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Family formation among adolescent Rohingya refugees; trajectories into adolescent marriage and childbearing in Cox's Bazar Bangladesh

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Abstract

Background Although both marriage and childbearing are potentially influenced by humanitarian emergencies, and for many individuals are intrinsically linked life-course events, they are rarely explored together in the literature on humanitarian emergencies. Additionally, literature on child marriage focuses largely on females, neglecting the experiences of males.

Objective To understand how trajectories of family formation for adolescent females and males have been affected by mass displacement. We compare time to first marriage and time to first birth following marriage between age cohorts of 15–19 and 20–24 year-old female and male Forcibly Displaced Myanmar Nationals.

Methods We use data from 1,565 females and 722 males aged 15–24, collected within fifteen camps in Cox's Bazar, to estimate hazard of first marriage and of child marriage and data from 643 married females to estimate hazard from marriage to first birth.

Results Females aged 20–24 had a 31% increased hazard of marriage overall and 42% increased hazard of child marriage relative to females aged 15–19 (95% CI: 1.07–1.87) and an 84% higher incidence rate (95% CI: 1.46–2.33). For males, there was a higher hazard of marriage by age 25 amongst males aged 20–24 relative to age 15–19 (HR: 1.80, 95% CI: 1.10–2.94), but no statistically significant difference in the hazard of marriage by age 18. Approximately 20% of females gave birth within a year of marriage and 70–75% within three years post-marriage, across age cohort and age at marriage. There were no statistically significant differences in hazard of first birth by either age cohort or age at marriage.

Discussion Displacement may have increased risk of child marriage for adolescents, as evidenced by higher child marriage rates amongst males and females who were age 14–18 at the time of displacement. Displacement did not affect time to childbirth following marriage, which remains high amongst both age cohorts. Efforts to reduce child marriage and adolescent child marriage must address limited opportunities for adolescents in situations of displacement.

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Keywords Child marriage, Adolescent, Early childbearing, Rohingya, Humanitarian emergency, Refugee

Background

As of 2023, 117.2 million individuals were forcibly displaced or stateless [1]. Humanitarian emergencies bring far-reaching and destructive consequences for social, political, economic, and health systems, particularly when accompanied by mass displacement of individuals. Women and children, including adolescents, make up the majority of displaced persons and are disproportionately affected by increased risk for poor sexual and reproductive health outcomes, including sexual violence, human trafficking, and forced marriage [1, 2].

Child marriage, or marriage prior to age 18, is a public health and human rights concern due to restrictions on autonomy and short- and long-term health impacts [3–5]. While child marriage occurs predominantly among girls, with estimates as high as 45% of women in South Asia being married before age 18 [6], adolescent boys are also at risk. Recent evidence suggests that, globally, approximately 1 in 21 males aged 20–24 years were married before age 18, with similar numbers in South Asia (4.3%) [7]. Despite significant declines in child marriage in recent years, the practice remains widespread, supported by gender norms that promote the role of women as mothers and caretakers for their spouse, children, and extended family and sanction against men undertaking these roles [8]. Concerns about protection against sexual violence, particularly with the onset of puberty and the control of adolescent sexuality, are often cited as reasons for child marriage, particularly for girls, and reflect the underlying gendered power imbalances that perpetuate child marriage [8, 9]. Poverty and lack of labor and educational opportunities, which generally disadvantage girls more than boys, exacerbate unequal gender dynamics further, as girls are often treated as a source of labor for household management and/or as a burden to natal homes [8, 10].

There is mixed evidence as to the causal mechanisms through which humanitarian emergencies affect child marriage, however, it is generally agreed that many pre-existing factors associated with child marriage [10] are exacerbated in emergencies [11–13]. Concerns about sexual violence are amplified in armed conflict when sexual violence can be used as a weapon of war [14–17]. Additionally, lack of opportunities in the education and labor market, coupled with economic hardship and poverty in the natal home, are amplified in humanitarian emergencies as labor markets and educational systems are destroyed, thus further limiting the opportunities outside of marriage for both boys and girls [12, 18–21]. Gender norms may become more rigid in crises [22], as social support systems erode and heightened material

deprivation supports child marriage as a coping strategy. At the same time, crises can reinforce traditional gender roles, limiting girls' autonomy and access to education while increasing expectations for boys to become financial providers, further entrenching gender inequalities [22].

There is little consistent evidence of the influence of humanitarian emergencies on fertility and childbearing, as some consequences of emergencies may reduce fertility, such as spousal separation during migration, while others may increase it, such as earlier sexual debut associated with child marriage [23, 24]. Evidence from developed countries during times of economic crises supports the idea that uncertainty introduced by large-scale events, such as COVID-19, is associated with declining fertility desires [25–27]. An alternative theoretical rationale, however, suggests that childbearing can serve as a means to ensure security during uncertain times [28], which may result in higher rates of child marriage and early childbearing (childbirth before age 18). Though not specific to humanitarian emergencies, there is evidence that economic and health related uncertainties in resource-limited settings increase fertility desires amongst the most vulnerable people, potentially as a means to exercise control and improve perceived security [29, 30]. Limited evidence of fertility behavior in populations affected by emergencies suggests that childbearing intentions at the individual level and population level are relatively stable in times of conflict [24, 31]. Little research, however, has specifically explored how humanitarian emergencies affect fertility behaviors among adolescents specifically, despite potential implications for adolescent childbearing introduced by changing marital patterns.

Although both marriage and childbearing are potentially influenced by humanitarian emergencies, and for many individuals are intrinsically linked life-course events, they are rarely explored together in the literature on humanitarian emergencies. Child marriage greatly impacts fertility behavior, significantly increasing the risk of adolescent childbearing and leading to higher lifetime fertility for both men and women due to an increased reproductive lifespan [3, 20, 32–34]. Additionally, gendered power imbalances that perpetuate child marriage also influence fertility; for example, child brides experience greater risk of gender based violence [35] which is linked to greater risk of unintended pregnancy [36]. Despite consensus that child marriage increases overall fertility, there is less consistent evidence regarding its relationship with time to first birth, unintended pregnancy, and contraceptive use [3]. For humanitarian

response actors whose goal is to improve sexual and reproductive health outcomes, understanding how humanitarian emergencies affect the process of family formation, i.e. how displacement affects child marriage and how both, in turn, affect fertility behavior, may provide valuable insight into potential areas of intervention.

Rohingya genocide and displacement

The Rohingya, an ethnic Muslim minority, have endured long-standing discrimination and harassment in the majority Buddhist country of Myanmar, which has led to intermittent waves of displacement. In 2017, a widespread and systematic Myanmar government operation drove more than 700,000 Rohingya from their homes, leading to the fastest growing refugee crisis in the world [37]. The attack was declared a genocide by the United States State Department in 2022 [38]. The majority of displaced Rohingya sought protection in Bangladesh, joining approximately 200,000 refugees who had fled previous persecution and resided there for decades. As of 2021, nearly 900,000 displaced Rohingya live in the world's largest and most densely populated refugee camp complex, most without official refugee status, instead referred to by the Bangladesh government as Forcibly Displaced Myanmar Nationals (FDMN)¹ [39].

The 2015–2016 Myanmar Demographic and Health Survey (DHS) indicated that Rakhine state – the state where the vast majority of Rohingya people reside – had the lowest median age of marriage for women (median age 20.3, as compared to the national median of 22.1) and age at first childbirth (median age 22.6, as compared to the national median of 24.7) of any state within Myanmar [40]. Qualitative research done in 2018 with Rohingya participants in Cox's Bazar supports the notion that child marriage was practiced among Rohingya people pre-displacement, citing norms around marrying adolescent girls after the onset of puberty [41]. This practice seems to have persisted despite the strict discriminatory restrictions on marriage licenses and large fees associated with marriage registration imposed on the Rohingya while still in Myanmar.

Given the pre-existing practice of child marriage, coupled with social and economic vulnerabilities exacerbated by displacement, rates of child marriage – and subsequent early childbearing – among the Rohingya may be expected to increase in Cox's Bazar post-displacement. Evidence is mixed, however, as to whether and how displacement has affected marriage rates. One 2019 report by the Human Rights Council reported that the average

age of marriage for girls decreased from 15.8 to 14.1 years old between 2017 and 2019 amongst displaced girls within camp and reported a 3.1% increase in child marriage from 2018 to 2019 [42]. Notably, it also reported that 30% of all child marriages during that time were amongst unaccompanied or separated minors due to displacement. Other recent quantitative research comparing child marriage among FDMN women who migrated in the 2017 wave and a comparison group of women who settled pre-2017, however, shows little difference in child marriage rates between the two cohorts [26].

Objectives

The objective of this paper is to quantify trajectories of family formation for adolescent females and males affected by mass displacement. Specifically, we compare time to first marriage and time to first birth following marriage between age cohorts of 15–19 and 20–24 year-old female and male FDMN. These age cohorts roughly represent those who were displaced before entering their reproductive years (adolescents currently age 15–19) and those who were displaced after entering their reproductive years (currently age 20–24). A complimentary qualitative paper provides further insight into these patterns [43].

Methods

Study setting

The current camp setting for the displaced Rohingya population in Bangladesh presents a complex environment with significant challenges. The camps are characterized by overcrowding, limited access to basic services, and restricted movement. These conditions exacerbate vulnerabilities, making women and girls susceptible to various forms of exploitation, abuse, and violence, including child and forced marriages. Education and vocational training opportunities are limited and generally of poor quality due to a number of structural [44, 45] and cultural barriers [46, 47], particularly for females.

Legal context

In Bangladesh, the Child Marriage Restraint Act of 2017 prevents marriage under the age of 18 for girls and under the age of 21 for boys. In order to enforce the law, the government enacted Child Marriage Prevention Committees at the national, district, upazila, and union levels. Penalties include up to one month in prison or a fine of 1,000 taka (\$9.11 USD). The law institutionalized the protection of children from child marriage and provides a legal basis for intervention in cases where child marriages are suspected or reported. There is limited ability to validate ages and enforce age restrictions within the camps, however, as marriage registration requires birth

¹ We use the term FDMN to distinguish displaced Rohingya people who arrived after October 2016, when Myanmar government violence began, from Rohingya refugees who arrived prior to October 2016 and who largely hold official refugee status, but recognize that both groups are refugees from their home country.

certificates for both individuals, which most Rohingya lack [41].

Data source

The data used for this study come from the Elrha R2HC (Research for Health in Humanitarian Crises) funded Early Marriage Early Childbearing study, a collaborative study between Community Partners International (CPI), BRAC James P Grant School of Public Health (BRAC-JPG), and Johns Hopkins Bloomberg School of Public Health (JHSPH) and were collected between January and April 2023.

Quantitative data were collected by face-to-face interviews conducted in fifteen camps in Teknaf and Ukhiya Upazila, in Cox's Bazar District, by Rohingya data collectors. Three camps were selected purposively due to feasibility and regulatory issues while twelve were chosen with probability proportional to camp size. Sixty-three clusters across the camps were chosen with probability proportional to size across all camps, using blocks as clusters. Households were randomly selected and screened for eligibility, which required that the household contain at least one adolescent aged 15–24, regardless of marital status, who had lived in that shelter for a minimum of one month and was an FDMN that arrived during or after October 2016, the beginning of the most recent wave of displacement. Ten households were included in each cluster. Once eligibility was confirmed, interviewers explained the research aims and administered informed consent if a member of the household over age 18 was interested in participating. Due to widespread illiteracy and as the local language is not written, consent was collected orally. Once the household survey was completed, interviewers identified and explained the research aims to the eligible adolescent and sought oral consent. For unmarried adolescents aged 15–17, parental consent and adolescent assent was required. Up to two randomly selected adolescents were interviewed within each household. Quota sampling using a ratio of 1:2 males to females was used to ensure sufficient size for analyses of fertility behavior. In total, 1,600 adolescent females and 730 males completed the survey. While we intended to interview 800 males, we were unable to do so due to internal security concerns within two camps.

In addition, explanatory qualitative data collection was undertaken to provide greater insight into the mechanisms through which displacement affected child marriage and childbearing. While we do not present results from the qualitative analysis in this paper, we attempt to triangulate findings in the discussion and thus provide a brief overview of the methods here. In brief, forty-nine in-depth interviews (IDIs) and sixteen focus group discussions (FGDs) were conducted with FDMNs aged 15–24. Interview guides were developed in conjunction

with community advisory boards. Researchers at Johns Hopkins University and BRAC James P Grant School of Public Health developed a codebook composed primarily of deductive codes informed by previous research conducted by this team [48], with the addition of inductive codes as appropriate. A separate publication details the qualitative methods and findings [43].

Ethics approval

All procedures were approved by the Institutional Review Boards of the Johns Hopkins Bloomberg School of Public Health (FWA00000287) and BRAC James P Grant School of Public Health, BRAC University (IRB protocol no.: IRB-25 June'22–022). Authorization was also granted by the NGO Affairs Bureau and relevant government and camp authorities. Due to widespread illiteracy and as Rohingya is not a written language, all participants provided verbal consent to participate.

Dependent variables

As we explored both first marriage and first birth, we have two separate sets of dependent variables. For analyses exploring first marriage, our primary dependent variable was time in years from age 10 to first marriage. Secondary analyses also included a binary variable indicating marriage before or after age 18 and marriage before or after age 15.

For first birth, our primary dependent variable was time in years between first marriage and first birth. Secondary analyses included a binary variable indicating if first birth occurred before or after age 18.

Independent variables

For first marriage, our primary explanatory variable was age cohort, categorized as 15–19 and 20–24. For first birth, we included age cohort and age at first marriage before or after age 18.

Analytic sample

For analyses exploring first marriage, we included all adolescents aged 15–24. We excluded any adolescents who had missing information for both age and birthdate ($n = 25$ females and $n = 6$ males) and adolescents who had missing information for both age at marriage and date of marriage ($n = 10$ for females and $n = 2$ for males). This resulted in a final analytic sample of 1,565 females and 722 males.

For analyses exploring first birth, in time-to-event models (described further below) we included only adolescent females who were ever married ($n = 664$ females) as our sample size was limited among males ($n = 153$ ever married males). Of note, 11 females reported a birth prior to marriage and were excluded from analyses of time to first birth following marriage due to sample

size limitations of this sub-population. An additional three females reported a birth but neither a year nor age at birth, and seven did not report if they had ever had a birth. This resulted in a final analytic sample of 643 females for time-to-event analyses and 1,544 for overall incidence of a birth prior to age 18.

Analytic models

All analyses were stratified by sex. We first used descriptive statistics to summarize the analytic sample and generate frequency estimates of marriage and childbearing by age. To provide greater context, we include descriptive information on respondent's report of the age they believe males and females should get married and how long they believe people should wait after marriage to have children. Following descriptive statistics, we conducted time-to-event analyses for time to first marriage, setting the origin to age 10, with events captured by year since birth. We tested the assumption of proportional hazards using Schoenfeld residuals. As our models did not violate the proportional hazards assumption, we used Kaplan-Meier and Cox proportional hazards to graphically demonstrate and test differences in hazard of marriage by age group. Individuals entered the analysis at age 10 and were censored at their exact age, at marriage, or at age 25. We then estimated the incidence rate ratio (IRR) of the incidence of marriage prior to age 18, comparing age 20–24 to age 15–19 (reference).

We followed these analyses with a similar set of analyses for time to first birth amongst the female sample only. For these models, the origin was set at marriage; we tested differences in time to first birth, measured in years, by age cohort and age at marriage, comparing women who were married before age 18 to those married at or after age 18 (reference). Observations were censored at exact year since marriage if less than three years, first birth, or at three years post marriage due to sample size issues. Additionally, we estimated the IRR of incidence of first birth prior to age 18, comparing age cohort and setting origin at age 10. We did not compare incidence rates of birth prior to age 18 by age at marriage, as women who married after 18 were perfectly correlated with births after age 18 (i.e. there were no cases of birth before age 18 among women who were married at or after age 18).

Finally, to better isolate the effect of displacement, we conducted sensitivity analyses comparing hazard of first marriage and hazard of first birth among females currently age 15–17 to those who were age 15–17 in 2017 when the majority of FDMNs fled Myanmar (currently age 21–23). We were unable to replicate this analysis with males due to limited sample size. All analyses accounted for clustering within blocks and were conducted using Stata version 18.0 [49].

Results

Table 1 below summarizes the characteristics of the sample, stratified by sex and age cohort. About two-thirds of females and males were age 15–19 and one-third age 20–24. About one-quarter of females aged 15–19 were married, relative to less than 5% of males aged 15–19. Mean age of displacement for females and males aged 15–19 was approximately age 11, while mean age of displacement amongst those aged 20–24 was approximately age 16. Approximately 75% of all respondents, regardless of age or sex, reported age 18 as the right age for females and 67% reported age 20–22 as the right age for males (not shown). Across age and sex, about one quarter of respondents said couples should wait less than one year before having a child, about 40% said they should wait one year, and about 30% said they should two or more years. Amongst the ever-married sample, most adolescents, regardless of age group, were married in Bangladesh and most had at least one child.

Table 2 shows the total sample size and percentage for a range of child marriage and childbearing indicators across different age groups. For example, of the 509 women aged 20–24, 28.3% were married by age 18, relative to 6.9% of the 261 males age 20–24.

Figure 1 below shows the Kaplan-Meier survival curve comparing age cohorts of 15–19 and 20–24 between females and males. All events occurring prior to the dashed line at age 18 represent events of child marriage. Appendix Table 1 shows the survivor function, stratified by sex, comparing age cohorts 15–19 and age 20–24. Approximately 21% of females aged 15–19 were married before age 18 compared to 28% of females aged 20–24 (Appendix Table 1). For males, these estimates were 4% and 7%, respectively. In both cohorts of females, there was a significant decline in the survivor function at age 18, with a 25-percentage point decrease in the survivor function for females in both age cohorts.

Table 3 below shows the hazard of marriage, censored at age 25 and at age 18, and the incidence rate ratio of marriage prior to age 18, comparing age cohort 20–24 to age cohort 15–19 (reference) for both females and males. Females aged 20–24 had a 31% increased hazard of marriage overall and 42% increased hazard of child marriage relative to females aged 15–19 (95% CI: 1.07–1.87) and an 84% higher incidence rate (95% CI: 1.46–2.33). For males, there was a higher hazard of marriage by age 25 amongst males aged 20–24 relative to age 15–19 (HR: 1.80, 95% CI: 1.10–2.94), but no statistically significant difference in the hazard of marriage by age 18. The incidence rate of marriage before age 18 was 2.56 times higher for males aged 20–24 relative to 15–19 (95% CI: 1.17–5.83), however.

Figure 2 below shows the Kaplan-Meier survival curve demonstrating time to first birth following first marriage.

Table 1 Sample characteristics by sex among all respondents and among ever married respondents

		Females				Males			
		15–19		20–24		15–19		20–24	
		N= 1056		N= 509		N= 461		N= 261	
Total sample		n	%	n	%	n	%	n	%
Marital status	Never married	807	76.4	94	18.5	440	95.4	129	49.4
	Ever married	249	23.6	415	81.5	21	4.6	132	50.6
Mean age displacement (SE)		11.3	01.	15.8	0.1	11.4	0.1	16.1	0.1
Mean “right” age for girl’s marriage (SE)		18.0	0.1	18.1	0.1	18.5	0.2	18.5	0.2
Mean “right” age for boy’s marriage (SE)		21.3	0.2	21.4	0.2	22.1	0.2	21.7	0.2
Time between marriage and first birth									
	< 1 year	266	25.2	163	32.0	122	27.2	61	27.4
	1 year	482	45.6	208	40.9	180	40.2	94	42.2
	2+ years	308	29.2	138	27.1	146	32.6	68	30.5
Ever married									
Age at first marriage									
	< 15	21	8.4	15	3.6	1	4.8	0	0.0
	15–17	135	54.2	129	31.1	11	52.4	18	13.6
	18+	93	37.3	271	65.3	9	42.9	114	86.4
Place of marriage									
	Myanmar	11	4.4	96	23.1	0	0.0	15	11.4
	Bangladesh	238	95.6	319	76.9	21	100.0	117	88.6
Parity									
	Nulliparous	107	43.5	58	14.1	8	38.1	32	24.2
	Parous	139	56.5	353	85.9	13	61.9	100	75.8

Note: Due to a skip logic error, 50 observations for boys were missing information on how long couples should wait between marriage and first birth

Table 2 Indicators of child marriage within the analytic sample

	Females		Males	
	N	%	N	%
% 20–24 married by age 18	509	28.3	261	6.9
% 20–24 married by age 15	509	2.9	261	0.0
% 15–19 who are married	1056	23.6	461	4.6
% 15–17 who are married	734	9.3	302	1.3
% 18–24 with birth before age 18	831	14.2	420	1.9

Comparisons between age cohort are shown in the left panel and marriage before/after age 18 in the right panel, both only among females. Approximately 20% of females gave birth within a year of marriage and 70–75% within three years post-marriage, across age cohort and age at marriage. There were no statistically significant differences in hazard of first birth by either age cohort or age at marriage (Table 4), though the incidence of having a child before age 18 was 2.13 times higher among females age 20–24 than age 15–19 (95% CI: 1.52–3.01).

Results of the sensitivity analysis comparing females aged 15–17 to females age 21–23 are shown in Appendix Table 3 and are consistent with the results presented above.

Discussion

We found quantitative evidence that early family formation amongst adolescents, that is, entrance into marriage and from marriage to childbearing before age 18, has declined among Rohingya FDMN. Though child marriage remains common, we found significant declines in child marriage between females aged 15–19 relative to females aged 20–24 and modest evidence of declines amongst males. We also found that female adolescents aged 20–24 were significantly more likely to have had a child before age 18, but differences were due only to increased rates of child marriage; there were no differences in time to childbirth after marriage by age cohort or age at marriage and widespread agreement that childbearing should start soon after marriage.

While there are a number of reasons why we may see differences between age cohorts in time to marriage, at least some of these differences may be directly

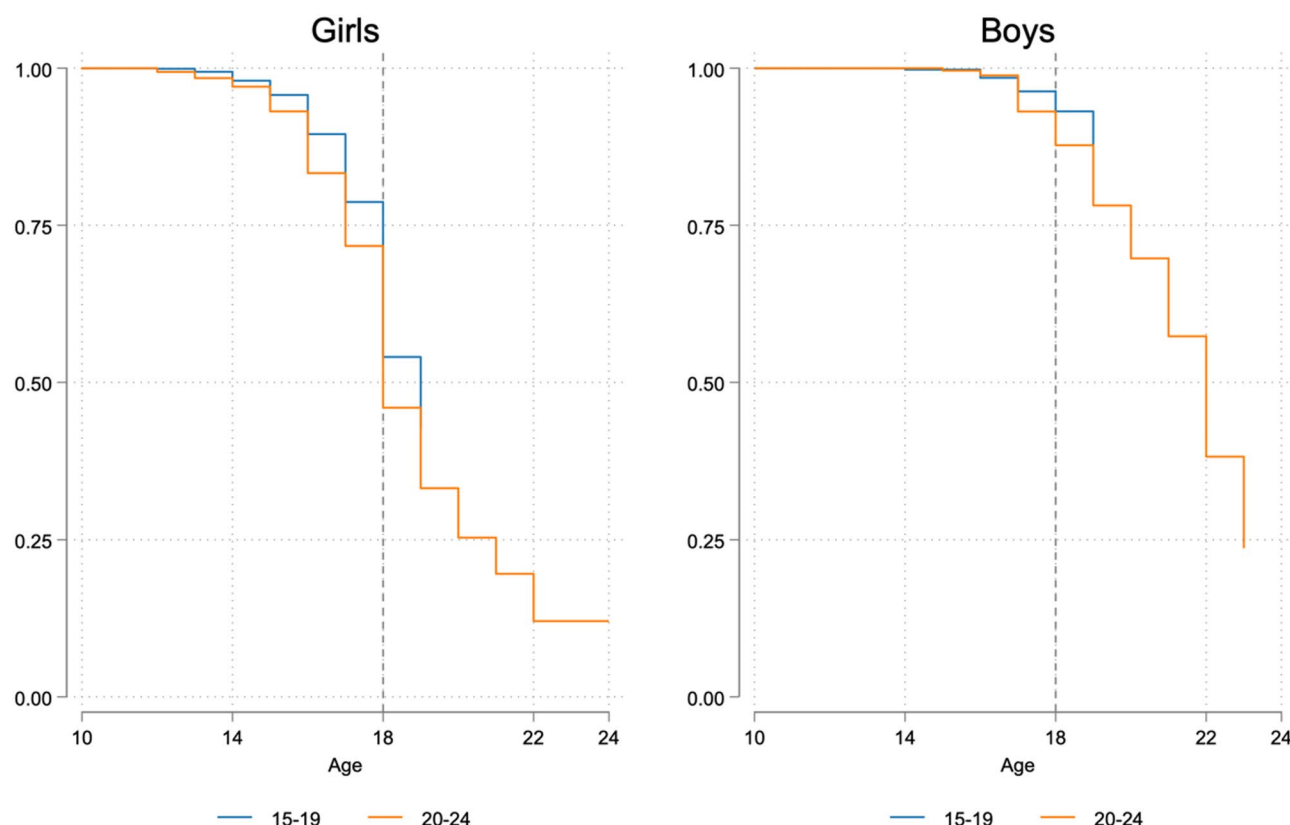


Fig. 1 Kaplan-Meier survival analysis where failure equals marriage, by age cohort and sex

Table 3 Hazard and incidence of marriage comparing age cohort 15–19 and 20–24, by sex

	Females		Males	
	Estimate	95% CI	Estimate	95% CI
Hazard ratio of marriage	1.31	(1.08–1.59)	1.80	(1.1–2.94)
Hazard ratio of marriage < 18, censored at age 18	1.42	(1.07–1.87)	1.78	(0.84–3.78)
Incidence Rate Ratio marriage < 18	1.84	(1.46–2.33)	2.56	(1.17–5.83)

attributable to displacement occurring in 2017. The cohort of adolescents aged 20–24 at the time of the survey was approximately age 14–18 at the time of displacement, entering or into their early reproductive years and at an age when marriage is considered acceptable, at least for girls [50]. Mass displacement from Myanmar brought dissolution of social networks, separation of families, increased mortality and threats to safety, and decimation of economic opportunity [37, 42]; these factors may have motivated an increase in marriage for those perceived to be at an appropriate age, even if they were under age 18. Surveys taking place shortly after displacement documented higher rates of child marriage during this time, particularly amongst adolescents who were separated from family [42]. The uncertainty of displacement, combined with the perception of looser restrictions in Bangladesh [41], may have explained these relatively higher numbers. Our qualitative findings seem to support this hypothesis, given widespread acknowledgement that

security concerns are a paramount reason for marriage [43]. As the acute stage of displacement passed, and with it, the immediate threats of political violence, rates of child marriage may have declined, though they remain high, due to pre-existing norms supporting marriage. Pre-displacement marriage trends would provide valuable data to corroborate this hypothesis, but unfortunately, we did not collect this information.

Beyond increased risk in the acute phase of displacement, there has been concerted effort in recent years to address high rates of child marriage within the camps. Multiple UN agencies and non-government organizations have prioritized reduction of child marriage through promoting education and outreach efforts that address negative repercussions of child marriage [51]. Respondents of both age cohorts and sexes overwhelmingly stated that age 18 was when females should get married and this corresponded with a significant increase in marriage of females at exact age 18, while there was

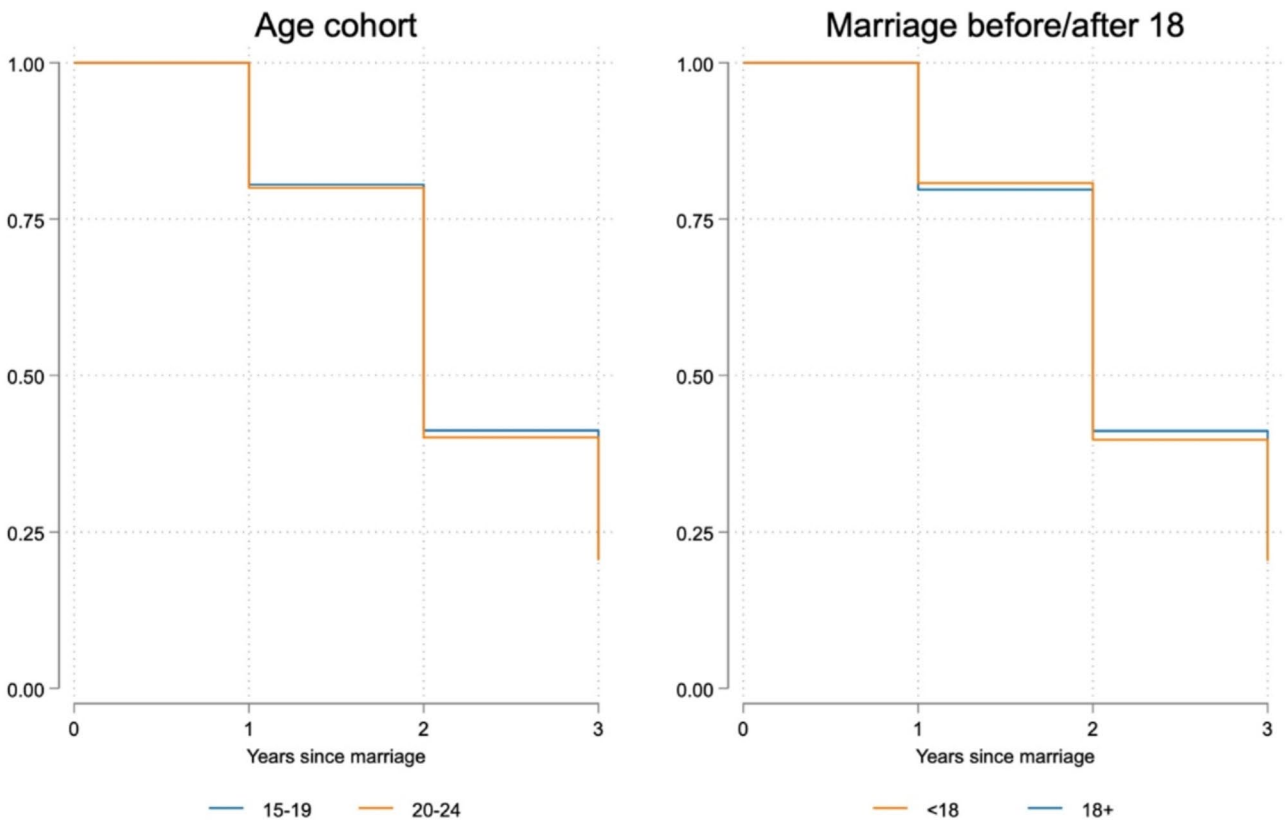


Fig. 2 Kaplan-Meier survival analysis where failure equals first birth, by age cohort and age at first marriage

Table 4 Hazard of first birth following marriage among females, by age cohort and age at marriage, and incidence of first birth prior to age 18, by age cohort

	Estimate	95% CI
HR First Birth: Age cohort (ref: 15–19)		
20–24	1.02	(0.83–1.25)
HR First Birth: Age at marriage (ref: 18+)		
< 18	1.01	(0.83–1.22)
IRR First Birth < 18: Age cohort (ref: 15–19)		
20–24	2.13	(1.52–3.01)

less consistency around age at marriage for boys. These findings are consistent with our qualitative findings that again found consistent agreement that 18 was the appropriate age at marriage for girls and a consistent, but less specific, norm towards higher age at marriage for boys [43]. While we cannot discount that social desirability bias affected responses regarding the age when people should be married, especially amongst a vulnerable group such as the FDMN, these patterns nonetheless suggest that attitudes across both age cohorts and sexes largely support delaying marriage until age 18 and do not vary across gender or age.

In terms of gender differences between females and males, we found lower rates of child marriage amongst males, with some evidence that risk of marriage before age 18 was higher among males aged 20–24 than aged

15–19. That rates of child marriage and overall hazard of marriage were lower among males is consistent with the vast majority of literature on child marriage [7, 52] and reflective of attitudes in the sample that supported older age at marriage for males. Additionally, that child marriage was higher among older males is consistent with patterns seen amongst females, again suggesting that displacement may have contributed to higher child marriage rates for this cohort, and is consistent with findings from previous research in this population [52]. Our qualitative research suggests that lack of education and economic opportunity were significant motivation for marriage amongst males, with many seeing marriage and family formation as one of the only viable options to transition to adulthood [43]. These views were coupled, however, with significant gendered expectations; specifically, boys

reported that they were much more likely to be married at younger ages if either mothers or sisters were unavailable to perform housework, thus necessitating marriage [43].

Efforts to address child marriage in the Rohingya camps need to be multifaceted, addressing both the economic and educational drivers of marriage and the larger structural drivers that perpetuate gender inequity. Providing access to education and vocational training for both boys and girls has the potential to equip adolescents with alternative skills and opportunities that can replace marriage as a marker of adulthood. This is particularly important for girls, who have been historically restricted from educational and vocational opportunities. Increasing girls' education has been shown to significantly reduce child marriage [53, 54] and contribute to challenging the underlying gender norms that limit girls' opportunities [9]. While there is mixed evidence of the success of economic support programs targeting families, such as unconditional cash transfers, on reducing child marriage [53], financial pressures are established to be associated with child marriage. More research is needed to develop programs that can both address poverty and reduce marriage. To be most effective, these strategies should be complimented by efforts to address underlying gender norms that support child marriage, however, implementation of interventions to change norms is hindered by a lack of consensus on which norms should be changed and how best to do so [54, 55], underscoring the need for greater research in this area.

We found no differences in time to onset of childbearing after marriage among females, by either age cohort or by age at marriage. Rapid onset of childbearing was consistent with the quantitative attitudinal data in which approximately 70% of respondents said the ideal time to wait between marriage and childbearing was less than two years. Adolescents, both males and females, indicated that there was high demand for childbearing upon marriage, despite living in a complex situation characterized by poverty, frequent threats to safety as a result of climate change and overcrowding, and general uncertainty [46]. Qualitative evidence, from this study and others, confirm the importance placed on having children quickly after marriage, particularly for young women [43, 50] and these norms appear to have been minimally impacted by displacement, if at all. Efforts which seek to improve adolescent sexual and reproductive health in emergencies through delaying first births, particularly through the use of contraception, must first identify and address the social pressures which are placed on adolescents, particularly girls, to demonstrate fecundity. Efforts to expand educational and economic opportunities for girls may be particularly impactful; by allowing girls to advance in the educational and labor market,

expectations around the appropriate role of girls as wives and mothers may expand, allowing more autonomy in the choice of timing and importance of childbearing.

That adolescent males also promoted rapid childbearing upon marriage underscores the importance of engaging males in programs to promote healthy childbearing, as they have significant influence on female partners [56, 57]. Finally, in addition to addressing social pressures that promote early childbearing, public health programs to promote birth spacing should also consider integration into maternal health programs, specifically postpartum family planning. Qualitative evidence from our study suggests that birth spacing is more commonly accepted within camps and evidence across six humanitarian settings, though not Cox's Bazar, shows that postpartum family planning programs can be effectively offered and met with significant demand [58]. There is, however, limited research with this population to identify effective strategies to promote postpartum contraception, suggesting that this is a priority area for further research.

Our research is not without limitations. Due to high innumeracy in the population, event dates were gathered only in one-year increments. This could mask statistically significant differences between groups that may have been present with more granular data, though on a programmatic level, differences in months may not be particularly meaningful. One-year increments also resulted in inconsistencies between self-reported age and age that was calculated based on event dates in about 20% of reports; however, only 5% of all reports differed by more than one year and fewer than 10 cases across both age cohorts and sex resulted in reclassifying child marriage. Finally, we were limited in our ability to conduct fertility analyses among male participants due to the limited number of married males at young ages. Our study has a number of strengths, however, including a large sample of both married and unmarried males and females and a large number of married females which allowed for significant expansion of the research question beyond establishing the child marriage risk for girls. Additionally, quantitative data collection was conducted by Rohingya data collectors, who were fluent in the local language and familiar with local customs.

Conclusion

Risk of child marriage among Rohingya FDMN was higher among adolescents age 20–24 than age 15–19, however, there were no differences in time to childbearing by either age cohort or age at marriage among females. Despite declines, child marriage rates remain high, particularly for female adolescents. Increased opportunities for education and vocational training, in addition to ongoing efforts to educate parents, are critical. Adolescent sexual and reproductive health programs

must address gender norms that promote early and rapid childbearing and identify relevant intervention points for contraceptive programs. By understanding the interplay of socio-economic factors, cultural dynamics, and the unique challenges within the camp setting, effective strategies can be developed to mitigate risks to reproductive health and create a safer environment for all adolescents.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s13031-025-00683-z>.

Supplementary Material 1

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Author contributions

LAZ led conceptualization, analysis, and drafting of the manuscript. SE supported analysis and was a major contributor in writing the manuscript. AA, RA, TH, TT, TH and TH contributed to data collection, interpretation of findings, and provided edits. KM supported interpretation, drafting, and provided edits. WCR oversaw all study activities. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

All procedures were approved by the Institutional Review Boards of the Johns Hopkins Bloomberg School of Public Health (FWA00000287) and BRAC James P Grant School of Public Health, BRAC University (IRB protocol no.: IRB-25 June'22–022). Authorization was also granted by the NGO Affairs Bureau and relevant government and camp authorities. Due to widespread illiteracy and as Rohingya is not a written language, all participants provided verbal consent to participate.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. UNHCR. Global Focus. [cited 2023 Aug 9]. Global Appeal 2023. Available from: <https://reporting.unhcr.org/globalappeal>
2. Ivanova O, Rai M, Kemigisha E. A systematic review of sexual and reproductive health knowledge, experiences and access to services among refugee, migrant and displaced girls and young women in Africa. *Int J Environ Res Public Health*. 2018;15(8):1583.
3. Fan S, Koski A. The health consequences of child marriage: a systematic review of the evidence. *BMC Public Health*. 2022;22(1):309.
4. ElHarake LS, Tzemach Lemmon G. Child brides, global consequences: how to end child marriage. Council on Foreign Relations; 2014.
5. Nour NM. Child marriage: A silent health and human rights issue. *Rev Obstet Gynecol*. 2009;2(1):51–6.
6. United Nations Children's Fund. A profile of child marriage in South Asia. New York, NY: UNICEF; 2023.
7. Gastón CM, Misunas C, Cappa C. Child marriage among boys: a global overview of available data. *Vulnerable Child Youth Stud*. 2019;14(3):219–28.
8. Greene ME, Stiefvater E. Social and gender norms and child marriage: A reflection issues, evidence and areas of inquiry in the field. London: ALIGN; 2019.
9. Malhotra A, Amin A, Nanda P. Catalyzing gender norm change for adolescent sexual and reproductive health: investing in interventions for structural change. *J Adolesc Health*. 2019;64(4 Suppl):S13–5.
10. Psaki SR, Melnikas AJ, Haque E, Saul G, Misunas C, Patel SK, et al. What are the drivers of child marriage?? A conceptual framework to guide policies and programs. *J Adolesc Health*. 2021;69(6):S13–22.
11. Krafft C, Arango DJ, Rubin AH, Kelly J. Conflict and Girl Child Marriage: Global Evidence. 2022 Aug [cited 2023 Aug 2]; Available from: <http://hdl.handle.net/10986/37827>
12. Hunersen K, Attal B, Jeffery A, Metzler J, Alkibi S, Elnakib S, et al. Child marriage in yemen: A mixed methods study in ongoing conflict and displacement. *J Refugee Stud*. 2021;34(4):4551–71.
13. UNFPA UNICEF. Addressing Child Marriage in Humanitarian Settings: Technical Guide for Staff and Partners of the UNFPA–UNICEF Global Programme to End Child Marriage. New York, NY: UNFPA and UNICEF; 2021 [cited 2023 Aug 23]. Available from: <https://www.unfpa.org/resources/addressing-child-marriage-humanitarian-settings-technical-guide-staff-and-partners-unfpa>
14. Al Akash R, Boswall K. Listening to the Voices of Syrian Women Refugees in Jordan: Ethnographies of Displacement and Emplacement. In: Aksaz E, Pérouse JF, editors. *Guests and Aliens: Re-Configuring New Mobilities in the Eastern Mediterranean After 2011 - with a special focus on Syrian refugees*. Istanbul: Institut français d'études anatoliennes; 2016 [cited 2023 Jul 31]. (La Turquie aujourd'hui). Available from: <http://books.openedition.org/ifeagd/1884>
15. Ortiz-Echevarria L, Greeley M, Bawoke T, Zimmerman L, Robinson C, Schlecht J. Understanding the unique experiences, perspectives and sexual and reproductive health needs of very young adolescents: Somali refugees in Ethiopia. *Confl Health*. 2017;11(1):26.
16. DeJong J, Sbeity F, Schlecht J, Harfouche M, Yamout R, Fouad FM, et al. Young lives disrupted: gender and well-being among adolescent Syrian refugees in Lebanon. *Confl Health*. 2017;11(1):23.
17. Danjibo N, Akinkuotu A. Rape as a weapon of war against women and girls. *Gend Behav*. 2019;17(2):13161–73.
18. Bartels SA, Michael S, Bunting A. Child marriage among Syrian refugees in Lebanon: at the gendered intersection of poverty, immigration, and safety. *J Immigr Refugee Stud*. 2021;19(4):472–87.
19. Elnakib S, Hussein SA, Hafez S, Elsallab M, Hunersen K, Metzler J, et al. Drivers and consequences of child marriage in a context of protracted displacement: a qualitative study among Syrian refugees in Egypt. *BMC Public Health*. 2021;21(1):674.
20. Misunas C, Gastón CM, Cappa C. Child marriage among boys in high-prevalence countries: an analysis of sexual and reproductive health outcomes. *BMC Int Health Hum Rights*. 2019;19(1):25.
21. Edmeades JD, MacQuarrie KLD, Acharya K. Child grooms: Understanding the drivers of child marriage for boys. *J Adolesc Health*. 2022;70(3, Supplement):S54–6.
22. Lafrenière J, Sweetman C, Thyllin T. Introduction: gender, humanitarian action and crisis response. *Gend Dev*. 2019;27(2):187–201.
23. National Research Council, War H, Crises P, Displacement, Fertility. A Review of Evidence. 2004 [cited 2022 Sep 9]. Available from: <https://nap.nationalacademies.org/catalog/11005/war-humanitarian-crises-population-displacement-and-fertility-a-review-of>

24. Thiede BC, Hancock M, Kodouda A, Piazza J. Exposure to armed conflict and fertility in Sub-Saharan Africa. *Demography*. 2020;57(6):2113–41.
25. Fahlén S, Oláh L. The impact of economic uncertainty on childbearing intentions in Europe. *Family Soc*. 2015;36:46.
26. Schneider D. The great recession, fertility, and uncertainty: evidence from the united States. *J Marriage Family*. 2015;77(5):1144–56.
27. Lindberg LD, VandeVusse A, Mueller J, Kirstein M. Early Impacts of the COVID-19 Pandemic: Findings from the 2020 Guttmacher Survey of Reproductive Health Experiences. 2020 Jun [cited 2020 Jul 22]. Available from: <https://www.guttmacher.org/report/early-impacts-covid-19-pandemic-findings-2020-guttmacher-survey-reproductive-health>
28. Cain M. Fertility as an adjustment to risk. *Popul Dev Rev*. 1983;9(4):688.
29. Trinitapoli J, Yeatman S. Uncertainty and fertility in a generalized AIDS epidemic. *Am Sociol Rev*. 2011;76(6):935–54.
30. Zimmerman LA, Karp C, Thiongo M, Gichangi P, Guiella G, Gemmill A, et al. Stability and change in fertility intentions in response to the COVID-19 pandemic in Kenya. *PLOS Global Public Health*. 2022;2(3):e0000147.
31. Svallfors S. The remarkable stability of fertility desires during the Colombian armed conflict 2000–2016. *Popul Space Place*. 2022;28(1):e2514.
32. Kerry MacQuarrie. Marriage and Fertility Dynamics: The Influence of Marriage Age on the Timing of First Birth and Birth Spacing. Rockville, Maryland, USA: ICF International. 2016 [cited 2021 Feb 23]. Report No.: 56. Available from: <http://dhsprogram.com/pubs/pdf/AS56/AS56.pdf>
33. Godha D, Hotchkiss DR, Gage AJ. Association between child marriage and reproductive health outcomes and service utilization: A Multi-Country study from South Asia. *J Adolesc Health*. 2013;52(5):552–8.
34. Bongaarts J. A framework for analyzing the proximate determinants of fertility. *Popul Dev Rev*. 1978;4(1):105–32.
35. Raj A. When the mother is a child: the impact of child marriage on the health and human rights of girls. *Arch Dis Child*. 2010;95(11):931–5.
36. Chisholm CA, Bullock L, Ferguson JE (Jef), editors. Intimate partner violence and pregnancy: epidemiology and impact. *American Journal of Obstetrics and Gynecology*. 2017;217(2):141–4.
37. Council on Foreign Relations. [cited 2023 Aug 2]. What Forces Are Fueling Myanmar's Rohingya Crisis? Available from: <https://www.cfr.org/background/rohingya-crisis>
38. Burma Genocide. United States Department of State. [cited 2023 Sep 13]. Available from: <https://www.state.gov/burma-genocide/>
39. Council DDR. Rohingya in Bangladesh: The world's largest refugee camp. [cited 2023 Aug 2]. Available from: <https://help.drc.ngo/en/how-we-work/life-as-a-refugee/rohingya-in-bangladesh-the-world-s-largest-refugee-camp/>
40. Ministry of Health and Sports. ICF. Myanmar Demographic and Health Survey 2015–2016. Nay Pyi Taw, Myanmar and Rockville, Maryland USA: Ministry of Health and Sports and ICF; 2017 [cited 2024 Jul 23]. Available from: <https://dhsprogram.com/pubs/pdf/FR324/FR324.pdf>
41. Melnikas AJ, Ainul S, Ehsan I, Haque E, Amin S. Child marriage practices among the Rohingya in Bangladesh. *Confl Health*. 2020;14(1):28.
42. Human Rights Council. Sexual and gender-based violence in Myanmar and the gendered impact of its ethnic conflicts. 2019 [cited 2024 Jul 23]. Available from: https://www.ohchr.org/sites/default/files/Documents/HRBodies/HRCouncil/FFM-Myanmar/sexualviolence/A_HRC_CRP_4.pdf
43. Mieth K, Chakrabarty A, Lee K, Kaiser A, Hasan T, Elnakib S et al. What other option did I have? – The effect of conflict and displacement on child marriage and early childbearing among displaced Rohingya adolescents. *Confl Health*. 2025 Mar 17;19(1):16. <https://doi.org/10.1186/s13031-025-00656-2>. PMID: 40091116; PMCID: PMC11912763.
44. Rahman MM, Shindaini AJM, Husain T. Structural barriers to providing basic education to Rohingya children in the Kutupalong refugee camp, Cox's bazar, Bangladesh. *Int J Educational Res Open*. 2022;3:100159.
45. Shohel MMC. Education in emergencies: challenges of providing education for Rohingya children living in refugee camps in Bangladesh. *Educ Inq*. 2022;13(1):104–26.
46. Mitu K, Jones N, Vintges J, Devonald M. Climate risks and truncated opportunities: how do environmental challenges intersect with economic and social disadvantages for Rohingya adolescents in Bangladesh?? *Sustainability*. 2022;14(8):4466.
47. The Lives They Lead. Exploring the Capabilities of Bangladeshi and Rohingya Adolescents in Cox's Bazar, Bangladesh| IPA. [cited 2023 Sep 14]. Available from: <https://poverty-action.org/lives-they-lead-exploring-capabilities-bangladeshi-and-rohingya-adolescents-coxs-bazar-bangladesh>
48. Elnakib S, Paina L, Attal B, Akter R, Khoury G, Karim L, et al. Incidence of child marriage among refugees and internally displaced persons in the middle East and South Asia: evidence from six cross-sectional surveys. *BMJ Open*. 2023;13(6):e070056.
49. StataCorp. Stata statistical software: release 18. College station, TX: StataCorp LLC; 2023.
50. Islam MM, Khan MN, Rahman MM. Factors affecting child marriage and contraceptive use among Rohingya girls in refugee camps. *The Lancet Regional Health – Western Pacific*. 2021 Jul 1 [cited 2023 Sep 14];12. Available from: [https://www.thelancet.com/journals/lanwpc/article/PIIS2666-6065\(21\)00084-5/fulltext](https://www.thelancet.com/journals/lanwpc/article/PIIS2666-6065(21)00084-5/fulltext)
51. UNICEF Global Programme. Preventing and Responding to Child Marriage in Humanitarian Settings: The Global Programme Approach| UNICEF. 2020 [cited 2023 Dec 1]. Available from: <https://www.unicef.org/documents/preventing-and-responding-child-marriage-humanitarian-settings-global-programme-approach>
52. UNFPA Asia Pacific Regional Office, UNICEF Regional Office for South Asia. Child Marriage in Humanitarian Settings in South Asia, UNICEF ROSA. 2020: UNFPA APRO; 2020 Oct [cited 2023 Aug 23]. Available from: <https://asiapacific.unfpa.org/en/publications/child-marriage-humanitarian-settings-south-asia>
53. Malhotra A, Elnakib S. 20 years of the evidence base on what works to prevent child marriage: A systematic review. *J Adolesc Health*. 2021;68(5):847–62.
54. Siddiqi M, Mann G. A synthesis of what we know works to prevent and respond to child marriage. Evidence paper for UNFPA-UNICEF global programme to end child marriage. UNFPA-UNICEF global programme to end child marriage. UNICEF Innocenti - Global Office of Research and Foresight; 2024.
55. Greene ME, Edmeades J, Siddiqi M. Scope, range and effectiveness of interventions to address social norms to prevent and delay child marriage and empower adolescent girls: a systematic review. *BMJ Open*. 2024;14(1):e071275.
56. Hossain MA, Hossain MB. Understanding fertility behavior of the forcibly displaced Myanmar nationals in Bangladesh: A qualitative study. *PLoS ONE*. 2023;18(5):e0285675.
57. Khan MN, Khanam SJ. Women's participation in childbearing decision-making and its effects on short-interval births in Rohingya refugee camps of Bangladesh. *Lancet Reg Health - Southeast Asia*. 2023;15:100250.
58. Gallagher MC, Morris CN, Fatima A, Daniel RW, Shire AH, Sangwa BMM. Immediate Postpartum Long-Acting Reversible Contraception: A Comparison Across Six Humanitarian Country Contexts. *Frontiers in Global Women's Health*. 2021 [cited 2023 Sep 20];2. Available from: <https://www.frontiersin.org/articles/https://doi.org/10.3389/fghw.2021.613338>

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