The perinatal epidemiology of child and adolescent marriage in Brazil, 2011–2018

Marcelo L. Urquia a,b,*, Rosangela F.L. Batista c, Viviane Cunha Cardoso d, Carlos Grandi d, Andrée-Anne Fafard St Germain a

a Manitoba Centre for Health Policy, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, Canada
b Dalla Lana School of Public Health, University of Toronto, Toronto, Canada
c Department of Public Health, Federal University of Maranhão, São Luís do Maranhão, Brazil
d Faculty of Medicine of Ribeirão Preto, University of São Paulo, Ribeirão Preto, Brazil

A B S T R A C T

Brazil is one of the top contributors of girl child marriages in the world and one of the United Nations’ members that committed to end child marriage by 2030 as part of the Sustainable Development Goals. Child marriage is an indicator of gender inequality associated with poor health outcomes. However, the perinatal epidemiology of minor mothers (<18 years) according to marital status has been insufficiently studied. We used 23,163,209 birth registrations (2011–2018) to describe the sociodemographic distribution of births to minor mothers. The association between adverse outcomes and marital status and maternal age was restricted to 7,953,739 births of mothers aged <15, 16–17, 18–19, 20–24 years. Multinomial logistic models were used for very (24–31 weeks) and moderately preterm birth (32–36 weeks), and severe (<3rd percentile) and moderately small-for-gestational age (SGA) (3rd to <10th percentile). Logistic models were used for binary outcomes. The proportion of births to minor mothers in the study period was 8.9%, composed of those of single (6.1%), common-law (2.4%) and married girls (0.4%). Births to minor mothers decreased over time (p-value < 0.001), were more common in the North Region (13.2%) and among Indigenous (17.4%). Very and moderately preterm birth increased with decreasing age but within each age group, rates were highest among single, followed by common-law and lowest among married mothers. A similar pattern was observed for SGA, low Apgar and late prenatal care initiation. Repeat birth and low age-appropriate education were less common among married compared to single mothers in all age groups, except among <15-year-olds [Adjusted Odds Ratio (AOR): 2.56; 95% Confidence Interval (95%CI): 2.40, 2.74 and AOR: 1.30; 95%CI: 1.03, 1.64, respectively]. The association between perinatal indicators and marital status among adolescents is strongly modified by decreasing maternal age. Marital status is relevant for the understanding of early pregnancies.

1. Introduction

The reduction of teenage pregnancies and of marriage before 18 years of age are top priorities to prevent early pregnancy and poor reproductive outcomes among adolescents in developing countries (World Health Organization (WHO), 2011). There is an increasing global recognition that child marriage (CM), defined as any formal marriage or informal union of an individual below age 18, threatens human rights (United Nations, 2021a, 2021b; Wodon et al., 2017), particularly those of girls, with serious consequences for their health, education, well-being, and autonomy (United Nations Children’s Fund, 2021 October 2021). Not only girls are more likely to marry before age 18 than boys but also do so at younger ages than for boys in many countries, which reflects entrenched gender inequalities (United Nations Children’s Fund, 2021 October 2021; World Policy Analysis Center, 2021). Globally, approximately 12 million girls marry before turning 18 annually (United Nations Children’s Fund, 2021 October 2021). Although the marriage of girls is most prevalent in Sub-Saharan Africa and South Asia (Godha et al., 2013; Yaya et al., 2019), it occurs worldwide, including the United States, Canada and Latin America (Fafard St-Germain et al., 2022; Koski & Heymann, 2018; Koski & Clark, 2021; United Nations Children’s Fund, 2021 October 2021). Brazil is the Latin American country with the highest number of child marriages and ranks fourth worldwide. In Brazil in 2006, 26% of women aged 20–24 years married before 18 years and 6% before 15 years (United Nations Children’s Fund, 2021 October 2021). Since 2002, the Brazilian Civil Code determined that minority status ceases by the eighteenth birthday, when the person is deemed fully capable of practicing all acts of civil life. However, the minor’s incapacity could also cease by marriage. In March 2019, Brazil modified the article 1520 of the Civil Code prohibiting anyone below the age of 16 from marrying under any circumstance (Presidency of the Republic, 2019). Until then,
≤15-year-old girls were able to marry to help her older partner avoid a
criminal sentence for statutory rape or in case of pregnancy (Presidency of
the Republic, 2002). Under the new law, however, 16 and 17 years old
can still marry with the consent of their parents or legal representatives.
While the new law affects legal marriage, common-law couples cohab-
iting out of wedlock are becoming increasingly common in Brazil,
reaching 36% of all couples in 2010 (Covre-Sussai, 2016). An informal
union in Brazil only differs from marriage in its formalization but shares
its meaning and implications for property and pension rights. The fact
that in Brazil the term “casada” (married in Portuguese) is equally
applied to both formally married and informally united women reflects
the cultural resemblance of the practices (Taylor et al., 2019).

As socially constructed, the meaning, drivers and consequences of
marriage are context-dependent, as well as the concept of a “child” or
“adult” (Elevebra & Bhabha, 2020). Most research pointing at the
harmful effects of child marriage have been conducted in high preva-
ience Asian and African countries, where patriarchal traditions confer
women subordinate roles and marriages often involve dowries, arranged
or forced marriages (Inter-Parliamentary Union (IPU) & World Health
Organization (WHO), 2016; United Nations Children’s Fund, 2015). In
these regions, secondary data analyses of Demographic and Health
Surveys have linked CM with a range of poor reproductive outcomes,
including unintended pregnancies (Marphatia et al., 2017; Raj et al.,
2009; Godha et al., 2013; Nasrullah et al., 2014), composites measures
of stillbirths, induced or spontaneous abortions (Marphatia et al., 2017;
Raj et al., 2009; Godha et al., 2013; Nasrullah et al., 2014; Kamal &
Hassan, 2015; Yaya et al., 2019), rapid repeat childbirth (Godha et al.,
2013; Nasrullah et al., 2014; Raj et al., 2009), preterm birth (Miller
et al., 2021; Rahman et al., 2018), and low prenatal care use (Paul &
Chouhan, 2019; Uddin et al., 2019). Less research has been produced in
Western countries, where CM is less prevalent (Fafard St-Germain et al.,
2022), believed to be consensual, most often involving cohabiting
informal unions, although influenced by structural determinants such as
intergenerational poverty (Taylor et al., 2019; Wodon et al., 2017;
United Nations Children’s Fund, 2021 October 2021).

To better understand the perinatal epidemiology of child marriage
we used nationwide Brazilian birth records, including 1.57 million
births to minor mothers. This study provides a baseline to measure the
impact of the 2019 law change and progress towards the Sustainable
Development Goals that aims at ending CM by 2030 (United Nations,
2021). The study has two objectives. Firstly, to quantify the
proportion and distribution of births to minor mothers according to
marital status and other sociodemographic characteristics. Secondly, to
assess the risk of adverse birth outcomes associated with marital ar-
rangements among minors and adolescents of different ages.

2. Methods

2.1. Study design and population

This cross-sectional study uses secondary data of all birth registra-
tions occurred in all the states of Brazil from 2011 to 2018. The
“Declaration of Live Birth” is a mandatory form that is distributed to all
health care providers, who are responsible for its completion. Birth at-
tendants (e.g., physician, nurse, midwife) directly enter information
generated during the birth episode (e.g., birthweight, Apgar score) and elicit
obstetric history and sociodemographic information from the
mother, right after giving birth (Ministerio da Saúde, 2011). These
public use data were downloaded from the Live Births’ Information
System (SINASC) of the Ministry of Health.

To quantify the proportion of births to minor mothers by marital
status all live births to mothers of all ages were considered. Birth records
with missing maternal age and missing or unknown marital status were
excluded.

For the second objective of assessing the associations between early
marriage and birth outcomes, to contextualize minors within the full
range of adolescents we restricted the study population to mothers aged
less than 25 years (Hardin et al., 2017; Sawyer et al., 2018). Exclusion
criteria further included multiple births, unknown infant sex, missing
gestational age, gestational age < 24 weeks or > 42 weeks, missing
birthweight and implausible combinations of birthweight and gesta-
tional age, based on four standard deviations below or above the median
sex- and gestational age-specific birthweight of international newborn
standards (Villar et al., 2014).

2.2. Variable definitions

2.2.1. Exposures

Maternal age, as well as other sociodemographic characteristics, was
measured at the time of the birth of the child. Maternal age groups
include all adolescents up to 24 years, categorized into 20–24 years,
18–19 years and minor or underage mothers. Minority of age was
defined as a maternal age < 18 years at the time of the birth, subdivided
into mothers aged 16–17 years and ≤ 15 years.

Marital status was categorized as legally married, divorced/sepa-
rated, widowed, common-law union, and single never married, based on
the preestablished categories present in the birth registration form. For
the first objective, divorced/separated/widowed mothers were grouped
with the legally married because it indicates that these mothers have
been married at some point before completing 18 years of age, irre-
spective of the marital status at the time of the birth. For the second
objective, however, the small group composed of divorced, separated
and widowed mothers was excluded to reduce heterogeneity of exposure
and not reporting unstable estimates based on small numbers.

2.2.2. Outcomes

Preterm birth (PTB) was subdivided into very preterm (24–31
gestation weeks) and moderately preterm (32–36 weeks) and compared
against term births (37–42 weeks). Small for gestational age (SGA) was
subdivided into extreme SGA (<3rd percentile) and moderately SGA
(3rd to <10th percentile). SGA percentile cutoffs were obtained from an
international standard (Villar et al., 2014) to enable international
comparisons. Repeat birth was defined as the birth of a mother who had
at least a previous live birth or stillbirth. Low Apgar was defined as an
Apgar score less than seven at 5 min (Casey et al., 2001). Late prenatal
care initiation was defined as having started after the first trimester. Low
age-appropriate education was defined as an educational attainment
below that expected for a given age group (OECD, 2021).

2.2.3. Covariates

In descriptive analyses we used Race (skin color) (Black, Brown,
Indigenous, White, Yellow and unknown), Region (North, North-East,
Central-West, South-East and South) and Period of birth (2011–2012,
2013–2014, 2015–2016 and 2017–2018) as stratification variables. Region
reflects broad geographic socioeconomic differences and was
based on the states of residence of the mother. For multivariable analysis
we further use Father’s age (< 18 years, 18–24, 25+ and unknown), Late
prenatal care initiation as occurring past the first trimester and Maternal
age-appropriate low education, defined as a maternal educational
achievement below the level expected by the Brazilian common national
curriculum at a given age (OECD, 2021). Missing values for covariates
were recoded as unknown to prevent sample size loss.

2.3. Data analysis

Multinomial logistic models were used to obtain crude and adjusted
odds ratios with 95% confidence intervals for the association between
marital status and maternal age with very preterm and moderately
preterm, with term births as the reference group. Likewise, severe SGA
(<3rd percentile) and moderately SGA (3rd to <10th percentile) were
compared to non-SGA births. For the remaining dependent variables, a
binary logistic model was used. All models included a product term
maternal age group*marital status to test for interaction. Effect estimates were first reported as joint associations with births to single mothers aged 20–24 years as the sole reference group and secondly within strata of age group with births to single mothers in each stratum as the reference group. All analyses were conducted with SAS 9.4® (SAS Institute, Cary, NC).

3. Results

3.1. Distribution of births to minor mothers by marital status

There were 23,446,170 births in the dataset. After excluding 544 records with missing or invalid maternal age, 2795 with maternal age >49 years, and 279,905 with missing or invalid marital status, 23,163,209 records (98.8%) were used to estimate the proportion of births to minor mothers.

Overall, births to minor mothers in the study period accounted for 8.9% of all births, composed of those of single (6.1%), in-union (2.4%) and married girls (0.4%) (Fig. 1). Births to minor mothers decreased over time from 0.59% in 2011–2012 to 0.27% in 2017–2018 (p-value for trend <0.001), were more common in the least urbanized and poorer regions of the country, such as the North (13.2%) and Northeast (10.9%), and more common among Indigenous (17.4%) and brown (mixed-race) mothers (10.7%). Black minor mothers were the least likely to have ever been legally married (0.3%) and Indigenous the most likely (1.8%).

3.2. Adverse birth outcomes

To assess how the interplay of maternal age and marital status was associated with perinatal indicators in the broad context of adolescence we restricted the analytic sample to 10,045,548 births to mothers aged ≤24 years. We excluded 713,967 (7.11%) with unknown parity, 5732 (0.06%) with missing birthweight, 912,080 (9.08%) with missing gestational age, 16,056 (0.16%) with gestational age less than 24 and more than 42 weeks, 141,570 (1.41%) multiple births, 1816 (0.02%) with invalid infant sex and 96,740 (1.08%) records with implausible combinations of birthweight for gestational age, 326,358 records with missing race information (3.25%), and 151,144 (1.50%) with missing maternal education. We also excluded mothers with divorced, separated or widowed marital status (38,947; 0.39%) due to low numbers for minor age subgroups. Some records qualified for more than one exclusion criteria. The final dataset included 7,953,739 records (79.2% of all births to mothers aged ≤24 years).

Minor mothers (<18 years) accounted for 19.7% of births to mothers aged ≤24 years (5.5% to ≤15- and 14.2% to 16-17-year-old mothers) and for 48.5% of teenage births (13.5% to ≤15- and 35.0% to 16-17-year-old mothers) (Table 1). Births within legal marriages were rare among minors (1.2% and 6.0% among ≤15- and 16-17-year-old mothers, respectively) but increased with maternal age. Common-law unions accounted for about 1 in 4 births in all age groups, including ≤15-year-old mothers. Births to White mothers were increasingly more common with advanced age, while an opposite pattern occurred among brown and Indigenous mothers. The North and North-East region were home of higher proportions of births to ≤15- and 16-17-year-old...
groups. Common-law women had a borderline reduced odds than single (AOR: 0.11) with marital status. Compared to births of single women, those of married women had lower odds of low Apgar within all maternal age groups. Except among those aged 18 years and older, but the marriage risk gradient was strongly modified by marital status (p-value for interaction <0.001) (Fig. 3, c, right). Common-law mothers had higher repeat birth rates than single women in all age groups. Low age-appropriate education showed a pattern similar to that of repeat birth (p-value for interaction <0.001) with increasing proportions associated with increasing age (Fig. 3, d, left). Compared to single women, married women were less likely to have low education across age groups, with the exception of ≤15-year-old mothers who had higher odds [AOR: 1.30; 95% CI: 1.03, 1.64] (Fig. 3, d, right). Common-law women had slightly higher odds than single women across age groups.

4. Discussion

4.1. Main findings

This nationwide population-based study indicates that, in the last decade one out of 11 Brazilian births were to women below 18 years of age. Births to minor mothers were unevenly distributed, with higher proportions in the poorest Northern regions and among Indigenous and mixed-race women. While the majority of these births were to single mothers, one third were to common-law or married mothers, although births to legally married girl mothers were less common and decreased by half in the study period.

Our main finding is that, among adolescents, maternal age modifies the association between marital status and most perinatal indicators in an outcome-specific way. First, married women had consistently better outcomes than single women, with common-law women generally having outcomes intermediate or similar to those of single women, particularly among those aged 18 years and older, but the marriage
Fig. 2. Preterm birth (a, b) and small for gestational age groups* (c, d) by maternal age group and marital status, Brazil, 2011-2018

1 Adjusted for infant sex, parity, father's age, maternal race, low maternal education, region, year of birth
2 Adjusted for parity, father's age, maternal race, low maternal education, region, year of birth*
Based on a multinomial model for gestational age groups: 24–31 weeks, 32–36 weeks, and 37–42 weeks (reference), and for small-for-gestational age groups: <3rd percentile, 3 to <10th percentile, and 10th percentile (reference).
advantage tended to weaken or disappear with decreasing age. Second, despite a marriage advantage within age groups, this advantage in PTB, SGA and prenatal care was not sufficient to offset the higher risk associated with early age across age groups experienced by all minor mothers, particularly ≤15-year-old mothers, who were at the highest risk of most indicators, compared to 20-24-year-old single mothers. The marriage advantage was also observed for repeat birth and low education within age groups, except among ≤15-year-old mothers, for whom the association reversed exhibiting higher odds for married girls compared to single girls. Together, these findings suggest that the protection associated with marriage among adult mothers cannot be easily generalized to minor mothers.

Fig. 3. Low Apgar† (a), late prenatal care initiation‡ (b), repeat birth (c), and low age-appropriate education (d) by maternal age group and marital status, Brazil, 2011–2018

189,838 (2.4%) observations were excluded due to missing data on Apgar scores.
467,532 (5.9%) observations were excluded due to missing data on prenatal care initiation.
(1) Adjusted for infant sex, parity, mother’s age, maternal race, low maternal education, region, year of birth
(2) Adjusted for father’s age, maternal race, low maternal education, region, year of birth
(3) Adjusted for parity, father’s age, maternal race, region, year of birth.
4.2. Interpretation

Despite decreasing trends in teen pregnancy, Brazilian teenage pregnancy rates are still above the global and Latin American averages (Lancet, 2020). Our study found that among births to teen mothers, half of them were to <18-year-old and 13% to ≤15-year-old girls. Child marriage, including formal and informal unions, accounted for one third of births to underage mothers, and was unevenly distributed within the country. These births occurred more often in poor regions and racialized groups that may also face challenges to access health services regularly (Lancet, 2020), as evidenced in the late initiation of prenatal care observed in our study.

We found an inverse age gradient in PTB, LBW, Apgar and late prenatal care initiation among adolescents that is consistent with previous studies (Ganchimeg et al., 2014; Osterman & Martin, 2018), some of which also observed a similar gradient for a wide array of pregnancy complications and neonatal adverse outcomes (Ganchimeg et al., 2014). This highlights the increased perinatal risk associated with early child-bearing age, particularly among ≤15-year-old girls (Ganchimeg et al., 2014; Salihu et al., 2006).

We also found a marriage advantage across all outcomes among 20-24-year-old mothers that is consistent with a substantial literature highlighting the beneficial associations of marriage with perinatal outcomes among adult women (Holt et al., 1997; Luo et al., 2004; Raatikainen, Heiskanen, & Heinonen, 2005). However, there is a knowledge gap regarding the generalizability of the marriage advantage below age 20 that our study contributes to fill. Despite a formal marriage advantage across age groups, perinatal health indicators of 16-17- and ≤15-year-old girls still fared worse than those of 20-24-year-old single mothers, implying that the marriage advantage within age groups was not strong enough to counterweight the higher absolute perinatal risk that gradually increases with younger maternal age. This suggests that preventing early pregnancies may result in health gains, beyond differences associated with marital arrangements. While the age gradient in perinatal risk may reflect biological and social immaturity for child-bearing (Ganchimeg et al., 2014) marital status differences within age groups reflect the influence of complex social contexts that confer marital and cohabitation arrangements meanings that guide social interactions and behaviors that in turn influence pregnancy outcomes.

Being married was associated with lower repeat birth and low education across age groups, with the exception of ≤15-year-old married girls, who were at higher odds relative to their single counterparts. The reversal of the direction of these associations among ≤15-year-old married girls may signal lack of autonomy and dependence on their older partners, which could manifest as limited ability to negotiate contraceptive use and sexual intercourse frequency, resulting in high early fertility, and renunciation of educational and career goals to exclusively embrace household roles (Wodon et al., 2017; Darroch, Landry, & Oslak, 1999). Giving birth to multiple children at an early age may exacerbate the challenges in advancing educational and career goals among childbearing girls (United Nations Children’s Fund, 2021 October 2021; Wodon et al., 2017). Higher rates of repeat birth among married minors may reflect that family formation is a desirable life trajectory, leading to intended early pregnancies. In contrast, lower repeat birth rates among 16-17-, 18-19- and 20-24-year-old married mothers compared to single mothers may reflect selection of women of higher socioeconomic status into legal marriages in which the planning of small families or longer birth spacing may be strategies to meet maternal career aspirations without delaying family formation. Overall fertility trends have reached below replacement levels in Brazil, particularly among the well-off but remain higher among women residing in poor regions, of low education and of non-white skin color (Tejada et al., 2017). Some ≤15-year-old girls may perceive legal marriage or an informal union as a trade-off to overcome a negative life situation, such as poverty or a detrimental family environment (Bhan et al., 2019; Taylor et al., 2019).

4.3. Strengths and limitations

Strengths of this study include the large nationwide population-based sample, which made it possible to conduct a detailed examination of the interplay between marital status and age groups, notably ≤15-year-old girls, who are usually collapsed with other teenagers in many studies due to sample size constraints. A second strength is the categorization of marital status into legally married, common-law and single women, unlike USA birth certificates that only distinguish legally married from unmarried women (Fafard St. Germain et al., 2022; Martin et al., 2019). There are several limitations. First, maternal age and marital status were self-reported and may be affected by misclassification. It is possible that some informal unions are misclassified as legal marriages, given the shared meaning and widespread acceptability of the practice. Marital status among Indigenous women must be interpreted with caution, given the diversity of Indigenous groups which marital practices cannot be reduced to a common statistical typology. Second, due to the cross-sectional nature of the data it was not possible to discriminate whether marriage or informal unions preceded conception or occurred during pregnancy. Third, some mothers may have contributed more than one birth in the study period but birth registrations lack a maternal identifier relating different births of a same mother. Fourth, since birth registrations occur at or after the birth of the child, many births to 16- and 18-year-old mothers may have been conceived at 15 or 17 years of age, respectively, and contributed to an underestimation of early pregnancies. Finally, residual confounding cannot be discarded due to measurement error and limited availability of covariates.

4.4. Implications

Despite these limitations, our study provides new insights on the perinatal epidemiology of child marriage by using birth records, less affected by self-reported biases than demographic surveys. Since our results cover the most recent period prior to the 2019 legislation forbidding underage marriage, they provide a baseline to monitor progress towards the reduction of adolescent pregnancy and child marriage in Brazil. The modification of the associations between perinatal outcomes and marital status according to adolescent age groups highlights the importance of not collapsing minors (<18 years) with other teenagers (18–19 years) to better understand how the health impacts of marital arrangements change with the legal majority of age. We propose to routinely report the proportion of births to <18-year-old girls among all births to teenage mothers as a relevant indicator to monitor progress towards the reduction of early pregnancy, since the 18th birthday signals the passage to adulthood in most countries, with the consequent uptake of civil rights and responsibilities, which may in turn influence health outcomes. Likewise, birth registrations may be strengthened by improving data completeness and quality, and reducing geographic inequalities in data collection. Improvements in the completeness of paternal age may help in determining boy child marriages and parental age differences, which reflect gender inequalities. Inclusion of other paternal characteristics, such as education, in birth registrations may help understand paternal influences on perinatal outcomes. Although the focus of this study was on girl child marriages and unions, births to adolescent single mothers were found to be more common and faced generally higher risk of adverse outcomes than those occurred in wedlock, which reinforces the need to prevent teenage pregnancies, irrespective of marital status. However, strategies for prevention and care of adolescent pregnancies would benefit from considering marital status, as a key dimension of the social environment. For example, although the 2019 Brazilian legislation is expected to deter legal marriages it may not prevent girls entering into informal unions, which are far more common than legal marriages. Decreasing secular trends in legal marriage and legislation seem insufficient to meet the Sustainable Development Goal of eliminating all forms of child marriage.
by 2030, unless effective interventions are put in place to accelerate progress (Lancet, 2020) by addressing informal unions and subnational inequalities. Longitudinal and qualitative studies are needed to disentangle the specific causes and health and social consequences of the different marital arrangements among adolescent age subgroups.

Author statement

Marcelo L. Urquia: Conceptualization, methodology, software, formal analysis, investigation, resources, data curation, writing – original draft and revision preparation, project administration. Rosangela F. L. Batista: Conceptualization, methodology, investigation, data curation, writing – reviewing & editing. Viviane Cunha Cardoso: Conceptualization, methodology, writing – reviewing & editing. Andreé-Anne Fafard St. Germain: Conceptualization, methodology, software, formal analysis, data curation, writing – reviewing & editing.

Ethical statement

Since only anonymized secondary public use data were used, the study did not require ethics review by Brazilian Research Ethics Boards, according to the Brazilian National Health Council’s Resolution no. 510/2016.

National Health Council of Brazil. 2016. Resolution no 510, April 7, 2016. Norms applicable to Research in Social Sciences and Humanities. Official Journal of the Union, May 2016. http://conselho.saude.gov.br/resolucoes/2016/Resoluca010510.pdf.

Funding statement

No funding was sought to conduct this collaborative study. MLU was supported by a Canadian Institutes of Health Research (CIHR) Canada Research Chair in Applied Population Health (950–231324). AAFSG was supported by the Canadian Institutes of Health Research’s Foundation Grant of MLU (FDN-154280).

Declaration of competing interest

The authors have no conflicts of interest to disclose.

Acknowledgments

MLU holds a Canadian Institutes of Health Research (CIHR) Canada Research Chair in Applied Population Health. AAFSG was supported by the Canadian Institutes of Health Research’s Foundation Grant of MLU.

References

Bhan, N., Gautich, L., McDougall, L., Lapsansky, C., Obregon, R., & Raj, A. (2019). Effects of parent-child relationships on child marriage of girls in Ethiopia, India, Peru, and Vietnam: Evidence from a prospective cohort. Journal of Adolescent Health, 65(4), 498-506. https://doi.org/10.1016/j.jadohealth.2019.05.002
Casey, B. M., McIntire, D. D., & Leveno, K. J. (2001). The continuing value of the Apgar score for the assessment of newborn infants. New England Journal of Medicine, 19(7), 467–471. https://doi.org/10.1056/NEJM200103151446701, 344.
Covre-Sussai, M. (2016). Socioeconomic and cultural features of consensual unions in Brazil. Revista Brasileira de Estudos de População, 31(3), 53–74. https://doi.org/10.20947/5013-209820160004
Darrock, J. E., Landry, D. J., & Ostal, S. (1999). Age differences between sexual partners in the United States. Family Planning Perspectives, 31(4), 160–167.
Elevera, Y., & Bhalba, J. (2020). Defining and deconstructing girl child marriage and application to global public health. BMC Public Health, 20(1), 1547. https://doi.org/10.1186/s12889-020-09545-0
Fafard St Germain, A. A., Kishore, R. S., & Urquia, M. L. (2018). Reproductive health and its effect on fertility and fertility-control outcomes of young women in India: A cross-sectional, observational study. Lancet, 2(9529), 1883–1889. https://doi.org/10.1016/S0140-6736(18)32046-4
Salihu, H. M., Sharma, P. P., Ekwandoyio, O. J., Kristensen, S., Iladewo, A. P., Kirby, R. S., & Alexander, G. R. (2006). Childhood pregnancy (10-14 years old) and risk of stillbirth in twins: A population-based, cross-sectional study. Journal of the Pediatric, 148(4), 522-520. https://doi.org/10.1016/j.jpeds.2005.06.067
Raj, A., Saggurti, N., Baliaha, D., & Silverman, J. G. (2009). Prevalence of child marriage and its effect on fertility and fertility-control outcomes of young women in India: A cross-sectional, observational study. Lancet, 2(9529), 1883–1889. https://doi.org/10.1016/S0140-6736(18)32046-4
Sawyer, S. M., Azizpurdeh, S., Azeem, A., & Patton, G. C. (2018). The age of marriage: Associations with preterm birth in Bangladesh. Environment International, 112, 23-32. https://doi.org/10.1016/j.earthplanet.2017.12.004
Taylor, A. Y., Murphy-Graham, E., Van Horn, J., Nafiz, A., & Cislaghi, B. (2019). Child marriages and unions in Latin America: Understanding the roles of age and social norms. Journal of Adolescent Health, 64(4), 545–551. https://doi.org/10.1016/j.jadohealth.2018.12.017
Tejada, C. A., Triaca, L. M., da Costa, F. K., & Hellwing, F. (2017). The sociodemographic, behavioral, reproductive, and health factors associated with fertility in Brazil. PLoS One, 12(4), Article e0171888. https://doi.org/10.1371/journal.pone.0171888, 12.
The Lancet. (2020). Preventing teenage pregnancies in Brazil. Lancet, 15(10223), 468. https://doi.org/10.1016/S0140-6736(20)30525-5, 395.
Uddin, J., Pulok, M. H., Johnson, R. B., Rana, J., & Baker, E. (2019). Association between
child marriage and institutional delivery care services use in Bangladesh:
Intersections between education and place of residence. Public Health, 171, 6–14.
https://doi.org/10.1016/j.puhe.2019.03.014

United Nations. (2021a). Universal declaration of human rights. Retrieved from ht
pc://www.un.org/en/about-us/universal-declaration-of-human-rights. (Accessed 27
October 2021).

United Nations. (2021b). Sustainable Development Goals, Goal 5: Achieve gender equality
and empower all women and girls. Retrieved from https://www.un.org/sustainabledev
velopment/gender-equality/. (Accessed 27 October 2021).

United Nations Children’s Fund. (2015). A profile of child marriage in Africa. New York:
UNICEF. Retrieved from https://www.unicef.org/wca/reports/profile-child-marriage
in-africa. (Accessed 18 November 2021).

United Nations Children’s Fund. (2021). Child marriage. Retrieved from, October 2021
https://data.unicef.org/topic/child-protection/child-marriage/. (Accessed 27
October 2021).

Villar, J., Cheikh Ismail, L., Victora, C. G., Ohuma, E. O., Bertino, E., Altman, D. G.,
Lambert, A., Papageorghiou, A. T., Carvalho, M., Jaffer, Y. A., Gravett, M. G.,
Purwar, M., Frederick, I. O., Noble, A. J., Pang, R., Barros, F. C., Chumlea, C.,
Bhutta, Z. A., Kennedy, S. H., & International Fetal and Newborn Growth Consortium
for the 21st Century (INTERGROWTH-21st). (2014). International standards for
newborn weight, length, and head circumference by gestational age and sex: The
newborn cross-sectional study of the INTERGROWTH-21st project. Lancet, 6,
857–868. https://doi.org/10.1016/S0140-6736(14)60932-6, 384, 9946.

Wodon, Q., Tavares, P., Fiala, O., Le Nestour, A., & Wise, L. (2017). Ending child marriage:
Legal age for marriage, illegal child marriages, and the need for interventions. London and
Washington, DC: Save the Children and The World Bank.

World Health Organization (WHO). (2011). WHO guidelines on preventing early pregnancy
and poor reproductive outcomes among adolescents in developing countries. Geneva:
WHO. Retrieved from https://www.who.int/immunization/hpv/target/preventing_early
pregnancy_and_poor_reproductive_outcomes_who_2006.pdf. (Accessed 3
November 2021).

World Policy Analysis Center. (2021). Marriage. Retrieved from https://www.worldpoli
cycenter.org/topics/marriage/policies. (Accessed 17 November 2021).

Yaya, S., Odusina, E. K., & Bishwajit, G. (2019). Prevalence of child marriage and its
impact on fertility outcomes in 34 sub-Saharan African countries. BMC International
Health and Human Rights, 19(1), 33. https://doi.org/10.1186/s12914-019-0219-1