



Trends in child marriage and new evidence on the selective impact of changes in age-at-marriage laws on early marriage

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ABSTRACT

This study adopts a cohort perspective to explore trends in child marriage – defined as the proportion of girls who entered first union before the age of 18 – and the effectiveness of policy changes aimed at curbing child marriage by increasing the minimum legal age of marriage. We adopt a cross-national perspective comparing six low- and middle-income countries (LMICs) that introduced changes in the minimum age at marriage over the past two decades. These countries belong to three broad regions: Sub-Saharan Africa (Benin, Mauritania), Central Asia (Tajikistan, Kazakhstan), and South Asia (Nepal, Bhutan). We combine individual-level data from Demographic and Health Surveys and Multiple Indicator Cluster Surveys with longitudinal information on policy changes from the PROSPERED (Policy-Relevant Observational Studies for Population Health Equity and Responsible Development) project. We adopt data visualization techniques and a regression discontinuity design to obtain estimates of the effect of changes in age-at-marriage laws on early marriage. Our results suggest that changes in minimum-age-at-marriage laws were not effective in curbing early marriage in Benin, Mauritania, Kazakhstan, and Bhutan, where child marriage showed little evidence of decline across cohorts. Significant reductions in early marriage following law implementations were observed in Tajikistan and Nepal, yet their effectiveness depended on the model specification and window adopted, thus making them hardly effective as policies to shape girls' later life trajectories. Our findings align with existing evidence from other countries suggesting that changes in age-at-marriage laws rarely achieve the desired outcome. In order for changes in laws to be effective, better laws must be accompanied by better enforcement and monitoring to delay marriage and protect the rights of women and girls. Alternative policies need to be devised to ensure that girls' later-life outcomes, including their participation in higher education and society, are ensured, encouraged, and protected.

Introduction

Early marriage – defined as the marriage of children below 18 – is widely recognized in international human rights agreements as a harmful and discriminatory global practice. International governmental, academic, and advocacy stakeholders have called for countries to establish legislative frameworks that prohibit early marriage and close legal loopholes that permit marriage below the age of 18 (Human Rights Watch 2011, 2013; Jensen & Thornton, 2003; Walker, 2012). The disproportionately high rate of early marriage among girls compared to boys is also widely documented and recognized by the international scholarship and community as reflecting persistent gender inequalities (Koski & Clark, 2021; Pesando & Abufhele, 2019; UNICEF, 2014) and

slow economic development (Vogelstein, 2013).

Elimination of early marriage is a direct target of Sustainable Development Goal (SDG) number five and is also critical to achieving other SDGs set by the United Nations (UN). For instance, early marriage disproportionately affects rural and disadvantaged girls in low- and middle-income countries (LMICs) creating cycles of poverty that perpetuate inequalities (Dahl, 2010; Otoo-Oyortey and Pobi 2003). Early marriage also keeps girls in poverty by depriving them of opportunities such as education and access to paid employment (Delprato et al., 2015; Field & Ambrus, 2008; Sunder, 2019). Women marrying in teenage years or younger have little say in terms of when they marry and whom they marry (Jensen & Thornton, 2003) and have low post-marital agency within unions (Crandall et al., 2016; Yount et al., 2018), often

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resulting in frequent instances of domestic violence (Hindin & Fatusi, 2009; Nasrullah et al., 2014; Rahman et al., 2014). Teen brides may also be unable to negotiate access to safe sex and medical care, leaving themselves vulnerable to health risks such as sexually transmitted infections and early pregnancies (Godha et al., 2013; Nour, 2006), which in turn correlate with worse pregnancy outcomes for mothers (Ashcraft & Lang, 2006; Fraser et al., 1995; Ganchimeg et al., 2014; Raj, 2010) and worse health outcomes for children (Efevbera et al., 2017).

In light of the sustained prevalence of early marriage and the array of negative consequences ensuing from it, there is heated discussion on the effectiveness of policies aimed at curbing the practice. Changes in age-at-marriage laws have featured prominently among the measures adopted by governments. Arthur et al. (2018) documented improvements in the frequency of countries to adopt legal provisions that prohibit marriage below the age of 18, and some research provides evidence of a significant association between protective laws and lower rates of early marriage (Bharadwaj, 2015; Maswikwa et al., 2015), as well as declines in adolescent fertility rates (Kim et al., 2013). Conversely, looking at a sample of 60 countries, Collin and Talbot (2017) found that – despite increases in legal provisions – most countries do not enforce the proposed laws, and enforcement is not getting better over time. Another recent synthesis from a meta-ethnographic approach reached the similar conclusion that in spite of global progress scaling up legislation against child marriage, the legal framework in many settings is insufficiently enforced (Kohno et al., 2020).

These results suggest that renewed efforts to outlaw early marriage may not deter the practice, even where the incidence of early marriage is declining – a finding that is largely echoed in Kidman and Heymann (2016). In a similar spirit, Arthur et al. (2018) documented persistent widespread discriminatory provisions in legislation that disadvantage girls, alongside legal exceptions to minimum age provisions based on parental consent and customary/religious laws that create loopholes that lower the legal minimum age at marriage below the age of 18 (see below in Background for additional details). A systematic review on legal interventions to curb early marriage found positive results in terms of decreasing the proportion married or increasing age at marriage in six cases, positive and negative findings in one case, and no statistical impacts on the proportion married or age at marriage in four other instances (Kalamar et al., 2016). As such, the understanding of the proper functioning of these laws across diverse contexts remains inadequate and empirically limited – an effort we undertake in the current study by focusing on six relatively unexplored LMICs.

Despite the complexities of identifying effective policies to prevent or reduce early marriage, this remains a key priority for scholars and policymakers concerned with raising children's and women's status by boosting their human- and social-capital opportunities. For instance, there's a rich literature relating later age at marriage with positive later-life outcomes. Delprato et al. (2015) found a delay in early marriage by one year to be associated with an increase of half a year of education in Sub-Saharan Africa, and nearly one third of a year in South-West Asia, as well as a lower likelihood of dropping out from secondary school of 5.5 percent in the latter region. Field and Ambrus (2008) found each additional year that marriage was delayed in Bangladesh to be associated with 0.22 additional years of schooling and 5.6 percent higher literacy. Polyakova (2018) found that delaying marriage by a year in Nigeria was associated with an 8.9 percentage-point increase in the probability of obtaining some secondary education, and with a 10–11 percentage-point increase in the likelihood of completing secondary school. In Uganda, a one-year delay in marriage for women led to higher educational attainment (0.5–0.75 years), literacy (10 percentage points) and, ultimately, labor force participation rates (Sunder, 2019). Lastly,

Dahl (2010) found that a girl who marries young in the US is 31 percentage points more likely to live in poverty when she is older. Therefore, assessing the effectiveness of changes in age-at-marriage laws in curbing early marriage is an essential first step to evaluate whether policy levers of this kind can eventually impact girls' later-life trajectories, from participation in education (including higher education) to higher decision-making power within couples and, ultimately, more active participation in society at large.

This study contributes to the relevant literature in several directions. First, we adopt a cohort perspective to trace changes in early marriage – defined as the proportion of girls entering first union before age 18 – over 20 years and across six LMICs, namely Benin, Mauritania (Sub-Saharan Africa), Tajikistan, Kazakhstan (Central Asia), and Nepal and Bhutan (South Asia). Second, in light of the policy changes on age at marriage that these countries experienced since 1995 onwards, we explore the extent to which changes in age-at-marriage laws were effective in curbing early marriage. We do so by combining individual-level data from Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) with longitudinal information on policy changes from the Policy-Relevant Observational Studies for Population Health Equity and Responsible Development (PROSPERED) Child Marriage Database. Third, in light of insufficient evidence on changes in minimum age-at-marriage laws as effective policy instruments, we reflect on alternative policies that might be better at placing girls onto more successful and thriving life trajectories.

Our results suggest that changes in minimum-age-at-marriage laws were not effective in curbing early marriage in Benin, Mauritania, Kazakhstan, and Bhutan, where child marriage showed little evidence of decline across cohorts to start with. For instance, the prevalence of early marriage in Benin has been stable around 32–35 percent and even slightly increasing between the 1970–74 and 1990–94 cohorts (in line with Koski et al., 2017). Significant reductions in early marriage following law implementations were instead observed in Tajikistan and Nepal, yet their effectiveness depends on the model specification and window adopted, thus making them hardly effective as policies to shape girls' later life trajectories. Our findings align with existing evidence from other countries suggesting that changes in age-at-marriage laws rarely achieve the desired outcome. In order for changes in laws to be effective, better laws must be accompanied by better enforcement and monitoring to delay marriage and protect the rights of women and girls. Alternative policies need to be devised to ensure that girls' later-life outcomes, including their participation in higher education and society, are ensured, encouraged, and protected.

Background

Existing evidence on trends in child marriage

UNICEF reports a reduction in the global prevalence of child marriage in the last decade, largely driven by prevention and care interventions in South Asia. However, 12 million girls per year still get married before the age of 18 (Kohno et al., 2020; UNICEF, 2019). The highest levels of child marriage are found in Sub-Saharan Africa (38 percent), with Niger reporting a prevalence as high as 76 percent, followed by South Asia (30 percent) and Latin America (25 percent) (UNICEF, 2019). According to data from the DHS in Bangladesh, 59 percent and 22 percent of women were married before the age of 18 and before the age of 15, respectively. In Latin America, the numbers are also alarming. In the Dominican Republic and Brazil, 36 percent of women were married before the age of 18.

While the above are (mostly) cross-sectional estimates from a single

time point, a recent study has documented trends and changes in child marriage using careful demographic indicators from 31 Sub-Saharan African (SSA) countries (Koski et al., 2017). The authors did find that child marriage became less common throughout much of SSA, but more than one third of girls continue to marry before reaching adulthood in more than half of the countries examined in the study. Evidence from their study suggests that early progress toward reducing child marriage has not been sustained in some countries, and the prevalence has remained essentially unchanged for 20 years in seven of them. Also, their study suggests that decreases in the prevalence of child marriage have been concentrated among girls aged 15–17, while more than half of the countries examined showed no significant progress among girls younger than 15, indicating lack of progress among the most vulnerable girls.

Some theoretical perspectives are relevant to the investigation of factors that influence and sustain child-marriage in cross-national perspective, which typically have to do with community forces and social norms surrounding the value of families and the role of women within households and societies. For instance, Kagitcibasi's theory of family change suggests that there is a link between sociocultural factors and development of the self, and family as a mediator (Kağitçibaşı, 1996). This model describes the relationship between society/culture, family, and the resultant self, as well as how children are perceived as economic value by the parents. Additionally, the theory by Gelfand et al. (2006) introduces the concept of cultural tightness-looseness, which describes the role of social norms that determine the sociocultural sanctions and stigma imposed on people within societies if they transcend such norms. Some of these perspectives do help understand why there is so much inertia behind the decline in child marriage.

More specifically, Kohno et al. (2020) undertook an exploration of some of the key factors that influence girls to enter into child marriage, thus contributing to perpetuating the practice. They identified a blend of individual, community, and contextual factors that underlie the sustained prevalence of the practice, including feelings of insecurity tied to violence and conflict (which would make early marriage a “protective” strategy for young girls), financial constraints on the part of families, insufficient legal protections and legal enforcement, discrepancies between societal and personal (or family) knowledge regarding the official age at marriage, cultural family values normalizing child marriage as a desirable and virtuous outcome for young girls, binding religious beliefs within the family and in the community perceiving marriage as promoting human spiritual maturity in religion, lack of autonomy in decision making alongside weak negotiation skills and, foremost, a strong influence of patriarchal ideologies pervading the structure of families and societies.

Existing evidence on the effectiveness of changes in age-at-marriage laws

From cross-country comparative studies, systematic reviews, and meta analyses, there is rather overwhelming evidence that high levels of child marriage persist throughout much of the LMIC world despite legislative efforts to prevent the practice (Collin & Talbot, 2017; Kalamar et al., 2016). The work by Koski et al. (2017) aligns with these findings, suggesting that by 2010, 25 of the 31 countries in their analyses had set a minimum legal age for marriage at 18 years or older, yet seeing very slow declines afterwards. They also noted that Guinea, Niger, Togo, Chad, the Democratic Republic of Congo, and Zimbabwe were exceptions and had legal minimums between 15 and 17 years of age, while all 31 countries still permit exceptions to the minimum in case of consent from parents or religious or judicial authorities, suggesting that even rigorous enforcement of existing laws is unlikely to completely eradicate the practice.

More recently, there have been two careful evaluations of policy changes aimed at banning child marriage by increasing the minimum age at marriage. For instance, Ethiopia raised the minimum age of marriage from 15 to 18 starting in 2000, yet the effect of this change has

already been documented (McGavock, 2021). This reform delayed women's marriage, and in particular delayed marriages of girls under 16 by about 17 percent (6.8 percentage points) in areas where early marriage was more common prior to the reform. However, the effect of the reform, though larger, was insignificant among women belonging to ethnic groups with the strongest norms toward early marriage. Similarly, a reform of this kind was already evaluated in Mexico, where Bellés-Obrero and Lombardi (2020) found that banning child marriage led to a large and statistically significant reduction in the number of registered child marriages, yet the driving mechanism was a substitution into informal unions, suggesting that when informal unions are a viable option for young couples, raising the minimum age at marriage is likely not enough to prevent early unions and their negative consequences.

Policy changes in countries under analysis

This study focuses on six countries that underwent a change in age-at-marriage provisions from 1995 onwards, attempting to provide evidence from selected countries across three regions of the world, namely Sub-Saharan Africa, Central Asia, and South Asia, and a subset of countries that are rarely investigated in the relevant literature (differently, for instance, from the Ethiopian and Mexican cases discussed above). As little is known about trends in child marriage in these contexts, we start this investigation by exploring trends across cohorts in the proportion of girls in union before the age of 18 using our own data from this study – described in detail below.

Overall, evidence from Fig. 1 aligns with some studies discussed above: the prevalence of early marriage is high across all countries considered, with Nepal featuring the highest shares – more than 50 percent of girls from the 1970-74 birth cohort – and Tajikistan and Kazakhstan featuring the lowest shares – around 10 percent of girls in the earliest birth cohort. Trends across cohorts show rather marginal declines in four out of six countries (Benin, Bhutan, Kazakhstan, and Mauritania), while Nepal experienced a decline from 55 percent in the 1980-84 birth cohort to 42 percent in the 1990-94 birth cohort, and Tajikistan experienced a decline from 25 percent in the 1975-79 birth cohort to about 10 percent in the 1990-94 birth cohort. As such, at first glance there is some evidence of a declining trend in child marriage overtime, but no drastic reduction – something we might observe, for instance, if a policy intervention banning child marriage were to be extremely effective.

Policy interventions aimed at curbing early marriage were actually implemented in each of these countries, starting in July 1996 in Bhutan and ending in July 2010 in Tajikistan. It is worth noting that alongside general provisions raising the minimum age at marriage to 18, in each

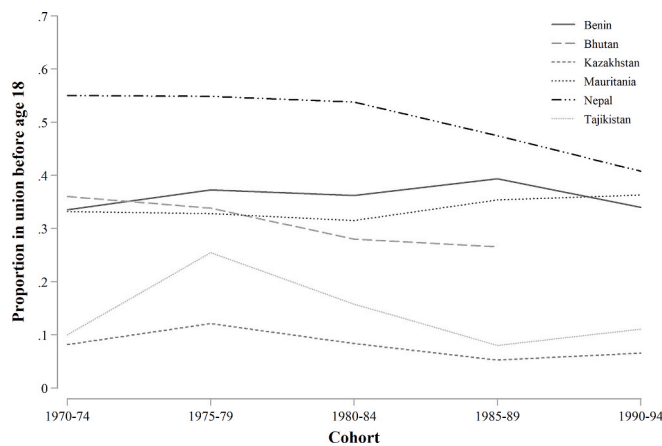


Fig. 1. Trends in the proportion of women who entered first union before the age of 18, women at least 20 years old at the time of the survey, 5-year cohorts, weighted proportions.

country legal exceptions to minimum age provisions based on parental consent and customary/religious laws persist, creating loopholes that, effectively, lower the legal minimum age at marriage below the age of 18. In Tajikistan, marriage among women is allowed at the age of 17 if permission is granted by a court or a government authority; the same holds in Kazakhstan at age 16 in case of pregnancy/birth, provided permission is granted by courts or other governmental bodies. In Benin courts or other governmental bodies can grant permissions to marry at any age, despite the set threshold. In Nepal, the minimum age at marriage was changed to 20, yet with parental consent it can be reduced to 18. Contrary to other countries, in Mauritania the line between religious and statutory laws is blurred. These simple facts suggest that, even if implemented, legal provisions are effectively hard to enforce and dependant on a multiplicity of country-specific factors which often go beyond the purely legal domain, intersecting with societal, cultural, and religious considerations. It is also important to recognize that the law is a blunt instrument, i.e., it does not address the underlying causes of child marriage and can do little to prevent informal child marriages (Bellés-Obrero & Lombardi, 2020; Koski & Clark, 2021).

Data

We focus on six countries that since 1995 passed a law increasing the legal minimum age at marriage and that have a DHS or MICS conducted after the law implementation (see Table 1). We used the PROSPERED database to identify countries as well as years in which the respective laws were passed (Nandi et al., 2018). Subsequently, searching through other sources such as, for example, official governmental documents and reports, we identified the month of the respective law implementation in each country.

Out of the countries that increased the legal minimum age at marriage identified using the PROSPERED database, we selected a subset of six for which we were able to evaluate the impact of the law change, and excluded countries that did not have necessary information, i.e.,: (i) countries that had surveys conducted only among ever-married women, (ii) countries for which we were unable to identify the exact date (year and month) of the law, and (iii) countries that had a survey conducted shortly after the law implementation and thus provided insufficient

Table 1
Details of the minimum age-at-marriage laws, datasets, country characteristics.

Country	Survey	Date of Law Implementation	Minimum Age at Marriage		% In Union Before Age 18
			After New Law	Before New Law	
Benin	DHS 2017	08/2004	18	15	35.5
Bhutan	MICS 2010	07/1996	18	16	30.6
Kazakhstan	MICS 2015	12/1998	18	17	7.8
Mauritania	MICS 2015	07/2001	18	at puberty (14)	35.2
Nepal	DHS 2016	09/2002	18	16	49.1
Tajikistan	DHS 2017	07/2010	18	17	12.3

Notes: For Nepal: age at marriage with parental consent; for the rest of the countries: age at marriage in general. The survey data do not permit to fully distinguish between marriage and cohabitation as they refer to unions in general. We use 14 as the age of puberty in Mauritania. The average age at menarche, which is a culmination of a process of puberty, tends to be between ages 13 and 15, depending on a country (Thomas et al., 2001). Since we could not identify the average age at menarche for Mauritania, we use age 14 as an approximation. Percentages (%) are weighted estimates calculated from each survey for women aged 20–49.

information about women who were affected by it.

Our final sample consists of six countries from three broad regions: Benin and Mauritania (Sub-Saharan Africa), Tajikistan and Kazakhstan (Central Asia), and Nepal and Bhutan (South Asia). The minimum age at marriage prior to the law implementation differed between the countries and ranged from “at puberty” in Mauritania to 17 years in Kazakhstan and Tajikistan. Following the implementation of laws, women in all countries are legally allowed to marry no earlier than at the age of 18.

Both DHS and MICS are nationally representative surveys of women of reproductive age (15–49) and have similar designs, which facilitates cross-national comparative analyses. All surveys provide information about women’s date of birth and date of first union (month and year), as well as their sociodemographic characteristics at the time of the survey. We define early marriage as a first union that took place before the age of 18. Using information about the month and year of women’s birth and first union from MICS and DHS, as well as the exact date of policies’ implementation, we identify women who were subject to the new law and whether they entered their first union before the age of 18.

Methods

To assess the effectiveness of the laws, we examine whether increases in the minimum age at marriage to 18 reduced the prevalence of early marriage. Our methodological approach draws from a regression discontinuity design (RDD). The RDD is a quasi-experimental method exploiting the knowledge about the rules determining the treatment assignment, which subsequently allows to capture the causal effect of the treatment on an outcome of interest (Angrist & Pischke, 2009). Our approach involves implementing the first stage of the fuzzy RDD,¹ that is, establishing whether there is a discontinuity in the probability of treatment, conditional on a covariate that determines treatment assignment. In our case, this involves examining whether there is a discontinuity in the probability of early marriage at the cut-off that distinguishes women who were exposed to the new law from those who were not.

In our study, the treatment indicator is a binary variable describing whether a woman married before the age of 18. The exposure indicator is a binary variable which takes a value of 1 for women who were exposed to the new law, and 0 for women who were not exposed. We obtain the exposure indicator using information about the month and the year of women’s birth and policies’ implementation. For instance, in Tajikistan the minimum age at marriage was raised by 1 year (from 17 to 18) in July 2010 (refer to Table 1). We classify women as exposed to the law if they were younger than exactly 17 years old at the moment of the policy, i.e., if they were still 16 in July 2011. These women were only exposed to the legal age at marriage of 18. We classify women as not exposed to the law if they were more than exactly 17 years old at the moment of the policy, i.e., women who were at least 17 years and 1 month old in July 2011. These women had an opportunity to legally marry before the age of 18. We exclude women who turned exactly 17 in July 2010, since we cannot determine whether that happened before or after the policy was implemented. We define the two groups in a similar manner for the rest of the countries.

Our methodological approach requires choosing a width of the interval (window) that determines which women around the cut-off defining exposure to the law are included in the analysis. This window needs to be sufficiently large to ensure adequate sample size yet sufficiently small to ensure that the group of women who were and who were not exposed to the law are comparable. We exploit three different windows to examine the sensitivity of the results to the choice of the

¹ Fuzzy RDD is a specification used when the probability of treatment does not fall to zero at the cut-off determining assignment to treatment. It is equivalent to an instrumental variable approach and is implemented with the two-stage least squares regression (Angrist & Pischke, 2009).

Table 2
Information about women exposed and not exposed to the law, 24-, 36- and 48-month windows.

Country	24-month window				36-month window				48-month window			
	N women		% in Union Before Age 18		N women		% in Union Before Age 18		N women		% in Union Before Age 18	
	Not exposed	Exposed	Not exposed	Exposed	Not exposed	Exposed	Not exposed	Exposed	Not exposed	Exposed	Not exposed	Exposed
Benin	1095	1164	39.0	36.6	1627	1902	38.6	36.6	1989	2441	38.7	35.6
Bhutan	1033	951	31.0	30.9	1458	1464	32.9	29.7	1880	2055	33.8	28.1
Kazakhstan	773	786	11.3	5.9	1142	1206	10.7	6.7	1521	1650	11.2	6.3
Mauritania	870	964	34.7	36.3	1397	1573	35.7	37.9	1816	2007	34.6	36.9
Nepal	748	843	52.7	44.1	1128	1241	53.1	45.0	1475	1683	52.2	44.3
Tajikistan	748	828	13.0	8.6	1146	1233	12.9	8.5	1517	1656	11.4	8.1

Notes: Percentages (%) are weighted estimates. N: number of observations.

interval: a 24-month, a 36-month and a 48-month window. The descriptive statistics for the three specifications are presented in Table 2. They indicate that, for all specifications and countries except for Mauritania, early marriage was lower among women who were exposed to the law than women who were not exposed. Nonetheless, even among women who were subject to the new law banning early marriage, the share of those who married before the age of 18 was very high in Benin, Bhutan, and Nepal (above 28%), and still above 5% in Kazakhstan and Tajikistan.

We examine the relationship between women's exposure to the law and prevalence of early marriage in more detail using visualization techniques and linear probability models. For the latter analyses, we regress the treatment indicator D on the exposure indicator Z (Eq. (1)). We include a continuous assignment variable Y , which is the age of a woman, in months, when the law was introduced, as well as controls X that include women's region of residence (country-specific) and place of residence (urban or rural). We conduct analyses separately by country and for each of the three windows:

$$D_i = \alpha_0 + \alpha_1 Z_i + \alpha_2 Y_i + \alpha_3 X_i + v_i \quad (1)$$

In the regressions, we are unable to control for additional characteristics. For example, information about women's religion is available only for Nepal and Benin, thus including this variable runs the risk of compromising the comparability of the results between countries.² Other characteristics such as household wealth or education refer to the time of the survey and are features that are unlikely to be stable over time, thus providing biased proxies if included. For instance, given that marriage is likely to result in moving households and women are still in education during teenage years, such current-status variables might not correspond to the wealth of the household in which women lived in, or education level that they had at the time of the law implementation. Moreover, and most importantly, household wealth and education at the time of the survey could in fact be outcomes of the laws' implementation through their impact on women's marriage trajectories.

Results

Visual examination of the effectiveness of changes in age-at-marriage laws

Fig. 2 provides a graphical depiction of the first stage of a fuzzy RDD specification described above, aimed at visually evaluating whether changes in age-at-marriage laws effectively reduced early marriage. Each graph reports the share of women – aged 20 and above at the time of the survey – who entered first union before the age of 18 in each country, as a function of the age at law implementation. The dashed

lines correspond to the group of women who were exposed to the law, i. e., those girls whose ability to marry was changed by the law, while the solid lines correspond to the group of women who were not exposed to the law. We add 95% confidence intervals (CIs) to cast light on the uncertainty around the estimates.

Fig. 2 does not provide evidence of a clear discontinuity in the share of women who married before the age of 18 at the cut-off in any of the countries. For example, in Mauritania, the proportion of women who married early in life is very similar among women who at the time of the law implementation were aged 14 and 13, despite the fact that the latter group was subject to the early marriage ban. A similar pattern is observed in Kazakhstan, Bhutan, and Benin. Although the point estimates for Nepal and Tajikistan suggest that the share of women who married before the age of 18 was lower among women just below the cut-off defining exposure to the law, the 95% CIs of the estimates are overlapping. Finally, analyses of long-term trends suggest that, in Nepal, Bhutan and Kazakhstan, the lower levels of early marriage among women exposed to the law are partly a continuation of a decline that began prior to the law implementation (Fig. 1). Thus, the visual examination of trends suggests that the laws were not particularly effective in reducing early marriage in any of the countries.

We conducted supplemental analyses of trends disaggregated by women's place of residence (urban – rural) (Fig. A1 and Fig. A2 in the Appendix). Although the comparison of women according to their exposure indicates that the decline in the share of early marriages following law implementation was greater in urban than rural areas, for example, in Tajikistan and Nepal, large uncertainty around the estimates does not allow us to conclude that laws were more effective in curbing early marriage in urban areas in these countries.

Regression analysis of the effectiveness of changes in age-at-marriage laws

Findings from Fig. 2 are confirmed by coefficient estimates of linear probability models reported in Fig. 3 (more detailed regression results are presented in Table A1 in the Appendix). We report coefficients with 95% CIs from different model specifications and windows. Model 1 (M1) is a model without any controls; thus, it describes a bivariate association predicting the probability of a girl entering a union before the age of 18 as a function of the exposure to the law. Model 2 (M2) includes an additional continuous variable of women's age at the time of the law implementation in months; Model 3 (M3) is an extension of M2 and includes additional categorical variables for women's place and region of residence. Each of the three panels corresponds to one of the three specifications, depending on the window (24, 36 and 48 months).

For the 24-month window, M1 indicates that, while the sign is consistently negative in all countries except for Mauritania, the estimates are only statistically significant at the 5% level in Tajikistan and Nepal. In these two countries, being exposed to the law reduced the likelihood of entering marriage before the age of 18 by 5 and 9 percentage points, respectively. Nonetheless, these associations are no

² We run additional regressions for Nepal and Benin including a control for religion and it does not affect the interpretation of our results (available on request).

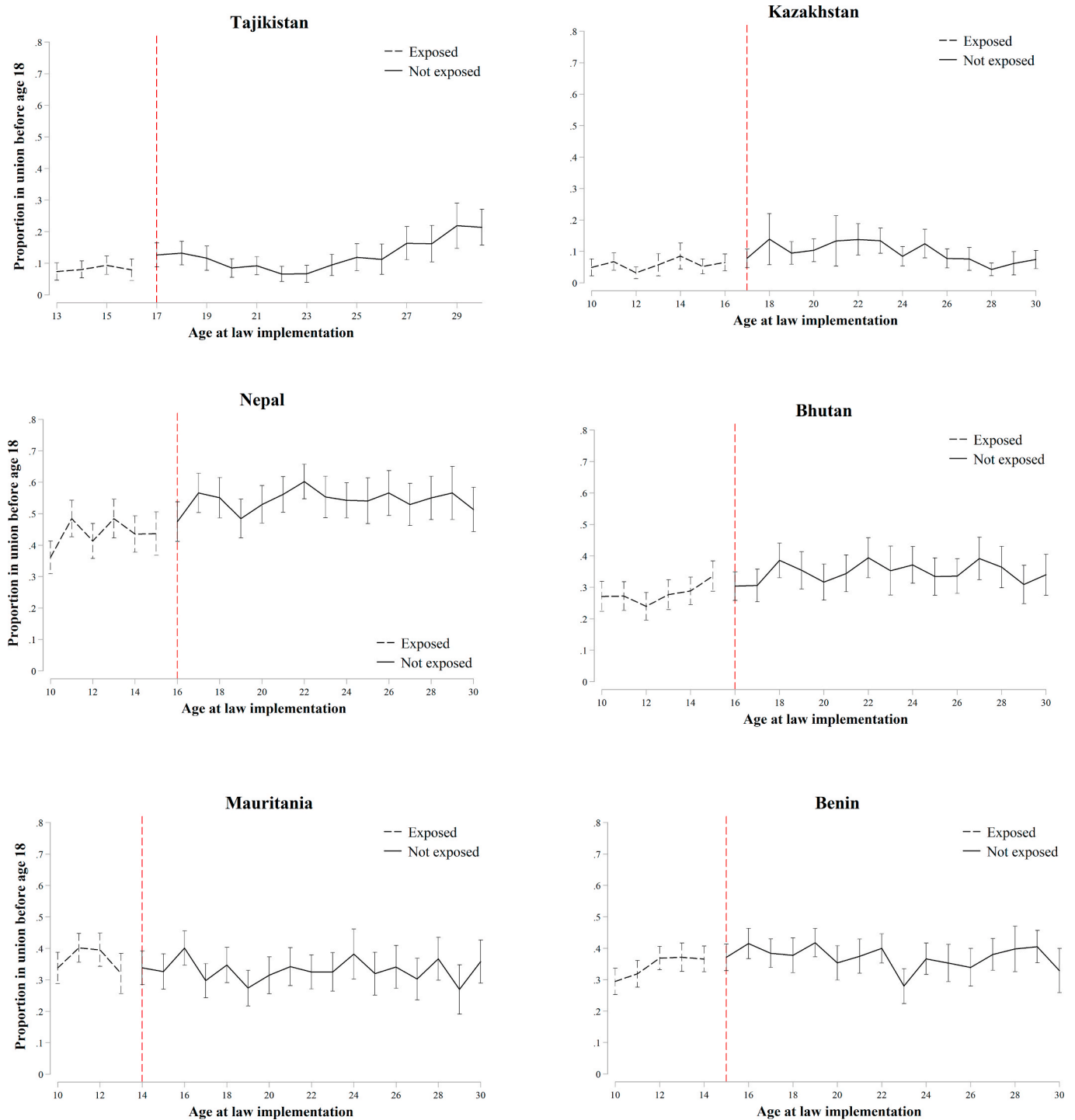


Fig. 2. Proportion of women who were at least 20 years old at survey and entered first union before age 18, 95% confidence intervals, by the age at the law implementation and their exposure to the law, accounting for survey design.

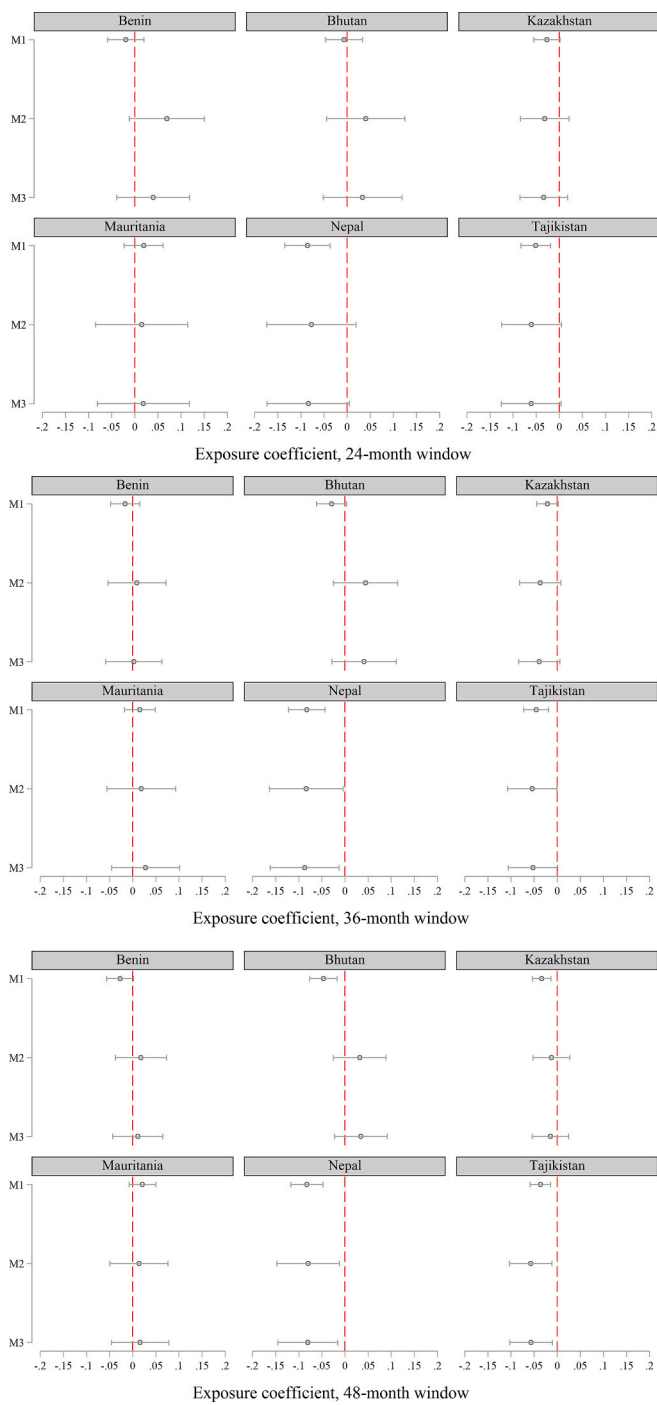


Fig. 3. Coefficients and 95% confidence intervals from OLS describing association between women's exposure to the law and entering union before the age of 18. 24-, 36- and 48-month windows. M1 - model without controls, M2 - model with a continuous control for women's age at law implementation in months, M3 - M2 + controls for region and urban/rural residence. Notes: Standard errors are clustered at the enumeration area level.

longer statistically significant in models that include additional controls, namely M2 and M3. The results for Benin and Mauritania remain unchanged for the 36- and 48-month specifications. The probability of

early marriage is significantly lower following the law implementation in Bhutan and Kazakhstan in M1 for the 48-month specification, but this is not the case once additional controls are included in models M2 and M3.

The results are more complex for Nepal and Tajikistan where, even controlling for additional covariates, exposure to the law is associated with reduced probability of early marriage when using the 48-months window specification for both countries, and the 36-month window for Nepal (reductions of around 8–9 percentage points in Nepal and 6 percentage points in Tajikistan). The fact that only some specifications produce evidence that the implementation of laws resulted in lower likelihood of early marriage in Nepal and Tajikistan means that we cannot unambiguously conclude whether bans effectively reduced the prevalence of marriage before the age of 18 – and use this, for instance, as an Instrumental Variable (IV) in first-stage estimations predicting later-life outcomes of girls. Moreover, it should be highlighted that the aim of the laws was to ban early marriage altogether. Hence, even if the share of women marrying before the age of 18 dropped by 6–8 percentage points in the two countries, the legislation did not achieve its goal of eradicating early marriage.

Taken together, our results suggest that changes in the minimum-age-at-marriage laws were not effective in curbing early marriage in Benin, Mauritania, Kazakhstan, and Bhutan. Although significant reductions in early marriage following law implementations are observed in Tajikistan and Nepal, their effectiveness depends on the model specification and window adopted. Overall, the analyses provide us with insufficient evidence to be able to claim unequivocally that the laws reduced the probability of early marriage in any of the six countries. Moreover, despite the policy implementation, Nepal, Bhutan, Mauritania, and Benin are far from eradicating early marriage, as even among the youngest cohorts around one third of women marries before the age of 18.

Conclusions and discussion

This study has adopted a cohort perspective to explore the extent to which changes in age-at-marriage laws were effective in curbing early marriage across six LMICS which introduced a policy change regarding the minimum age at marriage. We tackled our research question using survey data from countries located in different regions of the world combined with novel longitudinal information on policy changes. We drew from simple causal inference techniques to obtain estimates of the effect of changes in age-at-marriage laws on early marriage, in line with the existing literature on the topic relying primarily on difference-in-differences strategies or regression discontinuity designs (Bellés-Obrero & Lombardi, 2020; Collin & Talbot, 2017; Dahl, 2010; McGavock, 2021). In so doing, we reached two different sets of findings. The first set of results suggests that only in Tajikistan and Nepal there have been noticeable declines in child marriage across cohorts. Despite these declines observed in more recent cohorts, the majority of the countries under investigation – particularly Nepal, Bhutan, Mauritania, and Benin – are far from eradicating early marriage, as even among the youngest cohorts around one third of women marries before the age of 18.

Echoing much of the literature (Collin & Talbot, 2017; Kalamar et al., 2016; Koski et al., 2017), the second set of findings suggests that even in these previously unexplored countries, changes in minimum-age-at-marriage laws were not effective in curbing early marriage in Benin, Mauritania, Kazakhstan, and Bhutan, where child marriage showed little evidence of decline across cohorts to start with.

Significant reductions in early marriage following law implementations were instead observed in Tajikistan and Nepal, yet their effectiveness depends on the model specification and window adopted, thus making them hardly effective as policies to shape girls' later life trajectories. As the literature tends to focus on Sub-Saharan Africa, India, Bangladesh, and Mexico, we believe our results for Nepal and Tajikistan are informative and stress an additional layer of novelty even just from a purely "geographical" standpoint.

Our findings relating to the mixed and context-specific effectiveness of policy changes aimed at curbing early marriage align with claims made by Arthur et al. (2018) and Collin and Talbot (2017) that, despite the increasing prevalence of legal provisions aimed at increasing the legal age at marriage, the level of enforcement varies widely, and legal exceptions based on parental consent and customary or religious laws remain in place – alongside high rates of illegal or informal marriages (Bellés-Obrero & Lombardi, 2020; Collin & Talbot, 2017) – thus preventing the full effectiveness of the legal provisions. Unfortunately, we did not have data on exact implementation procedures, monitoring, or enforcement, which could also cast light on why reductions in child marriage in Nepal and Tajikistan were more pronounced than in other countries. Nonetheless, several sources suggest that these are serious issues that underlie the limited effectiveness of changes in legal provisions in countries covered by our analyses overall. In Bhutan, although child marriage is punishable by fine, enforcement is considered to be weak and is exacerbated by the lack of a reliable marriage registration system (ICRW, 2012). In Nepal, child marriage can carry a prison sentence and/or a fine, but punishment is weakened by wide discretionary sentencing powers given to courts (CRR, 2016). Overall, poor implementation and limited awareness of child marriage legislation are considered to be one of the reasons for the high prevalence of child marriage in South Asia (Khanna et al., 2013). In Tajikistan, child marriages carry a prison sentence of up to six months but, in practice, most cases are only punished by a fine. Moreover, religious ceremonies are sometimes performed without registration of marriages to civil authorities, thus bypassing legislation (UNFPA, 2014). Similar issues around the implementation of laws as in Tajikistan have been identified in Kazakhstan (UNFPA, 2012). We found little information about the working of legislation in Sub-Saharan African countries covered by our study, most notably Benin. Nonetheless, available sources suggest that, in Mauritania, the lack of clarity of the Personal Status Code that sets the minimum age at marriage makes it ineffective in having a meaningful impact on marriage practices.³ Albeit scarce, the available evidence consistently points to weak enforcement of the new legislation across countries included in our study.

Our results combined suggest that there is a long way to go before child marriage is eradicated, and changes in legal provisions are playing only a minimal role, if any. This pushes scholars and policymakers to think about alternative policies that might be more effective in curbing early marriage or delaying age at first union. For instance, Kalamar et al. (2016) found that providing incentives for girls' education was one of the few interventions that have been shown to effectively prevent child marriage. Many of the studies included in that review were conducted in Sub-Saharan Africa. Randomized evaluations in Kenya, Malawi, and Zimbabwe also found that reducing the cost of schooling by providing school fees, uniforms, or cash transfers conditional on attendance reduced the incidence of child marriage (Baird et al, 2010, 2012; Hallfors et al., 2015). A pilot program in Ethiopia that provided girls with mentorship and economic incentives to remain in school – and facilitated community discussion about the harms associated with child marriage – reduced the proportion of girls between ages 10 and 14 who were married by approximately 8 percentage points after a two-year

follow-up period, although the program had no measurable effect on the marriage of girls between ages 15 and 19 (Erulkar & Muthengi, 2009).

Preventing early, coerced, and forced marriage has been on the global agenda for several decades, first in 2000 with the Millennium Development Goals (MDGs) highlighting the reduction of child marriage as a global priority, and then in 2015 as part of the global agenda with the establishment of the SDGs. We have here argued that SDG Goal 5 – focusing on gender equality to empower all women and girls – is linked with progress on the elimination of early marriage, yet it is also inextricably linked with SDG Goal 4, related to better access and more gender-equal participation in education, Goal 3 (good health and well-being), Goal 8 (decent work and economic growth) and, ultimately, Goal 1 (no poverty). Significant progress is nowhere close, yet a clear implication ensuing from this study is that better enforcement and monitoring of legal provisions concerning the minimum age at marriage – if effective – would have the potential to raise women's status by simultaneously enabling the achievement of *multiple* goals. We thus posit two implications of this research for policy and speculate on a third point. First, the laudable goal of legislation curbing or banning early marriage must be accompanied by capacity-building and resourcing for more legal enforcement. Second, monitoring the efficacy of deterrence, including through exploiting cheap and plentiful micro-level data as we do here, is essential to test and improve the link from laws to ages at marriage, the outcome targeted by policy and the one that matters most for women and girls' later-life outcomes. Third, we speculate on the possibility that national marriage policies might have a more meaningful impact if part of a comprehensive, multi-pronged, and context-sensitive approach targeting poverty and rooted social norms in all their forms – such as some of the complementary interventions (including educational interventions) mentioned above.

Ethics approval

Ethical review not required. The study used publicly available, secondary data from the Demographic and Health Surveys and Multiple Indicator Cluster Surveys.

Financial disclosure statement

Nothing to disclose.

CRediT authorship contribution statement

Ewa Batyra: Conceptualization, Methodology, Formal analysis, Visualization, Writing – review & editing. **Luca Maria Pesando:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing.

Declaration of competing interest

None.

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³ <https://www.musawah.org/wp-content/uploads/2019/03/Mauritania-Overview-Table.pdf>.

Appendix

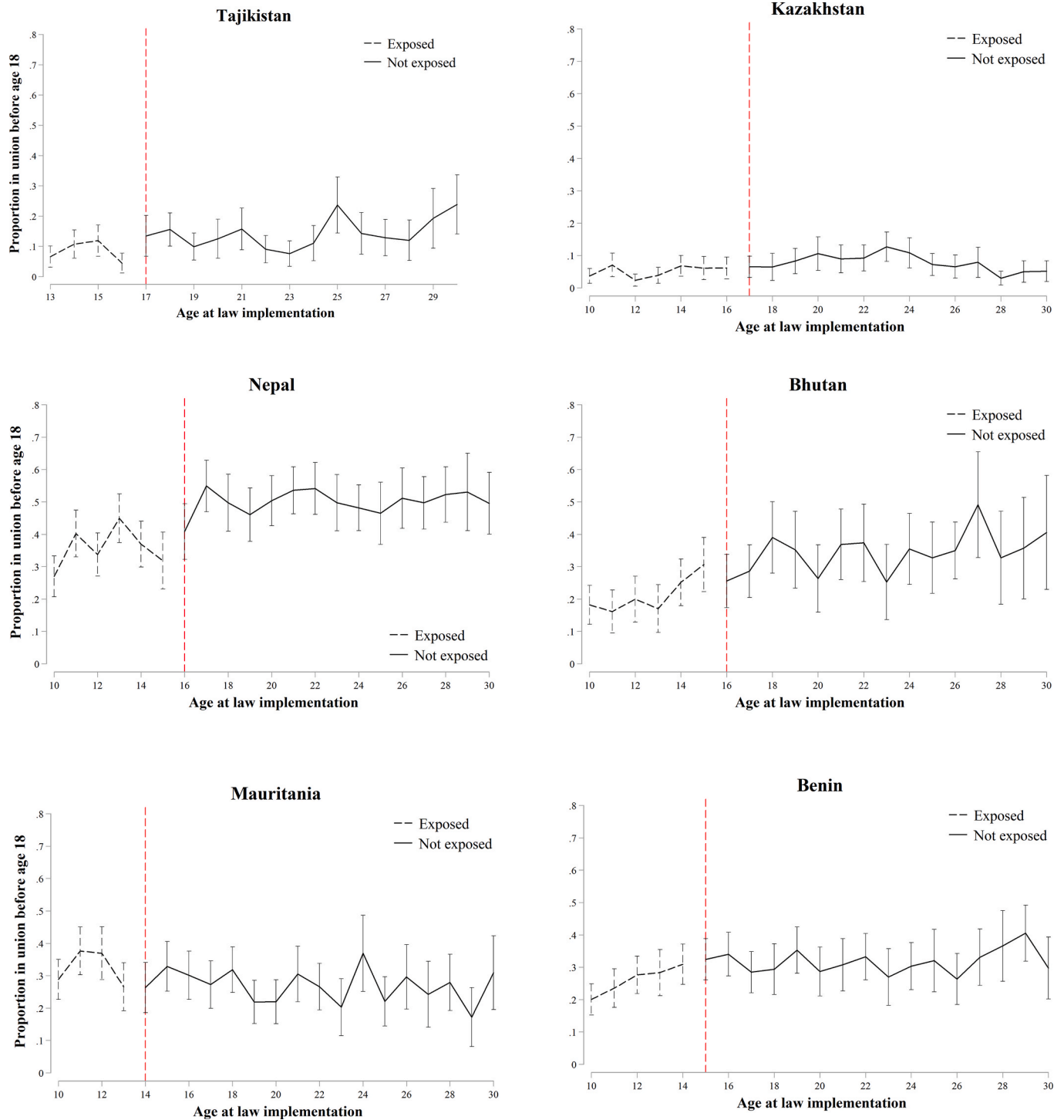


Fig. A1. Proportion of women who were at least 20 years old at survey and entered first union before age 18, 95% confidence intervals, by age at law implementation and exposure to the law, accounting for survey design, urban areas.

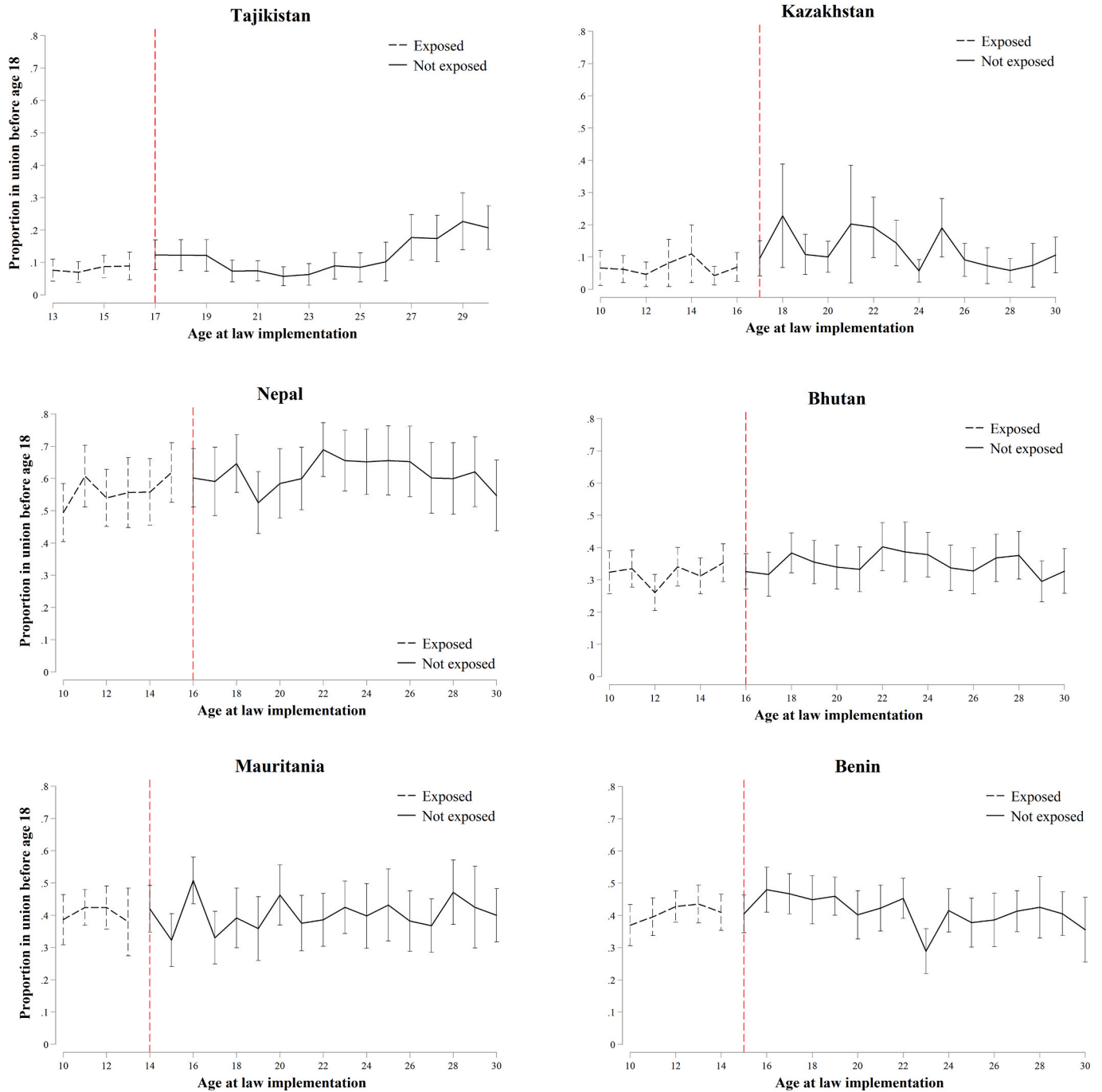


Fig. A2. Proportion of women who were at least 20 years old at survey and entered first union before age 18, 95% confidence intervals, by age at law implementation and exposure to the law, accounting for survey design, rural areas.

Table A1

Coefficients from OLS describing association between women's exposure to the law and entering union before the age of 18. 24-, 36- and 48-month windows. M1 - model without controls, M2 - model with a continuous control for women's age at law implementation in months, M3 - M2 + controls for region and urban/rural residence.

Benin	24-month window			36-month window			48-month window		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Exposed to law (ref. Not exposed)	-0.02	0.07	0.04	-0.02	0.01	0.00	-0.03	0.02	0.01
Urban (ref. Rural)			-0.08**			-0.09***			-0.10***
Control for age at law	no	yes	yes	no	yes	yes	no	yes	yes
Control for region	no	no	yes	no	no	yes	no	no	yes
Bhutan	24-month window			36-month window			48-month window		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Exposed to law (ref. Not exposed)	-0.01	0.04	0.03	-0.03	0.04	0.04	-0.05**	0.03	0.03
Urban (ref. Rural)			-0.05			-0.04			-0.04*
Control for age at law	no	yes	yes	no	yes	yes	no	yes	yes
Control for region	no	no	yes	no	no	yes	no	no	yes
Kazakhstan	24-month window			36-month window			48-month window		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Exposed to law (ref. Not exposed)	-0.03	-0.03	-0.03	-0.02	-0.04	-0.04	-0.03**	-0.01	-0.01
Urban (ref. Rural)			-0.01			-0.01			-0.01
Control for age at law	no	yes	yes	no	yes	yes	no	yes	yes
Control for region	no	no	yes	no	no	yes	no	no	yes
Mauritania	24-month window			36-month window			48-month window		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Exposed to law (ref. Not exposed)	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.01	0.02
Urban (ref. Rural)			-0.08**			-0.05*			-0.06*
Control for age at law	no	yes	yes	no	yes	yes	no	yes	yes
Control for region	no	no	yes	no	no	yes	no	no	yes
Nepal	24-month window			36-month window			48-month window		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Exposed to law (ref. Not exposed)	-0.09***	-0.08	-0.08	-0.08***	-0.08*	-0.09*	-0.08***	-0.08*	-0.08*
Urban (ref. Rural)			-0.08**			-0.07**			-0.08***
Control for age at law	no	yes	yes	no	yes	yes	no	yes	yes
Control for region	no	no	yes	no	no	yes	no	no	yes
Tajikistan	24-month window			36-month window			48-month window		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Exposed to law (ref. Not exposed)	-0.05**	-0.06	-0.06	-0.05**	-0.05*	-0.05	-0.04**	-0.06*	-0.06*
Urban (ref. Rural)			-0.01			-0.01			-0.01
Control for age at law	no	yes	yes	no	yes	yes	no	yes	yes
Control for region	no	no	yes	no	no	yes	no	no	yes

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

Notes: Standard errors are clustered at the enumeration area level.

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