Female Early Marriage in South Asia under the Threat of Global Climate Change

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Extended abstract

Climate change-induced natural disasters have substantial and adverse effects on human survival, especially for populations living in vulnerable areas (Muttarak 2021). Their effects go beyond the biophysical impact on the local environment. They tend to affect demographic, economic, institutional, and socio-cultural dimensions of human living as well, exacerbating the general level of population vulnerability and affecting poorer social classes (Jiang and Hardee 2011; Otto et al. 2017).

The United Nations (UNFCCC 2010) report that the negative fallout from climate change is having a devastatingly lopsided impact on women compared to men, from higher death rates during natural disasters to heavier household and care burdens. Extensive research across multiple fields has established that climate change and extreme weather events significantly interact with human health, well-being, and life course events through various economic and social development channels, particularly for impoverished individuals and families. When considering the demographic consequences of climate change, natural disasters such as heat waves, droughts, floodings, and cyclones have been found to have a profound impact on mortality patterns, particularly child mortality (Dasgupta 2018; Bunyavanich et al. 2003), and malnutrition (Dimitrova and Muttarak 2020, Muttarak and Dimitrova 2019). Furthermore, climate change is also linked to morbidity and migration (Best et al. 2022; Carrico and Donato 2019; Kartiki 2011; Piguet et al. 2011).

One further consequence of climate change on human life is observed in terms of the timing and outcomes of life course transitions, including the transition to marriage of young girls (Andriano and Behrman 2020), a phenomenon also known as female early marriage. As per the definition given by the United Nations Children's Fund **(**UNICEF), the term *early* or *child marriage* is used to refer to both formal and informal unions in which a young individual under the age of 18 years is involved as a partner. Marrying as a child is a fundamental violation of human rights and bears important consequences especially for young girls' lives, as it often results in early pregnancy and social isolation, increased risk of domestic violence and physical, sexual, and psychological abuse, school dropout, and severe limitations in terms of career and vocational advancement opportunities.

Despite having declined in the last decades, the practice of early marriage is still pervasive worldwide. South Asia shows today the highest proportion of girls and women who were married in childhood (Figure 1), and Bangladesh is the country with the highest prevalence of child marriage in the region, with as many as 38 million women – i.e., nearly 6% of the 650 million girls and women alive today who were married as child brides – who entered their first union before the age of 18 (UNICEF 2020a). The mean age at marriage in South Asia is increasing over time; however, historical progress against early marriage can be hindered by shocks originating from the economy and the environment, with more and more international observers pointing at climate change and extreme weather events as one among the possible causes (UNFPA 2021).

All the while, being exposed to cyclones, tidal surges, floods, increased surface air temperature, glacier melting, and droughts causing damage to human lives and properties every year, South Asia can be considered a disaster-prone region. It is among the 10 most climate change-affected countries worldwide (Shaw et al. 2022). Thus, it appears evident that the region's specificities, with its increasing proneness to climatic risks and the pervasiveness of early marriage, make South Asia an emblematic setting to study the interrelationship between climate change and the transition into union.

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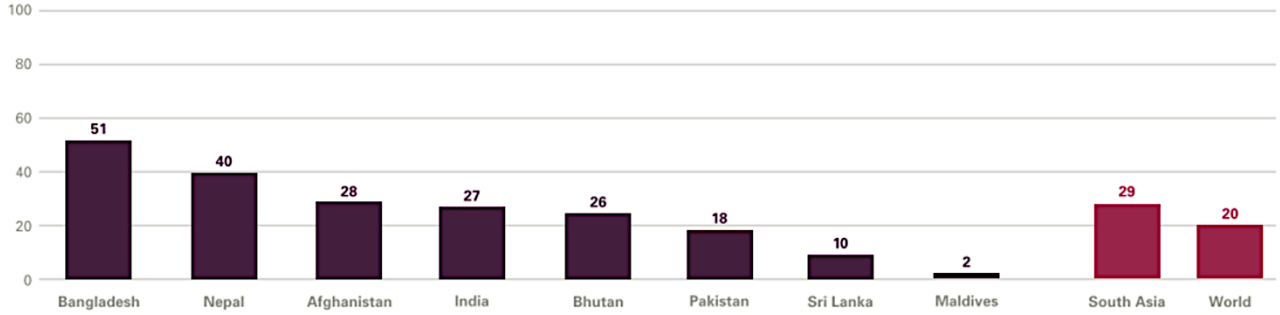
This paper studies the effect of weather variability on the risk of marrying as a child (i.e., before 18 years of age) and at any age for girls and women in Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka by applying multilevel discrete-time survival modelling to integrated data based on the Demographic and Health Surveys (DHS) administered between 1999 and 2018, and the corresponding climatic information at the district level conveyed by the Standardized Precipitation and Evapotranspiration Index (SPEI) (Vicente-Serrano et al. 2010). The SPEI is a measure of drought severity according to both its intensity and duration based on the cumulated difference between precipitation and potential evapotranspiration due to temperature, which allows to capture both dry and wet climate anomalies and can comprehensively reflect the change in surface water balance (Zhang et al. 2015). The SPEI is commonly used in both environmental and population science (e.g., Andriano and Behrman 2020; Muttarak and Dimitrova 2019) and allows comparison of drought severity through time and space since it can be calculated over a wide range of climates and timescales (1 to 48 months). To examine the effect of SPEI levels on the likelihood of marriage at each age, we control for individual-level and district-level covariates, observed and unobserved, by including a set of individual- and district-level covariates, and a random intercept at the district of residence level.

Our study contributes to the existing literature in several ways. First, by focusing on both persistently wet and dry extreme weather, our approach aims to assess the impact of different weather conditions. Second, by exploiting the fine geographical level of the available statistical information, we study the link between abnormal weather conditions and the timing of the transition to marriage by explicitly considering the diversity in the frequency and intensity of the two phenomena at the district (province) and division (region) level. Finally, besides testing the impact of climate variability on child marriage, we also verify its effect on the probability of accelerating the transition to marriage for women of any age. The latter approach is unprecedented in the literature and bears important implications in terms of family formation dynamics and women's empowerment and fundamental rights under the threat of global climate change.

Preliminary results elaborated on data for Bangladesh find that spells characterized by extreme humidity seem to affect the risk of entering marriage to a greater extent than drought. Lack of precipitation accelerates the transition to marriage both for girls under 18 years of age and older women only after prolonged periods of severe drought (36 to 48 months), while in the medium term (24 months) the likelihood of marriage solely responds to severely or extremely wet conditions (Tables 2 and 3). The prominence of the link between climate conditions and marriages registered after prolonged situations of either severe drought or extreme humidity suggests that our finding of an accelerated transition to marriage is to be interpreted as a response to *climate change* rather than to single extreme climate events. Such evidence improves the current understanding of the role of natural disasters as a trigger of suboptimal adaptation strategies, stressing the importance of monitoring the effect of permanent or long-lasting environmental changes on human behavior.

Figure 1. Percentage of women aged 20 to 24 year who were first married or in union before age 18



Source: UNICEF (2020a).

Table 2. Multilevel discrete-time survival model estimates of the risk of entering marriage before age 18 in Bangladesh

	Risk of entering marriage before age 18								
	SPEI24			SPEI36			SPEI48		
	HR	p-value	CI	HR	p-value	CI	HR	p-value	CI
SPEI (ref. Near normal)									
Severely or extremely wet	1.07	(0.005)	[1.03–1.11]	1.12	(0.000)	[1.07–1.17]	1.13	(0.000)	[1.09–1.17]
Moderately wet	0.95	(0.009)	[0.91–0.98]	1.01	(0.461)	[0.98–1.04]	1.03	(0.121)	[1.00–1.06]
Moderate drought	0.97	(0.231)	[0.93–1.01]	1.10	(0.000)	[1.06–1.14]	1.15	(0.000)	[1.11–1.19]
Severe or extreme drought	1.03	(0.294)	[0.98–1.08]	1.13	(0.000)	[1.08–1.18]	1.10	(0.001)	[1.05–1.16]
lnsig2u	0.10	(0.000)	[0.07–0.14]	0.10	(0.000)	[0.07–0.14]	0.10	(0.000)	[0.07–0.14]
Observations (person-years)	320255			320185			320665		
Number of districts	64			64			64		

Notes: *HR* are the exponentiated hazard ratios estimated from the random intercept discrete-time survival model, while *CI* are the confidence intervals. Estimates are robust to internal mobility of interviewed women. Controls for years at risk, religion, husband's educational level, residence in a rural/urban area, birth cohort, percentage of severely underweight children, and school attendance are applied. Source: Own elaborations of DHS and SPEI data (1990–2016).

Table 3. Multilevel discrete-time survival model estimates of the risk of entering marriage at any age in Bangladesh

	Risk of entering marriage at any age								
	SPEI24			SPEI36			SPEI48		
	HR	p-value	CI	HR	p-value	CI	HR	p-value	CI
SPEI (ref. Near normal)									
Severely or extremely wet	1.13	(0.000)	[1.09–1.17]	1.20	(0.000)	[1.15–1.24]	1.19	(0.000)	[1.15–1.23]
Moderately wet	0.96	(0.017)	[0.93–0.99]	1.02	(0.131)	[1.00–1.05]	1.07	(0.000)	[1.04–1.10]
Moderate drought	1.01	(0.657)	[0.98–1.04]	1.14	(0.000)	[1.10–1.18]	1.18	(0.000)	[1.14–1.22]
Severe or extreme drought	1.00	(0.845)	[0.96–1.04]	1.10	(0.000)	[1.06–1.15]	1.12	(0.000)	[1.07–1.17]
lnsig2u	0.10	(0.000)	[0.07–0.14]	0.10	(0.000)	[0.07–0.14]	0.10	(0.000)	[0.07–0.14]
Observations (person-years)	357478			357436			357938		
Number of districts	64			64			64		

Notes: *HR* are the exponentiated hazard ratios estimated from the random intercept discrete-time survival model, while *CI* are the confidence intervals. Estimates are robust to internal mobility of interviewed women. Controls for years at risk, religion, husband's educational level, residence in a rural/urban area, birth cohort, percentage of severely underweight children, and school attendance are applied. Source: Own elaborations of DHS and SPEI data (1990–2016).

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