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# The Impact of Conflict on Early Marriage in Yemen:

## A Test of the Insecurity Mechanism

**Maia Sieverding**

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**The impact of conflict on early marriage in Yemen: A test of the insecurity mechanism**

Maia Sieverding
American University of Beirut

**Abstract**

The Sustainable Development Goals call for the elimination of marriage prior to 18, which leads to a wide range of negative outcomes for women and their children. Progress towards this goal has stalled in the Middle East and North Africa region, and there has been considerable debate about the potential role of conflict and forced displacement in this trend. This study focuses on the case of Yemen, which has suffered from a devastating, decade-long civil war that has plunged the country into one of the world's worst humanitarian crises. Early marriage rates were high in Yemen prior to the war, but only one study in three governorates has examined early marriage post-2015. The analysis links georeferenced conflict event data from the Armed Conflict Location and Event Database for Yemen from 2015 – 2022 to the 2022-23 Yemen Multiple Indicator Cluster Survey. Kaplan-Meier failure estimates are used to describe trends in early marriage accounting for the censoring of marriage age. Complementary log-log discrete time hazard models are then estimated incorporating time-varying covariates for different types of conflict exposure, including conflict intensity, exposure to remote vs. direct violence events, and displacement status. The results indicate that early marriage rates have declined substantially in Yemen during the conflict period. However, variation in conflict exposure is unassociated with the risk of early marriage.

## 1. Introduction

The Sustainable Development Goals call for the elimination of early marriage, defined as a formal or informal union in which at least one of the parties is under age 18 (UNICEF, n.d.). Globally, early marriage overwhelmingly affects girls and puts them at risk of a wide range of negative outcomes, including lower educational attainment, early and closely-spaced pregnancies, poorer sexual and reproductive health, more limited social networks and mobility, reduced autonomy and greater exposure to intimate partner violence (Malhotra and Elnakib 2021). Children born to women married as teenagers also experience poorer survival outcomes (Malhotra and Elnakib 2021). Increasingly, attention has also turned to the societal costs of these negative outcomes for women married before age 18 and their children, with the estimated global economic impacts of early marriage reaching tens of billions of dollars annually (Wodon et al. 2017).

Early marriage has declined globally; 21 percent of women aged 20-24 in 2010-2016 had married before age 18 compared to 25 percent a decade earlier (UNICEF 2018). However, there is substantial variation in early marriage rates both cross-nationally and within many countries (UNICEF and ICRW 2017; UNICEF 2018). Progress towards reducing early marriage has also been uneven. The Middle East and North Africa (MENA) in particular is a region in which, after seeing steady declines in early marriage rates through the early 2000s, progress towards elimination of the practice has stalled (UNICEF and ICRW 2017; UNICEF 2018). There has been considerable debate about the degree to which the spread of armed conflict across the region has contributed to this trend (e.g. UNICEF and ICRW 2017; UNICEF 2014; El Arab and Sagbakken 2019; Elnakib et al. 2023). Empirical evidence regarding the relationship between conflict and early marriage is mixed (Neal, Stone, and Ingham 2016; Elnakib et al. 2023; Krafft et al. 2024) and complicated by differences in methodologies, the varying nature of conflicts and conflict exposure and pre-conflict marriage patterns.

This paper focuses on the case of Yemen, which has historically had high rates of early marriage but was making progress in reducing the practice prior to the civil war that began in 2014/15 (Ministry of Health and Population (Yemen) et al. 2015). Despite being identified as a high-burden, high-priority country by the UNICEF-UNFPA Global Programme to End Child Marriage (UNICEF and UNFPA, n.d.) and having the highest rates of early marriage in the MENA region, along with Sudan, Yemen is under-represented in the literature on early marriage (Malhotra and Elnakib 2021). This gap is particularly important given the devastating consequences of Yemen's decade-long civil war, which has consistently been identified as one of the worst humanitarian crises in the world (OCHA 2021; 2023; WFP et al. 2017). Little is known about how the conflict in Yemen has affected girls' risk of early marriage. One study conducted in three governorates found higher rates of early marriage among internally displaced women than host populations, as well as rising rates of early marriage among the displaced (Elnakib et al. 2023; 2024). However, internally displaced people (IDPs) are a selected population and forced displacement is only one form of conflict exposure.

In this paper, I examine the impact of conflict on early marriage in Yemen by linking geo-referenced conflict event data to the 2022-23 Yemen Multiple Indicator Cluster Survey, one of the first nationally representative household surveys to be conducted in Yemen since the start of the post-2015 civil war. Using complementary log-log survival models incorporating time-varying measures of conflict exposure, I examine how different types of conflict exposure are associated with the risk of early marriage. The exposure measures include birth cohort, governorate-level conflict intensity and experience of displacement. I also test whether exposure to remote violence (e.g. aerial strikes) versus direct violence that entails proximity of armed forces to civilian populations are differentially associated with early marriage risk. This latter exposure measure builds on previous evidence that insecurity and the associated risk of sexual violence is a driver of early marriage in conflict settings (Shemyakina 2013; Cetorelli 2014; Sieverding et al. 2020; Hunersen et al. 2021). The paper thus makes two main contributions to the

literature on conflict and early marriage. First, to the best of my knowledge, it is the first study on early marriage in Yemen since the onset of the post-2015 civil war to use nationally representative data as well as the first to examine forms of conflict exposure other than internal displacement. Second, it is one of few global studies to distinguish between different types of conflict exposure and early marriage risk, and specifically to test this insecurity mechanism in a quantitative framework.

## 2. Conceptual framework and hypotheses

The drivers of early marriage are complex and context-specific, complicating efforts to identify effective approaches to addressing the practice across different countries or even different communities within the same country (Psaki et al. 2021; Malhotra and Elnakib 2021). Psaki et al. (2021) propose a consolidated conceptual framework of the drivers of early marriage based on a cross-national literature review. They identify poverty and social norms favorable to early marriage as key macro-level factors that sustain the practice. Such social norms may include norms around the transition to adulthood, sexuality, gendered economic roles and other social domains as well as early marriage directly. Lack of educational and economic opportunities, girls' lack of agency over the decision to marry, and fear of girls' sexuality and (out-of-wedlock) pregnancy are more proximate, household- and individual-level factors that then drive early marriage within this macro environment.

The Psaki et al. (2021) framework, as with other conceptual models of the drivers of early marriage (Marcus and Page 2014; Girls Not Brides 2016), is primarily based on non-conflict settings and does not explicitly incorporate conflict or forced displacement. Meanwhile, a growing empirical literature, motivated by the spread of large-scale conflicts and resulting displacement over the past decade, has examined the extent to which conflict exposure increases early marriage rates, with mixed results (Neal, Stone, and Ingham 2016; Elnakib et al. 2023; Krafft et al. 2024). In some contexts, including Iraq (Cetorelli 2014) and Mali (Randall 2005), early marriage was found to increase among conflict-affected populations. However, in contexts including civil war Lebanon (Saxena, Kulczycki, and Jurdi 2004), the West Bank and Gaza (Khawaja, Assaf, and Jarallah 2009), Tajikistan (Shemyakina 2013) and Azerbaijan (Torrisi 2022) conflict led to declines in early marriage. In a cross-national analysis of 19 countries, Krafft et al. (2024) found that conflict significantly reduced early marriage in four countries, increased early marriage in seven countries and had no relationship with early marriage in eight countries. Broadly, lower-intensity conflict more commonly led to reductions in early marriage whereas higher-intensity conflict more commonly led to increases in early marriage (Krafft et al. 2024). In the case of Yemen, which has experienced high-intensity conflict over a period of nearly a decade, I therefore hypothesize that:

> (H1) Early marriage has increased among cohorts of women reaching their teenage years during the post-2015 civil war; and
> (H2) More intense conflict exposure is associated with greater risk of early marriage.

Among populations displaced by conflict, a cross-national comparative study similarly found no consistent relationship between displacement status and early marriage rates (Elnakib et al. 2023). Among Syrian refugees in MENA host countries, displacement has been found to be associated with lower rates of early marriage in South Lebanon (Elnakib et al. 2022), higher rates in Turkey (Foster, Gökçe, and Kırdar 2024) and no change in Jordan (Sieverding et al. 2020). In Yemen, a study in three governorates (Aden, Maarib and Hadramawt) found a higher hazard of early marriage among IDPs as compared to host populations, but this result was heterogenous across governorates and was only significant for IDPs in Aden (Elnakib et al. 2024). This finding could furthermore be driven by the selectedness of IDPs. Using the same data, another study also found higher rates of early marriage among the youngest IDPs relative

to older IDP women, which is suggestive of an increase in early marriage rates among this population (Elnakib et al. 2023). Based on this finding, I hypothesize that:

> (H3) The risk of early marriage is greater among displaced women than those not displaced.

Empirical variation in the relationship between conflict and early marriage may be in part a result of the multiple ways in which conflict may affect the drivers of early marriage. Key mechanisms highlighted by recent literature related to the economic, demographic and security impacts of experiencing conflict. Conflict and displacement are often associated with increased poverty, which may accelerate both families' and girls' decisions to marry (Foster, Gökçe, and Kırdar 2024), a factor that has been noted in a qualitative study in Yemen (Hunersen et al. 2021). On the other hand, in contexts such as many MENA countries where men are expected to make significant economic outlays upon marriage, conflict-induced economic hardship may act to reduce marriage rates (Saxena, Kulczycki, and Jurdi 2004; Khawaja, Assaf, and Jarallah 2009; Sieverding et al. 2020). From a demographic perspective, conflict may reduce the availability of marriageable men due to involvement in fighting and/or excess mortality (de Walque 2006; Neal, Stone, and Ingham 2016) and may disrupt social and kinship networks that facilitate marriage ties (Sieverding et al. 2020).

Insecurity may also be a driver of increasing early marriage rates during conflict (Cetorelli 2014; Shemyakina 2013). Qualitative research in MENA (Mourtada, Schlecht, and DeJong 2017; Bartels et al. 2018; Sieverding et al. 2020), including in Yemen (Hunersen et al. 2021), has highlighted how heightened insecurity and fear of sexual violence leads families to view early marriage as a form of "protection" for girls among conflict-affected populations. Thus, while gender norms around girls' sexuality are a driver of early marriage even in stable settings (Psaki et al. 2021), experiences of conflict- and displacement-driven security risks may exacerbate this driver. In order to investigate this driver in a quantitative framework, the paper tests the final hypothesis:

> (H4) The nature of conflict events matters for the risk of early marriage. Specifically, exposure to direct violence (i.e. violence that entails proximity of armed parties to civilian populations) is associated with greater risk of early marriage than exposure to remote violence (e.g. aerial strikes).

## 3. Civil war and early marriage in Yemen

Yemen, one of the poorest countries in the MENA region, has been facing years of a complex, internationalized armed conflict. Protests during the 2011 Arab Spring ousted the country's long-time President, Ali Abdullah Saleh, who had ruled Yemen since the reunification of the North and South of the country in 1990 (UCDP, n.d.). Saleh handed over power to his vice president, Abdrabbuh Mansour Hadi, for what was to be an interim period from 2012-2014. However, Hadi unilaterally extended his term in January 2014. Clashes soon began with the primarily Zaydi Ansarallah movement, commonly known as the Houthis, which pre-existed the civil war but shifted its aims to include deposing the Hadi government (UCDP, n.d.).

The conflict escalated rapidly from the end of 2014 through early 2015. The Houthi movement was able to take over Yemen's capital, Sana'a, in January 2015 and placed Hadi and several key ministers under house arrest (UCDP, n.d.; ACLED 2024b). The conflict was subsequently internationalized, as a Saudi-led coalition began military intervention to reinstate the Hadi government, while Iran strengthened its support for the Houthis (Guha Sapir et al. 2022; UCDP, n.d.). Multiple other non-state groups have been parties to the conflict in different regions and time periods, including factions that have split from the broad forces supporting the Houthis and the Hadi government (UCDP, n.d.). The Armed Conflict

Location and Events Data used in this paper records over 700 distinct conflict actors active in Yemen since 2015 (ACLED 2024b).

In 2018, the Stockholm Agreement was signed, a partially-implemented peace agreement that included a ceasefire around Hudaydah city, an important Red Sea port (UCDP, n.d.). After another re-escalation of the conflict between the Houthis and supporters of Hadi in 2020-2021, Hadi resigned in April 2022 and a United Nations mediated ceasefire came into effect throughout the country. While the ceasefire officially expired in October 2022, renewed talks continued throughout 2023 and the conflict was maintained at a lower intensity during this period (UCDP, n.d.; ACLED 2024b). Figure 1 shows the relative decline in conflict intensity in 2023 compared to previous years, and particularly compared to the peak years of 2018 – 2020 when Yemen suffered over 10,000 conflict events annually.

**Figure 1: Conflict events in Yemen by year, 2015 – 2023**
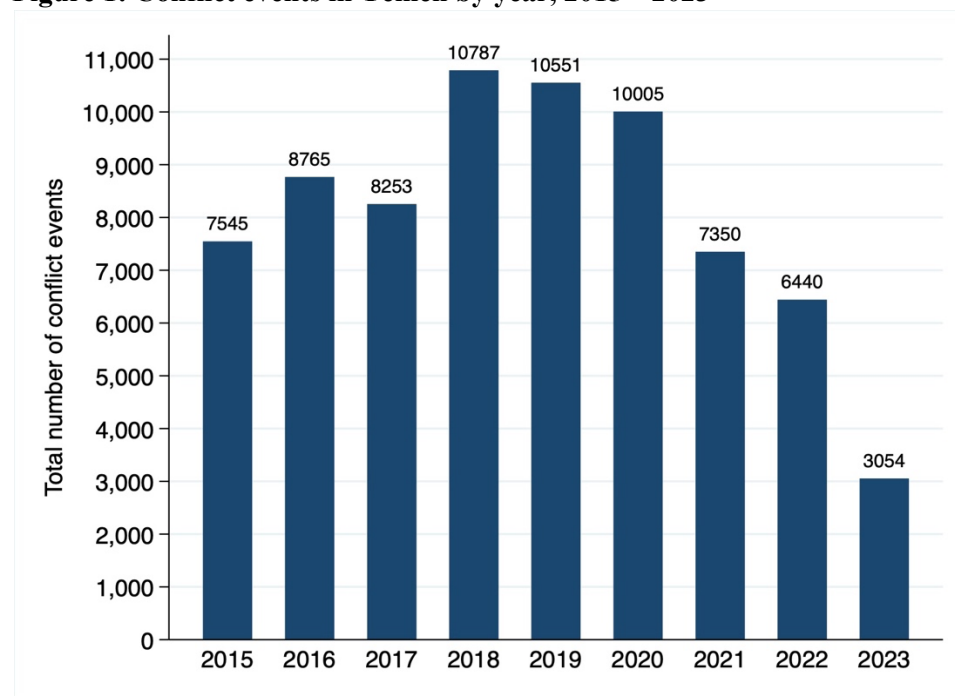


*Notes: Author's elaboration from the Armed Conflict Location and Events Database for Yemen (Raleigh, Kishi, and Linke 2023). Events include all events of political violence as coded by ACLED.*

Relentless air and drone strikes during the conflict have devastated Yemen's infrastructure, including healthcare facilities and food supply chains, while a blockade of key ports, such as Sana'a, has exacerbated food and aid scarcities (OCHA 2021). This has further impacted the already struggling healthcare sector, especially for women of childbearing age, who have limited or no access to reproductive health service (OCHA 2023). Meanwhile, Yemen's economy has collapsed, leaving it unable to import essential goods, creating one of the worst humanitarian crises in the world (WFP et al. 2017). By the end of December 2023, 21.6 million people in Yemen were in need of humanitarian assistance, including 4.5 million internally displaced persons (IDPs) (UNCHR 2024).

Yemen was a high-burden country for early marriage prior to the current conflict, with higher prevalence rates that many other countries in the MENA region (UNICEF and ICRW 2017). The limited data available suggest that early marriage rates were declining slowly prior to 2014. The most recent Demographic and Health Survey (DHS), conducted in 2013 shortly before the conflict escalated, reported that median age at marriage had risen to 18.2 years among women aged 25-49 at the time of the survey

compared to 16.0 years in 1997.[1] Among women aged 20-24 at the time of the survey, 31.9% had been married prior to age 18 and 9.4% prior to age 15 (Ministry of Health and Population (Yemen) et al. 2015). While median age at marriage in urban areas was only one year higher (18.9 years) than in rural areas (17.9 years), there was a substantial educational gradient in marriage ages, with women with secondary school having a median age at marriage nearly three years older (20.5 years) than those with no education (17.4 years). There was also subnational variation, with median ages at marriage ranging from 21.7 years in Aden to 16.6 years in Al Jawf governorate (Ministry of Health and Population (Yemen) et al. 2015).

Descriptive statistics from the 2022-23 Yemen Multiple Indicator Cluster Survey (MICS), the primary data source for this paper, suggest that early marriage prevalence may have declined slightly during the conflict period. Among women aged 20-24 in 2022-23, 29.6% had married before age 18 and 6.5% before age 15 (Central Statistical Organization (CSO) and UNICEF 2023). As with the 2013 DHS, the 2022-23 MICS demonstrated a strong educational gradient in early marriage and some regional variation. The rural-urban gap in prevalence of marriage before age 18 was about four percentage points (Central Statistical Organization (CSO) and UNICEF 2023). These figures do not account for differences in conflict exposure.


## 4. Methods

### 4.1 Data sources

#### 4.1.1 Yemen Multiple Indicator Cluster Survey 2022-23

The primary data source is the nationally representative 2022-23 Yemen Multiple Indicator Cluster Survey (YMICS) (Central Statistical Organization (CSO) and UNICEF 2023). The YMICS used a multi-stage cluster sampling strategy with rural and urban areas in each governorate as the main sampling strata. Due to the ongoing conflict, data collection for the southern part of Yemen was conducted from a hub in Aden from July – September 2022 and data collection for the northern part of the country was conducted from a hub in Sana'a from January – May 2023.[2]  The MICS data includes 31,134 women of reproductive age (15-49), who constitute the analytical sample for this paper. Surveys with this sample were conducted from June 29 -September 22, 2022 and January 1 - May 25, 2023.

A notable limitation of the YMICS data for this analysis is that it does not include the geographic coordinates of enumeration areas, which has become a more widespread practice in many nationally representative household surveys to facilitate linkage with external datasets. Measures of conflict exposure can therefore only be linked to the dataset at the governorate level and more granular matching between respondents' location of residence and conflict exposure is not possible. However, it is the only national household survey available for Yemen post-2015 that includes age at marriage.


#### 4.1.2 Armed Conflict Location and Events Data database

The second data source is the Armed Conflict Location and Events Data (ACLED) database (Raleigh et al. 2010; Raleigh, Kishi, and Linke 2023). ACLED is a publicly available, geo-located database on

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[1] Analyses of Demographic and Health Surveys conducted in 1991 and 1997 found median ages at marriage ranging from 16-18 (Central Statistical Organization (Yemen) and Macro International 1998; Eltigani 2001; Sunil and Pillai 2004). The analyses use different age groups for the calculation of median age at marriage and it is unclear the degree to which some of them take censoring of marriage age into account.
[2] Of a target 880 enumeration areas, 41 could not be surveyed due to security concerns.

political conflict around the world. ACLED data is event-based, i.e. the observation is a conflict event that consists of an interaction between at least two parties in a specific location on a given date. Among similar conflict event databases, ACLED is distinguished by its relatively broad definition of conflict and particularly conflict involving non-state actors (Raleigh, Kishi, and Linke 2023). Event data is compiled from news reports; in Yemen, ACLED collaborates with the Yemen Data Project to compile events from both local and international, English and Arabic language sources (ACLED 2024b). ACLED data have been widely used in studies of the economic and demographic impacts of conflict (e.g. Thiede et al. 2020; Torrisi 2024; Andriano and Ebbinghaus 2024; Liu, Modrek, and Sieverding 2019) as well as a recent study on the mortality impacts of the civil war in Yemen (Guha Sapir et al. 2022). Its key advantages for this study, compared to other conflict evet datasets, include the depth of the data collection process for a country that is relatively under-covered in the news and the breadth of the conflict event types that meet the dataset inclusion criteria.

ACLED covers Yemen from January 1, 2015 through the present (ACLED 2024b).[3] While the early stages of the civil war are thus missed in the data, this limitation is balanced by the advantages of the dataset relative to other options, and particularly the Uppsala Conflict Data Program (UCDP) dataset, which covers Yemen for a longer time frame but adopts a more restrictive definition of conflict. For this analysis, the data are limited to events taking place between January 1, 2015 and June 28, 2022, the day before the first MICS survey was conducted.

*4.2 Measures*

**4.2.1 Measures derived from the YMICS**

The key outcome of interest, marriage before age 18, is taken from the YMICS.[4] I also examine very early marriage, before age 15.

Two of the exposure measures are also derived from the YMICS. To test H1 regarding cohort exposure to conflict, women's year of birth is used to construct cohorts that were of varying ages when the conflict intensified in 2015.[5] This variable thus captures the extent to which women were exposed to conflict during the years in which they were at risk of early marriage (Shemyakina 2013; Torrisi 2022). The main variable is constructed as the following birth cohorts: pre-1981; 1981-1990 (exposed to early marriage pre-conflict); 1991-1996 (age 19-24 in 2015, exposed to early marriage prior to the intensification of the conflict); 1997-1999 (age 16-18 in 2015, exposed during peak early marriage ages), 2000-2005 (age 10-15 in 2015, exposed to conflict throughout their teen years) and 2006-2008 (age 7-9 in 2015, exposed to conflict prior to and entering teen years). For analyses among some sub-populations (e.g. IDPs), these birth cohorts are aggregated into 1981-1990 ("Pre-1990 exposed cohort") 1991-1996 ("Pre-war exposed cohort") and 1997-2008 ("War exposed cohort") due to sample size considerations.

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[3] The version of ACLED used in this paper was downloaded on June 5, 2024 and includes events recorded through May 24, 2024.

[4] Ever married women in the MICS were asked how old they were when they first started living with their husband, as well as the year and month in which they started living with their husband. For the small number of women (N=629) who had had multiple marriages, this data was also collected for their first marriage. Month of first marriage reporting was affected by recall, and was only reported by 39% of women. MICS has imputed the data so that the age at marriage variable is complete.

[5] 513 women are dropped from this analysis due to missing birth year.

To test H3, currently displaced women (IDPs) are identified through a question on residential mobility where a reason for the move could be "conflict/violence/fear for life." For women identified as IDPs, time and location of move are identified through retrospective questions on how many years they have spent in their current place of residence and which governorate they lived in prior to the current place of residence. These data likely capture respondents' most recent move and do not account for women who may have been displaced multiple times or displaced and then returned to their place of origin.

**4.2.1 Measures derived from ACLED**

ACLED includes detailed information on each event recorded, including the date, event type, actors involved, location (at different levels of administrative geography), geocoordinates and fatalities. The key variable of interest for this study is event type. ACLED codes events at several levels (ACLED 2024a). The broadest level distinguishes between political violence, demonstrations and strategic developments. In this analysis, events are restricted to those classified as political violence, which pose the greatest direct threat to civilians. Demonstrations as coded by ACLED are overwhelmingly peaceful, and strategic developments entail non-violent events, e.g. agreements or changes to the structure of conflict parties, that are relevant to the conflict.[6]

There were 66,842 events of political violence recorded in Yemen during the period of interest (January 2015 – June 2022), constituting 90.3% of all events during the time frame. ACLED recorded conflict events in all 18 of Yemen's governorates during this period. However, conflict intensity varied considerably by governorate (Table 1) and over time.[7] Based on this variation, for each year from 2015 – 2022, governorates were classified by intensity of conflict as follows: low intensity <25th percentile of total events in the year, medium intensity 25-75th percentile of total events in the year and high intensity >75th percentile of total events in the year. A similar approach of creating a three-level categorical measure of conflict intensity was followed by Krafft et al. (2024). This time-varying, categorical measure of total conflict intensity is used as the key exposure measure to test H2 in the multivariate models. For descriptive analyses, governorates are classified into a time-invariant grouping of low, medium and high intensity based on the same percentiles of total events in the overall period from 2015-2022 (Table 1).

**Table 1: Number of conflict events by type by governorate, ACLED Yemen January 2015 – June 2022, and conflict intensity categorization**

| Governorate | Remote violence events | Direct violence events | Total events | Conflict intensity categorization |
|---|---|---|---|---|
| Abyan | 444 | 975 | 1,419 | Medium |
| Ad Dali | 1,015 | 1,851 | 2,866 | Medium |
| Aden | 553 | 1,265 | 1,818 | Medium |
| Al Bayda | 1,337 | 1,540 | 2,877 | Medium |
| Al Hudaydah | 9,003 | 2,798 | 11,801 | High |
| Al Jawf | 2,418 | 1,665 | 4,083 | High |
| Al Mahrah | 9 | 45 | 54 | Low |

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[6] Within the period of interest, ACLED recorded 4,061 strategic developments (5.5% of all events), 2,786 protests (3.8% of all events) and 373 riots (0.5% of all events). Of the protests, 93.6% were peaceful. A small number of events that ACLED categorizes as both demonstrations and political violence (95 events of excessive force against protesters and 37 mob violence events) were dropped under these inclusion restrictions.
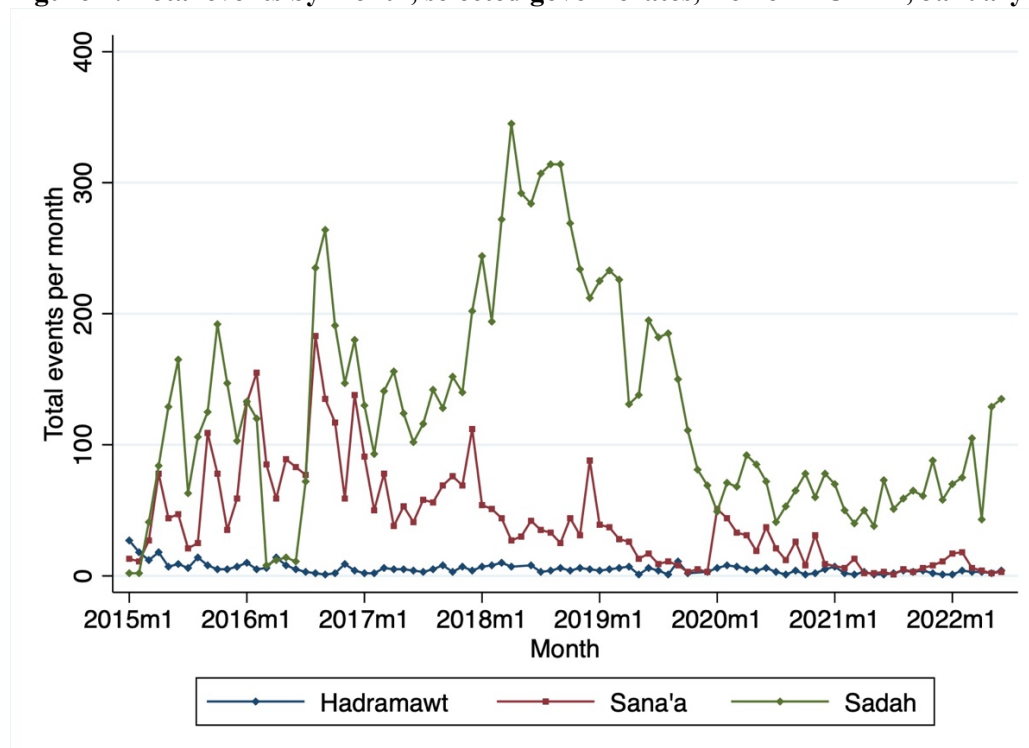
[7] 22 events are dropped because they lack location data.

| | | | | |
|---|---|---|---|---|
| Al Mahwit | 68 | 23 | 91 | Low |
| Amanat al Asimah | 1,464 | 297 | 1,761 | Medium |
| Amran | 452 | 69 | 521 | Medium |
| Dhamar | 203 | 175 | 378 | Low |
| Hadramawt | 141 | 336 | 477 | Low |
| Hajjah | 3,206 | 853 | 4,059 | High |
| Ibb | 337 | 466 | 803 | Medium |
| Lahij | 661 | 693 | 1,354 | Medium |
| Marib | 4,533 | 2,900 | 7,433 | High |
| Raymah | 16 | 12 | 28 | Low |
| Sadah | 9,331 | 2,120 | 11,451 | High |
| Sanaa | 2,828 | 957 | 3,785 | Medium |
| Shabwah | 673 | 848 | 1,521 | Medium |
| Suqutra | 4 | 48 | 52 | Low |
| Taizz | 4,134 | 4,054 | 8,188 | High |
| **Total** | **42,830** | **23,990** | **66,820** | |

*Notes: Author's calculation from ACLED Yemen.*

In an alternative specification, conflict intensity is defined as the total conflict events per year per governorate. Figure 2 illustrates temporal variation in total events for a selected low (Hadramawt), medium (Sana'a) and high (Sadah) intensity governorate. Variation in number of events per year for all governorates can be seen in Appendix Table A2.

**Figure 2: Total events by month, selected governorates, Yemen ACLED, January 2015 – June 2022**

Within the political violence category, the key distinction of interest is between events of remote violence – i.e. that do not entail proximity of conflict parties to civilian populations – and those that occur in closer proximity to populations. Remote violence is an event type coded directly by ACLED and the coding was maintained as is for this analysis.[8] Direct violence was constructed by aggregating the ACLED sub-event types of battles and violence against civilians.[9] While remote violence events predominated (64.1% of events during the period), this was particularly the case in the earlier years covered. Between 2020 - 2021, direct violence events became as common as remote violence (Figure 3). To test H4 about exposure to different types of conflict events, exposure is defined low (<25th percentile), medium (25th-75th percentile) and high (>75th percentile) for each governorate-year combination from 2015-2022 for each of i) remote violence and ii) direct violence.

**Figure 3: Total, direct and remote violence events by month, Yemen ACLED, January 2015 – June 2022**
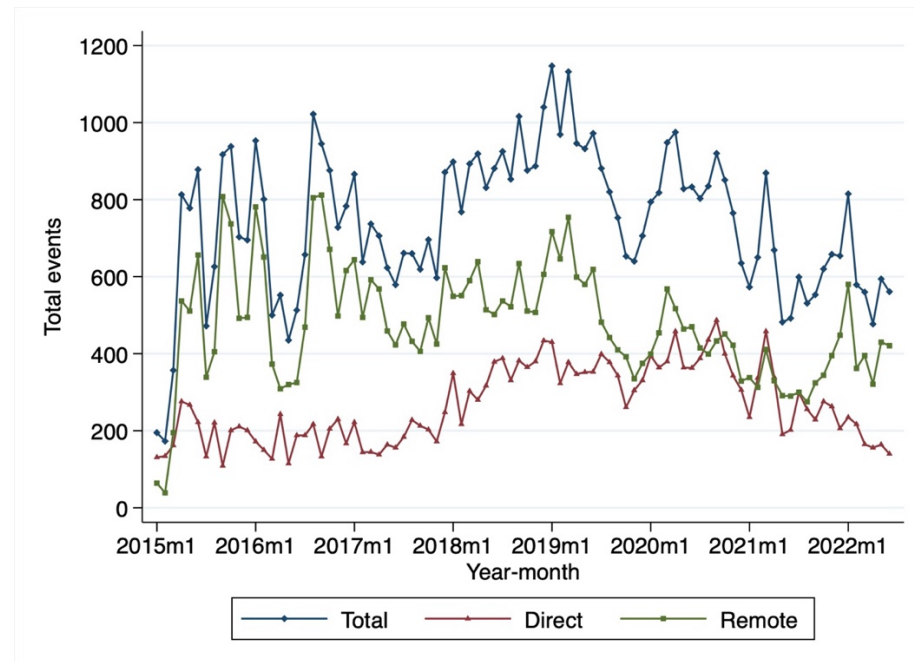


*Notes: Author's elaboration from ACLED Yemen.*

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[8] Remote violence includes use of chemical weapons, air/drone strikes, suicide bombings, shelling/artillery/missle attacks, use of remote explosives and grenades (ACLED 2024a). During the period of interest, the vast majority of such events in Yemen were air/drone strikes (56.5%) or shelling/artillery/missile attacks (36.5%) (Appendix Table 1).

[9] The violence against civilians category includes attacks, abductions/forced disappearance and sexual violence (ACLED 2024a). During the period of interest, 81.2% of such events in Yemen were attacks, 18.1% were abductions/forced disappearances. Only 22 events of sexual violence were recorded (0.7% of events of violence against civilians) (Appendix Table 1). As this is a small number of events in a category that likely suffers from substantial underreporting, the sexual violence category is not used as an exposure measure in the analysis.

## 4.3 Estimation

Age at marriage is censored for women who had not married at the time of the YMICS survey but may still marry in the future, so survival analysis is used. To descriptively examine marriage patterns by differential exposure to conflict, I estimate Kaplan-Meier failure functions by birth cohort, IDPs vs. non-displaced, and high-medium-low conflict intensity governorates. In these estimates, "failure" is marriage, and the failure function is interpreted as the probability of marrying by age *a*.

$$F_a = \Pr (T_a \leq a)$$

In this analysis, we are interested in very early marriage by age 15 and early marriage by age 18.

I then estimate complementary log-log discrete time hazard models to include time-varying exposure measures in the analysis (Jenkins 1995). In this analysis, the data are structured as person-year observations. Women therefore have an observation for each year from birth until year of marriage if they marry prior to age 18, or until age 18 if they are censored (i.e. did not marry early). The following equation is estimated:

$$\log(-\log (1 - \pi_{itgy})) = \alpha_t + \beta Exposure_{gt} + X_c + X_g + X_u$$

Where $\pi_{itgy}$ is the probability of marrying at age *t* for woman *i* in governorate *g* in year *y*. $\alpha_t$ is the baseline hazard of marriage at each year of age through age 17 (a series of year dummies); since the hazard of marrying below age 10 was very low, the combined hazard for 0-10 is used as the reference category. $\beta$ is the coefficient of interest on the exposure measure. To test H1, this is birth cohort. To test H2 and H4, respectively, this is the time varying measure of conflict intensity in governorate *g* in calendar year *c*. To test H3, it is the time varying measure of displacement status in calendar year c. $X_c$ is a vector of calendar year controls. These are not included in models incorporating birth cohort due to collinearity. $X_g$ is a vector of governorate dummies and $X_u$ an indicator of rural vs. urban residence. These calendar year and location controls control for the underlying time trend in early marriage and time-invariant characteristics of the different governorates.

While it would be ideal to include mother's education, an important predictor of early marriage (Malhotra and Elnakib 2021), as a control, this is not possible because the YMICS did not collect data on parents' education for women who did not reside in their natal households. This constitutes the majority of married women. Women's own education is not included because it is endogenous to marriage decisions. Exponentiated coefficients are presented, which can be interpreted as hazard ratios. YMICS sampling weights are used in all analyses.

## 5. Results

### 5.1 Characteristics of women of reproductive age

Sixteen percent of women aged 15-49 lived in low conflict intensity governorates, 47% in medium intensity governorates and 36% in high intensity governorates. This reflects the relatively lower intensity of the conflict in the more sparsely populated areas of the country (Guha Sapir et al. 2022). The distribution of women of reproductive age reflects the young age structure of Yemen, which has high fertility rates, but there were not differences across the conflict intensity groupings (Table 2). The

population was primarily rural (67.6%), with a notably higher level of urbanity (44.1%) in medium conflict intensity areas, which included the major cities of Sana'a and Aden.

Overall, 62.5% of reproductive age women were currently married, with a slightly lower percentage in high intensity governorates (60.0%) compared to other areas (about 64%). Among married women, 12.5% had married prior to age 15 and 44.7% before age 18. The prevalence of early marriage was higher in low conflict intensity governorates (15.7% married before 15 and 48.6% married before 18), noting that these figures include women who married prior to the conflict. Just over four percent of women were current IDPs, with higher percentages of IDPs in more heavily conflict affected governorates. Of current IDPs, 58% reported having been displaced from another governorate whereas 42% were displaced within the same governorate (not shown).

**Table 2: Characteristics of women of reproductive age, Yemen MICS, 2022-2023**

| | Conflict intensity | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Low | Medium | High | Total | Low | Medium | High | Total |
| | | N | | | | Col % | | |
| **Age group** | | | | | | | | |
| 15-19 | 1,253 | 3,175 | 2,466 | 6,894 | 24.7 | 21.5 | 21.9 | 22.1 |
| 20-24 | 1,049 | 2,922 | 2,244 | 6,214 | 20.7 | 19.8 | 19.9 | 20.0 |
| 25-29 | 789 | 2,542 | 1,699 | 5,030 | 15.6 | 17.2 | 15.1 | 16.2 |
| 30-34 | 612 | 2,101 | 1,515 | 4,228 | 12.1 | 14.2 | 13.4 | 13.6 |
| 35-39 | 595 | 1,802 | 1,466 | 3,863 | 11.7 | 12.2 | 13.0 | 12.4 |
| 40-44 | 458 | 1,309 | 1,081 | 2,848 | 9.0 | 8.9 | 9.6 | 9.1 |
| 45-49 | 315 | 929 | 813 | 2,057 | 6.2 | 6.3 | 7.2 | 6.6 |
| **Birth cohort** | | | | | | | | |
| <1981 | 531 | 1,485 | 1,283 | 3,299 | 10.6 | 10.2 | 11.6 | 10.8 |
| 1981-1990 | 1,091 | 3,523 | 2,718 | 7,332 | 21.8 | 24.2 | 24.6 | 23.9 |
| 1991-1996 | 823 | 2,726 | 1,847 | 5,396 | 16.4 | 18.7 | 16.7 | 17.6 |
| 1997-1999 | 625 | 1,691 | 1,186 | 3,502 | 12.5 | 11.6 | 10.7 | 11.4 |
| 2000-2005 | 1,370 | 3,777 | 2,966 | 8,113 | 27.4 | 26.0 | 26.8 | 26.5 |
| 2006-2008 | 569 | 1,349 | 1,060 | 2,978 | 11.4 | 9.3 | 9.6 | 9.7 |
| **Marital status** | | | | | | | | |
| Married | 3,245 | 9,440 | 6,770 | 19,455 | 64.0 | 63.9 | 60.0 | 62.5 |
| Never married | 1,635 | 4,682 | 4,079 | 10,396 | 32.2 | 31.7 | 36.2 | 33.4 |
| Previously married | 190 | 655 | 429 | 1,274 | 3.8 | 4.4 | 3.8 | 4.1 |
| **Married before age 15** | | | | | | | | |
| No | 2,901 | 8,916 | 6,369 | 18,187 | 84.3 | 88.1 | 88.3 | 87.5 |
| Yes | 541 | 1,202 | 845 | 2,588 | 15.7 | 11.9 | 11.7 | 12.5 |
| **Married before age 18** | | | | | | | | |
| No | 1,769 | 5,729 | 3,997 | 11,495 | 51.4 | 56.6 | 55.4 | 55.3 |
| Yes | 1,673 | 4,390 | 3,217 | 9,280 | 48.6 | 43.4 | 44.6 | 44.7 |
| **Internally displaced person (IDP)** | | | | | | | | |

| | | | | | | | | |
|---|---:|---:|---:|---:|---:|---:|---:|---:|
| No | 4,969 | 14,230 | 10,638 | 29,837 | 98.0 | 96.3 | 94.3 | 95.8 |
| Yes | 101 | 549 | 647 | 1,297 | 2.0 | 3.7 | 5.7 | 4.2 |
| **Residence** | | | | | | | | |
| Urban | 1,106 | 6,514 | 2,478 | 10,097 | 21.8 | 44.1 | 22.0 | 32.4 |
| Rural | 3,964 | 8,266 | 8,807 | 21,037 | 78.2 | 55.9 | 78.0 | 67.6 |
| **Governorate** | | | | | | | | |
| Ibb | 0 | 3,371 | 0 | 3,371 | 0.0 | 22.8 | 0.0 | 10.8 |
| Abyan | 0 | 691 | 0 | 691 | 0.0 | 4.7 | 0.0 | 2.2 |
| Sana'a City | 0 | 3,816 | 0 | 3,816 | 0.0 | 25.8 | 0.0 | 12.3 |
| Al Bayda | 0 | 778 | 0 | 778 | 0.0 | 5.3 | 0.0 | 2.5 |
| Taizz | 0 | 0 | 3,570 | 3,570 | 0.0 | 0.0 | 31.6 | 11.5 |
| Al Jawf | 0 | 0 | 266 | 266 | 0.0 | 0.0 | 2.4 | 0.9 |
| Hajjah | 0 | 0 | 2,242 | 2,242 | 0.0 | 0.0 | 19.9 | 7.2 |
| Al Hudaydah | 0 | 0 | 3,828 | 3,828 | 0.0 | 0.0 | 33.9 | 12.3 |
| Hadramaut | 1,338 | 0 | 0 | 1,338 | 26.4 | 0.0 | 0.0 | 4.3 |
| Dhamar | 2,144 | 0 | 0 | 2,144 | 42.3 | 0.0 | 0.0 | 6.9 |
| Shabwah | 0 | 748 | 0 | 748 | 0.0 | 5.1 | 0.0 | 2.4 |
| Sa'ada | 0 | 0 | 1,129 | 1,129 | 0.0 | 0.0 | 10.0 | 3.6 |
| Sana'a | 0 | 1,613 | 0 | 1,613 | 0.0 | 10.9 | 0.0 | 5.2 |
| Aden | 0 | 1,138 | 0 | 1,138 | 0.0 | 7.7 | 0.0 | 3.7 |
| Lahj | 0 | 957 | 0 | 957 | 0.0 | 6.5 | 0.0 | 3.1 |
| Marib | 0 | 0 | 250 | 250 | 0.0 | 0.0 | 2.2 | 0.8 |
| Al Mahwit | 837 | 0 | 0 | 837 | 16.5 | 0.0 | 0.0 | 2.7 |
| Al Maharah | 111 | 0 | 0 | 111 | 2.2 | 0.0 | 0.0 | 0.4 |
| Amran | 0 | 1,033 | 0 | 1,033 | 0.0 | 7.0 | 0.0 | 3.3 |
| Al Dhale'e | 0 | 635 | 0 | 635 | 0.0 | 4.3 | 0.0 | 2.0 |
| Raymah | 589 | 0 | 0 | 589 | 11.6 | 0.0 | 0.0 | 1.9 |
| Socotra | 50 | 0 | 0 | 50 | 1.0 | 0.0 | 0.0 | 0.2 |
| **Total** | **5,070** | **14,779** | **11,285** | **31,134** | **100.0** | **100.0** | **100.0** | **100.0** |

### 5.2 Cohort trends in early marriage

Figure 4 shows the proportion of women who were married by age 15 and 18, respectively, by birth year. While the trend is noisy, likely in part due to heaping on age reporting in the YMICS, the prevalence of early marriage hovered around 35% of women born before the early 1990s, and very early marriage at about 10% of women in the same cohorts. After this point, the proportion married by each age declines noticeably, reaching around 25-30% of women born in the early 2000s married by age 18 and less than 5% of women married by age 15.

**Figure 4: Proportion of women married by age 15 and 18, by birth cohort, YMICs**
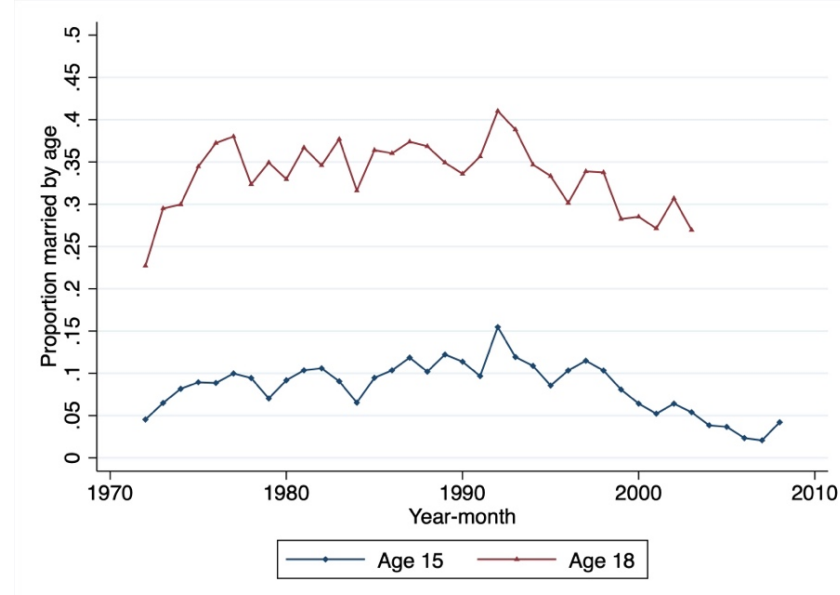


*Source: Author's construction from the YMICS.*

Survival analysis confirms these trends while accounting for censoring of the data. For cohorts born through 1996, the median age at marriage was 19 and the 25th percentile age 16 (Figure 5). Among the 1997-1999 birth cohort, the median age at marriage remained 19 but the 25th percentile rose to age 17. The decline in very early marriage among this cohort occurred during the years of instability following the 2011 Arab Spring, but prior to the intensification to civil war in 2015, at which point this cohort was aged 16-19. Among women born in 2000-2005, who experienced most of their adolescence exposed to conflict, the failure curve shifts noticeably to the right. Among this cohort, the median age at marriage rose to 21 and the 25th percentile stayed at 17. Among the 2006-2008 cohort, who were aged 7-9 when the conflict began and aged 14-16 at the time of the survey, the proportion married very early continues to shift downward. These results also hold in the multivariate, discrete time hazard models (Table 2, Column 1). Compared to women born in 1991-1996 (aged 19-24 in 2015), the hazard ratio for early marriage among those born in 1997-1999 was 0.87 ($p<0.01$) and among those born in 2000-2005, 0.65 ($p<0.001$), contrary to H1.

**Figure 5: Kaplan-Meier curves for age at marriage, by birth cohort, YMICs**
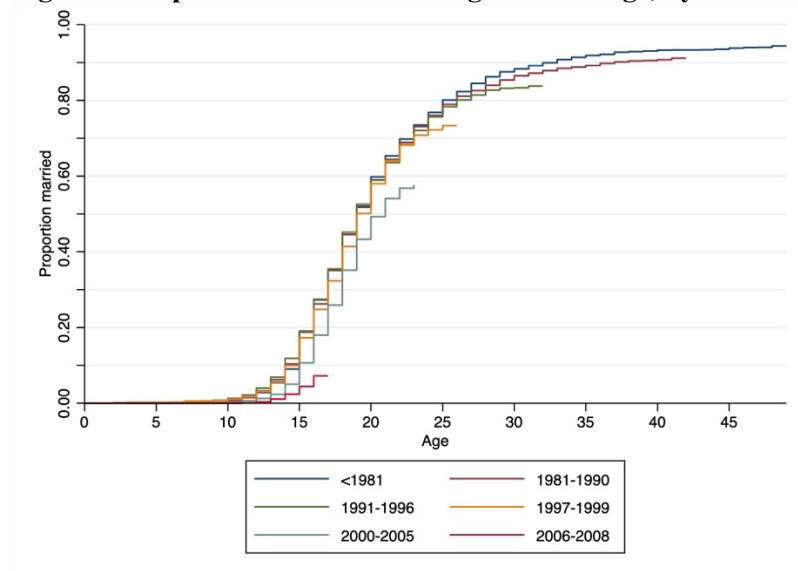


*Source: Author's construction from the YMICS.*

**Table 2: Results for discrete time hazard models for early marriage, birth cohort and overall conflict intensity exposure measures**

| | Hazard ratio, marriage prior to age 18 | | |
|---|---|---|---|
| | **(1)** | **(2)** | **(3)** |
| **Birth cohort (ref: 1991-1996)** | | | |
| 1997-1999 | 0.87** | | |
| | [0.79,0.96] | | |
| 2000-2005 | 0.65*** | | |
| | [0.59,0.72] | | |
| 2006-2008 | 0.22*** | | |
| | [0.17,0.28] | | |
| **Conflict intensity (time-varying; ref: Low)** | | | |
| Medium | | 1.17 | |
| | | [0.92,1.49] | |
| High | | 1.21 | |
| | | [0.89,1.64] | |
| **Conflict events (time-varying; continuous)** | | | 1.00 |
| | | | [1.00,1.00] |
| Baseline hazard (age) controls | Yes | Yes | Yes |
| Governorate controls | Yes | Yes | Yes |
| Rural/urban control | Yes | Yes | Yes |
| Calendar year controls | No | Yes | Yes |
| N person-years | 146,566 | 62,419 | 62,419 |

*Exponentiated coefficients; 95% confidence intervals in brackets; Standard errors clustered by PSU*

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

### 5.3 Conflict intensity and early marriage

As shown in Table 1, the prevalence of early marriage was higher in low conflict intensity governorates than medium and high intensity governorates when using the time-invariant categorization of conflict intensity. However, this pattern obscures both pre-conflict differences in early marriage rates by governorate and potential conflict impacts. Figure 6 examines trends in early marriage by birth cohort within each conflict intensity grouping. The decline in early marriage is evident across conflict intensity groupings for the 2000-2005 and 2006-2008 birth cohorts.

In the multivariate hazard models, in which conflict intensity is time-varying, neither medium nor high intensity conflict exposure was significantly associated with the risk of early marriage compared to low intensity exposure (Table 2, Column 2). The results were the same when using the continuous measure of conflict events (Table 2, Column 3). H2 is thus rejected.

**Figure 6: Kaplan-Meier curves for age at marriage, by birth cohort and conflict intensity grouping, YMICs**
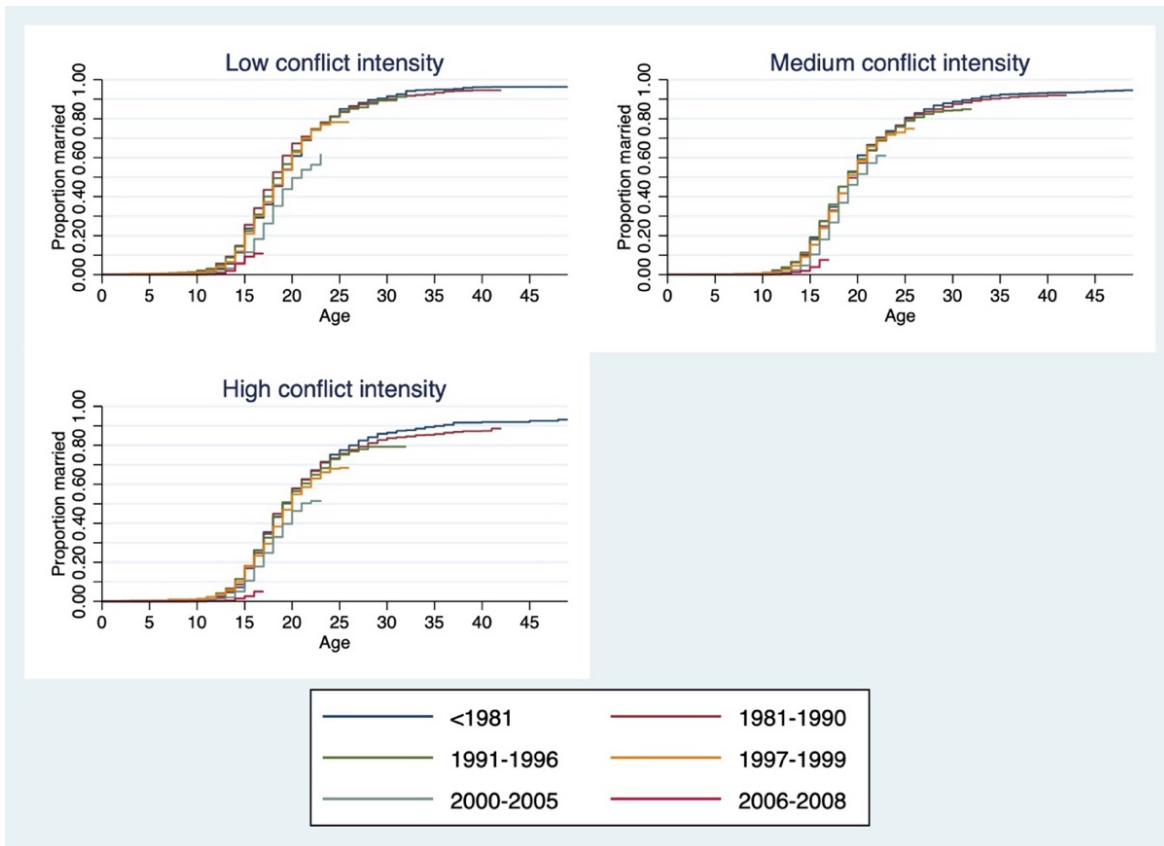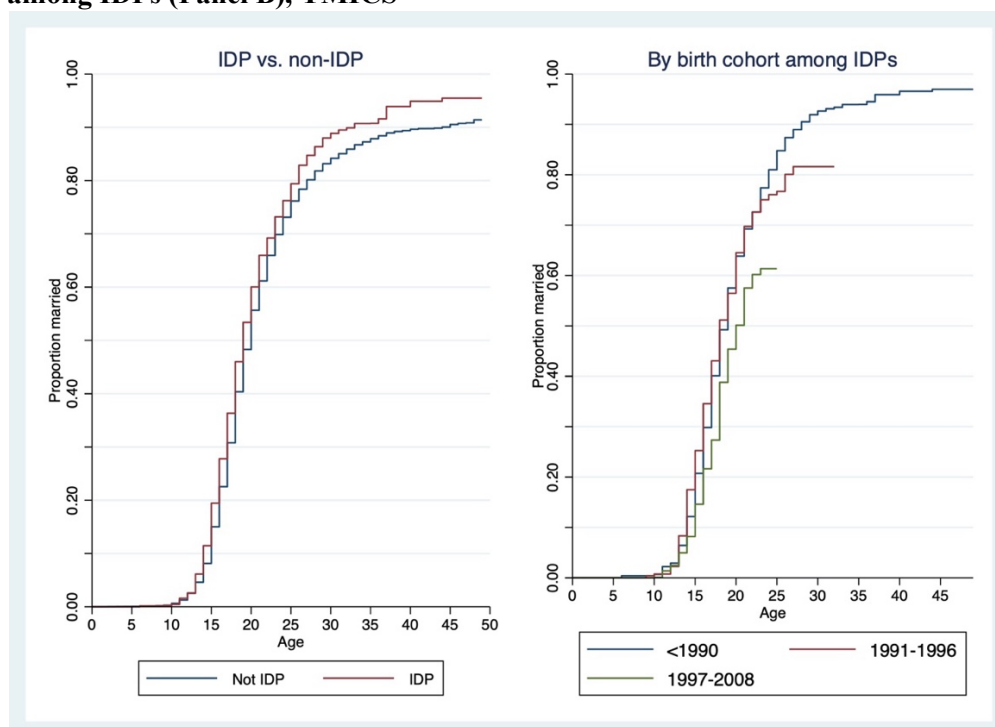


*Source: Author's construction from the YMICS.*

## 5.4 Displacement

I now turn to examining early marriage in relation to specific types of conflict exposure. Beginning with displacement, the Kaplan-Meier curves in Panel A of Figure 7 suggest a slightly earlier transition to marriage among IDPs relative to non-IDPs. However, IDPs are a selected group, whether they are displaced within or outside their governorate of origin. When focusing within the IDP population (Figure 7, Panel B), we observe the same overall trend as on the national level, i.e. a shift towards lower rates of early marriage among cohorts who reached marriage age during the war.

The multivariate analysis confirms that displacement is not associated with early marriage among this population. Table 3, Column 1 shows the results for the hazard model incorporating time-varying displacement status, comparing IDPs vs. non-IDPs. The results are non-significant. Table 3, Column 2 restricts the analysis to women who were IDPs at the time of the survey, effectively comparing the risk of early marriage before and after displacement among the same group of women. The results are likewise not significant and H3 is rejected.

**Figure 7: Kaplan-Meier curves for age at marriage, by IDP status (Panel A), and by birth cohort among IDPs (Panel B), YMICS**



*Source: Author's construction from the YMICS.*

**Table 3: Results for discrete time hazard models for early marriage, displacement and event type exposure measures**

| | Hazard ratio, marriage prior to age 18 | | | |
|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** |
| **Displaced (time-varying)** | 1.1 | 0.96 | | |
| | [0.70,1.74] | [0.41,2.27] | | |
| **Remote violence intensity (time-varying; ref: Low)** | | | | |
| Medium | | | 0.96 | |

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
|  |  |  | [0.76,1.22] |  |
| High |  |  | 0.92 |  |
|  |  |  | [0.66,1.28] |  |
| **Direct violence intensity (time-varying; ref: Low)** |  |  |  |  |
| Medium |  |  | 1.21 |  |
|  |  |  | [0.93,1.57] |  |
| High |  |  | 1.29 |  |
|  |  |  | [0.94,1.77] |  |
| **Event count (remote violence)** |  |  |  | 1.00 |
|  |  |  |  | [1.00,1.00] |
| **Event count (direct violence)** |  |  |  | 1.00 |
|  |  |  |  | [1.00,1.00] |
| Baseline hazard (age) controls | Yes | Yes | Yes | Yes |
| Governorate controls | Yes | Yes | Yes | Yes |
| Rural/urban control | Yes | Yes | Yes | Yes |
| Calendar year controls | Yes | Yes | Yes | Yes |
| N person-years | 65,616 | 1,999 | 62,419 | 62,419 |

*Exponentiated coefficients; 95% confidence intervals in brackets; Standard errors clustered by PSU*

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

### 5.5 *Nature of conflict events*

Finally, Columns 3 and 4 of Table 3 present the results of the hazard models using time-varying intensity of remote and direct violence events as the exposure measures. Using the preferred intensity grouping measure, there is no association between remote violence and early marriage. The coefficient on direct violence is positive, but insignificant (p=0.11 for the high intensity group). H4 is therefore also rejected.

## 6. Discussion

This study contributes to the mixed global evidence on the impact of conflict exposure on early marriage. While the prevalence of early marriage in Yemen remains high overall, analysis of the YMICS produces a consistent picture of a decline in the incidence of early marriage among the youngest cohorts that have reached marriage age during the post-2015 civil war. This is consistent with findings in several other countries where marriage declined among war-exposed cohorts (Shemyakina 2013; Torrisi 2022). However, the decline in early marriage in Yemen appears to be a secular, country-wide trend that is not affected by variation in conflict exposure. The decline in the hazard of early marriage was seen across conflict intensity groupings as well as among IDPs and non-displaced populations. This is again consistent with some other contexts in which conflict exposure was not found to be associated with risk of early marriage (Krafft et al. 2024; Elnakib et al. 2022; Sieverding et al. 2020). This finding emphasizes the empirical variability in the relationship between conflict and early marriage and the importance of country-level analysis and context.

The finding that early marriage rates did not increase among IDPs is somewhat unexpected given that a previous study found a higher hazard of early marriage among younger IDPs (Elnakib et al. 2023). This difference may be due to variability within IDP populations, as even in that other study the increase in early marriage among IDPs was only found in some governorates (Elnakib et al. 2024). The YMICs

sample of IDPs is not large enough for governorate-level analysis in order to compare these specific findings. Yet the overall finding that internal displacement is not associated with early marriage emphasizes the importance of having national level data.

The major question that arises from the study results is why Yemen has experienced this secular decline in early marriage rates during the civil war. While there was a pre-conflict trend towards somewhat lower rates of early marriage, this trend accelerated significantly during the war period across levels of conflict intensity. The consistency of the trend in early marriage suggests that there may be national-level impacts of the conflict that drove the acceleration of early marriage decline more so than conflict exposure. One potential mechanism is the increase in poverty, which has been extensive due to the humanitarian crisis. In several conflict-affected populations in the region, men's inability to meet marriage costs has been suggested as a possible factor putting upward pressure on marriage ages (Saxena, Kulczycki, and Jurdi 2004; Khawaja, Assaf, and Jarallah 2009). However, the one qualitative study on early marriage in Yemen pointed to economic factors as a driver of accelerated early marriage among IDPs (Hunersen et al. 2021). The inclusion of governorate- and calendar-year controls in the multivariate models controls to some extent for trends in poverty during the conflict period, but it is unfortunately not possible to test this mechanism at the household level due to the lack of data on women's natal households, which would be the relevant context for economic decision making around marriage.

Another potential mechanism behind the decline in early marriage rates could be unavailability of men either to due to participation in armed forces or excess mortality. One study of mortality during Yemen's civil war found that, in contrast to many other conflicts, direct, conflict-related mortality, which is typically much higher among men, constituted the bulk of mortality between 2015 – 2019 (Guha Sapir et al. 2022). In other countries, such demographic factors have been found to reduce marriage rates during conflict periods (Andriano and Ebbinghaus 2024; de Walque 2006).

There are several important limitations to this analysis. The first is that, due to the lack of georeferenced coordinates for the YMICS enumeration areas, conflict exposure could only be captured at the governorate level. This may be too wide of a measure to capture how households experienced conflict and how this may have affected household decision-making. Particularly in a context where conflict was so pervasive during the study period, the range of what households experienced as 'relevant' violence may have been much smaller. The range of covariates that can be incorporated into the analysis is also very limited due to the lack of data on women's natal households in the YMICS. Age reporting in the YMICS also suffered from some data quality issues that are common among low-educated populations. In addition, conflict event databases are known to suffer from biases related to the sourcing of information from news sources; however, the ACLED data collection for Yemen is robust relative to other options.

Subsequent revisions of the paper will explore several aspects of these findings. Robustness checks will be conducted with other measures of conflict intensity and different definitions of direct violence, particularly distinguishing between battles and violence against civilians. Models will also be run using lagged conflict events and cumulative years of conflict, as the impacts of conflict on early marriage may occur with some delay. Alternative definitions of conflict-exposed cohorts will also be explored, as well as whether the YMICS data can be used to identify whether demographic factors may influence the observed trend in early marriage.

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**Appendix Table A1: Detail of included event types in ACLED Yemen**

| | Battles | Battles | Explosions/Remote violence | Explosions/Remote violence | Violence against civilians | Violence against civilians | Total | Total |
|---|---|---|---|---|---|---|---|---|
| Sub-event type | No. | % | No. | % | No. | % | No. | % |
| Abduction/forced disappearance | 0 | 0.0 | 0 | 0.0 | 548 | 18.1 | 548 | 0.8 |
| Air/drone strike | 0 | 0.0 | 24,217 | 56.5 | 0 | 0.0 | 24,217 | 36.2 |
| Armed clash | 17,485 | 83.4 | 0 | 0.0 | 0 | 0.0 | 17,485 | 26.2 |
| Attack | 0 | 0.0 | 0 | 0.0 | 2,461 | 81.2 | 2,461 | 3.7 |
| Government regains territory | 2,914 | 13.9 | 0 | 0.0 | 0 | 0.0 | 2,914 | 4.4 |
| Grenade | 0 | 0.0 | 193 | 0.5 | 0 | 0.0 | 193 | 0.3 |
| Non-state actor overtakes territory | 567 | 2.7 | 0 | 0.0 | 0 | 0.0 | 567 | 0.9 |
| Remote explosive/landmine/IED | 0 | 0.0 | 2,734 | 6.4 | 0 | 0.0 | 2,734 | 4.1 |
| Sexual violence | 0 | 0.0 | 0 | 0.0 | 22 | 0.7 | 22 | 0.0 |
| Shelling/artillery/missile attack | 0 | 0.0 | 15,624 | 36.5 | 0 | 0.0 | 15,624 | 23.4 |
| Suicide bomb | 0 | 0.0 | 77 | 0.2 | 0 | 0.0 | 77 | 0.1 |
| **Total** | **20,966** | **100.0** | **42,845** | **100.0** | **3,031** | **100.0** | **66,842** | **100.0** |

**Appendix Table A2: Total conflict events per governorate per year, ACLED Yemen**

| Governorate | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Abyan | 169 | 137 | 134 | 73 | 170 | 549 | 130 | 57 | 1,419 |
| Ad Dali | 218 | 96 | 93 | 204 | 972 | 839 | 283 | 161 | 2,866 |
| Aden | 604 | 197 | 99 | 200 | 257 | 243 | 169 | 49 | 1,818 |
| Al Bayda | 414 | 246 | 365 | 605 | 333 | 479 | 335 | 100 | 2,877 |
| Al Hudaydah | 290 | 327 | 459 | 2,049 | 3,778 | 2,709 | 1,785 | 404 | 11,801 |
| Al Jawf | 140 | 703 | 518 | 659 | 598 | 863 | 454 | 148 | 4,083 |
| Al Mahrah | 1 | 0 | 4 | 6 | 18 | 20 | 4 | 1 | 54 |
| Al Mahwit | 19 | 25 | 24 | 13 | 4 | 1 | 5 | 0 | 91 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Amanat al Asimah | 665 | 457 | 166 | 122 | 77 | 88 | 115 | 71 | 1,761 |
| Amran | 113 | 152 | 57 | 57 | 47 | 45 | 23 | 27 | 521 |
| Dhamar | 117 | 62 | 41 | 32 | 30 | 57 | 24 | 15 | 378 |
| Hadramawt | 136 | 69 | 54 | 68 | 50 | 52 | 31 | 17 | 477 |
| Hajjah | 376 | 445 | 831 | 758 | 835 | 253 | 155 | 406 | 4,059 |
| Ibb | 241 | 139 | 40 | 80 | 107 | 108 | 46 | 42 | 803 |
| Lahij | 274 | 289 | 176 | 301 | 76 | 104 | 88 | 46 | 1,354 |
| Marib | 790 | 862 | 699 | 425 | 187 | 1,575 | 2,094 | 801 | 7,433 |
| Raymah | 5 | 1 | 4 | 6 | 6 | 1 | 0 | 5 | 28 |
| Sadah | 1,159 | 1,387 | 1,626 | 3,281 | 1,926 | 812 | 703 | 557 | 11,451 |
| Sanaa | 547 | 1,312 | 791 | 504 | 199 | 322 | 60 | 50 | 3,785 |
| Shabwah | 213 | 240 | 293 | 58 | 142 | 177 | 189 | 209 | 1,521 |
| Suqutra | 0 | 0 | 1 | 0 | 6 | 35 | 7 | 3 | 52 |
| Taizz | 1,053 | 1,615 | 1,775 | 1,281 | 733 | 669 | 648 | 414 | 8,188 |
| **Total** | 7,544 | 8,761 | 8,250 | 10,782 | 10,551 | 10,001 | 7,348 | 3,583 | 66,820 |