2020). However, this conception cannot account for near-universal

marriage among men in some polygynous societies (Edlund and Ku, 2011; Neelakantan and Tertilt, 2008).

Therefore, we revisit the dynamic marriage market model previously developed to address the shortcomings of using adult sex ratios as a static variable (Bhaskar, 2011, 2019; Neelakantan and Tertilt, 2008). We augment this model by considering the average number of wives per husband as a measure of polygyny intensity, and the effect that this factor has within the local marriage market context. We then empirically test both models using Demographic and Health Survey (DHS) data for 38 SSA countries from 1991 to 2023. This exercise provides a fuller description of the levels and trends of marriage markets across the continent, and the importance of each component. We calculate and discuss marriage ratios using the dynamic marriage market model and our augmented model and simulate the effects that predicted demographic changes are expected to have on marriage ratios across the continent. We also benchmark the marriage ratios from the dynamic and augmented model with adult sex ratios. Our final sample includes information on 1,001,423 women aged 25 and over, of which 933,301 have formed at least one union, spread across 38 SSA countries with at least one data wave. We use the geolocated nature of the DHS to calculate marriage ratios for 1,762 first administrative unit-year pairs.

We present several key findings. SSA has experienced notable demographic shifts in recent decades, including a slight decline in population growth, later average ages at marriage for both men and women, narrowing partner age gap, and a reduction in the average number of wives per husband. When abstracting from the intensity of polygyny and focusing solely on the underlying demographic dynamics, the marriage market appears structurally tilted in favour of men, with more women than men entering the marriage market. This advantage stems from historically high population growth and wide age gaps between partners, which have resulted in more women than men entering the marriage market at any given time. However, this male advantage has diminished over time: between 1991 and 1995, there were approximately 1.39 women entering the marriage market for every man, compared to 1.27 women per man between 2021 and 2023. This shift reflects the decline in both population growth and partner age gaps—trends not counterbalanced by other demographic factors in the marriage market.

Although multiple factors influence marriage market (im)balances, the intensity of polygyny—measured as the average number of wives per husband—emerges as the most important structural constraint squeezing the marriage market for men. It is the key factor that shifts the marriage market from being more to less favourable, with less women than men available to marry. Across the full sample, the adjusted marriage ratio (accounting for polygyny) increased from 0.785 women per man in 1991–1995 to 0.991 in 2021–2023, largely due to a decline in the average number of wives per husband. However, this decline has plateaued since the 2006–2010 period. These broader trends—including falling population growth, narrowing partner age gaps, and declining polygyny—are evident across most countries in the sample, although their levels vary considerably. Notably, in many West African countries, marriage markets remain heavily squeezed when polygyny is factored in.

In terms of benchmarking, we show that the adult sex ratio heavily underestimates the ratio to which women and men enter the marriage market, especially in societies with high population growth rates and larger partner age gaps. Adult sex ratios also remain fairly constant over time, thereby not reflecting the role of demographic changes in causing variations in marriage ratios. We also find that the dynamic marriage market ratio severely underestimates the ratio of women actually available to marry, given the prevailing intensity of polygyny.

Looking ahead, future demographic trends suggest a gradual shift in marriage market dynamics. If current declines in population growth rates and partner age differences continue, they are likely to exert steady downward pressure on the marriage ratio and squeeze the marriage market—even in the absence of changes in polygyny. While the market is still expected to remain somewhat favourable to men in the near term, this advantage may continue to narrow. With the intensity of polygyny having largely stalled, any further demographic changes could make the marriage market increasingly less favourable for men, particularly in rural areas, for Muslims, and certain intensely polygynous ethnic groups. To help maintain relative balance in the number of women and men available to marry—especially in countries where polygyny remains common—a continued, albeit gradual, decline in the average number of wives per husband may be necessary.

We make key contributions to the body of research on marriage market imbalances. We build on and empirically test the dynamic marriage market model, developed and used by Neelakantan and Tertilt (2008), Bhaskar (2011), and Bhaskar (2019) by more explicitly considering the intensity of polygyny. We decompose the dynamic marriage market model into its core components and assess the contribution of each component to the overall marriage ratio. This provides an updated and nuanced understanding of the state of marriage markets both across and within SSA countries, the exact factors driving contemporary marriage market dynamics, and how these factors might influence the future marriage market. By calculating marriage ratios at the first level of administration, we also illustrate the heterogeneity of local marriage markets. We explore heterogeneity further by calculating marriage ratios separately for religious and ethnic groups.²

We further provide updated information on changes in demographic factors relevant to marriage markets across the continent, thereby contributing to the nascent literature on this topic. Past research has sought to provide a description of individual elements of marriage markets across SSA, particularly polygyny (Chae and Agadjanian, 2022; Fenske, 2015; Tabutin and Schoumaker, 2020; Whitehouse, 2018), age at first union formation (Bongaarts et al., 2017; Hertrich, 2017; Koski et al., 2017; Shapiro and Gebreselassie, 2014; Tabutin and Schoumaker, 2020), partner age difference (Batyra et al., 2021; Tabutin and Schoumaker, 2020), and bride price (Anderson, 2007; Corno et al., 2020). In addition to contributing to this literature by providing updated information, we draw all individual elements together to provide a holistic view of the evolution of the marriage market across the continent, capturing how these individual elements interact with each other to determine the overall marriage ratio.

Characterising marriage market imbalances in SSA is crucial, given the role such imbalances have played—both implicitly and explicitly—in conflict dynamics across the continent. Existing research has linked marriage-related pressures to various forms of violence: young men from polygynous communities have been shown to raid their monogamous neighbours (Koos

²This is not the primary focus of our study. We only illustratively discuss religious and ethnic dynamics and abstract from inter-ethnic and inter-religious marriages. This is partly due to data constraints (discussed in Section 4.2) and partly because a more in-depth analysis of these dynamics is beyond the scope of the present paper and is left for future research. For a recent in-depth overview of this topic, we refer readers to Crespin-Boucaud (2020) and Bandyopadhyay and Green (2021).

and Neupert-Wentz, 2020); polygyny and high bride prices have been associated with rebel recruitment in Nigeria (Hudson and Matfess, 2017; Rexer, 2022) and with violent cattle raids in South Sudan (Hudson and Matfess, 2017; Pospisil et al., 2024). Mokuwa et al. (2011) argue that grievances related to local marriage markets contributed to Sierra Leone’s civil war and facilitated rebel recruitment. More broadly, Renner and Krieger (2023) find a correlation between local levels of polygyny and increased rates of conflict and social instability across the continent. Our study contributes to this body of work by systematically characterising marriage markets—a potentially important but often insufficiently analysed factor in understanding local conflict dynamics in this conflict-prone region.

The remainder of our study is structured as follows: We introduce the dynamic and augmented marriage market models in Section 2. In Section 3, we discuss previously-researched changes in marriage market characteristics in light of these models, and provide updated trends. In Sections 4, we present our methodology and data sources. We present the main results in Section 5, with heterogeneous results discussed in Section 6. Section 7 concludes.

2 Conceptual Framework

In this section, we discuss and extend the dynamic marriage market model. We begin by outlining the framework developed by Neelakantan and Tertilt (2008) and Bhaskar (2019), which represents a significant advancement over the earlier, widely used static marriage market model. The static model typically focuses on the sex ratio within a given age group (Baranov et al., 2023; Dancygier et al., 2022; Edlund et al., 2013; Filser et al., 2021; La Mattina, 2017; Schacht et al., 2016; South et al., 2022). In this model, the marriage market is balanced when the same number of men and women are willing to marry (in the marriage market), and each adult finds a partner.

Let the ratio,

$$\frac{W_t^k}{M_t^k} = 1 \tag{1}$$

represent a balanced marriage market, where W_t^k and M_t^k denote the number of women and men born in period t who marry at age k , respectively. Deviations from this ratio—typically values less than one, indicating more men than women in the marriage market—signal an imbalanced marriage market, or a ‘squeezed’ marriage market for men.

Most empirical studies abstract from differences in the actual ages at which men and women marry, often assuming a common age k and birth cohort t for both sexes (e.g., Cameron et al., 2017; Edlund et al., 2013; Filser et al., 2021; Schacht et al., 2016; South et al., 2022). However, this simplification overlooks important demographic dynamics. In reality, the timing of the marriage and the age differences between the spouses significantly affect the observed marriage ratio. As shown by Neelakantan and Tertilt (2008) and Bhaskar (2019), these dynamics interact with factors such as population growth and sex-specific mortality rates.

Men tend to marry women younger than themselves. In growing populations, this age gap allows older men to draw from larger cohorts of younger women for potential partners. Furthermore, because men typically marry later and have higher mortality rates, fewer of them survive to marriageable age k , even in cohorts where men initially outnumber women. These combined effects skew the marriage market in favour of men, meaning that metrics like the adult sex ratio or sex ratio at birth can substantially underestimate the *effective* marriage ratio.

Consider a country where the adult sex ratio is calculated for individuals aged 15–45, men marry at an average age of 25, and the typical age gap between spouses is about seven years. This broad age range includes many young men under 25 who have not yet reached the average marriage age. These individuals are often counted as ‘excess men’, even though not all of them will survive to age 25. As a result, the apparent surplus of men is overstated based on the entire age group of 15 to 45 years. Moreover, these men tend to marry women who are, on average, seven years younger—women who have not yet entered the 15–45 age cohort for men younger than 22. Consequently, the relevant pool of potential female partners is not fully captured by looking only at the current adult sex ratio.

In a context of population growth, this discrepancy becomes even more pronounced. A growing population means that younger female cohorts are larger, so by the time these men reach

marriageable age, a larger cohort of eligible women will be available. Therefore, relying solely on the current adult sex ratio (ages 15–45) misrepresents the actual marriage market conditions faced by men at age 25.

These considerations were formalised by Neelakantan and Tertilt (2008)³ in the form of a dynamic marriage market ratio (DMR), which accounts for age gaps, population growth, and mortality differences:

$$\frac{W_{t+g_t}^{k_t-g_t}}{M_t^{k_t}} = \frac{W_t^0}{M_t^0} (1 + \gamma_t)^{g_t} \left(\frac{(1 - \pi_{iwt})(1 - \pi_{awt})^{k_t-g_t-5}}{(1 - \pi_{imt})(1 - \pi_{amt})^{k_t-5}} \right) \quad (2)$$

The left-hand side represents the DMR—the ratio in which men and women enter the marriage market. Specifically, $W_{t+g_t}^{k_t-g_t}$ denotes the number of women born in year $t + g_t$ who marry at age $k_t - g_t$, where g_t is the average age gap between spouses. $M_t^{k_t}$ represents the number of men born in year t who marry at age k_t .

The right-hand side decomposes this ratio into several demographic components: the initial sex ratio at birth $\frac{W_t^0}{M_t^0}$, the effect of population growth at rate γ_t , and sex-specific mortality adjustments—where π_{iwt} and π_{mwt} represent infant mortality for women and men, and π_{awt} and π_{amt} represent annual adult mortality rates.

A DMR value above one indicates that there are more women than men entering the marriage market, while a value below one reflects the entry of more men than women. The lower the DMR, the more ‘squeezed’ the marriage market for men. This framework captures how dynamic demographic factors shape the marriage market more accurately than static sex ratios alone.

Each term on the right-hand side of the DMR reflects a specific demographic mechanism:

1. Sex ratio at birth $\left(\frac{W_t^0}{M_t^0}\right)$: the initial proportion of females to males in the birth cohort.
2. Cohort size effect $(1 + \gamma_t)^{g_t}$: adjusts for population growth, where γ_t is the annual growth rate and g_t is the average spousal age gap in a given year. With a positive g_t , men draw from younger, and thus larger, female cohorts in growing populations.

³While not the central premise of the study, Bhaskar (2019) uses a version of this equation to calculate the number of excess men across SSA for the 1955–2005 birth cohorts.

3. Under-five mortality adjustment $\left(\frac{1-\pi_{iwt}}{1-\pi_{imt}}\right)$: accounts for sex-specific survival rates from birth to age five.
4. Adult mortality adjustment $\left(\frac{(1-\pi_{aw})^{k_t-g_t-5}}{(1-\pi_{am})^{k_t-5}}\right)$: captures the yearly survival probabilities from age five to marriage, incorporating differences in male and female mortality rates and marriage timing.

Together, these components show how demographic dynamics—particularly age gaps, mortality, and population growth—systematically shape the effective pool of potential partners. Because men typically marry later ($k_t > (k_t - g_t)$ for a positive partner age gap g_t) and face higher mortality rates, larger age gaps and later male marriage ages tend to increase the DMR, suggesting a relative abundance of women in the marriage market.

We extend the dynamic marriage market model to explicitly account for the intensity of polygyny—an original contribution of this study and a particularly relevant refinement in the SSA context, where polygyny remains a widespread marital practice (Dalton and Leung, 2014; Fenske, 2015). The intensity of polygyny is defined as the average number of wives per husband. While a DMR greater than one indicates that more women than men enter the marriage market, the presence and intensity of polygyny may still reduce the effective marriage ratio (EMR)—that is, the number of women available to marry each man—below one (more men than women available to marry). This occurs because polygyny allows some men to marry multiple women, effectively removing these ‘additional’ women from the general pool of potential spouses. Thus, some women newly entering the marriage market will not be paired up with single men newly entering the market, but rather with already married men.

To account for this, we adjust Equation (2) by subtracting the number of surplus wives per married man at age k_t , resulting in:

$$\frac{W_{t+g_t}^{k_t-g_t}}{M_t^{k_t}} = \frac{W_t^0}{M_t^0} (1 + \gamma_t)^{g_t} \left(\frac{(1 - \pi_{iwt})(1 - \pi_{awt})^{k_t-g_t-5}}{(1 - \pi_{imt})(1 - \pi_{amt})^{k_t-5}} \right) - (S_m^{k_t} - 1) \quad (3)$$

Here, $S_m^{k_t}$ denotes the average number of wives per husband at the time men reach the average age of marriage k_t . This equation gives the ratio of women *available* to marry for single men

newly entering the marriage market. Again, lower EMRs represent a more squeezed marriage market for single men.

For example, a DMR of 1.2 implies that, after accounting for the sex ratio at birth, population growth, marriage timing, partner age gaps, and sex-specific mortality, 1.2 women enter the marriage market for every man. However, if the average number of wives per husband is 1.25, then the EMR—using Equation (3)—would be:

$$1.2 - (1.25 - 1) = 0.95,$$

indicating that for every single man reaching the marriage market at age k_t , only 0.95 women are effectively available to marry.

3 Background: Demographic Trends

In this section, we examine SSA’s demographic trends influencing the DMR and EMR components, as defined in Eqs. (2) and (3). The region is marked by high population growth, early female union formation, large spousal age gaps, and a high prevalence of polygyny (Hertrich, 2017). While these characteristics have historically shaped the structure of SSA marriage markets, they have also undergone significant shifts in recent decades. Despite growing attention to individual demographic trends, their combined implications for marriage market imbalances remain underexplored. The following review summarizes the key demographic dynamics most relevant to the models introduced in the previous section.

3.1 Population Growth

One trend impacting the DMR and the EMR—via γ_t —is the changing pace of population growth. SSA has historically exhibited some of the highest population growth rates in the world, largely due to persistently high fertility rates. As of 2023, SSA’s average annual population growth rate stood at approximately 2.5%, significantly higher than the global average of 0.9%, and more than double that of other low- and middle-income countries (LMICs) outside Africa, which averaged around 1.1% (UN DESA, 2024; World Bank, 2024).

While SSA's demographic transition—the shift from higher to lower fertility and mortality—has proceeded slower than in other world regions, recent data suggest that the pace of fertility decline is accelerating in many countries. Some studies argue that this fertility decline is now occurring faster in SSA than historically in other LMICs (Bongaarts, 2017; Grimm et al., 2022; Tabutin and Schoumaker, 2020). Nevertheless, pockets of high and stagnant fertility remain, especially in countries with limited urbanisation and lower levels of female education (Bongaarts, 2017; Tabutin and Schoumaker, 2020).

The gradual decline in fertility has contributed to a slight slowdown in population growth, which we observe in our sample of 38 SSA countries. Figure 1 illustrates this trend: the average population growth rate decreased from 2.7% annually in 1991–1995 to 2.3% in 2021–2023. This confirms previous research suggesting that SSA is undergoing a gradual but definitive population growth decline.

The implications of this trend for marriage market dynamics are significant. Bhaskar (2019) highlights how the previous high population growth contributed to a surplus of women in the marriage market, which may help explain the persistence of polygyny in many SSA societies. However, as growth rates decline, this surplus is expected to diminish. In turn, older men may increasingly struggle to rely on the demographic bulge of younger women, placing new constraints on traditional marriage patterns and likely causing a squeeze in both the DMR and EMR.

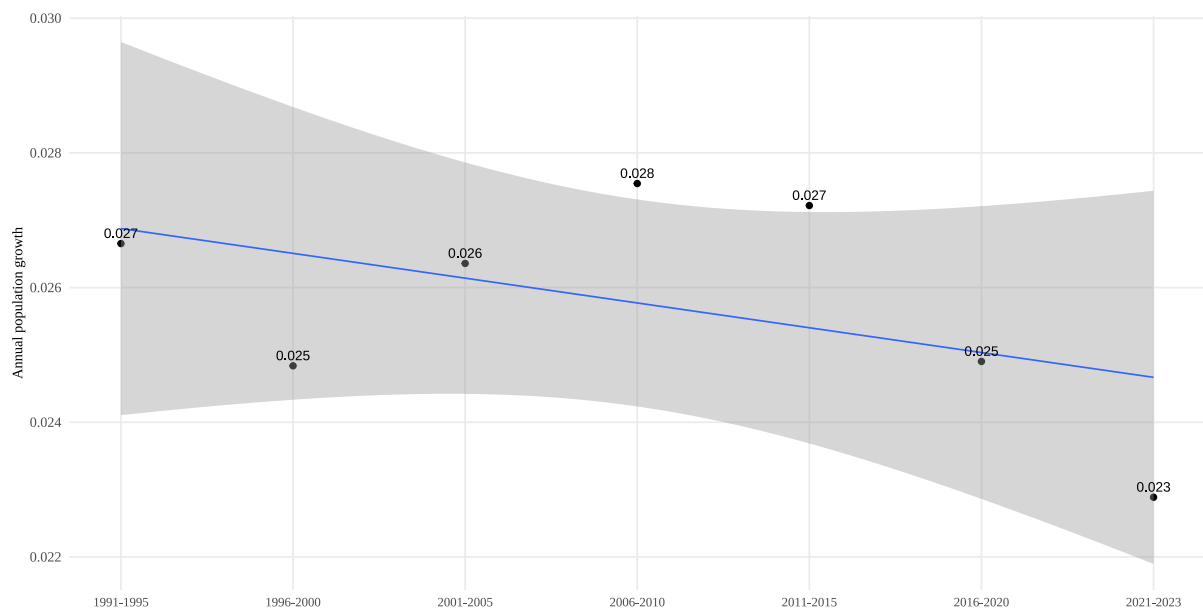


FIGURE 1: Population growth rate over time
 Note: The grey area represents 95% confidence intervals.
 Source: Own calculations using data from WDI.

3.2 Sex Ratio at Birth

Another demographic factor affecting the DMR and the EMR is the sex ratio at birth. This ratio summarises the number of male and female births, which forms the baseline of the size and composition of future marriage cohorts. In nearly all human populations, the sex ratio at birth is biologically skewed in favour of boys, with typically around 1.05 male births for every female birth (Bongaarts and Guilмото, 2015; Chao et al., 2019).

SSA, however, consistently records the lowest sex ratio at birth of any major world region. On average, SSA registers around 1.03 male births per female, compared to 1.05–1.07 in other world regions (Anderson and Ray, 2010; Bongaarts, 2013; Bongaarts and Guilмото, 2015; Chao et al., 2019; Kaba, 2015). Importantly, this ratio has remained remarkably stable over time and has not exhibited the distortions observed in parts of Asia, where sex-selective abortion has significantly altered the natural balance (Chao et al., 2019).

The sex ratio at birth can be influenced by various factors, including improvements in maternal nutrition and health and, in some cases, cultural practices such as sex-selective abortion (Anderson and Ray, 2010; Morse and Luke, 2021). While some countries in SSA—particularly in West Africa—exhibit a degree of son preference, there is currently no evidence of widespread

sex-selective abortion in the region (Anderson and Ray, 2010; Bongaarts, 2013; Bongaarts and Guilмото, 2015). This absence has been attributed to several factors: strong pronatalist norms, limited access to ultrasound and abortion technologies, and persistently high fertility rates that reduce pressure to influence the sex composition of births (Bongaarts, 2013; Flatø, 2018).

Nonetheless, Bongaarts (2013) cautions that as fertility rates continue to decline, the underlying son preference could become more pressing. If coupled with expanding access to prenatal sex-detection technologies, SSA could eventually experience the emergence of sex-selective practices, as seen elsewhere.

Figure 2 presents trends in the sex ratio at birth in our sample of 38 SSA countries. We code the sex ratio at birth as the number of female births per male birth—the inverse of the conventional measure—to align with our DMR and EMR framework. The ratio is relatively stable, with a slight downward trend in some countries. At present, this implies a largely neutral and steady effect on the DMR and EMR. Absent major changes in sex-selective behaviour or biology, we do not expect substantial deviations from this pattern in the near term.

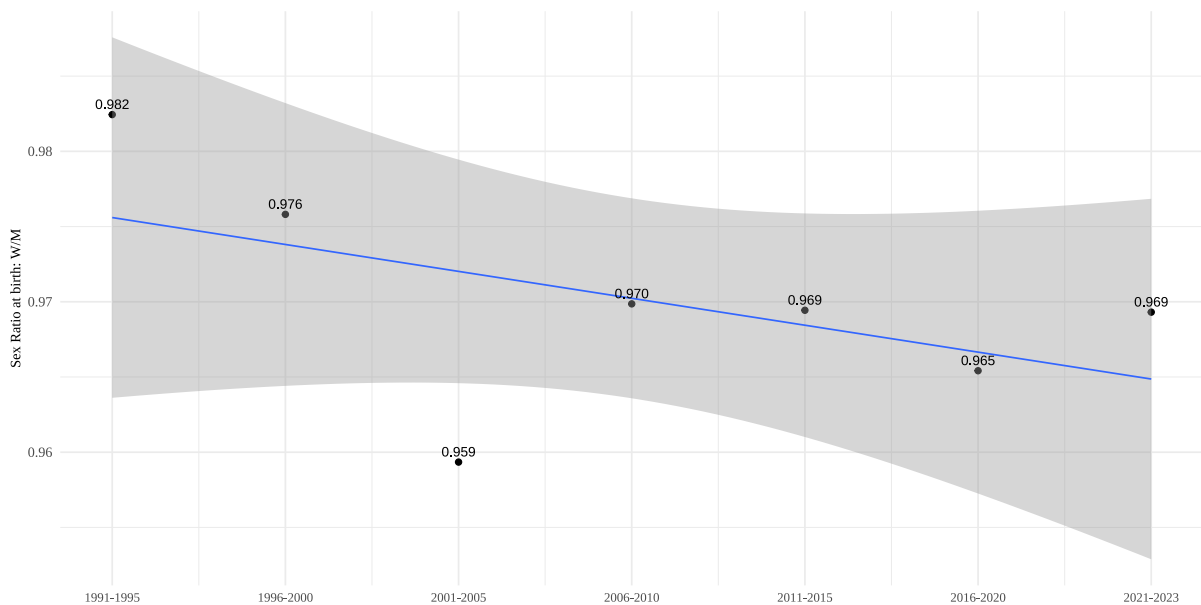


FIGURE 2: Sex ratio at birth (W/M) over time
 Note: The grey area represents 95% confidence intervals.
 Source: Own calculations using data from DHS.

3.3 Age at First Union

The age at which individuals form their first union—whether through formal marriage or informal cohabitation—is another important demographic factor influencing the DMR and the EMR. Differences in union timing between men and women affect the alignment of male and female cohorts in the marriage market, thereby shaping the overall demographic structure of union formation.

In SSA, women enter unions at younger ages than men. Historically, the median age at first union for women has been below 20, while for men it has been considerably higher, typically in the mid to late twenties (Bongaarts et al., 2017; Tabutin and Schoumaker, 2020). These gendered age gaps have contributed to a marriage market dynamic where older men often partner with younger women.

Recent research documents a trend toward delayed union formation, particularly among women. Shapiro and Gebreselassie (2014), using DHS data from 1986 to 2011, report a decrease in the proportion of women aged 15–19 and 20–24 in a union. Hertrich (2017), drawing on all available censuses and surveys conducted since 1950, finds a consistent rise in the median age at first marriage across SSA. Similarly, Bongaarts et al. (2017) and Tabutin and Schoumaker (2020) observe an increase in women’s age at first union formation between approximately 1993 and 2010. More recently, Grant and Kohler (2022) show that this upward trend continued to 2015–2019.

Figure 3 confirms these findings in our sample of 38 SSA countries. The average age at first union increased from 17.3 to 19.7 years for women, and from 26.5 to 27.6 years for men. Aside from its implications for the parameter k_t , which captures exposure time in the marriage market, this trend has differing effects on men and women. Women’s rising age at first union may reduce the number of women surviving to enter the marriage market, increasing competition and potentially lowering the DMR and EMR. In contrast, delayed union formation among men reduces immediate pressure on the male marriage cohort, potentially offsetting some of the demographic strain.

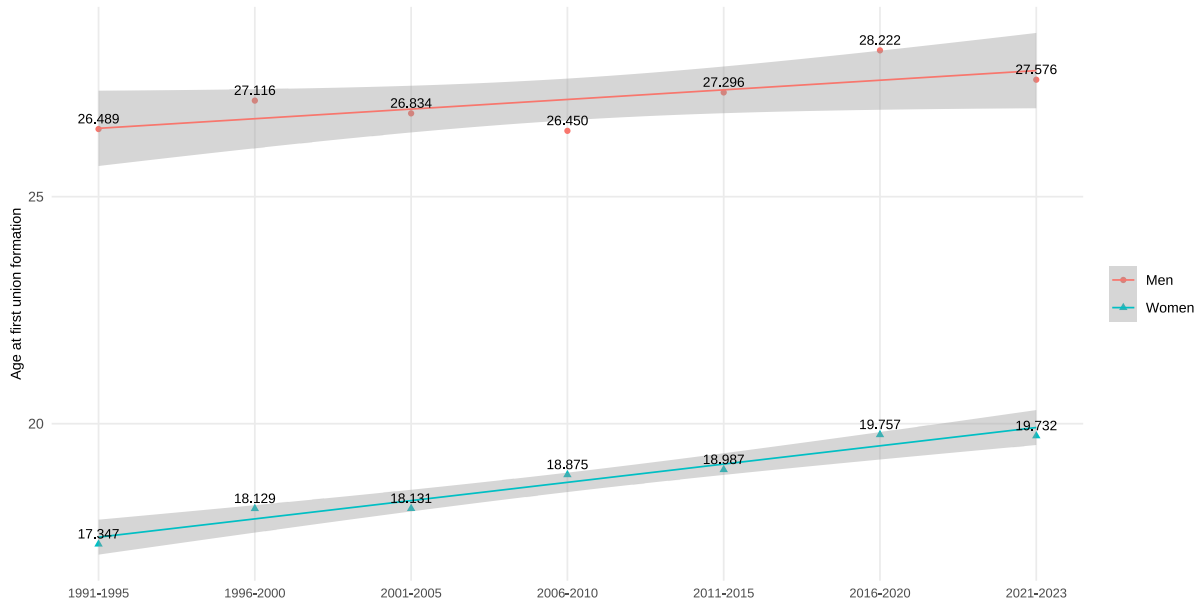


FIGURE 3: Age at first union over time
 Note: The grey area represents 95% confidence intervals.
 Source: Own calculations using data from DHS.

3.4 Partner Age Difference

Changes in the age difference between men and women at the time of first union formation influence the structure of marriage markets by affecting the overlap of male and female cohorts—entering our model via the parameter g_t —and thereby impacting both the DMR and EMR. Wider age gaps allow older men to draw on younger, more populous female cohorts, while narrower gaps constrain this dynamic by limiting the potential for intercohort pairings.

Existing research on trends in partner age gaps in SSA presents mixed findings. Hertrich (2017) and Batyra et al. (2021), using DHS data, argue that although both men and women are forming unions later in life, the increase in women’s age at first union has outpaced that of men. This asymmetry has resulted in a gradual narrowing of the partner age gap. In contrast, Tabutin and Schoumaker (2020) find that union formation ages have increased at similar rates for both sexes, resulting in a stable partner age gap since the early 2000s. Supporting this perspective, Whitehouse (2017) report no significant changes in partner age gaps in the city of Bamako, Mali.

Our own data align more closely with the first view. Although Figure 3 suggests a parallel upward shift in the age at first union for both sexes, Figure 4 shows a clear decline in the

average partner age gap—from nine years in 1991–1995 to 7.6 years in 2021–2023.

This narrowing of the partner age gap may squeeze the marriage market for men. As older men are less able to rely on substantially younger female cohorts, the compression reduces the effective pool of potential partners. This change is expected to contribute to a reduction in the eventual DMR and EMR, particularly among older or lower-status men.

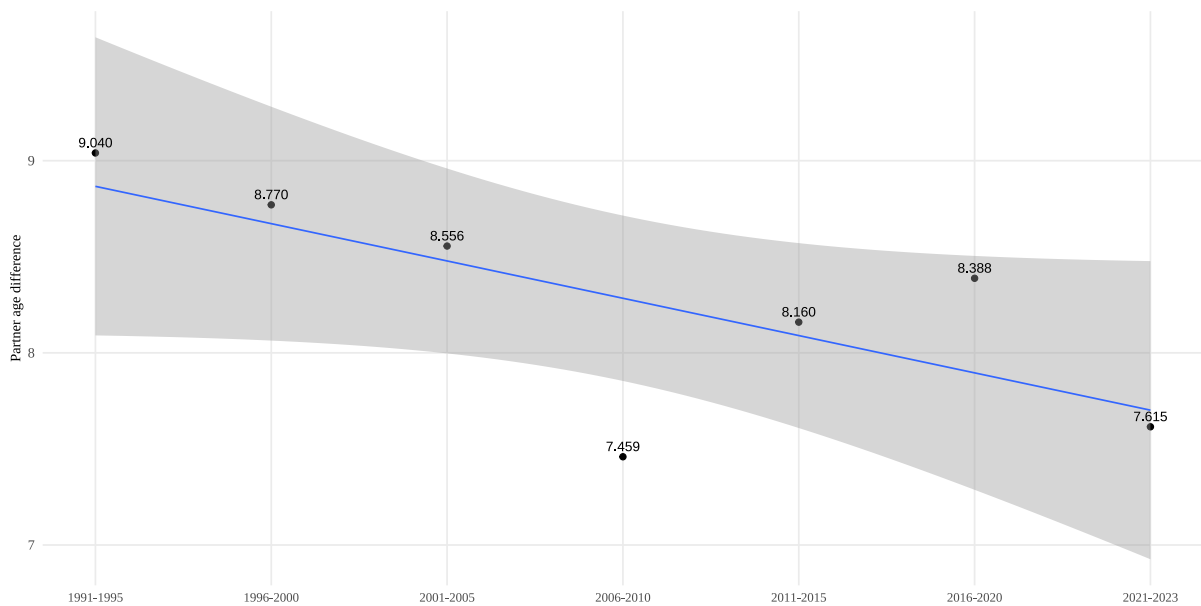


FIGURE 4: Partner age difference over time

Note: The grey area represents 95% confidence intervals.

Source: Own calculations using data from DHS.

3.5 Mortality Rates

Another demographic trend influencing the structure of the marriage market is the overall decline in mortality across SSA, particularly in childhood. It affects the DMR and EMR through its effect on cohort survival—specifically, the proportion of each birth cohort that survives to marriageable age.

In general, male mortality rates are higher than female mortality rates across all age groups, leading to fewer men than women surviving into adulthood and entering the marriage market (Bongaarts and Guilmoto, 2015; Tabutin et al., 2017). The sex gap in mortality begins early: boys face higher under-five mortality rates than girls throughout SSA (Alkema et al., 2014; Boco, 2015; Malderen et al., 2019). This disparity has slightly widened over time. From the 1990s to the 2010s, the male disadvantage in child mortality has increased modestly, meaning

that a growing number of boys die relative to girls before reaching age five (Alkema et al., 2014; Tabutin and Schoumaker, 2020).

Adult mortality has declined steadily for both men and women over the past three decades. These declines have occurred at roughly the same pace, resulting in little change in the sex gap in adult mortality rates (Anderson and Ray, 2010; Tabutin et al., 2017; Tabutin and Schoumaker, 2020).

Figure 5 supports these findings. Panels A and B show that men face consistently higher mortality than women, both in early childhood and in adulthood. However, mortality rates for both sexes have fallen substantially over time, and the gap between male and female mortality has remained largely stable.

While declining mortality is an important development in its own right, its impact on the marriage market is expected to be limited. Because improvements in survival have affected both sexes in parallel, the relative balance of men and women reaching marriageable age has changed only marginally, resulting in a minimal net effect on DMR and EMR.

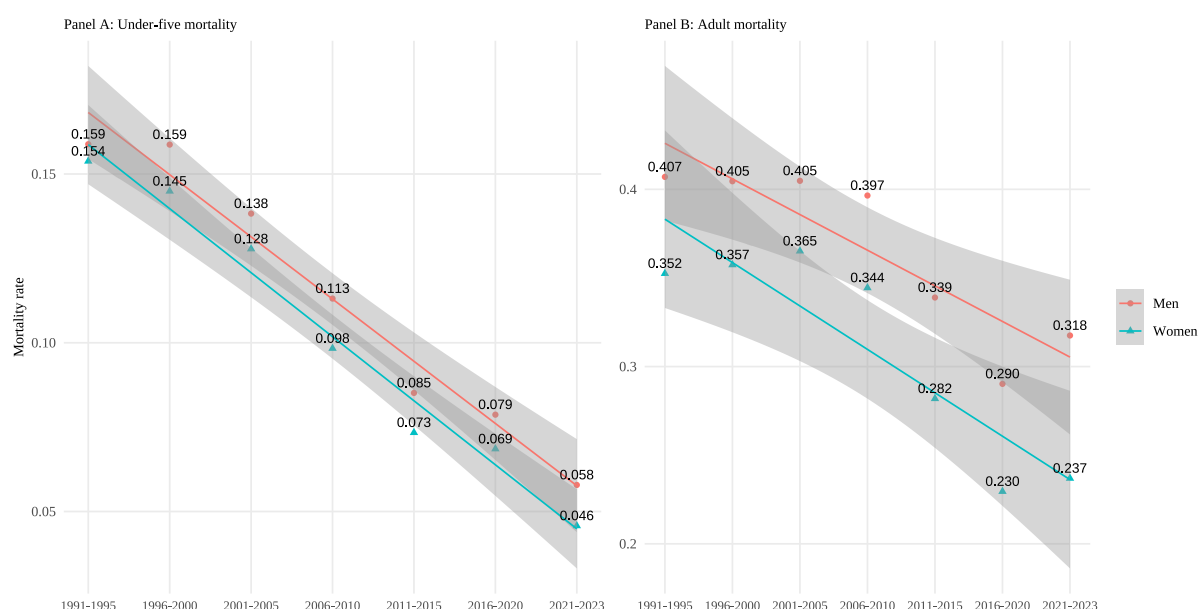


FIGURE 5: Mortality rates over time

Note: The grey area represents 95% confidence intervals.

Source: Own calculations using data from DHS and WDI.

3.6 Polygyny

Although polygyny is not explicitly accounted for in the DMR, it plays an important role in shaping the EMR by influencing the distribution of women across unions. In polygynous systems, multiple women are removed from the marriage pool for each man who marries, reducing the number of available female partners and increasing competition among remaining single men.

Over recent decades, the prevalence of polygyny in SSA has declined. Using DHS data, Fenske (2015) documents a nearly universal reduction in the probability that women aged 30 are in polygynous marriages. Tabutin and Schoumaker (2020) report a similar, though more modest, downward trend in the proportion of women in polygynous unions. More recently, Chae and Agadjanian (2022) estimate an average annual decline of 2% in polygyny rates, with slower declines among rural populations, Muslim women, women with lower levels of education, and previously married women. As noted in several studies, the decline has been faster in urban than in rural areas, with increases in polygyny observed in some rural contexts (Tabutin and Schoumaker, 2020; Whitehouse, 2018).

Despite these declines, polygyny remains more persistent than expected. Dalton and Leung (2014) notes its enduring popularity even in the face of economic and social change, and Fenske (2015) finds that higher levels of modern education have not significantly reduced the prevalence of polygynous practices.

Our findings are consistent with this broader literature. Figure 6 shows a decline in the average number of wives per husband across our sample of SSA countries. While the overall trend appears linear, two distinct phases can be observed. Between 1991–1995 and 2006–2010, the polygyny rate dropped sharply—from 1.541 to 1.346 wives per husband. Since then, the decline has slowed, with the average reaching 1.290 in 2021–2023.

This reduction in polygyny rates is expected to lessen pressure in the marriage market by ensuring that fewer women are concentrated in marriages with already-partnered men. However, as the rate of decline has slowed in recent years, this alleviating effect on the EMR has become

less pronounced.

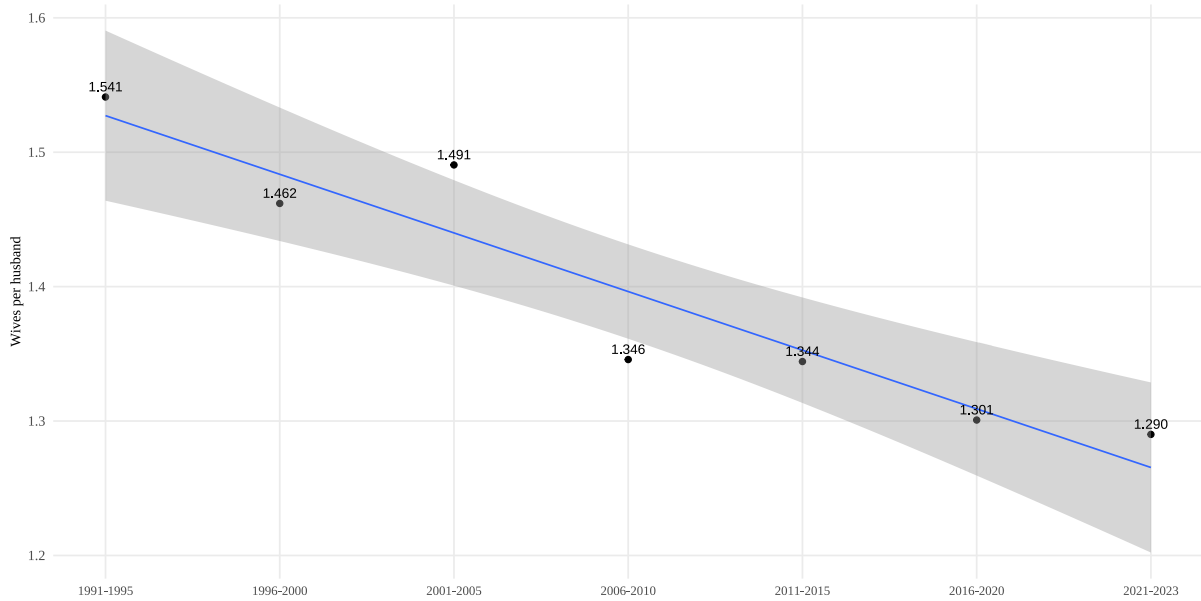


FIGURE 6: Number of wives per husband over time
Note: The grey area represents 95% confidence intervals.
Source: Own calculations using data from DHS.

4 Empirical Analysis and Data

In this section, we outline our empirical approach in more detail, focusing on the assessment of marriage market squeezes across SSA. In the following subsections, we describe the key steps undertaken in this analysis, including model calibration, estimation procedures and data sources.

4.1 Empirical Approach

Calculating the DMR and EMR

We begin by calculating the DMR and the EMR, as defined in Eqs. (2) and (3), respectively. These measures are constructed as a demographic accounting exercise and are calculated at the subnational level (first administrative division), before being aggregated to the national level.

For each country in the sample, we solve Eqs. (2) and (3) using the data sources described in Section 4.2. This allows us to characterise the extent of marriage market imbalances within and

across countries, and to examine how these imbalances have evolved over time.

Decomposition

Following the calculation of the DMR and EMR, we assess the key demographic factors driving changes in these ratios through a series of decomposition exercises. The first is a raw decomposition, in which we isolate the contribution of each component—four for the DMR and five for the EMR—by solving for each component individually. This exercise provides a direct estimate of the number of women effectively ‘added’ or ‘subtracted’ from the marriage market by each factor. We perform this analysis both at the continental level and for each country in our sample.

In a second step, we conduct a log-linear decomposition of the DMR to quantify the percentage-wise contribution of each component to changes in the overall ratio. This approach enables us to assess the relative importance of each demographic factor in driving trends in marriage market imbalances over time.

Benchmarking

As a next step, we examine the extent to which adult sex ratios misrepresent the balance of men and women in the marriage market. In Section 2, we argue that adult sex ratios likely underestimate the number of women relative to men compared to more nuanced measures such as the DMR. We test this empirically by calculating and comparing the DMR, EMR, and adult sex ratios for a selection of countries in SSA. The selection of countries is determined by data availability, discussed in Section 4.2. We also compare trends over time for the marriage and adult sex ratios.

Simulation

Finally, we simulate the potential effects of future demographic changes on marriage market dynamics by projecting their impact on the DMR and EMR. To do so, we conduct a set of forward-looking simulation exercises that isolate the effect of individual demographic shifts. These simulations are implemented by holding all components in Eqs. (2) and (3) constant, while varying only the parameter expected to change due to ongoing demographic trends.

Specifically, we simulate the effects of a continued slowdown in population growth, a linear

extrapolation of the observed compression in partner age gaps, an increase in the sex ratio at birth to levels more typical of global norms, and a scenario in which female mortality declines more rapidly than male mortality. These counterfactuals allow us to assess how plausible demographic trajectories may shape future marriage market squeezes across SSA.

4.2 Data

Our empirical analysis draws on three main data sources: the DHS, the WDI, and the Integrated Public Use Microdata Series (IPUMS). We briefly describe each data source and the construction of our analysis dataset, and we provide summary statistics for the key variables used in the empirical analysis.

Demographic and Health Surveys

Our study's main data source is the DHS, a nationally representative survey programme conducted in LMICs since the mid-1980s. The DHS primarily collects data on maternal and child health, fertility, and family planning. Surveys are typically implemented in five-year intervals and target women aged 15–49, with data provided in the form of Individual Recode files.

This study includes all DHS surveys conducted in SSA from 1991 to 2023. Countries are grouped into five-year intervals, ranging from 1991–1995 to 2021–2023.⁴ We pool marriages and cohabitation—defined as living together with a man 'as if married' (Wang et al., 2017)—into 'unions' and use this term throughout.

To capture subnational variation—often hidden in national-level aggregates—we restrict our analysis to DHS waves that can be disaggregated to the first administrative level. This includes geocoded surveys or those containing region identifiers (e.g., variable `v024`) that can be linked to first administrative units.⁵ The DMR, EMR, and all relevant components are calculated at the first administrative level and aggregated to the national level. For the sex ratio at birth, we aggregate all male and female births at the first administrative level and compute the ratio from these totals.

⁴Surveys conducted prior to 1991 are excluded because they do not consistently include information on partners' ages, which is necessary to compute partner age gaps and male age at first union.

⁵Variable `v024` indicates the region in which the survey was conducted and allows mapping to first administrative boundaries.

To avoid right-censoring in union formation, we restrict the sample to women aged 25 and older, the age at which marriage or union formation is nearly universal.⁶ Data on women’s age at first union, their partner’s age, men’s age at first union, and number of wives are sourced from the Individual and Couples Recode files, where available.

Women currently or previously in a union report the age at which they formed their first union and whether their partner has other wives. In most Individual Recode files, women are asked their partner’s age; where this is missing, partner age is retrieved from the linked Couples Recode.⁷ The partner age gap is calculated as the partner’s age minus the woman’s age. Men’s age at first union is approximated by adding the partner age gap to the woman’s reported age at first union, under the assumption that the current partner is the man’s first partner. To improve accuracy, this calculation is restricted to women reporting that they are in their first union. Outliers in age at first union and age gaps are winsorised at the 99th percentile. All individual-level estimates are weighted using DHS sampling weights.

Data on under-five mortality and the sex ratio at birth are drawn from the Birth Recode files, which contain complete birth histories for each woman. Under-five mortality rates for boys and girls are calculated using the direct synthetic cohort life table method developed by the DHS Program (Croft et al., 2023).⁸ Under-five mortality is expressed as the number of deaths per 1,000 live births within the five years preceding the survey. This mortality rate is converted to a survival rate by subtracting it from one. For example, an under-five mortality rate of 200 per 1,000 yields a survival rate of $1 - \frac{200}{1,000} = 0.8$. The sex ratio at birth is calculated as the number of girls born divided by the number of boys born—i.e., the inverse of the conventional ratio.

World Development Indicators

Population growth rates and adult mortality rates, which are not available in DHS data, are obtained from the World Bank’s WDI (World Bank, 2025). These indicators are available an-

⁶In our sample, only 6.8% of women aged 25 and over have never formed a union.

⁷Women were not asked the religion or ethnicity of their partner in the Individual Recode files, although this information is available from Couple Recodes. As Couple Recodes are only available for certain years and waves (and are only available for a subset of women present in the Individual Recodes), relying on these datasets severely limits our sample size. These variables (particularly ethnicity) are often inconsistently coded between countries and survey waves, an issue also noted by Bandyopadhyay and Green (2021).

⁸This method is implemented in Stata using the `syncmrates` package (Masset, 2016).

nually for all countries in the sample between 1991 and 2023. Adult mortality is reported as the number of deaths between the ages of 15 and 60 per 1,000 individuals. To convert this into a yearly survival rate (used as π_{awt} and π_{amt} in Eqs. (2) and (3)), we subtract the annualised mortality rate from one. For instance, an adult mortality rate of 200 per 1,000 yields a yearly survival rate of $1 - \left(\frac{200}{1,000} \div (60 - 15) \right) = 0.996$. National values are applied uniformly across all first administrative units within each country. We also use the WDI to obtain adult sex ratios for 15-64 year olds for all countries in our sample, which we use in our benchmarking exercise.

Integrated Public Use Microdata Series (IPUMS)

For our benchmarking analysis, we use 10% census subsamples from IPUMS (Ruggles et al., 2025). We include countries for which a census and DHS survey were conducted in the same year or within one year of each other. These data allow us to compute adult sex ratios by age group and compare them directly to the DMR and EMR.

Sample Descriptive Statistics

Our final dataset includes information on 1,001,423 women aged 25 and over, of whom 933,301 have ever formed a union. These women are aggregated into an unbalanced panel of 1,839 first administrative unit-year observations, covering 38 countries from 1991 to 2023. The DMR and EMR could be calculated for 1,762 and 1,703 of these observations, respectively. These are aggregated into 132 country–five-year-window observations.

To prevent countries with more administrative units from being overrepresented, each unit is assigned a weight such that each country–five-year window carries a total weight of one.⁹ Descriptive statistics for the first administrative unit-year panel used in the DMR calculation are presented in Table 1, and the full list of included countries and years is shown in Table A1.

⁹We employ this weighting system instead of population weights for two reasons. Firstly, first administrative unit population numbers are only reported in infrequent censuses. Secondly, population weights will give significantly more weight to urban administrative units.

TABLE 1: First administrative unit-year descriptive statistics

	Mean	SD	Min	Max	N
Annual population growth rate	0.026	0.008	-0.007	0.050	1,762
Partner age difference	8.274	2.784	1.242	17.813	1,762
Age at first union: Women	18.699	1.886	13.650	26.227	1,762
Age at first union: Men	27.132	2.462	20.886	36.784	1,762
Under five female survival rate	0.898	0.061	0.599	0.998	1,762
Under five male survival rate	0.886	0.060	0.624	0.997	1,762
Yearly adult female survival rate	0.993	0.002	0.986	0.997	1,762
Yearly adult male survival rate	0.992	0.002	0.984	0.995	1,762
Sex ratio at birth: W/M	0.969	0.060	0.633	1.355	1,762
Wives per husband	1.398	0.286	1.000	2.794	1,703
Observations per admin one-year	767	763	12	6,552	1,762

Source: Own calculations using data from DHS and WDI.

5 Results

This section presents our main results. We begin by describing temporal changes in the DMR and EMR across the region. Next, we decompose these aggregate changes into their constituent components. We then examine national-level trends to highlight within-continent variation. To contextualise our findings, we benchmark the marriage ratios against prevailing adult sex ratios. Finally, we present a series of simulations to test the implications of our results.

5.1 DMR and EMR

The DMR is calculated for 1,762 observations, whereas the EMR is calculated for 1,703. This discrepancy arises because the number of wives was not reported for Lesotho (2004, 2009, and 2023) and Tanzania (1999). As shown in Figure 7, the DMR declines from 1.391 in 1991–1995 to 1.268 in 2021–2023. This indicates that, in countries surveyed between 2021 and 2023, there

were 1.268 women of marriageable age for every man reaching the average age of first union formation. These results support prior arguments that SSA has a markedly favourable marriage market for men. This demographic structure may help sustain the persistence of polygyny (Bhaskar, 2019; Dalton and Leung, 2014; Edlund and Ku, 2011; Whitehouse, 2018).

Figure 8 displays the average DMR and EMR for each country, with all survey years pooled. The DMR is notably high in West Africa and considerably lower in Southern Africa, although for all countries, more women enter the marriage market than men. The lowest pooled DMR is observed in South Africa (1.128), while Chad has the highest (1.541).

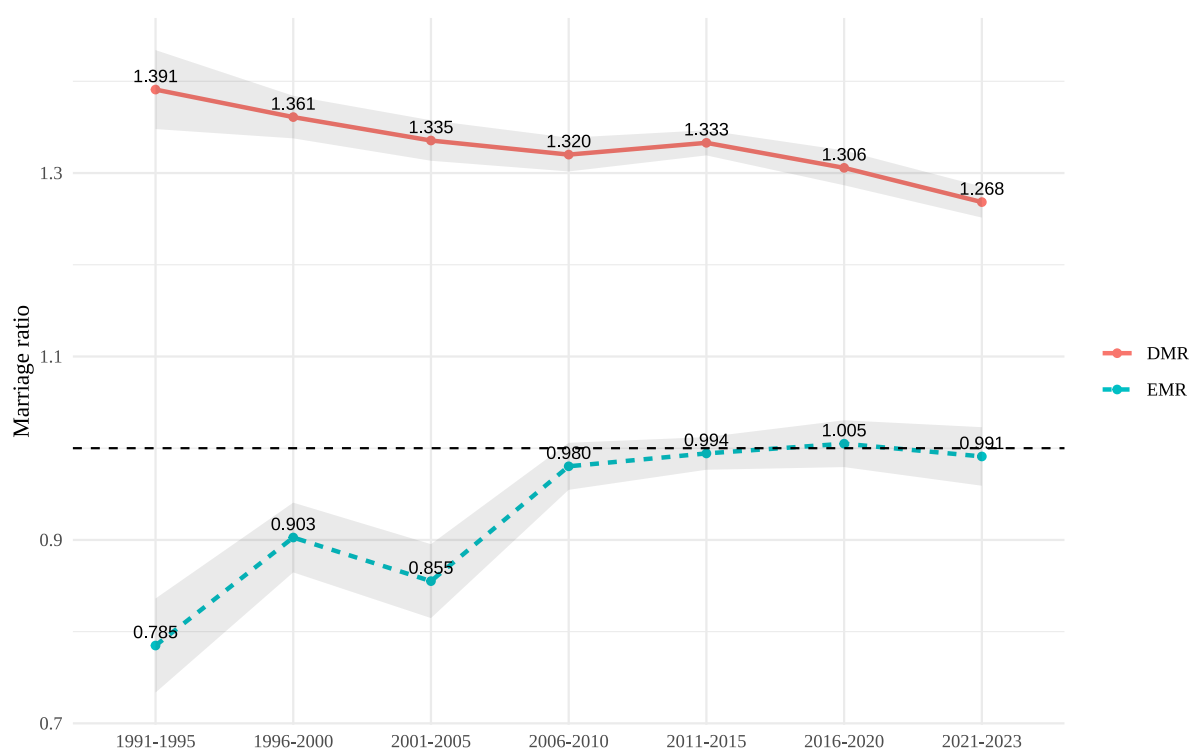


FIGURE 7: DMR and EMR across year windows
 Note: The grey area represents 95% confidence intervals.
 Source: Own calculations using data from DHS and WDI.

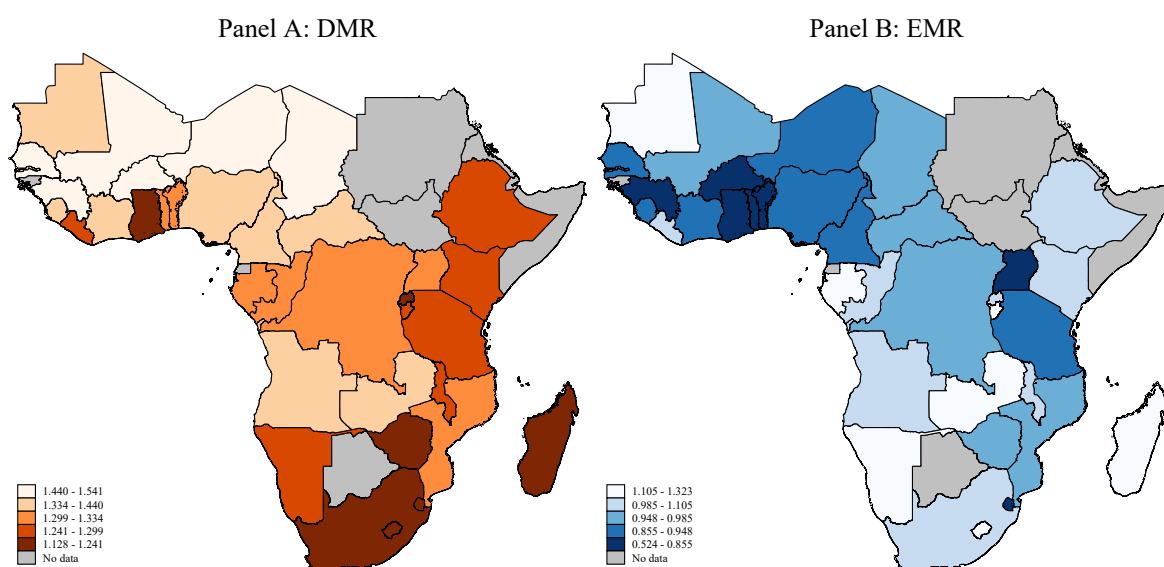


FIGURE 8: Average DMR and EMR across countries: 1991–2023 pooled
Source: Own calculations using data from DHS and WDI.

The higher DMR in West Africa appears counterintuitive, given that the region is typically characterised as having the most squeezed marriage markets and is the primary focus of research linking this squeeze to conflict. However, the EMR clearly illustrates the importance of looking beyond the DMR to explicitly account for the intensity of polygyny. While a DMR above one suggests that more women than men enter the marriage market, not all women will marry a man newly entering the marriage market, given the prevailing average number of wives per husband. Once this factor is taken into account, the EMR drops substantially. Specifically, the EMR rises from a low of 0.785 women per man in 1991–1995 to a peak of 1.005 in 2016–2020, before dipping to 0.991 in 2021–2023. This initial rise is largely driven by the rapid decline in the number of wives per husband, as shown in Figure 6.

Figure 8, Panel B, underscores the highly squeezed nature of marriage markets in West Africa, where a high intensity of polygyny significantly reduces the EMR. Across the continent, the pooled EMR ranges from a low of 0.524 in Guinea to a high of 1.323 in Mauritania.

In summary, the DMR begins at a high level and exhibits a small but consistent decline over time. By contrast, the EMR starts low and steadily increases, although this trend appears to

have plateaued in recent years. While the DMR is unexpectedly high in West Africa, the region's intense polygyny results in a much lower EMR, revealing the underlying imbalance in the marriage market. These trends are robust to limiting our sample to women who lived in their current home for five or more years, and when limiting the sample to women currently in a union (excluding divorcees, widows, and women otherwise separated).¹⁰

5.2 Component Decomposition

In the following section, we examine changes in each component included in Equations (2) and (3). For the DMR, this decomposition is illustrated in Figures 9–11. The lines in Figure 9 are multiplicative; multiplying all four components yields the DMR. Among these, the cohort size component—defined as a function of both the population growth rate and the average partner age difference, $(1 + \gamma_t)^{g_t}$ —emerges as the dominant contributor to the DMR.

The close alignment between the overall DMR and the cohort size component, coupled with only minor fluctuations in the other three components, indicates that cohort size is the primary driver of changes in the DMR. In 1991–1995, this component contributed an additional 0.283 women for every man entering the marriage market. Over time, this contribution has declined—most sharply in the most recent period—resulting in a drop in the overall DMR to 1.268. The decrease in the cohort size component reflects both a narrowing of the partner age gap and a slowdown in population growth.

The remaining components have exhibited relative stability, with only slight downward trends. The implication of this decomposition is that future changes in the DMR will continue to be primarily influenced by the cohort size component. Further declines in population growth and continued convergence in partner age are likely to exert downward pressure on the DMR. Given the relatively minor role, stability, and gradual decline of the other components, they are unlikely to offset this effect.

¹⁰Results available from the authors upon request.

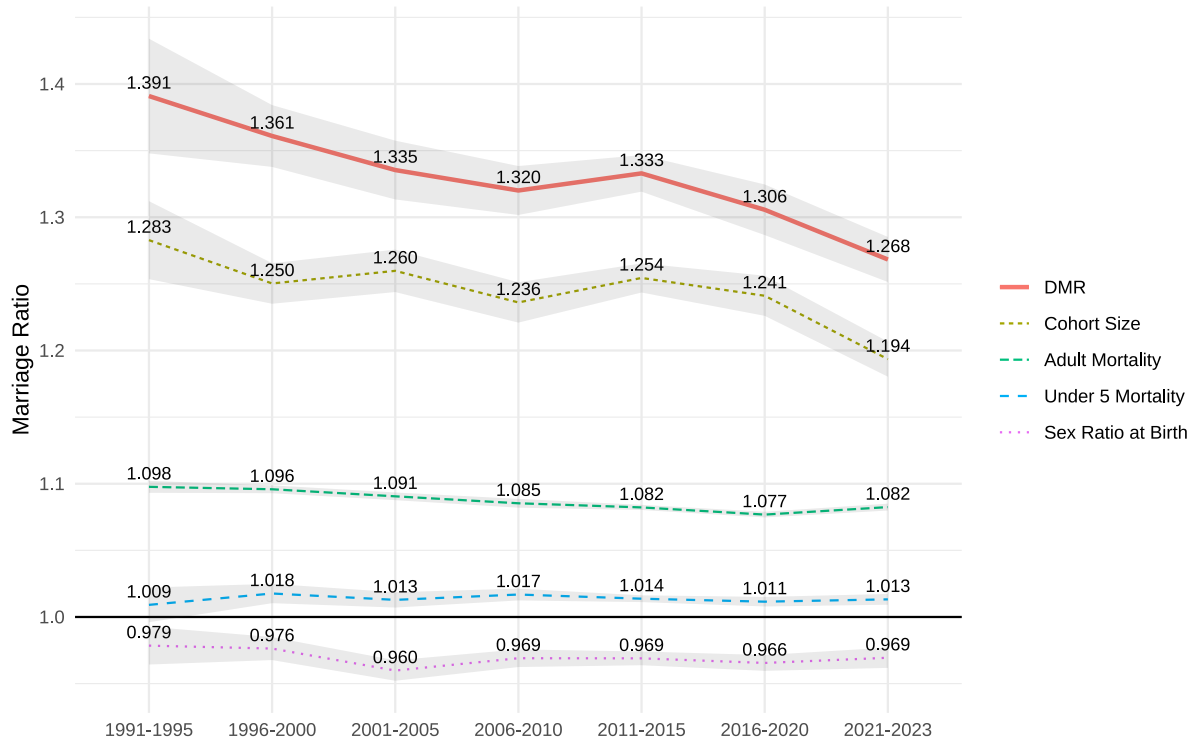


FIGURE 9: DMR by component

Note: The grey area represents 95% confidence intervals.

Source: Own calculations using data from DHS and WDI.

Another way to illustrate the contribution of each component is to convert the multiplicative components into additive ones by log-linearising Equation (2). This allows us to compute the log change in the DMR and in each component between consecutive time periods. The percentage contribution of each component to the overall change in the DMR is then calculated by dividing the component's change by the total change in the DMR.¹¹ Figure 10 presents the results of this decomposition. The figure shows that, across nearly all time periods, changes in the cohort size component accounted for the largest share of changes in the DMR. Between 1991–1995 and 1996–2000, both the DMR and the cohort size component declined, with the latter accounting for 136% of the overall decrease. During the same interval, adult mortality and the sex ratio at birth also made small contributions to the overall decline. This decline was partially offset by an increase in the under-five mortality component, which made a *negative* contribution to the overall *decrease* in the DMR. In every year window except 2001–2005, the cohort size component was the dominant driver of change in the DMR. Nonetheless, the DMR

¹¹Specifically, the percentage contribution of the change in the cohort size component is given by: $\frac{\ln(1+\gamma_t)_{t_1}^{g_t} - \ln(1+\gamma_t)_{t_0}^{g_t}}{\ln(DMR)_{t_1} - \ln(DMR)_{t_0}}$ We apply the same formula to compute the contributions of the remaining components.

also appears to be particularly sensitive to changes in the sex ratio at birth, especially in the 2006–2010 period.

This decomposition reinforces the central conclusion regarding the DMR: its high value is primarily driven by the cohort size component, and most of the observed changes in the DMR over time can be attributed to shifts in this component. This finding aligns with the argument made by Bhaskar (2019), who contends that high population growth rates contribute to a surplus of men in SSA marriage markets. However, as observed in many other developing countries (Bhaskar, 2019), reductions in population growth—and consequently in the cohort size component—are expected to further lower the DMR and cause a squeeze in the marriage market. Given the relatively minor role and limited variability of the other three components, this squeeze is unlikely to be offset by compensatory changes elsewhere.

Supporting this view, Bhaskar (2011) finds that sex-selective mortality has only a modest impact on the marriage market squeeze in China and India. Similarly, Gulczyński (2023) reports a limited effect of sex-selective mortality on global sex ratios among young adults.



FIGURE 10: Percentage change in DMR by component
Source: Own calculations using data from DHS and WDI.

The cohort size component is driven by two distinct factors: population growth rates and changes in partner age differences. To assess the influence of each factor, we conduct a counterfactual exercise in which we hold one factor constant at its 1991–1995 level while the other is allowed to vary. Figure 11 plots the evolution of the cohort size component under each scenario.

At baseline, all three lines coincide, as expected. In the 1996–2000 window, holding the population growth rate constant while allowing the partner age difference to vary reduces the component to 1.265. Conversely, holding the partner age difference constant while allowing the population growth rate to vary reduces the component to 1.262. The combined effect of both factors yields a further decrease to 1.250.

Interestingly, with the exception of 1996–2000 and the most recent window, the two factors generally had offsetting effects: one exerting upward pressure on the cohort size component, the other downward. In the final period, however, both the population growth rate and the partner age difference declined simultaneously. As a result, the cohort size component dropped to a low of 1.194. What appears to be a relatively stable component over time is, in fact, the product of offsetting movements in its underlying drivers. The partner age difference component consistently lies below the population growth component, indicating that it exerts the strongest downward pressure on the cohort size component. Moreover, the partner age gap also influences the adult mortality component. Specifically, as g_t decreases in the expression $\left(\frac{(1-\pi_{awt})^{k_t-g_t-5}}{(1-\pi_{amt})^{k_t-5}} \right)$, the overall value of the adult mortality component also declines. This dual effect implies that reductions in partner age differences are one of the primary drivers behind the observed decline in the DMR over time.

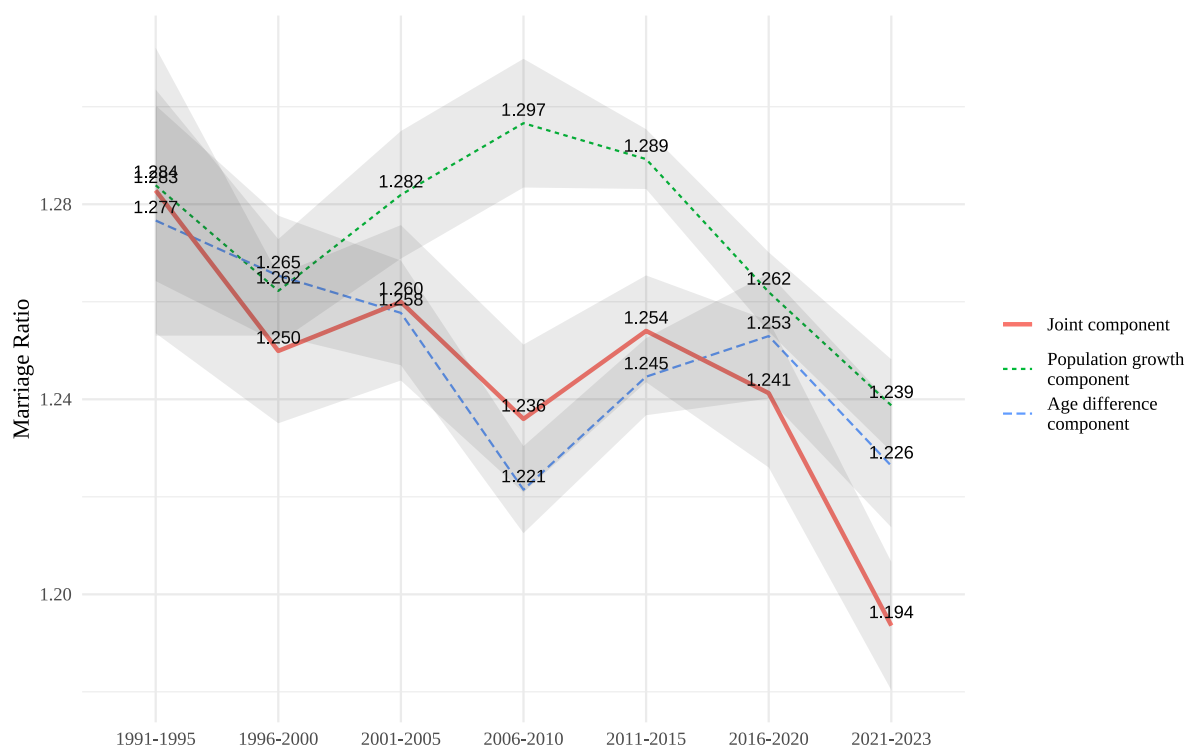


FIGURE 11: Change in population growth and partner age difference factors

Note: The grey area represents 95% confidence intervals.

Source: Own calculations using data from DHS and WDI.

The factors driving changes in the EMR are illustrated in Figure 12. The four multiplicative components used in the DMR decomposition remain unchanged, with the EMR additionally incorporating the number of wives component additively. In the 1991–1995 period, each married man had, on average, 1.606 wives. This implies that 0.606 ‘additional’ women were effectively removed from the marriage market for newly entering single men by marrying already married men. This adjusts the DMR of 1.391 downward to an EMR of 0.785.

The number of wives component declines by more than half over the study period, falling from 0.606 in 1991–1995 to 0.291 in 2021–2023. However, this decline slows significantly after 2006–2011. As a result, the reduction in women removed from the marriage market—due to a declining average number of wives per husband—has supported an increase in the EMR, even as the DMR itself declined.

This leads to another key finding of our analysis: the pressure exerted by polygyny on the marriage market has lessened over time. A declining DMR can be offset by continued reductions in polygyny, thereby ensuring that around the same number of men and women are available in the

marriage market. However, prior research suggests that, despite its overall decline, polygyny is becoming increasingly concentrated among less-educated, rural women (Chae and Agadjanian, 2022; Whitehouse, 2018). This trend is reflected in the plateauing of the number of wives per husband since 2006–2010.

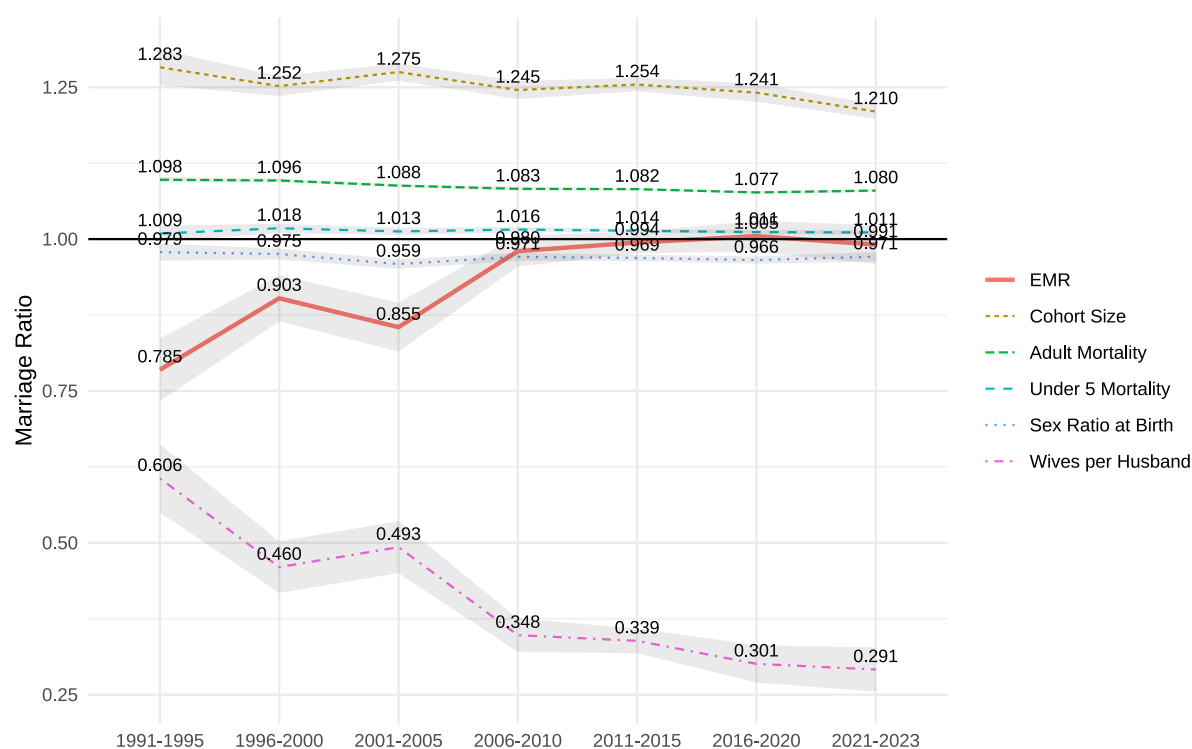


FIGURE 12: EMR by component

Note: Some component values differ slightly between this figure and Figure 9. The DMR could be calculated for 1,752 observations, whereas the EMR could only be calculated for 1,703 observations.

The grey area represents 95% confidence intervals.

Source: Own calculations using data from DHS and WDI.

5.3 National DMR and EMR

Continental averages mask substantial variation at the national level, as shown in Table 2. For most countries, there is a general trend of decreasing DMRs and increasing EMRs, although the pace and consistency of these changes vary across survey waves. Among the 33 countries with data from more than one wave, 25 experienced a decline in the DMR. In some cases, this decrease was particularly pronounced—for example, Burundi, Gabon, and Liberia. Liberia’s DMR fell from 1.490 in 2006–2010 to 1.162 in 2016–2020. By contrast, eight countries—Democratic Republic of the Congo (DRC), Ghana, Lesotho, Mali, Namibia, Niger, Uganda, and Zimbabwe—recorded increases in the DMR. Nevertheless, DMR values re-

main above one (implying more women than men entering the marriage market) in all countries, with the highest levels concentrated in West Africa.

Regarding the EMR, 24 of the 32 countries with multiple survey waves experienced an increase over time. However, Burundi, Comoros, Ethiopia, Gabon, Gambia, Liberia, Madagascar, and Sierra Leone saw declines. In the most recent wave, 13 countries report an EMR below one (implying less women than men available in the marriage market). Among the West African countries in the sample, all but Côte d'Ivoire (1.004), Liberia (1.001), Mali (1.064), Mauritania (1.323), and Niger (1.135) have EMRs below one.

In summary, nearly all countries experienced a decrease in the DMR, which nonetheless remains above one across the board. Most countries saw an increase in the EMR, although approximately half of the sampled countries still exhibit EMRs below one. West African countries, in particular, are disproportionately represented among those with EMRs below one.

TABLE 2: DMR and EMR by country

		1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2023
Angola	DMR					1.440		
	EMR					1.047		
Benin	DMR		1.353	1.327	1.362	1.273	1.263	
	EMR		0.499	0.534	0.678	0.692	0.672	
Burkina Faso	DMR	1.581	1.440	1.511	1.467			1.322
	EMR	0.609	0.518	0.657	0.782			0.706
Burundi	DMR				1.407		1.139	
	EMR				1.319		1.053	
Cameroon	DMR	1.460		1.385		1.421	1.387	
	EMR	0.649		0.820		1.041	1.064	
CAR	DMR	1.364						
	EMR	0.979						
Chad	DMR		1.544	1.609		1.530		
	EMR		0.924	0.906		0.965		
Comoros	DMR		1.375			1.161		
	EMR		1.030			0.940		
Côte d'Ivoire	DMR	1.533	1.494			1.331		1.330
	EMR	0.928	0.907			0.897		1.004

TABLE 2: DMR and EMR by country

		1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2023
DRC	DMR				1.274	1.327		
	EMR				0.940	0.972		
Eswatini	DMR				1.212			
	EMR				0.834			
Ethiopia	DMR		1.349	1.291		1.290	1.262	
	EMR		1.145	1.076		1.118	1.079	
Gabon	DMR					1.387	1.265	
	EMR					1.190	1.179	
Gambia	DMR					1.534	1.416	
	EMR					0.891	0.851	
Ghana	DMR	1.200	1.299	1.254	1.244	1.242		1.207
	EMR	0.612	0.884	0.762	0.936	0.970		0.975
Guinea	DMR		1.462	1.402		1.492	1.445	
	EMR		0.527	0.022		0.750	0.798	
Kenya	DMR			1.364	1.342	1.270		1.221
	EMR			1.041	1.107	1.064		1.048
Lesotho	DMR			1.088	1.152	1.197		1.156
	EMR					1.180		
Liberia	DMR				1.490	1.142	1.162	
	EMR				1.215	0.945	1.001	
Madagas- car	DMR		1.228	1.179	1.180			1.175
	EMR		1.153	1.081	1.131			1.135
Malawi	DMR	1.291	1.266	1.309	1.291	1.284		
	EMR	0.859	0.979	1.012	1.055	1.080		
Mali	DMR		1.413	1.493	1.530	1.457	1.510	
	EMR		0.798	0.932	1.060	1.010	1.064	
Maurita- nia	DMR						1.410	
	EMR						1.323	
Mozam- bique	DMR		1.366	1.230		1.316		1.317
	EMR		0.868	0.796		1.018		1.083
Namibia	DMR		1.320		1.232	1.345		
	EMR		1.089		1.122	1.242		
Niger	DMR	1.435	1.524		1.577	1.582		
	EMR	0.915	1.005		0.716	1.135		

TABLE 2: DMR and EMR by country

		1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2023
Nigeria	DMR			1.410	1.399	1.383	1.320	
	EMR			0.829	0.941	0.967	0.942	
Rep. of Congo	DMR			1.369		1.289		
	EMR			1.071		1.078		
Rwanda	DMR		1.137	1.215	1.141	1.162	1.136	
	EMR		0.969	0.960	1.040	1.072	1.039	
São Tomé & Príncipe	DMR				1.195			
	EMR				0.853			
Senegal	DMR	1.630	1.509	1.392		1.503	1.458	1.395
	EMR	0.773	0.949	0.718		0.962	0.975	0.936
Sierra Leone	DMR				1.419	1.295	1.309	
	EMR				0.940	0.856	0.928	
South Africa	DMR		1.154				1.101	
	EMR		1.067				1.067	
Tanzania	DMR		1.293	1.314	1.216	1.339		1.291
	EMR		0.824	0.945	0.888	1.053		1.046
Togo	DMR		1.402			1.267		
	EMR		0.620			0.740		
Uganda	DMR	1.310		1.354	1.276	1.249	1.315	
	EMR	0.730		0.909	0.806	0.853	0.910	
Zambia	DMR		1.363	1.401	1.403	1.315	1.300	
	EMR		1.075	1.092	1.191	1.136	1.138	
Zimbabwe	DMR	1.102	1.296	1.155	1.233	1.170		
	EMR	0.795	1.077	0.960	1.049	1.005		

Source: Own calculations using data from DHS and WDI.

Table A2 breaks down changes in the DMR and EMR, along with their respective components, for the 38 countries in the sample. While the levels of each component vary across countries, the trends in the most influential components remain remarkably consistent. The cohort size component contributes the most to the DMR in all countries, with the exception of those affected by HIV/AIDS or severe conflict—Eswatini, Lesotho, Namibia, Rwanda, South Africa, and Zimbabwe—where adult mortality plays a larger role.¹² All countries, except Chad, Co-

¹²Women have been more frequently targeted for HIV/AIDS treatment and generally respond better to existing

moros, the DRC, Guinea, Lesotho, Mali, Niger, Rwanda, Tanzania, Uganda, and Zimbabwe, experienced a decline in the number of women ‘added’ through the cohort size component from their first to most recent survey wave.

Interestingly, all countries that registered an increase in their DMR also experienced an increase in the cohort size component—except for Ghana, which only saw a marginal DMR increase (1.200 to 1.207), and Namibia. In these two cases, a decrease in the cohort size component was offset by favourable changes in the other three components, particularly a high sex ratio at birth. This pattern reinforces the broader argument that changes in the other three components are unlikely to fully compensate for a decline in the cohort size component. In nearly all countries with an increasing cohort size component, the increase was driven by rising population growth, partially offset by declining partner age gaps. Exceptions include the DRC, Uganda, and Zimbabwe, where both population growth and partner age difference increased. Chad presents a unique case, with a declining population growth rate counterbalanced by an increasing partner age difference, resulting in a stable cohort size component value of 1.413.

These national-level findings reinforce the continent-wide trends. The cohort size component continues to be the primary driver of changes in the DMR across most countries. To date, increases in the DMR have almost exclusively been associated with increases in the cohort size component. No country—aside from Ghana and Namibia—has seen a DMR increase in the context of a declining cohort size component. Among countries experiencing a rise in this component, the trend is largely explained by higher population growth rates, partially offset by narrowing partner age gaps. Although Figure 5 indicates decreasing partner age differences as a key driver of the continent-wide decline in the cohort size component, increases in population growth can—and in some cases do—counteract this effect.

5.4 Benchmarking

Benchmarking our DMR and EMR estimates is challenging, as comparable marriage ratios have rarely been calculated. Neelakantan and Tertilt (2008) introduced the dynamic marriage

therapies, resulting in higher HIV/AIDS-related mortality among men (Bor et al., 2015; Kerkhoff et al., 2020; Tsai and Siedner, 2015).

ratio model and computed DMR values for India and China. In 2006, they found DMRs of 1.09 for India and 0.95 for China. In India, population growth was the dominant contributing factor, while in China, sex-specific mortality and skewed sex ratios at birth were more influential (Neelakantan and Tertilt, 2008). By comparison, countries in SSA exhibit significantly higher DMRs, and in some cases, lower EMRs than China—a country often cited for its severely imbalanced marriage market (Cameron et al., 2017; Edlund et al., 2013).

Nonetheless, the DMR and EMR can be indirectly benchmarked against the more widely used adult sex ratios, given theoretical expectations that adult sex ratios typically underestimate the true marriage ratio. Using census data from IPUMS International (Ruggles et al., 2025), we calculate the adult sex ratio for the 15–45 age group, restricting the analysis to countries with a DHS and census dataset from the same year or within one year of each other. Figure 13 compares the adult sex ratio to both the DMR and EMR.

The adult sex ratio consistently underestimates the DMR, sometimes by considerable margins. Its relationship to the EMR is less consistent—it either underestimates or overestimates the EMR depending on a country’s intensity of polygyny and the extent to which the DMR itself is underestimated. The adult sex ratio proves to be a poor proxy for the marriage ratio in settings characterised by high population growth, large partner age gaps, and intense polygyny—features that define marriage markets in most SSA countries.

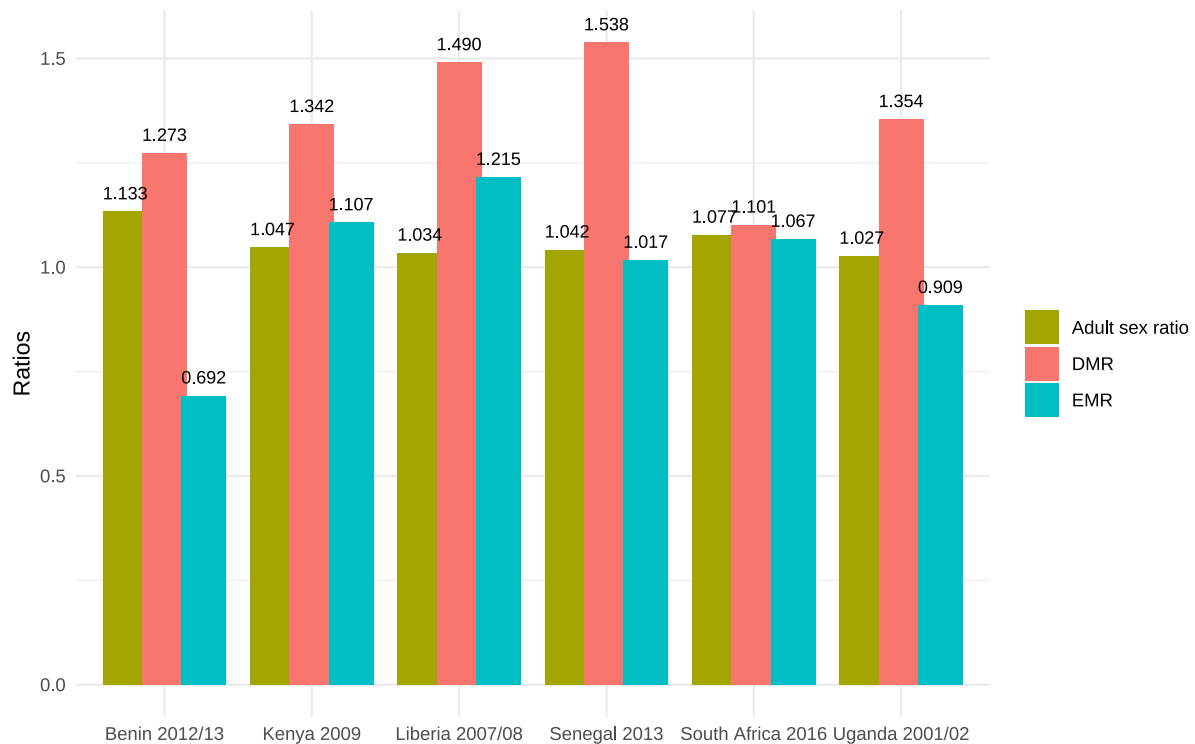


FIGURE 13: Benchmarked adult sex ratio and marriage ratios
Source: Own calculations using data from DHS, WDI, and IPUMS

Another way to show this is to plot the trends in adult sex ratios and our marriage ratios over time. From the WDI, we calculate the adult sex ratio for adults aged 15–64 for the same countries and years as we do the DMR and EMR (World Bank, 2025). Figure A2 shows the results. As in Figure 13, the mean adult sex ratio is always between the DMR and the EMR, the values staying consistent. There is only a very slight decrease over time. Consequently, not only do adult sex ratios mischaracterise marriage ratios, but they also account for less of the variation captured in our marriage ratios over time.

5.5 Simulations

We conduct a series of simulations to estimate the potential impact of future demographic trends on the DMR and EMR. The main simulation explores the influence of projected changes in partner age differences and population growth rates. We estimate future partner age differences using a linear extrapolation of observed trends from 1991 to 2023, based on the following regression model:

$$AgeDifference_{i,j} = \beta_0 + \beta_1 Year_{i,j} + \epsilon_{i,j} \quad (4)$$

where each first administrative unit j is weighted such that each country i contributes equally to the estimation (i.e., weight = 1). Regression results are shown in Table A3 in the Appendix. From 1991 to 2023, the average partner age difference declined by 0.043 years annually, a trend that is statistically significant at the 0.1% level. Extrapolating this trend forward to 2035 implies a projected reduction of:

$$0.043 \times (2035 - 2023) = 0.52 \text{ years}$$

relative to the 2021–2023 baseline.

Figure 14 illustrates the effects of this projected decrease in partner age differences on the DMR and EMR, under two population growth scenarios. In the first scenario, shown by the solid red (DMR) and dashed blue (EMR) lines, population growth rates are held constant at 2021–2023 levels. Under this assumption, the DMR is projected to decline modestly from 1.264 in 2024 to 1.247 in 2035, while the EMR falls from 0.974 to 0.957 over the same period.

In the second scenario, we account for expected changes in the population growth rate, which is projected to decline nearly linearly from 2.56% in 2024 to 2.08% in 2035 (United Nations, 2025). The solid green line (DMR) and dotted purple line (EMR) show the combined effects of decreasing partner age differences and declining population growth. Under this scenario, the DMR and EMR drops to 1.229 and 0.939 by 2035, respectively.

These results indicate that, even under projected demographic shifts—and in the absence of polygyny—marriage markets will continue being favourable towards men, with more women than men entering. In the presence of polygyny, if the decline in the number of wives per husband continues to stall, these demographic changes will increasingly squeeze marriage markets, with increasingly less women than men available to marry.

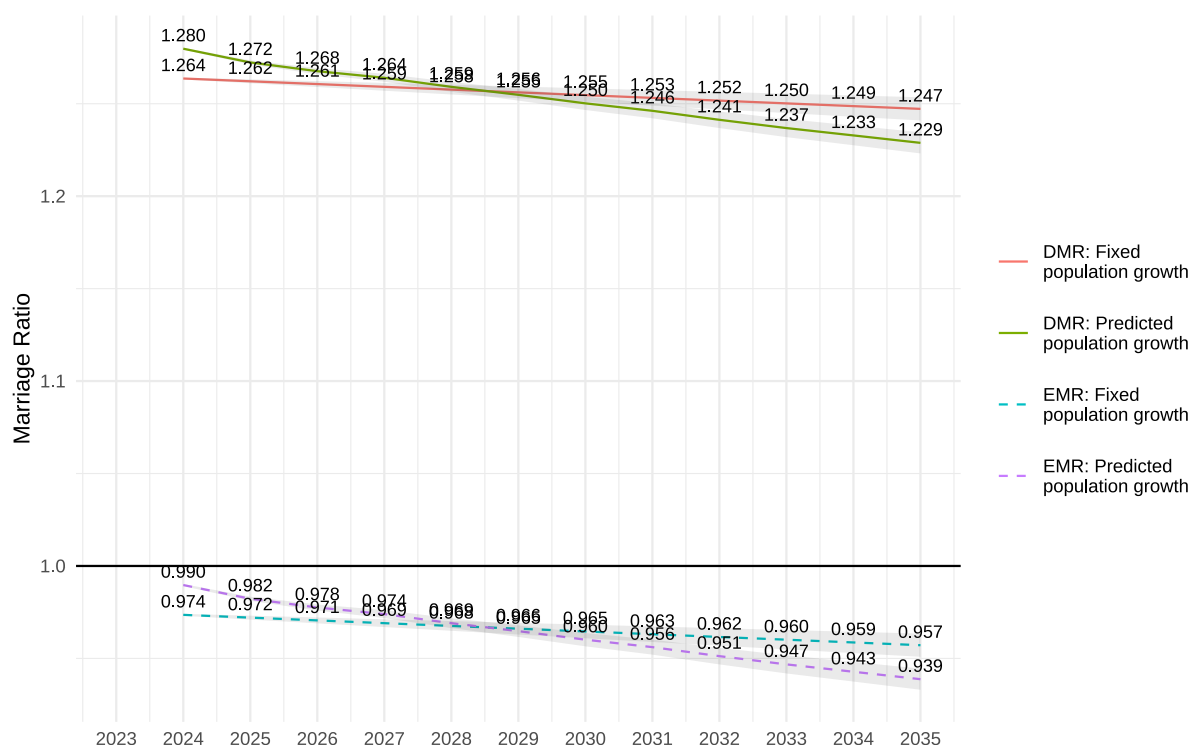


FIGURE 14: Simulated partner age difference and population growth rate

Note: The grey area represents 95% confidence intervals.

Source: Own calculations using data from DHS and UN.

As we have argued, the projected decline in the DMR cannot be offset by any of the other three components in the decomposition. The sex ratio at birth component, in particular, offers limited scope for further increases. Given the already low sex ratio at birth in many SSA countries, and in light of warnings by Bongaarts (2013) and evidence suggesting that improved maternal health may actually increase the proportion of male births (Morse and Luke, 2021), the potential for upward adjustment in this component is constrained. Indeed, if the sex ratio at birth were to rise to the global standard of 1.07 boys per girl, the DMR would decline from 1.268 to 1.223, assuming all other components remain fixed at 2021–2023 levels.

It is theoretically possible that dramatic improvements in female survival rates could lead to a substantial increase in the DMR. For illustrative purposes, we use 2022 data from South Korea, one of the countries with the lowest mortality rates globally, where the adult female mortality rate was 21.66 per 1,000 females and the under-five female mortality rate was 2.5 per 1,000 live births (World Bank, 2025). Substituting these values into our model while keeping all other components constant at 2021–2023 levels results in a DMR of 1.375.

However, such an outcome would require an unprecedented leap in female survival—effectively shifting from some of the highest to some of the lowest mortality rates globally—and would unrealistically assume no concurrent improvement in male survival. Nevertheless, while unlikely to fully counteract projected declines, improvements in female health represent a viable channel through which the DMR and EMR could be partially sustained, and are of intrinsic value beyond their demographic implications.

6 Heterogeneity

Given that marriage markets operate locally and are often endogamous (Haandrikman, 2019), there is good reason to expect substantial heterogeneity in DMRs and EMRs across regions, localities, and ethnic and religious subgroups.¹³ Due to data limitations, we are unable to disaggregate these measures to the smallest available geographic units. Nevertheless, in this section, we briefly explore three important sources of heterogeneity in greater detail: urban–rural differences, religious and ethnic differences, and within-country variation.

6.1 Rural-Urban Heterogeneity

There are strong reasons to expect that marriage ratios differ significantly between urban and rural areas. For instance, previous research has shown that the practice of polygyny remains particularly resistant to change in rural contexts (Chae and Agadjanian, 2022; Tabutin and Schoumaker, 2020; Whitehouse, 2018). Consequently, marriage markets in rural areas are likely to be more squeezed. This is especially concerning given that squeezes in particularly rural marriage markets have been linked to increased risk of conflict (Koos and Neupert-Wentz, 2020; Mokuwa et al., 2011; Rexer, 2022). We therefore briefly examine the evolution of marriage market imbalances in rural and urban areas separately. However, we emphasise that our results are only illustrative, as they do not account for sex-specific rural-to-urban migration

¹³For example, a survey in Senegal found that married couples and their parents lived within a 20 kilometer radius of each other, with most couples hailing from the same region (the first administrative unit in Senegal) (Mbaye and Wagner, 2017).

patterns.¹⁴ In addition, national-level population growth and adult mortality rates are applied equally to rural and urban areas.

We calculate the DMR and EMR separately for urban and rural regions in each country. These measures are disaggregated only at the national level, as the DHS is not designed to produce representative estimates for urban and rural populations at the first administrative level. As a result, our estimates are somewhat less precise: we are unable to leverage the larger sample size offered by the first administrative units, and the DMR and EMR levels differ slightly from those shown in Figure 7.

With these caveats in mind, Figure 15 displays the levels and trends in the DMR and EMR for urban and rural areas. Several notable patterns emerge. The DMR is similar in both settings, although consistently higher in rural areas—primarily due to significantly larger partner age differences. The divergence between rural and urban areas is far more pronounced for the EMR. While the EMR has increased substantially in urban areas, it has effectively stalled in rural areas since 2006–2010, remaining well below one in 2021–2023. Consistent with prior findings (Tabutin and Schoumaker, 2020; Whitehouse, 2018), polygyny has remained remarkably stable in rural settings. In our sample, the average number of wives per husband in rural areas declined only marginally, from 1.38 in 2006–2010 to 1.33 in 2021–2023.¹⁵ These trends suggest that men in rural areas face significantly more squeezed marriage market conditions than their urban counterparts—particularly when accounting for the prevailing intensity of polygyny.

¹⁴Previous research has found that rural-to-urban migration is especially common among young men, which tends to increase male-to-female sex ratios in urban areas while reducing them in rural areas (Menashe-Oren and Stecklov, 2023). This dynamic is expected to ease marriage market squeezes in rural areas and intensify them in urban areas.

¹⁵Over the same time period, it has decreased from 1.24 to 1.16 wives per husband in urban areas.

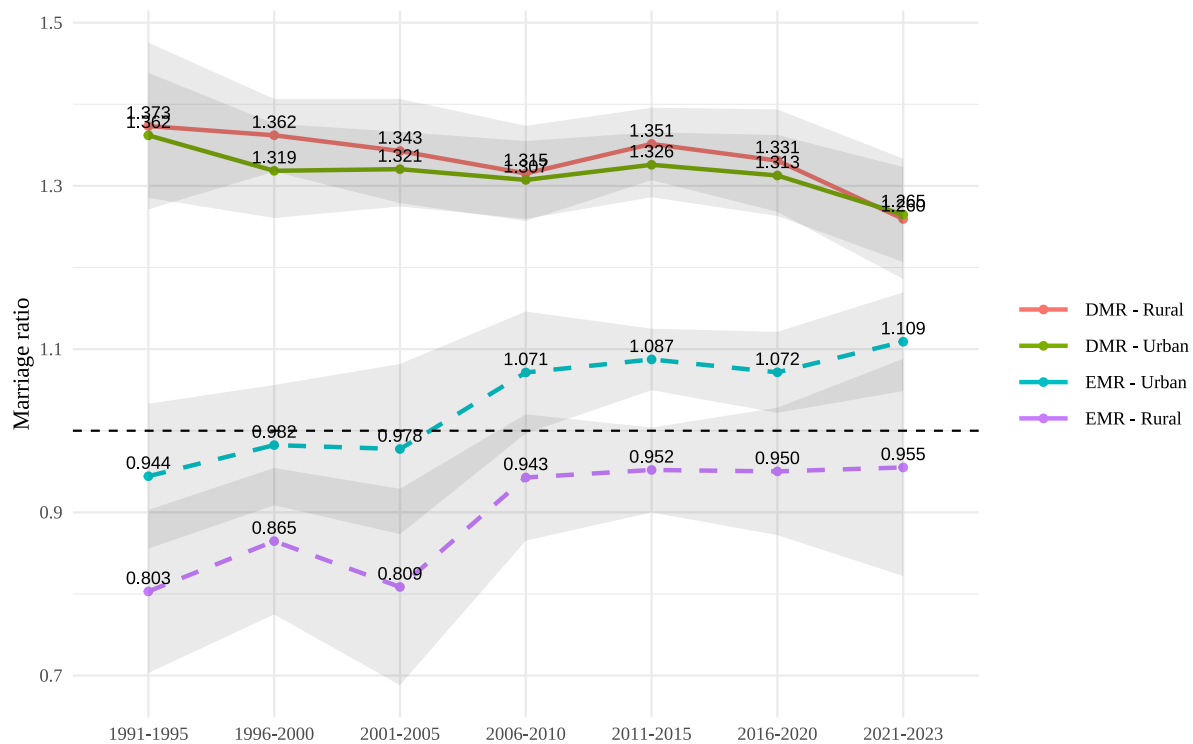


FIGURE 15: DMR and EMR by rural and urban areas
 Note: The grey area represents 95% confidence intervals.
 Source: Own calculations using data from DHS and WDI.

6.2 Religious and Ethnic Heterogeneity

Religion

Inter-ethnic and inter-religious unions are still rare in SSA (Bandyopadhyay and Green, 2021; Crespin-Boucaud, 2020). This means that marriage markets might be segmented for different religious and ethnic groups. Given data and space constraints, we perform an illustrative investigation of this segmentation by analysing marriage ratio trends between different religious and ethnic groups.

We expect marriage ratios to differ between religious groups. As in rural areas, polygyny has shown a slower decline among Muslims (Chae and Agadjanian, 2022). In addition, marriages tend to occur earlier and partner age gaps tend to be larger for Muslim women (Carmichael, 2011). We investigate trends in marriage ratios by religious group through using women's self-reported religion to divide the sample into Muslim, Christian (Catholic, Protestant, and all other Christian denominations), and other religious groups.¹⁶ From this, we calculate religion-

¹⁶In doing so, we limit our sample to DHS waves containing information on respondents' religion, and to countries

specific age at first union, partner age gaps, under five mortality rates, and number of wives per husband for each country-year pair. We assign country-year-specific population growth rates and adult survival rates to both groups equally.

Trends are shown in Figure 16. Because of larger partner age differences, the DMR is higher for Muslims than for Christians. However, the DMR has shown a steady decrease for both groups over time. In contrast, the EMR has shown an increase over time for both groups, although the EMR is consistently lower for Muslims than Christians. In fact, since 2011–2015, the EMR has remained constant for Muslims at a level well below one, while it increased to levels above one for Christians. Religion-specific trends show that marriage markets remain squeezed for Muslims, while they have become less squeezed for Christians. Along with the urban-rural distinction, this finding shows the importance of accounting for the endogamous nature of marriage markets.

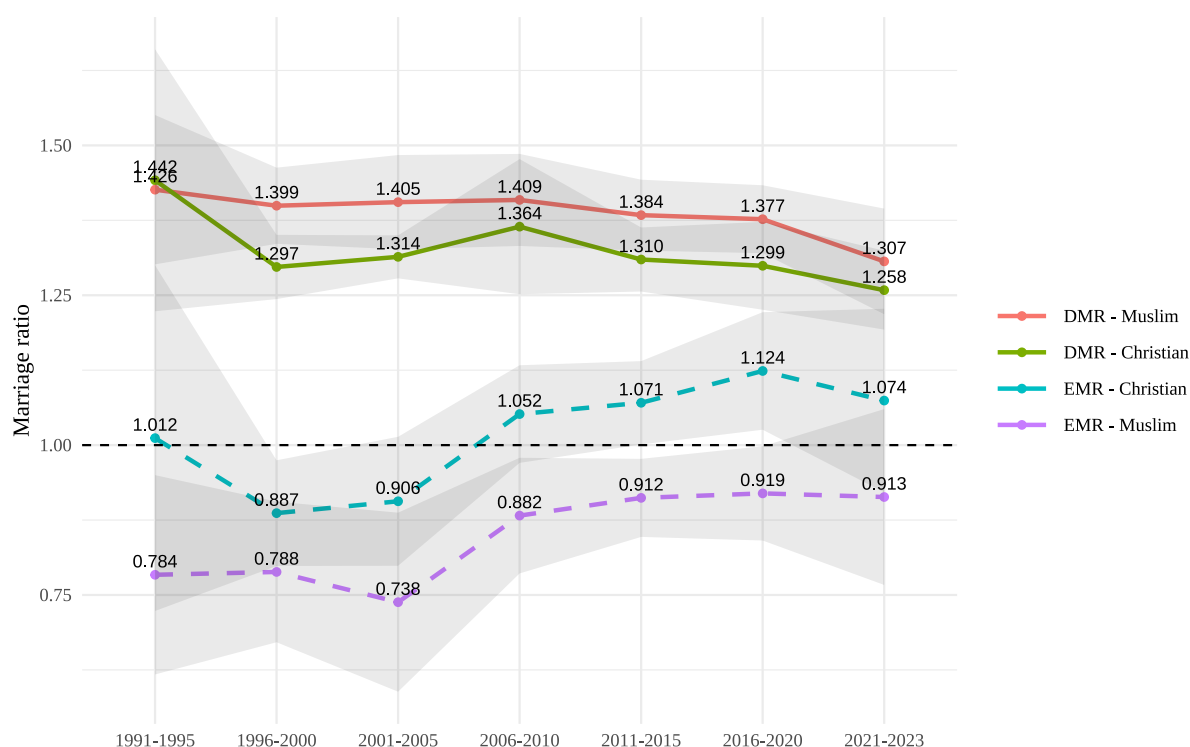


FIGURE 16: DMR and EMR by Christian and Muslim religious group

Note: The grey area represents 95% confidence intervals.

Source: Own calculations using data from DHS and WDI.

that have a significant population of both religious groups. Our sample is therefore limited to 757,007 observations, aggregated into 105 country-year pairs.

Ethnicity

We limit our sample to Senegal when considering marriage ratios for ethnic groups. As noted in Section 4.2, ethnicity data is inconsistently coded across countries and waves, making it easier to focus this analysis on Senegal only. For this country, the DHS coded ethnicity consistently over time, and Senegal contains enough information to calculate ethnic-specific marriage ratios for the three largest ethnic groups; Wolof, Fula, and Serer. The rates of interethnic marriages are fairly low in Senegal, ranging between 15–25%, indicating a degree of segmentation of the marriage market (Bandyopadhyay and Green, 2021; Crespin-Boucaud, 2020).¹⁷ The country is also characterized by intense polygyny, large differences in the age of the partners, and increases in the age at which women form their first union.

As with religion, we calculate ethnic-specific age at first union, partner age gaps, under five mortality rates, and number of wives per husband for each year, while assigning national values for population growth and sex-specific mortality rates. Results are shown in Figure 17, focusing on the EMR for brevity. The EMR has increased for all three ethnic groups, although differences between the groups are quite pronounced. The Wolof ethnic group faces a much lower ratio, driven by more intense polygyny. Across the pooled sample, the average number of wives per husband is higher for the Wolof group (1.58) than the Fula (1.50) and Serer (1.41) groups.¹⁸ This is partly offset by very high partner age gaps (12.07 years) and late age at first union formation for men (31.37 years). This shows that, in contexts with limited inter-ethnic marriages, marriage ratios can differ significantly between ethnic groups. Men from the Wolof ethnic group will face more pressure in the marriage market, especially if there are frictions to finding partners across ethnic boundaries.

¹⁷Using Couple Recode files for Senegal, we find that 19.1% of unions were inter-ethnic.

¹⁸The sample average number of wives per husband across all countries is 1.398.

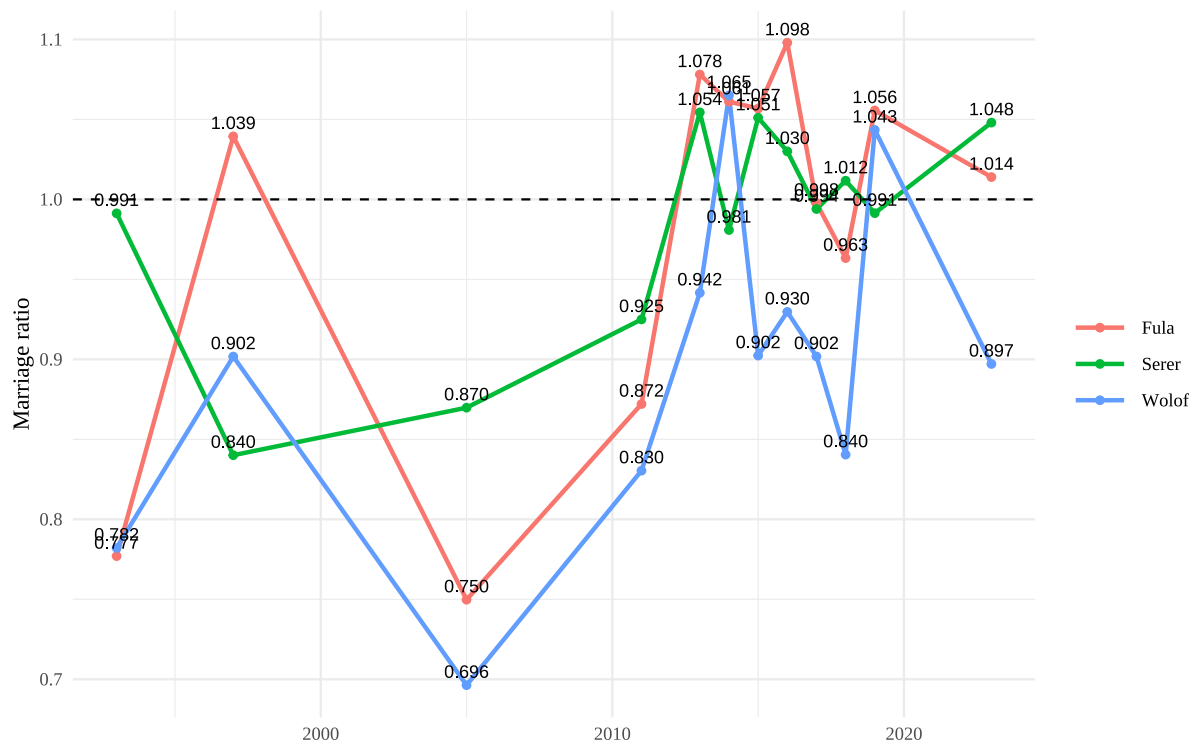


FIGURE 17: EMR by three largest Senegalese ethnic groups

Note: The figure lacks 95% confidence intervals because each EMR was calculated from only one ethnic group-year pair.

Source: Own calculation using data from WDI and DHS.

6.3 Subnational Heterogeneity

Figure A1 maps the pooled DMR and EMR for all first administrative units included in our sample. In this section, we take a closer look at subnational variation within Senegal.

Figure 18 provides a visual representation of changes in the DMR between 1993 and 2023 across Senegal's 14 regions. In 1993, the national average DMR was 1.630. However, most regions exhibited DMRs above this average, with particularly high values in Louga, Matam, and Sédhiou. Lower DMRs in regions such as Diourbel, Kédougou, and Kolda exercised downward pressure on the national average. By 2023, the national average DMR had declined to 1.395, with reductions observed in nearly all regions except Kédougou. The most pronounced decreases occurred in Louga, Matam, Sédhiou, and Thiès, while more modest declines were observed in Kolda and Tambacounda.

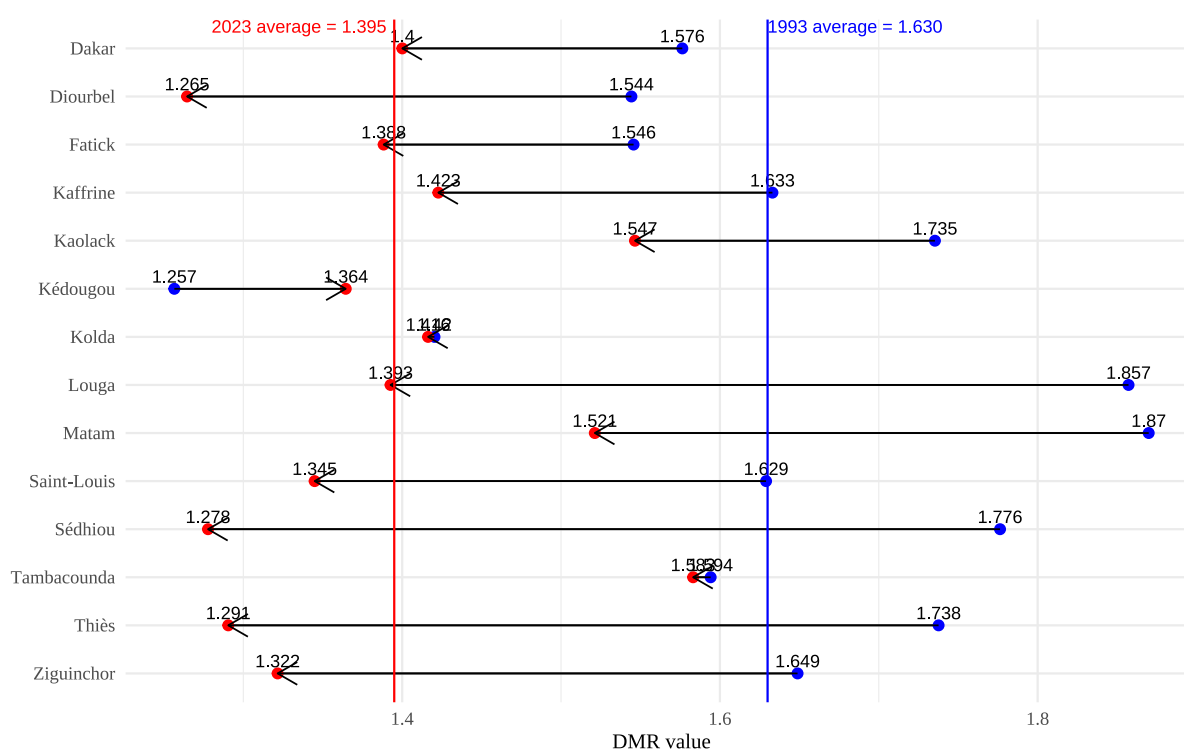


FIGURE 18: DMRs across Senegal's regions
 Note: Blue values refer to 1993 and red values to 2023.
 Source: Own calculations using data from DHS and WDI.

Figure 19 shows the EMR across regions and time. In 1993, the national average EMR was 0.773, with many regions reporting values well below this level. The EMR was as low as 0.155 in Kédougou and 0.413 in Kolda. From 1993 to 2023, most regions experienced an increase in the EMR, with the national average rising to 0.936. Notably rapid increases were observed in Kédougou, Kolda, and Tambacounda.

However, some regions experienced a decline in the EMR over the same period, including Louga, Saint-Louis, Sédhiou, and Thiès. These results underscore that while the EMR has increased nationally, this trend masks substantial heterogeneity. Regions started from vastly different baseline levels and experienced growth at different rates. In some cases, the EMR has actually declined, indicating that marriage market conditions for men have become more squeezed over time in those areas.

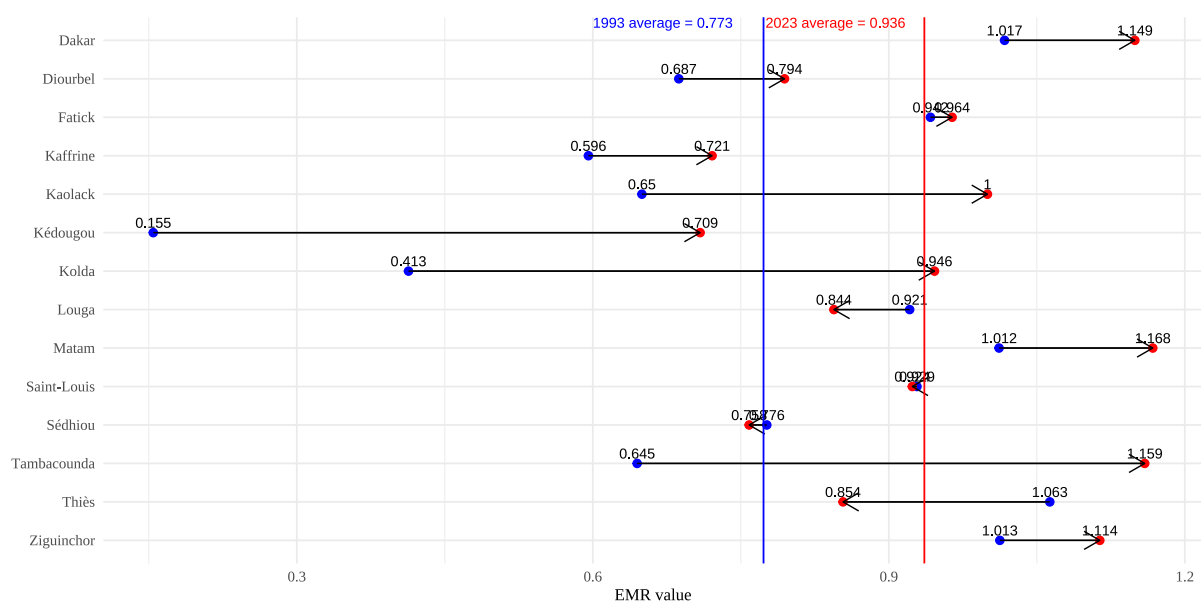


FIGURE 19: EMRs across Senegal's regions
Source: Own calculations using data from DHS and WDI.
Note: Blue values refer to 1993 and red values to 2023.

These findings further highlight the localised and endogamous nature of marriage markets. Regions within the same country can experience markedly different levels and trajectories in marriage ratios, with national trends obscuring underlying regional dynamics. In addition, different components might be responsible for driving trends in different regions. This reinforces the importance of subnational analysis in understanding demographic and social patterns.

7 Conclusion

In this study, we argued that neither the adult sex ratio nor the presence of polygyny—considered in isolation—provide sufficient insight into marriage market squeezes. Adult sex ratios systematically underestimate true marriage ratios in contexts of early marriage, large partner age gaps, and rapid population growth. Similarly, discussions of polygyny often overlook its intensity and fail to situate it within broader demographic dynamics. To address these gaps, we applied a previously developed dynamic marriage market model and extended it to explicitly account for polygyny's intensity. Using data from the Demographic and Health Surveys and World Development Indicators, we calculated the dynamic marriage market ratio across 1,762 (1,703 for the effective marriage ratio) first administrative unit-year pairs in Sub-Saharan Africa from 1991 to

2023.

We found that, across the continent, marriage markets appear favourable to men when polygyny intensity is not considered, with more women than men entering it. However, this advantage has declined over time. This decline is primarily driven by decreasing population growth rates and narrowing partner age differences, limiting older men's access to larger cohorts of younger women. This pattern holds for nearly all countries in our sample, and is unlikely to be reversed by changes in the other demographic components considered in the model. Projecting forward, we find that marriage markets are likely to remain favourable to men, though increasingly less so, as these demographic trends continue.

When we account for the intensity of polygyny, the picture becomes more concerning, with less women than men available to marry in the marriage market. The decline in the number of wives per husband has stalled since 2006–2010, resulting in a plateau—and even a decline—in the effective marriage ratio, particularly in rural areas, for Muslims, and for certain intensely polygynous ethnic groups.

Historically, high population growth and large partner age gaps allowed intensely polygynous societies to maintain some degree of marriage market balance (Edlund and Ku, 2011). However, these buffers are eroding. Moreover, they were never benign. Large age gaps are associated with lower autonomy for women, poorer sexual and reproductive health outcomes, and greater exposure to intimate partner violence (Evans et al., 2016; Kyei and Bawah, 2024; Teitelman et al., 2011; Volpe et al., 2013). Polygyny is not only linked to higher levels of male-driven conflict (Mokuwa et al., 2011; Renner and Krieger, 2023; Rexer, 2022), but is also correlated with negative economic and health outcomes, including lower household savings, higher infant mortality, and increased rates of child undernutrition (Amare et al., 2021; Edlund and Ku, 2011; Tertilt, 2005; Wagner and Rieger, 2015). The prevailing combination of intense polygyny, high population growth, and large partner age differences is thus both demographically unsustainable and socially costly.

Yet alternative demographic balances are possible—and already observable. In 2016, Burundi maintained a relatively low partner age difference (5.54 years) and population growth rate

(1.7%) while sustaining an effective marriage ratio of 1.053, due to a low polygyny intensity (1.086 wives per husband). Similar demographic configurations were found in South Africa (2016), Rwanda (2020), Gabon (2020), Lesotho (2014), and Madagascar. These examples suggest that marriage markets can remain favourable to men under conditions of low population growth, modest age gaps, and minimal polygyny. Such a trajectory may represent a more equitable demographic transition for many countries in Sub-Saharan Africa.

Our study has important implications for how we conceptualise and measure marriage market squeezes. Static proxies—such as the adult sex ratio or sex ratio at birth—are often misleading, especially in polygynous and demographically dynamic contexts. Our findings highlight the importance of considering dynamic factors—population growth, age gaps, mortality, and polygyny intensity—in shaping marriage markets. This supports calls made in prior theoretical work (Angrist, 2002; Bhaskar, 2019; Neelakantan and Tertilt, 2008) to move beyond simplistic measures of scarcity.

From a policy perspective, our findings suggest that addressing marriage market squeezes requires a multidimensional approach. Investments in maternal and female health, reductions in early marriage, and efforts to address the drivers of polygyny could all contribute to a more equitable marriage landscape. Moreover, since marriage markets often operate at highly localised levels, subnational variation must be acknowledged in program design and policy implementation.

This work also opens several avenues for future research. First, we encourage further empirical efforts to quantify marriage market imbalances across different spatial and demographic groups. As most marriages are endogamous—occurring within specific ethnic, religious, or geographic communities—future research should aim to document how imbalances vary by subgroup and region. Of particular interest might be trends in inter-ethnic and inter-religious marriages, the influence that variations in marriage market imbalances will have on these marriage types, and how the lack of inter-ethnic and inter-religious marriages places further pressure on the marriage market. Second, we call for deeper investigation into how marriage market squeezes interact with broader social outcomes, such as conflict, economic development, inequality, and women's

agency. Lastly, this research challenges assumptions about the presumed link between excess males and violence. If dynamic demographic factors compensate for these imbalances more than previously thought, the foundation of such claims may require re-examination. Our study provides a first step in building the empirical and theoretical tools necessary to assess that possibility.

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Appendix

TABLE A1: Countries and years in sample

Country	Year
Angola	2015
Benin	1996, 2001, 2006, 2012, 2018
Burkina Faso	1993, 1999, 2003, 2010, 2021
Burundi	2010, 2016
Cameroon	1991, 2004, 2011, 2018
Central African Republic	1994
Chad	1997, 2004, 2015
Comoros	1996, 2012
Congo, Democratic Republic of	2007, 2013
Congo, Republic of	2005, 2011
Côte d'Ivoire	1994, 1998, 2012, 2021
Eswatini	2006
Ethiopia	2000, 2005, 2011, 2016
Gabon	2012, 2020
Gambia	2013, 2020
Ghana	1993, 1998, 2003, 2008, 2014, 2022
Guinea	1999, 2005, 2012, 2018
Kenya	2003, 2009, 2014, 2022
Lesotho	2004, 2009, 2014, 2023
Liberia	2007, 2013, 2019
Madagascar	1992, 1997, 2004, 2009, 2021
Malawi	1992, 2000, 2004, 2010, 2015
Mali	1996, 2001, 2006, 2012, 2018
Mauritania	2020
Mozambique	1997, 2003, 2011, 2015, 2022
Namibia	2000, 2007, 2013
Nigeria	2003, 2008, 2013, 2018
Niger	1992, 1998, 2006, 2012
Rwanda	2000, 2005, 2010, 2015, 2020
São Tomé and Príncipe	2008
Senegal	1993, 1997, 2005, 2011, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2023
Sierra Leone	2008, 2013, 2019
South Africa	1998, 2016
Tanzania	1996, 1999, 2004, 2007, 2010, 2012, 2015, 2022
Togo	1998, 2014
Uganda	1995, 2001, 2006, 2011, 2016
Zambia	1992, 1996, 2002, 2007, 2013, 2018
Zimbabwe	1994, 1999, 2005, 2010, 2015

Source: DHS

TABLE A2: DMR and EMR by component

	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Angola							
Sex Ratio at Birth					0.996		
Cohort Size					1.314		
Under 5 Mortality					1.020		
Adult Mortality					1.088		
DMR					<u>1.454</u>		
Wives per Husband					0.393		
EMR					<u>1.061</u>		
Benin	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth		0.967	0.939	0.962	0.922	0.962	
Cohort Size		1.264	1.310	1.307	1.281	1.222	
Under 5 Mortality		1.014	0.999	1.009	1.012	1.018	
Adult Mortality		1.081	1.082	1.075	1.067	1.059	
DMR		<u>1.340</u>	<u>1.332</u>	<u>1.364</u>	<u>1.275</u>	<u>1.269</u>	
Wives per Husband		0.855	0.793	0.684	0.581	0.591	
EMR		<u>0.485</u>	<u>0.539</u>	<u>0.681</u>	<u>0.694</u>	<u>0.679</u>	
Burkina Faso	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth	0.959	0.971	0.945	0.951			0.950
Cohort Size	1.402	1.339	1.423	1.379			1.258
Under 5 Mortality	1.030	1.000	1.002	1.012			1.016
Adult Mortality	1.134	1.109	1.118	1.103			1.099
DMR	<u>1.577</u>	<u>1.443</u>	<u>1.509</u>	<u>1.463</u>			<u>1.333</u>
Wives per Husband	0.976	0.922	0.854	0.685			0.616
EMR	<u>0.601</u>	<u>0.521</u>	<u>0.655</u>	<u>0.778</u>			<u>0.716</u>
Burundi	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth				1.001		0.979	
Cohort Size				1.305		1.099	
Under 5 Mortality				1.014		1.006	
Adult Mortality				1.061		1.059	
DMR				<u>1.406</u>		<u>1.147</u>	
Wives per Husband				0.089		0.086	
EMR				<u>1.317</u>		<u>1.061</u>	
Cameroon	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth	0.970		0.971		0.980	0.970	
Cohort Size	1.358		1.293		1.297	1.279	
Under 5 Mortality	1.018		1.013		1.025	1.023	
Adult Mortality	1.099		1.101		1.090	1.084	
DMR	<u>1.482</u>		<u>1.401</u>		<u>1.421</u>	<u>1.378</u>	

Wives per Husband	0.811		0.565		0.380	0.323	
EMR	<u>0.671</u>		<u>0.836</u>		<u>1.041</u>	<u>1.056</u>	
Central African Republic	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth	0.971						
Cohort Size	1.233						
Under 5 Mortality	1.035						
Adult Mortality	1.100						
DMR	<u>1.361</u>						
Wives per Husband	0.385						
EMR	<u>0.976</u>						
Chad	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth		0.980	0.967		0.948		
Cohort Size		1.412	1.492		1.412		
Under 5 Mortality		1.016	1.014		1.021		
Adult Mortality		1.106	1.100		1.122		
DMR		<u>1.559</u>	<u>1.626</u>		<u>1.533</u>		
Wives per Husband		0.620	0.704		0.565		
EMR		<u>0.939</u>	<u>0.922</u>		<u>0.968</u>		
Comoros	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth		1.028			0.919		
Cohort Size		1.166			1.173		
Under 5 Mortality		1.028			1.010		
Adult Mortality		1.079			1.077		
DMR		<u>1.329</u>			<u>1.170</u>		
Wives per Husband		0.345			0.221		
EMR		<u>0.984</u>			<u>0.949</u>		
Côte d'Ivoire	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth	1.010	0.934			0.958		0.978
Cohort Size	1.359	1.345			1.205		1.233
Under 5 Mortality	1.020	1.050			1.053		1.014
Adult Mortality	1.102	1.098			1.084		1.078
DMR	<u>1.545</u>	<u>1.519</u>			<u>1.317</u>		<u>1.317</u>
Wives per Husband	0.605	0.617			0.433		0.326
EMR	<u>0.940</u>	<u>0.931</u>			<u>0.884</u>		<u>0.992</u>
DRC	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth				0.959	0.983		
Cohort Size				1.223	1.256		
Under 5 Mortality				1.028	1.007		
Adult Mortality				1.067	1.067		
DMR				<u>1.287</u>	<u>1.327</u>		
Wives per Husband				0.334	0.355		

EMR				<u>0.953</u>	<u>0.972</u>		
Eswatini	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth				0.989			
Cohort Size				1.039			
Under 5 Mortality				0.997			
Adult Mortality				1.174			
DMR				<u>1.203</u>			
Wives per Husband				0.369			
EMR				<u>0.834</u>			
Ethiopia	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth		0.934	0.909		0.946	0.935	
Cohort Size		1.303	1.284		1.254	1.240	
Under 5 Mortality		1.012	1.025		1.017	1.020	
Adult Mortality		1.085	1.087		1.074	1.075	
DMR		<u>1.337</u>	<u>1.299</u>		<u>1.293</u>	<u>1.272</u>	
Wives per Husband		0.204	0.214		0.172	0.183	
EMR		<u>1.133</u>	<u>1.085</u>		<u>1.121</u>	<u>1.088</u>	
Gabon	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth					1.014	0.989	
Cohort Size					1.273	1.172	
Under 5 Mortality					1.010	1.012	
Adult Mortality					1.075	1.080	
DMR					<u>1.400</u>	<u>1.268</u>	
Wives per Husband					0.196	0.086	
EMR					<u>1.204</u>	<u>1.181</u>	
Gambia	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth					0.968	0.971	
Cohort Size					1.450	1.324	
Under 5 Mortality					1.000	1.013	
Adult Mortality					1.090	1.098	
DMR					<u>1.530</u>	<u>1.430</u>	
Wives per Husband					0.643	0.565	
EMR					<u>0.887</u>	<u>0.864</u>	
Ghana	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth	0.944	0.958	0.927	0.965	0.962		0.989
Cohort Size	1.198	1.234	1.256	1.211	1.186		1.135
Under 5 Mortality	1.008	1.014	1.002	1.016	1.016		1.010
Adult Mortality	1.062	1.073	1.073	1.065	1.068		1.070
DMR	<u>1.209</u>	<u>1.289</u>	<u>1.253</u>	<u>1.262</u>	<u>1.239</u>		<u>1.214</u>
Wives per Husband	0.588	0.415	0.491	0.297	0.272		0.233

EMR	<u>0.621</u>	<u>0.874</u>	<u>0.762</u>	<u>0.965</u>	<u>0.967</u>		<u>0.981</u>
Guinea	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth		0.947	0.946		0.960	0.925	
Cohort Size		1.363	1.314		1.389	1.406	
Under 5 Mortality		1.023	1.024		1.012	1.006	
Adult Mortality		1.107	1.110		1.111	1.098	
DMR		<u>1.462</u>	<u>1.413</u>		<u>1.499</u>	<u>1.438</u>	
Wives per Husband		0.935	1.381		0.742	0.647	
EMR		<u>0.526</u>	<u>0.032</u>		<u>0.757</u>	<u>0.791</u>	
Kenya	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth			0.965	0.954	0.977		0.983
Cohort Size			1.283	1.258	1.186		1.137
Under 5 Mortality			1.023	1.019	1.008		1.003
Adult Mortality			1.095	1.093	1.095		1.102
DMR			<u>1.390</u>	<u>1.330</u>	<u>1.277</u>		<u>1.237</u>
Wives per Husband			0.308	0.232	0.206		0.170
EMR			<u>1.076</u>	<u>1.114</u>	<u>1.071</u>		<u>1.067</u>
Lesotho	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth			0.978	0.933	0.990		
Cohort Size			0.958	1.043	1.066		
Under 5 Mortality			1.023	1.042	1.017		
Adult Mortality			1.138	1.133	1.124		
DMR			<u>1.091</u>	<u>1.149</u>	<u>1.208</u>		
Wives per Husband					0.028		
EMR					<u>1.180</u>		
Liberia	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth				0.977	0.942	0.959	
Cohort Size				1.418	1.138	1.132	
Under 5 Mortality				1.007	1.009	1.010	
Adult Mortality				1.064	1.052	1.055	
DMR				<u>1.486</u>	<u>1.139</u>	<u>1.157</u>	
Wives per Husband				0.275	0.197	0.160	
EMR				<u>1.211</u>	<u>0.942</u>	<u>0.996</u>	
Madagascar	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth	0.992	0.939	0.932	0.960			0.959
Cohort Size		1.215	1.166	1.167			1.149
Under 5 Mortality	0.972	1.020	1.030	1.001			1.012
Adult Mortality		1.060	1.048	1.048			1.059
DMR		<u>1.232</u>	<u>1.176</u>	<u>1.174</u>			<u>1.181</u>
Wives per Husband	0.066	0.075	0.098	0.049			0.040

EMR		<u>1.156</u>	<u>1.078</u>	<u>1.124</u>			<u>1.141</u>
Malawi	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth	0.990	0.982	0.968	0.978	0.995		
Cohort Size	1.185	1.169	1.185	1.193	1.171		
Under 5 Mortality	1.024	1.014	1.038	1.025	1.021		
Adult Mortality	1.099	1.109	1.096	1.081	1.092		
DMR	<u>1.318</u>	<u>1.291</u>	<u>1.305</u>	<u>1.292</u>	<u>1.298</u>		
Wives per Husband	0.431	0.287	0.297	0.235	0.204		
EMR	<u>0.887</u>	<u>1.004</u>	<u>1.008</u>	<u>1.056</u>	<u>1.094</u>		
Mali	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth		0.975	0.951	0.941	0.929	0.951	
Cohort Size		1.289	1.426	1.470	1.395	1.438	
Under 5 Mortality		1.023	1.016	1.016	1.032	1.013	
Adult Mortality		1.103	1.095	1.095	1.093	1.095	
DMR		<u>1.418</u>	<u>1.510</u>	<u>1.538</u>	<u>1.461</u>	<u>1.519</u>	
Wives per Husband		0.615	0.561	0.470	0.447	0.446	
EMR		<u>0.804</u>	<u>0.949</u>	<u>1.068</u>	<u>1.014</u>	<u>1.073</u>	
Mauritania	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth						0.974	
Cohort Size						1.341	
Under 5 Mortality						1.007	
Adult Mortality						1.072	
DMR						<u>1.413</u>	
Wives per Husband						0.088	
EMR						<u>1.325</u>	
Mozambique	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth		0.994	0.957		1.002		0.986
Cohort Size		1.225	1.176		1.188		1.208
Under 5 Mortality		1.025	1.000		1.012		1.012
Adult Mortality		1.100	1.096		1.089		1.109
DMR		<u>1.370</u>	<u>1.233</u>		<u>1.314</u>		<u>1.337</u>
Wives per Husband		0.497	0.434		0.300		0.235
EMR		<u>0.873</u>	<u>0.799</u>		<u>1.014</u>		<u>1.102</u>
Namibia	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth		1.007		0.992	1.029		
Cohort Size		1.161		1.081	1.154		
Under 5 Mortality		1.008		1.027	1.005		
Adult Mortality		1.126		1.134	1.134		
DMR		<u>1.329</u>		<u>1.251</u>	<u>1.353</u>		
Wives per Husband		0.231		0.110	0.103		

EMR		<u>1.098</u>		<u>1.141</u>	<u>1.250</u>		
Niger	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth	0.944	1.002		0.950	0.944		
Cohort Size	1.441	1.439		1.516	1.533		
Under 5 Mortality	0.969	0.973		1.012	1.015		
Adult Mortality	1.099	1.087		1.085	1.076		
DMR	<u>1.449</u>	<u>1.525</u>		<u>1.583</u>	<u>1.578</u>		
Wives per Husband	0.520	0.519		0.860	0.446		
EMR	<u>0.930</u>	<u>1.005</u>		<u>0.722</u>	<u>1.132</u>		
Nigeria	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth			0.923	0.951	0.952	0.949	
Cohort Size			1.340	1.324	1.305	1.254	
Under 5 Mortality			1.013	1.015	1.014	1.017	
Adult Mortality			1.118	1.102	1.094	1.090	
DMR			<u>1.406</u>	<u>1.410</u>	<u>1.380</u>	<u>1.319</u>	
Wives per Husband			0.565	0.457	0.416	0.378	
EMR			<u>0.824</u>	<u>0.953</u>	<u>0.964</u>	<u>0.941</u>	
Republic of the Congo	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth			0.985		0.977		
Cohort Size			1.298		1.236		
Under 5 Mortality			1.007		1.008		
Adult Mortality			1.060		1.058		
DMR			<u>1.362</u>		<u>1.289</u>		
Wives per Husband			0.298		0.211		
EMR			<u>1.064</u>		<u>1.078</u>		
Rwanda	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth		0.967	0.986	0.950	0.979	0.971	
Cohort Size		1.050	1.153	1.126	1.114	1.100	
Under 5 Mortality		1.035	1.001	1.011	1.009	1.004	
Adult Mortality		1.082	1.052	1.058	1.058	1.062	
DMR		<u>1.136</u>	<u>1.197</u>	<u>1.141</u>	<u>1.164</u>	<u>1.140</u>	
Wives per Husband		0.168	0.254	0.102	0.090	0.097	
EMR		<u>0.968</u>	<u>0.942</u>	<u>1.040</u>	<u>1.074</u>	<u>1.043</u>	
São Tomé and Príncipe	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth				0.955			
Cohort Size				1.129			
Under 5 Mortality				1.041			
Adult Mortality				1.060			
DMR				<u>1.192</u>			
Wives per Husband				0.341			

EMR	<u>0.851</u>						
Senegal	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth	1.000	0.975	0.947		0.966	0.967	
Cohort Size	1.474	1.392	1.324		1.414	1.386	
Under 5 Mortality	1.010	1.016	1.015		1.013	1.009	
Adult Mortality	1.120	1.117	1.088		1.087	1.084	
DMR	<u>1.664</u>	<u>1.543</u>	<u>1.383</u>		<u>1.504</u>	<u>1.465</u>	
Wives per Husband	0.858	0.560	0.674		0.541	0.480	
EMR	<u>0.806</u>	<u>0.983</u>	<u>0.709</u>		<u>0.963</u>	<u>0.985</u>	
Sierra Leone	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth				0.988	0.940	0.976	
Cohort Size				1.298	1.251	1.234	
Under 5 Mortality				1.002	1.024	1.027	
Adult Mortality				1.097	1.072	1.067	
DMR				<u>1.410</u>	<u>1.293</u>	<u>1.319</u>	
Wives per Husband				0.479	0.439	0.381	
EMR				<u>0.930</u>	<u>0.854</u>	<u>0.938</u>	
South Africa	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth		0.962				0.942	
Cohort Size		1.062				1.049	
Under 5 Mortality		1.018				1.017	
Adult Mortality		1.105				1.099	
DMR		<u>1.150</u>				<u>1.105</u>	
Wives per Husband		0.087				0.034	
EMR		<u>1.063</u>				<u>1.071</u>	
Tanzania	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth		1.011	0.980	1.000	1.004		0.974
Cohort Size		1.185	1.230	1.139	1.238		1.215
Under 5 Mortality		1.020	1.017	1.017	1.009		1.021
Adult Mortality		1.092	1.083	1.059	1.075		1.059
DMR		<u>1.321</u>	<u>1.327</u>	<u>1.223</u>	<u>1.341</u>		<u>1.281</u>
Wives per Husband		0.454	0.369	0.328	0.481		0.242
EMR		<u>0.839</u>	<u>0.958</u>	<u>0.895</u>	<u>1.056</u>		<u>1.036</u>
Togo	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Sex Ratio at Birth		0.987			0.964		
Cohort Size		1.283			1.228		
Under 5 Mortality		1.023			1.012		
Adult Mortality		1.088			1.061		
DMR		<u>1.409</u>			<u>1.271</u>		
Wives per Husband		0.782			0.526		

EMR	<u>0.628</u>		<u>0.745</u>				
Uganda	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth	1.023		0.999	0.973	0.960	0.990	
Cohort Size	1.167		1.223	1.194	1.199	1.221	
Under 5 Mortality	1.009		1.018	1.029	1.019	1.017	
Adult Mortality	1.102		1.107	1.078	1.080	1.081	
DMR	<u>1.327</u>		<u>1.375</u>	<u>1.289</u>	<u>1.266</u>	<u>1.329</u>	
Wives per Husband	0.581		0.445	0.470	0.396	0.405	
EMR	<u>0.746</u>		<u>0.930</u>	<u>0.819</u>	<u>0.871</u>	<u>0.924</u>	
Zambia	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth	1.012	0.992	0.996	1.010	0.990	1.001	
Cohort Size		1.213	1.250	1.253	1.217	1.196	
Under 5 Mortality	1.032	1.027	1.037	1.040	1.010	1.014	
Adult Mortality		1.121	1.108	1.087	1.076	1.079	
DMR		<u>1.386</u>	<u>1.432</u>	<u>1.432</u>	<u>1.309</u>	<u>1.308</u>	
Wives per Husband	0.365	0.289	0.310	0.212	0.178	0.162	
EMR		<u>1.097</u>	<u>1.122</u>	<u>1.220</u>	<u>1.131</u>	<u>1.147</u>	
Zimbabwe	1991- 1995	1996- 2000	2001- 2005	2006- 2010	2011- 2015	2016- 2020	2021- 2022
Sex Ratio at Birth	0.975	0.981	0.975	0.997	0.987		
Cohort Size	1.007	1.133	1.069	1.113	1.088		
Under 5 Mortality	1.010	1.014	1.006	1.022	1.012		
Adult Mortality	1.119	1.173	1.133	1.118	1.090		
DMR	<u>1.110</u>	<u>1.325</u>	<u>1.187</u>	<u>1.269</u>	<u>1.182</u>		
Wives per Husband	0.307	0.219	0.195	0.184	0.164		
EMR	<u>0.803</u>	<u>1.106</u>	<u>0.992</u>	<u>1.085</u>	<u>1.018</u>		

Source: Own calculations using data from DHS and WDI.

TABLE A3: Partner age difference over years regression

(1)	
Partner age difference	
Year	-0.043*** (0.008)
Constant	93.773*** (15.386)
Observations	1824

Standard errors in parentheses.

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

Source: Own calculations using data from DHS.

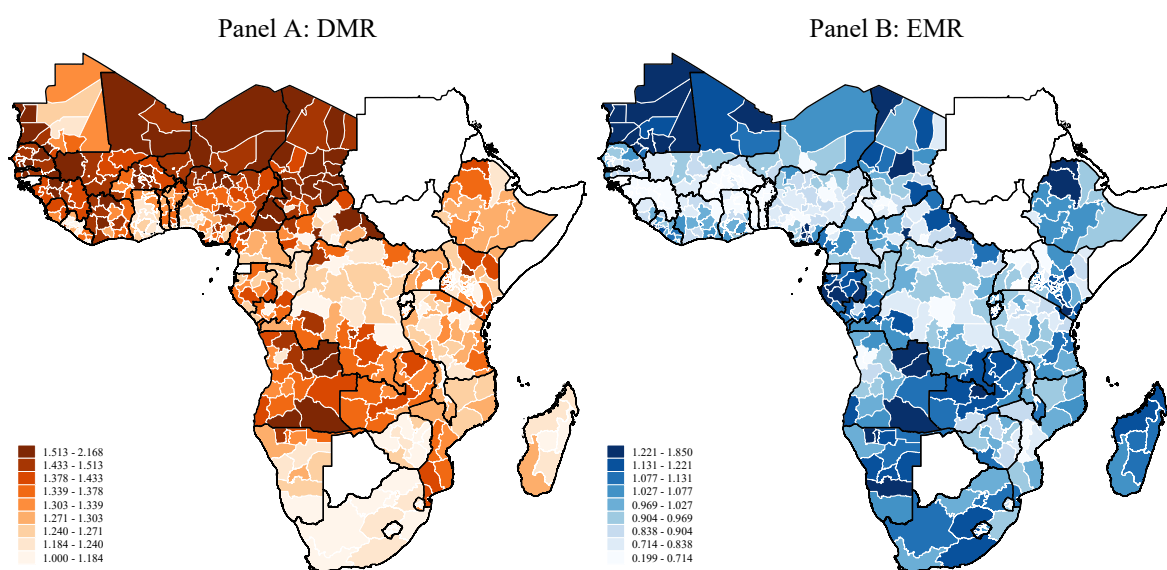


FIGURE A1: DMR and EMR by admin 1 level
Source: Own calculations using data from DHS and WDI.

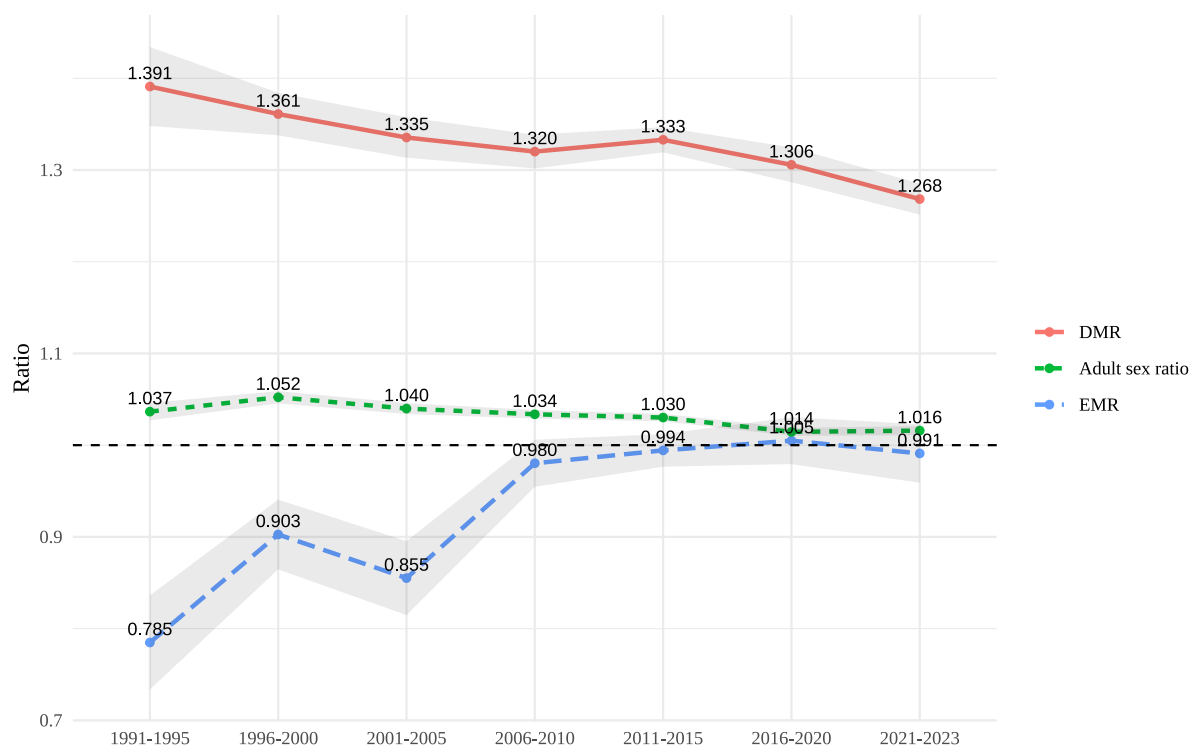


FIGURE A2: Adult sex and marriage ratios over time
Note: The grey area represents 95% confidence intervals.
Source: Own calculations using data from DHS and WDI.