Adolescents' Concerns in Northeast India: A special focus on Mizoram and Nagaland

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Abstract

Keyword

Shifting demographic paradigms have made prioritizing sexual and reproductive health for adolescents crucial for achieving the Sustainable Development Goals. This study captures the prevalence of child marriage and teenage pregnancy, assessing the relationship between maternal health, child health, and gender-based violence among married adolescent youth, focusing on adolescents in Mizoram and Nagaland. Data from the 4th and 5th rounds of the National Family Health Survey (NFHS) (2015–2021) included adolescents and youth aged 10–24 from Mizoram and Nagaland. Univariate analysis assessed changes in outcome indicators over time, while bivariate analysis compared demographic and well-being indicators between adolescent mothers (15–19) and adult mothers (20+). District-level maps for the Northeast were prepared to identify areas vulnerable to child marriage and teenage childbearing, analyzing trends between 2015 and 2021. Child marriage prevalence in the Northeast was 22%, with Nagaland at 28% and Mizoram at 15%. Teenage pregnancy affected 18% of adolescent girls, with early motherhood linked to poor maternal outcomes, including low antenatal care utilization (42%) and high anaemia (58%), and child health indicators such as low birth weight (18%) and incomplete immunization (30%). Sexual and reproductive health remains lacking amid socio-economic disparities in Nagaland and Mizoram with adolescents constituting 15–20% of the population.

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Background

In several low and middle-income countries, the proportion of adolescents in the total population is rapidly increasing (Patton et al., 2016). With this, the societal contribution of adolescents has the potential to become an important demographic dividend for countries. However, in many developing countries, adolescents face unprecedented challenges such as multidimensional poverty, gender inequality, lack of education, employment, housing and food security, injuries, non-communicable diseases and limited access to sexual and reproductive health services (Azzopardi et al., 2019). These challenges indicate that the health and well-being of adolescents remain neglected globally (Sherr et al., 2020).

India has the largest number of young people aged 10–24 years, constituting 30% of the country's population (Babu and Fatima, 2022). To meet the national and international development agendas such as the Sustainable Development Goals (SDGs), the Government of India has articulated its commitment to protect and promote the health and rights of youth. The government's commitment focuses on meeting the development needs of adolescents through the formulation of numerous policies and programs that have been implemented over decades and particularly since the turn of the century. Despite these efforts, there exist major

gaps that need to be bridged in order to reach the 2030 agenda for Sustainable Development. For instance, nearly 23% of young women aged 20–24 years were married before the age of 18 in India and 7% of women aged 15–19 years were already mothers or pregnant (IIPS & ICF, 2021). However, while there have been improvements in these indicators over time, the national-level scenario often masks the sub-national-level situation. This is particularly true for regions that are characterised by weak healthcare systems, hard-to-reach geographies and unequal access and use of healthcare services.

The prevalence of child marriage adds to the challenges adolescents face, particularly female adolescents. It impedes adolescents from leading healthy and productive lives by enabling negative health and social consequences such as hindering educational opportunities, increasing risk of contracting sexually transmitted infections (STIs), intimate partner violence, lack of voice and agency, etc. (Nour 2009; Parsons et al., 2015). Furthermore, child marriage results in adolescent pregnancy, which is negatively associated with the survival of mothers and their newborns. This is particularly true in low-resource settings, where inequities in access to healthcare facilities persist.

A multi-country study has clearly shown that nations with higher rates of girl-child marriage are significantly more likely to

have higher rates of maternal and infant mortality (Raj and Boehmer, 2013). Therefore, addressing sexual and reproductive health, well-being and general health needs of adolescents and youth, particularly of women, is critical to achieving many of the related SDGs such as reduction in maternal mortality (SDG 3.1), reduction in neonatal mortality (SDG 3.2), universal coverage to reproductive healthcare services (SDG 3.7), adolescents birth rate (SDG 3.7.2) and nutritional needs of adolescents (SDG 2.2).

The North-east region of India comprises of eight states—Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim—and is geographically challenged, making access to healthcare difficult. The region has an estimated population of over 51.2 million, of which 9.8 million are in the 10–19 years age-group and 9.5 million are in the 20–29 years age-group (Census 2011). The region is characterised by a high prevalence of non-communicable and infectious diseases, poor quality of care, unavailability of human resources and limited reach and scope of public health services coupled with a lack of private investments and a weak market economy (Ngangbam and Roy, 2019). Overall, utilisation of sexual and reproductive healthcare services is lower in this region than in other parts of the country and the situation for adolescents and youth is even worse (IIPS and ICF, 2021).

Within this context, the present study aimed to generate evidence around the health and well-being of adolescents/youth in the northeast region with a special focus on Mizoram and Nagaland. In terms of health, this study focused on sexual and reproductive healthcare services. Special emphasis was given to Mizoram and Nagaland as these states have a higher percentage of adolescents/youth than other states of the northeast region. Moreover, in general, coverage of sexual and reproductive healthcare services is lower in these states, particularly in Nagaland (IIPS & ICF, 2021). Therefore, highlighting the adolescent/youth-specific issues in these states can help policymakers adopt strategies for improving the health and well-being of the adolescent population. The specific research questions analysed in the study were prevalence of child marriage and teenage pregnancy in North-east region, relationship of early motherhood with maternal health, child health and gender-based violence among married adolescents/youth and assessing the status of health and wellbeing among adolescents/ youth of Mizoram and Nagaland.

Data and methods

Data

This study used two recent rounds of the National Family Health Survey (NFHS)

data conducted during 2015–16 (NFHS-4) and 2019–21 (NFHS-5). The NFHS is part of Demographic Health Survey (DHS) conducted in other countries. It aims to provide reliable estimates on fertility, family planning (FP) use, use of maternal and child healthcare services, childhood mortality, nutritional status of mothers and their children, among others. It is a nationally and state-representative survey of households and women of reproductive age (15–49 years) based on a multi-stage stratified sampling design. These surveys are stratified by urban-rural, district and at state level. The individual women response rates were high in both rounds of surveys 97% in NFHS-4 as well as NFHS-5. Details about the sampling design, sample size estimation and related information are available in the relevant NFHS reports (IIPS and ICF, 2017; IIPS and ICF, 2021).

The analyses presented in this paper are based on a sample of women aged 15–29 years from the eight states of the northeast region. The analytical sample size varied by the type of indicators considered in the analyses. However, the broad analytical sample size (women aged 15–29 years) was 49,410 and 50,124 for the northeast region from NFHS-4 and NFHS-5, respectively. Similarly, the broad analytical sample size was 5,965 and 3,212 for Mizoram and 5,272 and 4,683 for Nagaland from NFHS-4 and NFHS-5, respectively. Indicator-specific sample sizes were drawn from the broader analytical samples for both the region and the focus states.

Key outcome variables

In this study, a range of outcome variables related to sexual and reproductive health and well-being of adolescents and youth were analysed for both the northeast region as well as the focus states. The age group and analytical sample differed by indicators. A list of the outcome variables, their definition, the geography for which the indicator was analysed (i.e. all states of the northeast region or for the focus states) and the analytical sample size of the indicator is presented in Table 1.

Predictor variables

To examine the disparity in the use of sexual and reproductive healthcare services among adolescents and youth, place of residence, education status, household wealth quintile and caste groups were considered as key predictor variables. The two extreme categories of these indicators were considered to show the differences between the best and the worst groups. For example, place of residence was categorised as urban and rural; education level was categorised as 10+ years of education and no education/primary level of education; household wealth groups were categorised as richest and poorest; and caste groups were categorised as scheduled castes (SC) and other castes.

Table 1: List of outcome indicators used in the analysis

Indicator	Definition	Data source and sample	Geography
Married before 18 years of age	Percentage of women aged 20–24 years married before reaching age 18 years	NFHS 2015-16 (16,034) & 2019-21 (15,841)	All 8 states of the Northeast region
Teenage childbearing	Percentage of women aged 15–19 years who were already mothers or pregnant at the time of the survey	NFHS 2015-16 (16,070) & 2019-21 (16,129)	All 8 states of the Northeast region
Any incidence of anaemia	Percentage of women aged 15–29 years who were anaemic	NFHS 2019-21 (50,124),	Northeast region
Experience of any violence	Percentage of ever-married women aged 15–29 years who experienced emotional, physical or sexual violence by their husband in12 months preceding the survey	NFHS 2019-21 (3,051),	All 8 states of the Northeast region
Education	Percentage of women aged 15–19 years, who have completed 10 or more years of schooling	NFHS 2019-21 (Mizoram=986; Nagaland=1,309)	Mizoram and Nagaland
Dropout rate of secondary education level	Proportion of students (both boys and girls) enrolled in secondary level education (9–10 years) who were no longer enrolled at any grade in the following school year	UDISE* report 2021-22	Mizoram and Nagaland
Tobacco use	Percentage of men aged 15–19 who use any kind of tobacco	NFHS 2019-21 (Mizoram=443; Nagaland=567)	Mizoram and Nagaland
Alcohol consumption	Percentage of men aged 15–19 who consume alcohol	NFHS 2019-21 (Mizoram=443; Nagaland=567)	Mizoram and Nagaland
Hygienic menstrual practices	Percentage of women aged 15–19 years using either sanitary/locally prepared napkins, tampons or menstrual cups and not using any other unhygienic materials such as cloth during menstruation	NFHS 2019-21 (Mizoram=961; Nagaland 1302)	Mizoram and Nagaland
Received antenatal care within the first trimester	Percentage of married women 15–29 years who had an antenatal check-up for the last birth** in the first trimester of pregnancy	NFHS 2019-21 (Mizoram=926; Nagaland=1,149)	Mizoram and Nagaland
Received 4 or more antenatal care check-ups	Percentage of married women 15–29 years who had at least 4 antenatal check-ups for the last birth**	NFHS 2019-21 (Mizoram=926; Nagaland=1,149)	Mizoram and Nagaland
Had institutional delivery	Percentage of married women 15–29 years who delivered the last birth** in a health institution	NFHS 2019-21 (Mizoram=926; Nagaland=1,149)	Mizoram and Nagaland

| Current use of a modern contraceptive method | Percentage of currently married women 15–29 years who were using a modern contraceptive method[1] at the time of the survey | NFHS 2019-21 (Mizoram=1,102; Nagaland=1,574) | Mizoram and Nagaland |
| Unmet need for contraception | Percentage of currently married women 15–29 years who reported an unmet need for contraception[2] | NFHS 2019-21 (Mizoram=1,102; Nagaland=1,574) | Mizoram and Nagaland |

*Unified district information system for education (UDISE), 2021-22; ** Last birth in last the 5 years preceding the survey

Statistical analysis

Univariate analysis was conducted to examine the changes in selected outcome indicators across the states over NFHS-4 and NFHS-5. Bivariate analysis was conducted to compare the selected health, demographic and well-being indicators between adolescent mothers (aged 15–19 years) and adult mothers (aged 20 years or more). Furthermore, bivariate analysis was also used to examine the socioeconomic disparity in the use of selected sexual and reproductive healthcare services among adolescent mothers in the focus states. This was done to identify adolescent/youth women groups that were left behind in terms of utilisation of sexual and reproductive healthcare services. District-level maps, combined for all states of the region, were prepared to identify districts that were vulnerable in terms of harmful social practices such as child marriage and teenage childbearing and changes in these practices across both rounds of NFHS. Given that the NFHS used a multistage sampling design, standard errors were adjusted for weighting and clustering in all estimations by applying appropriate sampling weights. The analyses presented in the subsequent sections were carried out in STATA 16.0.

Results

### Overview of child marriage and teenage pregnancy in the northeast region

Child marriage in the northeast region: current level and changes

Child marriage was high across all the states, with different levels and patterns of change in the last 5 years. For example, according to data from NFHS-5, practice of child marriage was highest in Tripura (40%) and Assam (32%) and has increased in these states over time. Whereas it was comparatively lower in Sikkim (11%), Mizoram (8%) and Nagaland (6%) and has declined in these states over time **(Figure 1).** Practice of Child marriage remained unchanged in Meghalaya (17%) each during both rounds of NFHS.

Figure 1: Child marriage (%) across states of the northeast region, India, 2015–21
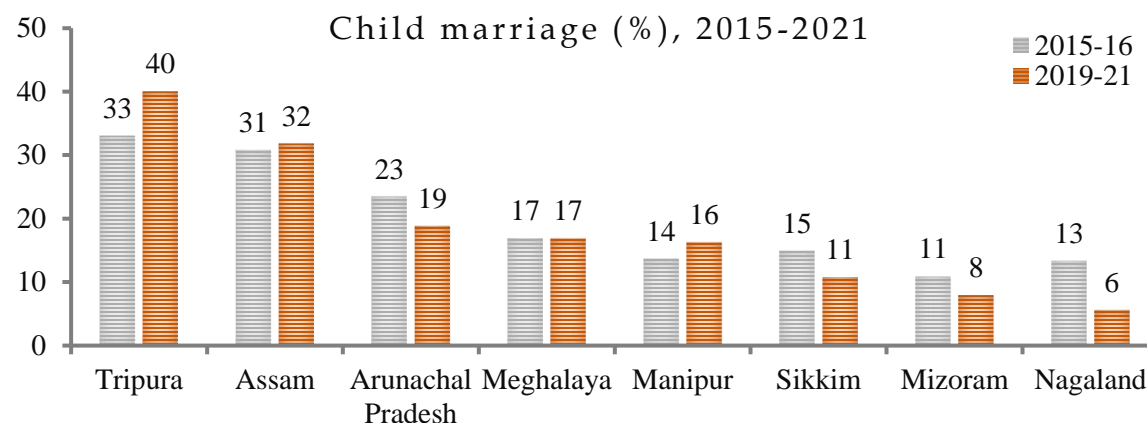
The district-level change in child marriage showed a decreasing pattern in most of the districts. **Figure 2** compares district-level prevalence of child marriage during 2015–16 with 2019–21. Several districts coloured in brown and yellow changed to green over the two rounds of NFHS, indicating a decrease in the prevalence of child marriage. However, 53 out of 104 districts currently have more than 20% prevalence of child marriage.

Figure 2. Child marriage (%) across districts of the northeast region, India, 2015–21
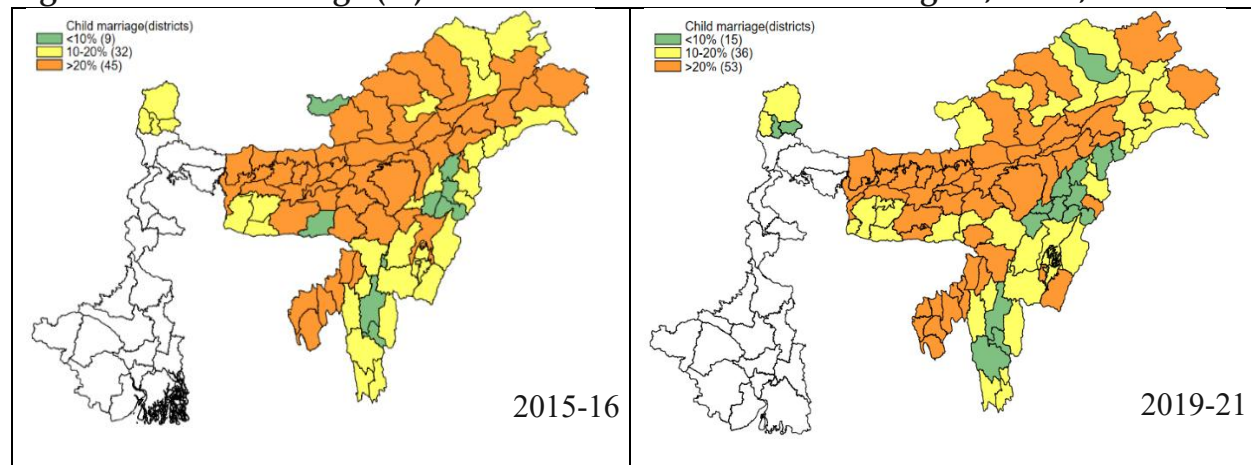
Teenage pregnancy in the Northeast region:

Current level and changes

Level of teenage pregnancy in the region varied across the states. According to NFHS-5, teenage pregnancy was highest in Tripura (22%), followed by Assam (12%), Manipur (9%), Meghalaya (7%), Arunachal Pradesh (6%), Mizoram and Nagaland (4% in each), Sikkim (3%) and Assam (32%) (Figure 3). The changes in
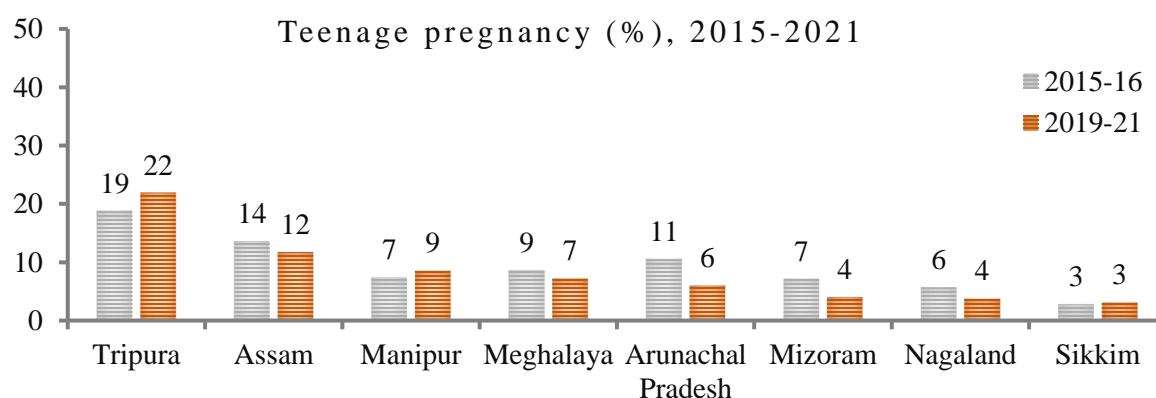
teenage pregnancies between 2015–16 and 2019–21 showed three clear patterns:

(i) an increase in Tripura (19% to 22%) and Manipur (7% to 9%),

(ii) a decrease in Assam (14% to 12%), Meghalaya (9% to 7%), Arunachal Pradesh (11% to 6%), Mizoram (7% to 4%) and Nagaland (6% to 4%), and

(iii) stagnation in Sikkim (3% in both survey rounds).

Figure 3. Teenage pregnancy (%) across states of the northeast region, India, 2015-21

District-level patterns and changes in teenage pregnancy across the districts of the northeast region showed a decreasing pattern in most of the districts in the last 5 years (Figure 4). However, there were 34 districts where the level of teenage pregnancy was >10 percent. These districts were identified in Assam (19), Tripura (8), Meghalaya (4), Arunachal Pradesh (3), Manipur (2) and Mizoram (1).

Figure 4. Teenage pregnancy (%) across districts of the northeast region, India, 2015-21
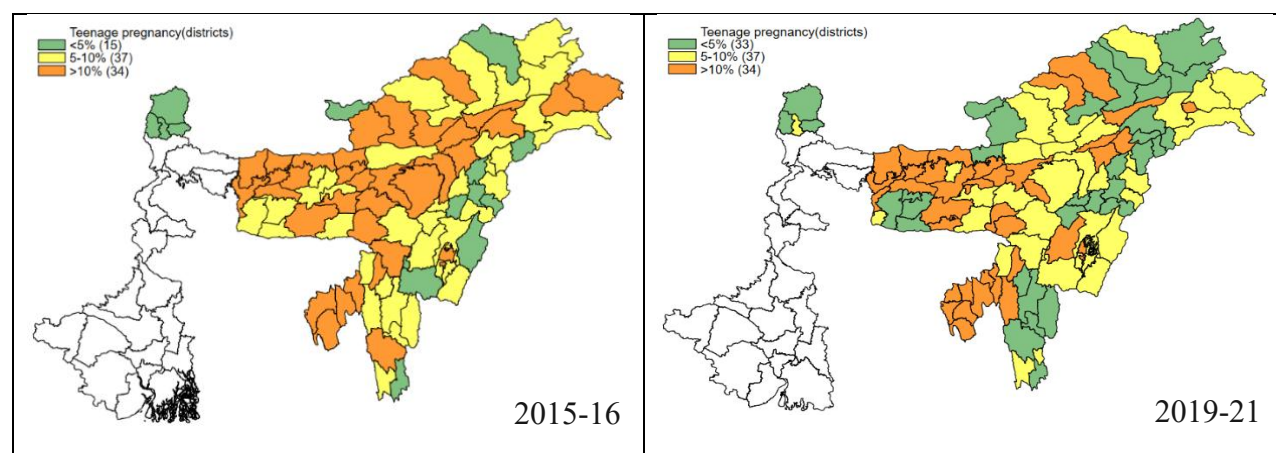
Relationship of early marriage/motherhood with gender-based violence, maternal and child health

Adverse effect of early marriage on gender-based violence

In most of the northeastern states, women married as adolescents were more likely to experience gender-based violence than those married as adult **(Figure 5)**. For instance, in Meghalaya, 57% of the women who married as adolescents experienced violence, compared to 24% of those who married as adults. Similarly, in Mizoram, 40% of the women who married as adolescents and 9% of those women married as adults experienced violence. A similar pattern was observed in Manipur, Nagaland and Tripura.

Figure 5. Experience of gender-based violence (%) among women married as adolescents and women married as adults across states of the northeast region, India, 2019–21
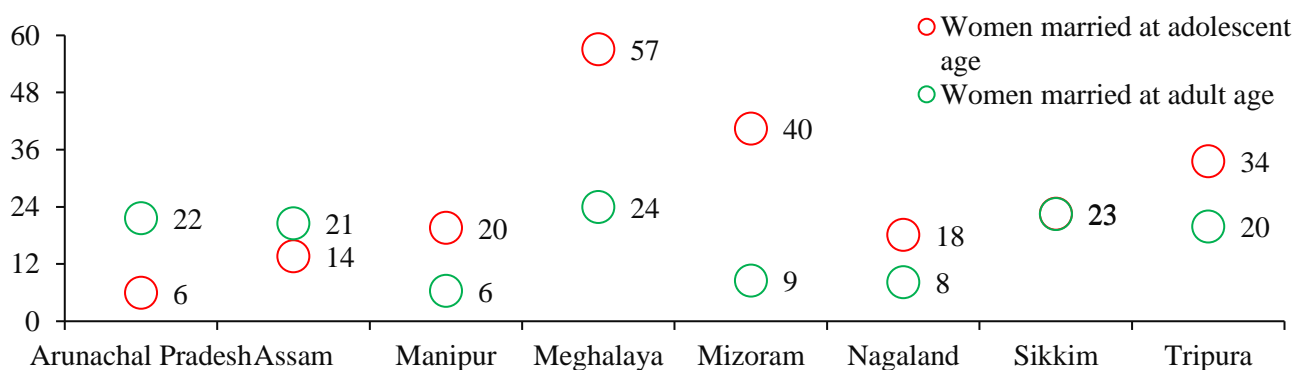

Adverse effect of early motherhood on the health of the mother and their children

Health outcomes for both mothers and children were poorer among those younger than 20 years, compared to mothers aged 20 or older **(Figure 6)**. For instance, the neonatal mortality rate was higher among mothers aged <20 years (27 per 1000 live births) compared to mothers aged 20 years or older (21 per 1000 live births). Similarly, the prevalence of stunting was higher among children born to mothers aged <20 years (40%) than mothers of age 20 years or older. A similar adverse situation was observed in the case of the mother's nutritional status. It is important to mention that this analysis was not carried out for each state individually because of the small sample size, particularly for early childhood mortality rates.

Figure 6. Comparison of childhood mortality rate, childhood undernutrition and maternal nutrition among mothers aged <20 years and mothers of age 20 years or older in the Northeast region, India, 2019-21
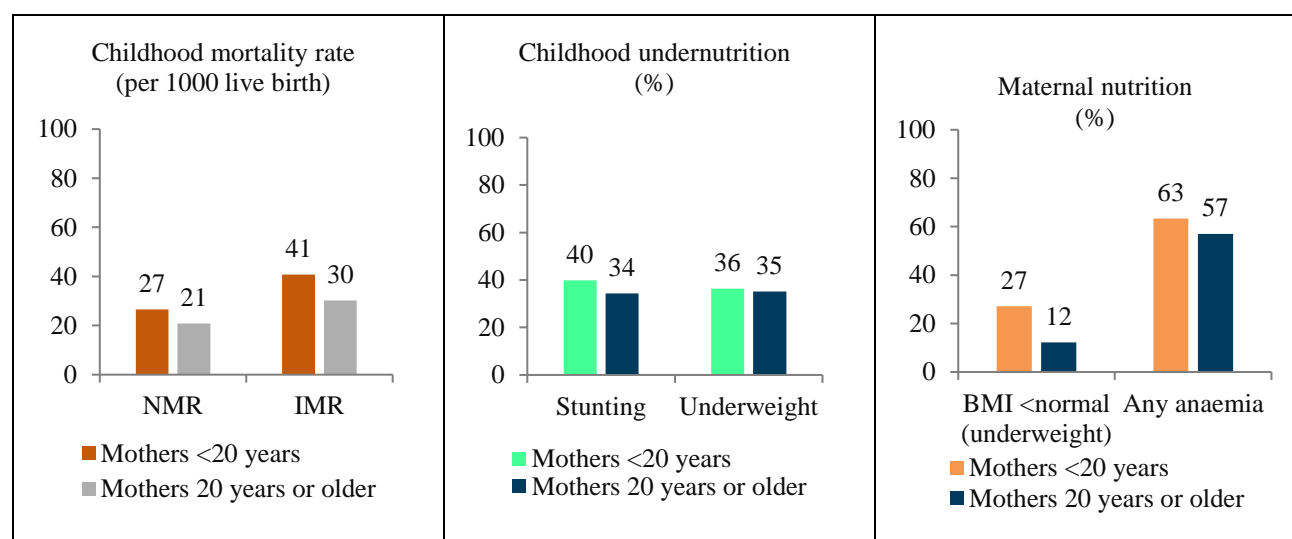
NMR: Neonatal mortality rate; IMR: Infant mortality rate; BMI: Body mass index
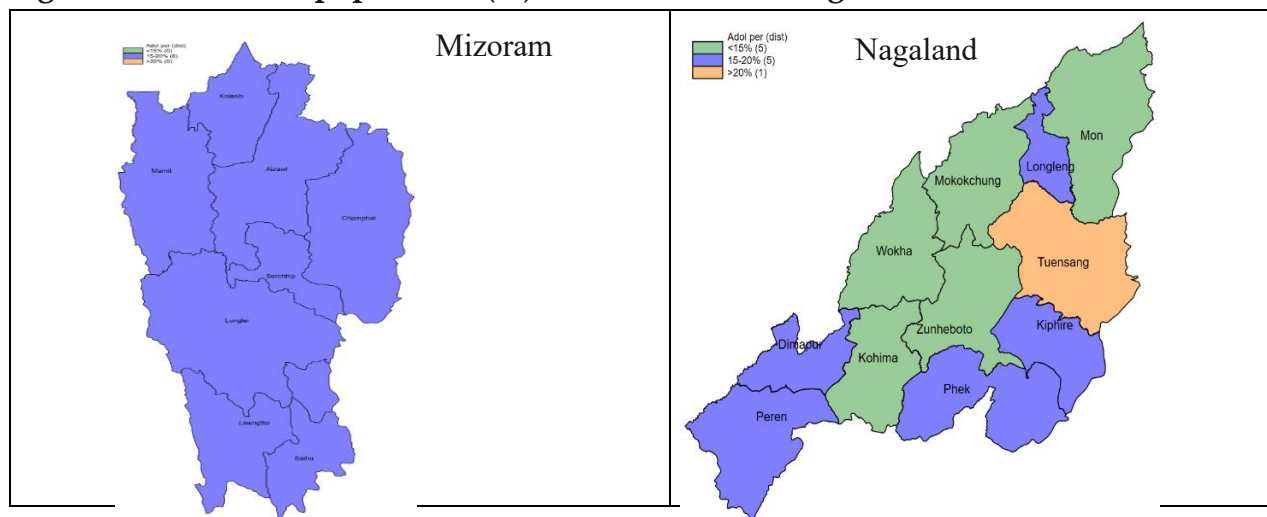
Mizoram and Nagaland

Size of adolescent population in Meghalaya and Nagaland

The recent round of NFHS (2019-21) showed that more than one in every five individuals in Mizoram was in the age group of 10–19 years and almost one in six in Nagaland (IIPS and ICF, 2021). Analysis based on the data further showed a huge volume of adolescent population across districts of these two states. For instance, in Mizoram, the adolescent population constituted more than 20% of the total population across the districts of the state. In Nagaland, the adolescent population constituted >15% of the total population in 6 out of the 11 districts **(Figure 7).** Well-being of adolescents/youth

The well-being of adolescents/youth in Mizoram and Nagaland is presented in

Table 2. Among female adolescents, 10+ years of schooling was far from universal in both states— Only 47% of the adolescents in Mizoram and 36% in Nagaland completed 10+ years of schooling. The dropout rate for secondary-level schooling was high with 12% in Mizoram and 18% in Nagaland. Only 26% of adolescents/youth in Mizoram and 28% in Nagaland were currently working at the time of the survey. Menstrual hygiene practices were very low among adolescents of Nagaland (44%) while it was high in Mizoram, but the level was not universal. Over a fourth of the adolescents/youth in both states consumed tobacco and around 10% or more consumed alcohol.

Figure 7. Adolescent population (%) in Mizoram and Nagaland, 2019–21

Table 2. Situation of adolescents/youth well-being indicators in Mizoram and Nagaland, 2019–21

Indicators	Mizoram	Nagaland
10+ years of schooling among women aged 15–19 years	47%	36%
Dropout rate from secondary schooling among students	12%	18%
Work participation rate among women aged 15–29 years	26%	28%
Menstrual hygiene practices among women aged 15–19 years	85%	44%
Tobacco use among men aged 15–19 years	32%	25%
Alcohol consumption among men aged 15–19 years	13%	10%
Comprehensive knowledge of HIV among women aged 15–19 years	64%	25%

Utilization of sexual and reproductive healthcare services

In Mizoram, the use of antenatal check-ups in the first trimester of pregnancy among female adolescents/youth increased from 59% in 2015–16 to 68% in 2019–21 **(Figure 8)**. However, during the survey period, the indicator for receiving 4 or more antenatal care (ANC) remained stagnant at 53% and so did institutional delivery at 82 percent. The prevalence of modern contraceptives was low among adolescents/youth in the state (19%) and even slightly decreased over time. This was despite the consistently high level of unmet need for contraceptives–30% of adolescents/youth reported an unmet need for contraceptives in the state.

Figure 8. Sexual and reproductive healthcare services (%) among adolescents/youth in Mizoram, 2015–21

Percentage of key SRH indicators, 2015-2021
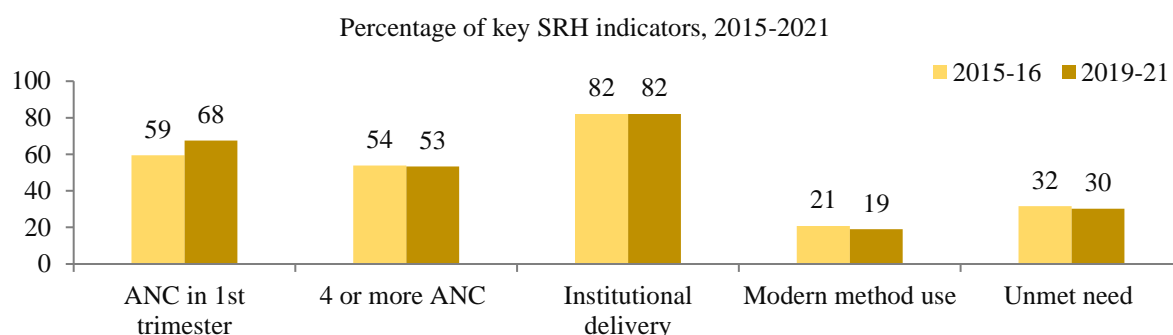
In Nagaland, utilisation of sexual and reproductive health services remained low among adolescents/youth. For example, only 42% of adolescents/youth received antenatal check-ups in the first trimester of their pregnancy, 18% received 4 or more ANC during pregnancy and less than half (45%) delivered at a health facility (Figure 9). The use of modern contraceptive methods was only 16% and the unmet need for contraceptives was 15 percent. While there was an improvement in coverage of these sexual and reproductive healthcare services over time, the level was still low.

Inequality in the use of key sexual and reproductive healthcare services

In both states, coverage of sexual and reproductive healthcare services among adolescents/youth was characterised by wide socio-economic inequality. In Mizoram, coverage of services was higher among adolescents/youth of urban areas, belonged to the richest quintiles, completed 10+ years of schooling and belonged to other caste groups than their counterparts. For instance, 4 or more ANC check-ups were 72% among adolescents/youth of urban areas compared to 44% in rural areas, 93% among adolescents/youth of the richest quintile compared to 29% in the poorest quintile **(Table 3)**. Institutional delivery was 96% in urban areas compared to 75% in rural areas; 100% among the richest quintile and 56% in the poorest quintile and 95% among more educated (10+ years of schooling) and 43% among less educated (primary/no education).

Figure 9. Sexual and reproductive healthcare services (%) among adolescents/youth in Nagaland, 2015–21

% of key SRH indicators, 2015-2021
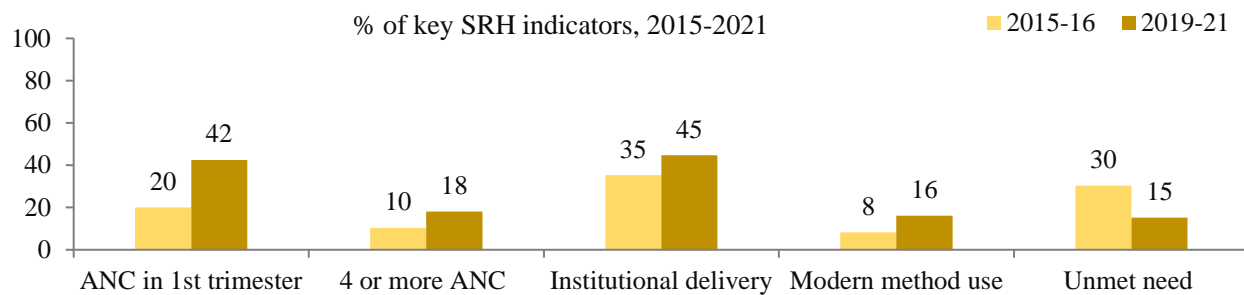
Similarly, the use of modern contraceptives was 16% among adolescents/youth who completed primary, or no education compared to 28% among those who completed 10+ years of schooling. The unmet need of contraceptives was 13% among richest adolescents/youth and 35% among poorest. The absence of hygienic menstrual practices was lower among urban (5%) than rural (28%), richest (3%) than poorest (38%) and more educated (8%) than less educated (50%) adolescents/youth.

In Nagaland, though the overall coverage of sexual and reproductive healthcare services was low, there were wide socioeconomic inequalities by place of residence, household wealth, education and caste groups. For instance, coverage of ANC in the first trimester was 60% among adolescents/youth of urban areas compared to 38% in rural areas; 69% among the richest compared to 26% among the poorest; 53% among more educated compared to 36% among less educated and 100% among other castes compared to 38% among ST (Table 4). A similar pattern was observed in adolescents/youth receiving of 4 or more antenatal check-ups.

Institutional delivery was 60% in urban areas as compared to 40% in rural areas; 79% among the richest quintile and 33% in the poorest quintile; and 60% among more educated than 38% among less educated. Non-adoption of hygienic menstrual practices was lower among adolescents/youth of urban (46%) than in rural areas (63%), richest (38%) than poorest quintiles (78%), more educated (78%) than less educated (48%), and other castes (34%) than ST (58%).

Table 3. Key sexual and reproductive healthcare of adolescents/youth by selected socioeconomic characteristics (%), Mizoram, 2019–21

	ANC in 1st trimester	4 or more ANC	Institutional Delivery	Modern method Use	Unmet Need	No menstrual Hygiene
Place of residence						
Urban	73	72	96	25	33	5
Rural	65	44	75	16	29	28
Wealth						
Richest	67	93	100	52	13	3
Poorest	51	29	56	15	35	38
Education						
10+ years of education	75	66	95	28	28	8
Primary/No education	46	15	43	16	29	50
Caste						
Other castes	n/a	n/a	n/a	n/a	n/a	n/a
Scheduled Tribes	70	55	84	19	31	13

n/a: not estimated due to low sample size

Discussion

Using data from the last two rounds of the NFHS, this study documents the broad situation of child marriage and teenage pregnancy in the North-east region of India. Furthermore, it gives special attention to the states of Mizoram and Nagaland to provide details about adolescents/youth well-being and their utilization of sexual and reproductive healthcare services. As observed in other parts of South Asia, marriage is still the main context for sexual intercourse. Getting married therefore signals the start of exposure to the chance of becoming pregnant, leading to increase in the number of child marriage (Marphatia et al., 2017). In the North-east region, the prevalence of child marriage is comparatively high and has even increased in the states of Tripura and Assam. In other states of the region, it is low and has either decreased or remained stagnant over time. The district-level patterns indicate a decrease in child marriage; however, it was substantially high in few districts of states like Assam, Arunachal Pradesh and Tripura. Teenage pregnancy in the region is also high in those states where child marriage is high. In these states, the level of schooling among women is very low (data not shown), which is one of the reasons for such a high prevalence of child marriage. Previous studies have documented that Universal secondary-level schooling among girls plays a critical role in reducing early marriage in the Indian sub-continent and elsewhere (Gangadharan

and Maitra 2003; Kalamar et al, 2016; Kamal 2014; Maitra 2004; Sabbah-Karkaby and Stier 2017; Yabiku, 2005).

Specifically, in both the focus states, the proportion of adolescents/youth to the total population is high, as many of the

districts across Mizoram and Nagaland have more than 20% adolescents/youth population.

Table 4. Key sexual and reproductive healthcare of adolescents/youth by selected socioeconomic characteristics (%), Nagaland, 2019–21

	ANC in 1st Trimester	4 or more ANC	Institutional Delivery	Modern method Use	Unmet Need	No menstrual Hygiene
Place of residence						
Urban	60	38	62	20	19	46
Rural	38	13	40	15	14	63
Wealth						
Richest	69	46	79	5	3	38
Poorest	26	5	33	16	12	78
Education						
10+ years education	53	23	60	16	15	48
Primary/No education	36	17	38	18	17	78
Caste						
Other castes	100	100	100	n/a	n/a	34
Scheduled Tribes	38	13	41	16	14	58

n/a: not estimated due to low sample size.

This disparity is particularly pronounced in Nagaland. Poor adolescent well-being is reflected in low use of maternal, child, and family planning services. This is despite having high unmet need as well as no significant change in the coverage of these services over time, particularly in Nagaland. Moreover, utilization of the services is lower among adolescents/youth belonging to poor socioeconomic groups, less educated and belonging to rural areas. Previous studies

from India and other countries have shown persisting inequality in the use of sexual and reproductive healthcare services by socioeconomic groups (Ali et al., 2021; Kurlikar et al., 2020; Yadav et al., 2021). Low utilisation of sexual and reproductive health services in Nagaland is associated with several factors, ranging from programmatic and healthcare systems to individual factors, similar to the trends nationwide (Ghosh & Ghosh, 2020). Among these, programmatic factors

play a crucial role. For instance, in Nagaland, only 7% of adolescents/youth are contacted by community health workers for FP and only 22% are contacted by healthcare providers during the last trimester of the pregnancy (IIPS and ICF, 2021). Contact with health workers is important for utilising maternal as well as FP services (Baqui et al., 2007; Bhutta et al., 2009; Phillips and Hossain, 2003; Roux et al., 2020). The factors related to enabling environment such as providers' preference and choice for FP among newly married women, perceived poor quality of services and long waiting periods at government health facilities are critical (Parsekar et al., 2021).

On the other hand, in Mizoram, demand side factors such as low level of education, lack of knowledge on sexual and reproductive health issues, low decision-making agency, high gender-based violence and high concentration of tribal communities are found to be associated with low and unequal use of sexual and reproductive healthcare in the state.

Conclusion

Based on the findings, this study suggests some major takeaways for ongoing health and well-being programs for adolescents/youth in the North-east region of India as well as specifically for the focus states of Nagaland and Mizoram. First, ensuring universal education up to

secondary level of schooling can help in reducing prevailing child marriage as well as subsequent teenage pregnancies in selected geographies of the region. This requires improving school infrastructure and connectivity as well as increasing interest in pursuing studies. Second, the measures to increase the age of marriage, should not only focus on child marriage but should also have focus on marriage before the age of 21, as high vulnerability has also been observed in women who married at the ages 18, 19 and 20. Third, focus on programmatic factors in Nagaland requires immediate attention to improve coverage of healthcare services among adolescents and youth. Subsequently, efforts should focus on creating an enabling environment and fostering behaviour change. Fourth, in Mizoram, factors related to the demand for healthcare need to be strengthened for increasing use among adolescents/youth in the state. These actions will help the states improve adolescent health and contribute to achieving India's national and international development commitments.

Declarations

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biomarkers, and healthcare utilization indicators for populations aged 15 to 49. They are also grateful to NFHS-project partners and the International Institute for Population Sciences (IIPS).

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Ethical declarations

The present study utilizes a secondary dataset available in the public domain for legitimate research purposes with no identifiable information on the survey participants. Hence, there is no requirement for any additional ethical approval.

Consent for publication

Not applicable. No details, images or videos related to individual participants were obtained. In addition, data are available in the public domain.

Competing interests

The authors declare no competing interests.

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