

Postpartum Health and Access to Nutrition Services among Adolescent and Adult Adi-Minyong Mothers of Arunachal Pradesh

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ABSTRACT

Scanty of data are available on nutrition and immediate symptoms of postpartum mothers and their access to health and nutrition services in pregnancy period in India and North-East India. This is a comprehensive approach of studying how early childbearing is associated with maternal health risks and nutritional status, maternal access to health and nutrition services and their knowledge of WHO recommendations on nutrient supplements comparing the differences between adolescent and adult mothers belonging to Adi-Minyong community of Arunachal Pradesh in North-East India. A total of 175 eligible mothers were selected and divided into two age categories: Adolescent mothers (15–19 years) and adult mothers (20-40 years) each with an infant from Siang and West-Siang districts. Differences in service use and postpartum health outcomes between adolescent and adult mothers were evaluated using multivariate regression models. Higher number of adolescent mothers were school dropouts and belonged to low-income-group maternal households. The awareness of antenatal care and nutrition services was similar for adolescent and adult mothers but significantly higher number of adult mothers received four times of ANC services and practised nutrient supplementation for longer duration in pregnancy. Adolescent mothers weighed significantly less than adult women (51.78 ± 5.62 vs. 55.42 ± 6.22 kg, $p<0.001$) and their body mass index was significantly lower (21.97 vs. 23.19 , $p<0.001$). Adolescent mothers recovered later with more difficulty after childbirth had significantly with lower scores for "postpartum functional abilities" (Adolescent= 46.63 ± 17.51 vs Adult= 57.13 ± 18.37 ; $p<0.0001$). This study confirmed that adolescent childbearing exposes substantial risks to mothers after childbirth, and they lagged behind in attaining knowledge on benefits of ANC and nutrition services.

Keywords: Adolescence, Postpartum Health, Nutrition Services, Adi-Minyong tribe, North-East India

INTRODUCTION

Adolescent pregnancy is undoubtedly the greatest health concern that affects both the mother and the child's overall health and well-being. As of 2019, adolescents aged 15–19 years in low- and middle-income countries (LMICs) had an estimated 21 million pregnancies each year, of which approximately 50 percent were unintended, and which resulted in an estimated 12 million births (Sully et al., 2020; Darroch et al., 2016). One in five adolescents globally resides in India, which is also the region with the highest proportion of adolescents (Nguyen et al., 2019). 12.1 million children marry before the legal age for marriage in India, which is the highest in the world (Census of India, 2011). This is one of the major reasons of childhood stunting and malnutrition globally as well as in India (Nguyen et al., 2019). Anaemia, pregnancy-induced hypertension, premature labour, cephalopelvic disproportion, maternal mortality, perinatal and neonatal mortality, low birth weight, and impairment to the reproductive system are only a few of the major health concerns that young women face when they get pregnant, give birth and concomitantly suffer from undernutrition. This is a vicious cycle of adverse health risks and outcomes that would proceed till the intergenerational cycle of adolescent marriage and childbearing could be broken. Various studies (Marphatia et al., 2017; Nguyen et al., 2017) conducted in India and abroad independently found associations between adolescent pregnancy and mothers' socio-demographic, nutrition and living conditions, access to health care during antenatal and delivery timeframe, faulty new-born and infant feeding, childhood stunting and less education and absence of bargaining power of women. Except for Nagaland and Sikkim, the North-Eastern states of India have high adolescent fertility rates (AFR) and the percentage of women aged 15-19 who have begun childbearing in North-East India was found to be highest in Tripura (21.9%) followed by Assam (11.7%), Manipur (8.6%), Meghalaya (7.2%) and Arunachal Pradesh (6.0%) (IIPS & ICF, 2021). The states of Tripura (21.6%), Assam (16.7%), and Arunachal Pradesh (12.1%) are among the 12 states with higher rates of child marriage and teen pregnancy compared to the national average, according to the National Commission for the Protection of Child Rights (NCPCR, 2017) study. Other findings (Reid and Meadows-Oliver, 2007; Macdonald, 2022) found that higher rates of depressive symptoms among adolescent mothers during the first postpartum year were related to higher family conflict, less social supports, and low self-esteem, poorer emotional bonding with infants. A similar course of study found that adolescent mothers may have low maternal self-efficacy and high levels of anxiety, depression, and stress as a result of an incomplete

development process that renders them either physically or psychologically unprepared for the demands of motherhood and parenting (Léniz-Maturana et al., 2022). A recent study found that adolescent pregnancy is associated with child undernutrition through various interlinking factors such as poorer maternal nutritional status, lower educational attainment, less access to health services during antenatal or postnatal care and early childhood, inadequate complementary feeding practices, and worse living conditions compared to adult pregnancy through representative data on more than 60,000 mother-child pairs (Nguyen et al., 2019). Between those who marry before the age of 18 and those who marry beyond the age of 24 years, studies found a twofold increase in the prevalence of thinness among Indian women who are adolescent mothers (Goli et al., 2015). In addition, pregnant women who are still in their adolescence may not have access to high-quality medical care during the important first 1000 days (Godha et al., 2013; Owolabi et al., 2017), which could have long-term effects on the children (Ganchimeg et al., 2014). Adolescents are more likely to experience difficulties during and after childbirth. Although postpartum treatment provided in facilities focuses on preventing difficulties for both mothers and infants, it is unclear how adolescent mothers view their own healthcare requirements during the first few weeks after giving birth. According to statistics, young mothers have less access to healthcare and engage in less health-seeking behaviour than adult mothers (UNICEF, 2019). Additionally, among women under the age of nineteen, operative vaginal births, caesarean section rates, and low birth rates were all significantly greater compared to among adult women. Additionally, as compared to adult women with a similar sociodemographic profile, adolescent women who got adequate prenatal care did not have a greater likelihood of having a suboptimal obstetric outcome (Bukulmez and Deren, 2000). Adolescent first-time mothers therefore need extra effective care throughout pregnancy and after childbirth. According to other research (Namutebi et al., 2022), adolescent mothers and their children are more likely to become ill because they are not prepared for the demands of motherhood, lack of access to accurate health information, and receive little support from the family. Many communities in North-East India prefer early marriages and a report by NCPCR (2017) added that in Arunachal Pradesh 72 percent of child marriages were observed among the Scheduled Tribes. A previous study done by Sharma (2022) in the Adi-Minyong community of West Siang district of Arunachal Pradesh from 2012-2015 reported a significantly high risk of adverse perinatal outcomes among adolescent mothers compared to adult mothers. Even though there is evidence that pregnancy during adolescence adversely affects maternal and child outcomes,

to our knowledge, very few studies have taken a comprehensive approach to studying how early childbearing is associated with maternal health and nutritional status, maternal access to health and nutrition services and their knowledge of WHO recommendations on nutrient supplements in India and North-East India in particular, so this study aimed to assess and examine health and nutritional status of the adolescent and adult mothers with an infant and their access to health and nutrition services along with their knowledge on WHO recommendations on iron and folic acid (IFA) and calcium supplements among the Adi-Minyong community of Arunachal Pradesh, North-East India. The rationale behind selecting this community was that evidence of early marriages were reported in previous studies done and the community imparts all kinds of societal responsibilities to adolescents treating them as adults (Sharma, 2022).

MATERIAL AND METHODS

Between December 2015 and August 2019, a cross-sectional study was conducted in two districts of Arunachal Pradesh, namely, Siang and West Siang districts which are the homeland of many Adi tribes including the Adi-Minyong: the tribe under present study. A household census was done in each of the two districts to compile a list of mothers aged less than or equal to 40 years with children under the age of one year. A total of 175 mother-infant pairs were chosen for the study using systematic sampling to get the necessary sample size. Data on socio-demographic, anthropometric, obstetric and nutrition interventions were collected through a well-designed semi-structured interview schedule and face-to-face in-depth information related to self-reported postpartum symptoms and causes of discontinuation of antenatal care services were also collected. Verbal consent in vernacular dialect and written informed consent were taken from all the women who voluntarily participated in the study. This is part of Ph.D. research, and the ethical protocol was approved by the Research Committee of Dibrugarh University, Dibrugarh, Assam. This is a non-invasive, qualitative-quantitative research.

Maternal Sociodemographic, Nutrition, and health characteristics

Adolescent mothers (15–19 years old) and adult mothers (20–40 years) with infants were the two general age groups into which the participants were divided. The women who got married after reaching 19 were considered as adult mothers. The ages of the participants were established mostly using official sources, including voter identification cards, school transcripts, and data kept by the public health centre during antenatal care (ANC) visits. The

participants were questioned in-depth about their ages in the absence of reliable documentation proving their age, such as "how old were they when their younger siblings were born," "how long had they been out of school," and "what standards were they studying when they got married". Per capita monthly income of the maternal household before marriage was estimated by using the formula developed by Khongsdier (2002) into three income groups: Low-Income Group (LIG), Middle-Income Group (MIG), and High-Income Group (HIG). Mothers were discussed concerning antenatal care (ANC) services they had received in the last pregnancy (ever received ANC, the timing of the first visit, and total ANC visits), whether or not they had been visited at home by ASHA workers (Accredited Social Health Activist), how many times they had been visited, and the content of the counselling with the health care providers in the PHC and ASHA workers at home, particularly on nutrition-related topics like diet and IFA/calcium supplements.

The BMI (body mass index) of mothers was categorized using WHO Asia Pacific BMI cut points (WHO Expert Consultation, 2004). Mother's anthropometric measures were obtained using standard methods. Weight was measured to the nearest 0.1 kg using electronic weighing scales. Height was measured to the nearest 0.1 cm using Martin's anthropometric rod. Body mass index (BMI) was calculated as weight (kg)/ height² (meters). We gathered data on maternal functional disability throughout the postpartum period up to 6 weeks from delivery in addition to the usual indications of postpartum morbidity. The measurement is based on the self-reported level of difficulty in taking care of oneself, of children, and performing domestic duties at four specific times following delivery up to 45 days (1–7 days, 8–15 days, 16–30 days, and 31–45 days). These probes were prepared using the WHODAS 2.0 manual for the WHO Disability Assessment Schedule (WHO, 2010), and they were then put through pretesting to make them appropriate for the postpartum period and the local context. Functional ability was defined as the "Resumption of household, social and community, and occupational activities, and assumption of infant care responsibilities" (Tulman and Fawcett, 1988) at a quality equal to or greater than that of a pre-pregnancy level. Self-reported postpartum symptoms of mothers were assessed based on the mother's recall of specific signs/ symptoms she experienced from delivery to 6 weeks of postpartum and a standard list of symptoms was also followed (Sugarman, 1984) as reference.

Statistical analysis

The main explanatory variable of interest was adolescent maternal age of ≤ 19 years. Using multivariate linear regression models (for continuous variables) and logistic regression

models (for categorical variables), controlling for covariates, it was determined whether adolescents and adult mothers differed from each other in the services they received as well as in certain maternal nutrition and health conditions (referred to as "outcomes"). SPSS version 14 was used for all analyses. Statistical significance for differences between adolescent and adult mothers was considered at $p < 0.05$.

RESULTS

Maternal and household characteristics

As presumed, the mean age at first marriage of the adolescent mothers (16.89 ± 1.03 years) was found to be lower than that of the adult mothers (22.44 ± 0.76 years). The study reported lower age at first childbirth (adolescent 18.01 ± 1.42 years vs. adult 24.13 ± 1.31 years, $p < 0.01$) and lower parity amongst the adolescent mothers compared to the adult mothers. As expected, the highest percentage of adolescent mothers had only one child (89.46%) and the highest percentage of adult mothers were multiparous who had two children (49.15%) or more than two children (28.82%) (Table 1). This was expected as the duration of marriage was comparatively higher in adult mothers compared to the adolescent mothers with average duration of marriage was 2.86 years. A higher percentage of adolescent mothers was uneducated (26.32%) and more than half of the adolescent mothers were school drop-outs with less than 8 years of education (56.14%). On the other hand, most of the adult mothers (50.88%) had more than 8 years of formal schooling and a comparatively lesser percentage of uneducated mothers (21.19%) than adolescent mothers. Statistically significant differences were observed between the two groups of mothers concerning the duration of formal schooling in the case of both less than and more than 8 years of formal schooling ($p < 0.01$). As the cultivation of rice, maize, millet, potato, ginger, and mustard form the main source of livelihood, most of the adolescent, as well as adult mothers, were found to be cultivators and some of them sell the surplus products in the village market to obtain some extra money. However, interestingly, compared to the adolescent mothers, a considerable number of adult mothers were found to be now engaged in different levels of government and private sector services in the headquarters and in government schools (adolescent 8.77% vs. adult 17.80%, $p < 0.01$). A statistically significant difference had been observed between the two groups of mothers for service holders. Compared to adult mothers, the majority of adolescent mothers were from the maternal low-income group (LIG) households before marriage (adolescent 73.68% vs. adult 50.85%, $p < 0.05$); whereas, compared to adolescent mothers significantly

more adult mothers belonged to middle-income maternal households (MIG) (adolescent 17.55% vs. adult 36.17%, $p < 0.01$) and higher income maternal households (HIG) (adolescent 8.77% vs. adult 12.98 %, $p < 0.05$), before entering into marriage. A significant difference was found among the adult and adolescent mothers in the case of maternal household size ($p < 0.05$). Adolescent mothers were raised in households with more adults (4.70 ± 1.62), with an average household size of six individuals (6.18 ± 1.52) compared to the adult mothers who were raised in smaller households (4.72 ± 2.11) with a comparatively lesser number of adults (3.06 ± 1.47).

Table 1. Maternal and household characteristics of adolescent and adult mothers

Maternal characteristics	Adolescent mothers ≤19 years (n=57) Mean±SD/Percent	Adult mothers >19 years (n=118) Mean±SD/Percent
Age at first marriage (years)	16.89±1.03	22.44±0.76**
Age at first childbirth (years)	18.01±1.42	24.13±1.31**
Parity		
1 child	89.46	22.03
2 children	10.53	49.15
≥3 children	0.00	28.82
Educational level attained		
Never attended school	26.32	21.19
Less than 8 years of formal schooling	56.14	27.93**
More than 8 years of formal schooling	17.54	50.88**
Occupation		
Cultivation	64.91	53.39
Petty business (weaving and selling cloths, selling vegetables and groceries)	26.32	28.81
Service	8.77	17.80**
Maternal household per capita monthly income of the mothers		
LIG	73.68	50.85*
MIG	17.55	36.17**
HIG	8.77	12.98*
Maternal Household size	6.18±1.52	4.72±2.11*
Number of adults in the household	4.70±1.62	3.06±1.47

* $p < 0.05$,

** $p < 0.01$

Mothers' access to health and nutrition services and their knowledge of WHO recommendations

Reproductive, Maternal, New-born, Child and Adolescent Health (RMNCH+A) is a framework that the Indian government approved in 2013. Its main objective was to address the leading causes of death and morbidity in women and children. This paradigm also aids in comprehending the lags in using and getting health care services, particularly antenatal care services. Still in India, many pregnant women are reluctant to avail of the ANC services due to certain socio-cultural beliefs and being not encouraged by the elders and husbands of the community most of the time and transportation problems (Kumar et al., 2019; Sharma, 2021). These factors were also evident in the present study. It was apparent that higher numbers of adolescent mothers did not seek ANC services (22.81%) compared to adult mothers (16.10%). No statistical difference was found between the adolescent and adult mothers with respect to never preferring ANC services. However, compared to adolescent mothers (10.51%), significantly higher numbers of adult mothers (21.19%) completed the four visits, at least received and preferred to seek one to three ANC services ($p < 0.01$). The average numbers of ANC visits were comparatively lower among the adolescent mothers and adult mothers (Adolescent 2.03 ± 1.22 vs Adult 3.41 ± 2.10 , $p < 0.05$) in the study. The majority of the women reported that they were contacted and consulted on diet and nutrition by health care providers during the ANC visits, and some of them stated that they were contacted by ASHA workers and consulted about proper diet and nutrition during the gestational period at home. However, considerable percentages of the adult (31.09%), as well as adolescent mothers (34.21%), did not consult/did not prefer to discuss on nutrition and diet during pregnancy and lactating periods with the health care providers though some of them visited the PHC for ANC services. In pregnant women who were adolescents or adults, the levels of nutrition advice and supplements they had access to were also similar in the study. Though a majority of the adult and adolescent mothers heard about the iron and folic acid (IFA) supplements (Adolescent 89.47% vs. adult 95.76%) compared to the adolescent mothers, a significantly higher percentage of adult mothers reported consumption of IFA supplements (Adolescent 45.61% vs. adult 76.27%, $p < 0.01$). Similarly, the knowledge of the benefits of consuming IFA was significantly different across the two groups of mothers, a lesser number of adolescent mothers knew about the benefits and duration of consumption of IFA and calcium tablets. For both adolescent and adult mothers, the recommended six-month period for IFA

and calcium consumption during pregnancy was actually less than 180 days recommended by WHO as reported by the mothers, which was evident on looking at the average number of IFA consumption (adolescent 2.89 ± 2.61 months vs. adult 4.67 ± 2.78 months (IFA), $p < 0.05$) (Table 2). A statistically significant difference was reported among the two groups of mothers on the average number of months of IFA supplements actually consumed, adult mothers consumed a higher number of months on average than adolescent mothers. A similar picture was noticed when their knowledge and practices on calcium supplements were studied. The majority of adolescent and adult mothers had heard about calcium supplements from the ASHA workers and in the PHC but compared to the adolescent mothers significantly more adult mothers knew about the benefits of these supplements during pregnancy and actually consumed the supplements. The average duration of actual calcium consumption was significantly higher among the adult mothers compared to the adolescent mothers (adolescent 2.64 ± 1.28 months vs. adult 4.18 ± 2.12 months (IFA), $p < 0.05$). It is again pertinent to note here that the actual consumption of IFA was higher than that of calcium consumption in both the groups of mothers. The majority of births (65.79% among adolescents and 63.16% among adult women) occurred at home with no statistical difference between mother's age groups. But it is very important to report here that though a majority of deliveries occurred at home significantly higher percentage of adult mothers were attended by trained birth attendants at home (46.66% among adolescents and 70.42% among adult women, $p < 0.001$) during the parturition process. In the case of adolescent mothers, the majority of them were attended to and supported by either elder women of the household or untrained traditional birth attendants of their society.

Table 2. Maternal access to health and nutrition services and their knowledge on WHO recommendations

Maternal access to health and nutrition services	Adolescent mothers ≤19 years (n=57) Mean±SD/Percent	Adult mothers >19 years (n=118) Mean±SD/Percent
Obtained ANC services		
Never preferred to received ANC services	22.81	16.10
One Visit to ANC services	47.37	26.27**
Two to three visits to ANC services	19.31	36.44**
Four visits to ANC services	10.51	21.19**
Average number of ANC	2.03 ± 1.22	$3.41 \pm 2.10^*$

visits		
Contact with health care providers/ ASHA workers		
Never been preferred to contact during ANC visits/ASHA at PHC or home	34.21	31.09
Contacted during ANC visits/ASHA at PHC or home	65.79	68.91
Knowledge and practice on IFA supplements		
Ever heard of IFA supplements	89.47	95.76
Consumed IFA supplements	45.61	76.27**
Knowledge on benefit of IFA supplements	26.32	47.46**
Average number of months IFA supplements consumed	2.89±2.61	4.67±2.78*
Knowledge and practice on calcium supplements		
Ever heard of calcium supplements	85.25	91.76
Consumed calcium supplements	41.01	60.78**
Knowledge on benefit of calcium supplements	28.17	54.66**
Average number of months IFA supplements consumed	2.64±1.28	4.18±2.12**
Delivery		
Home delivery	65.79	63.16
Institutional delivery	34.21	36.84
Accompanied by trained birth attended	46.66	70.42***

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

Maternal Health and nutrition outcomes

Despite having slightly lower mean heights of adolescent mothers to adult mothers (Adolescent 149.11±4.42 cm vs. adult 151.42±3.66 cm, p>0.05) (Table 3), adolescent mothers had considerably lower body weight (51.78±5.62 vs. 55.42±6.22 kg, p<0.001) and average BMI (21.97 vs. 23.19, p<0.001) than adult women. Significantly high numbers of

adolescent mothers were found to be underweight (15.78%), on the other hand, compared to adolescent mothers significantly high numbers of adult mothers were found to be overweight (4.78 vs. 14.41, $p < 0.001$) though the percentages of normal mothers were similar in the two groups (79.44 vs. 75.98, $p > 0.05$). Mothers with self-reported postpartum symptoms were reported to be significantly higher among adolescents (84.74%) compared to adults (68.95%, $p < 0.01$). A statistically significant difference was observed in the number of women with any postpartum symptoms among the two groups. Mothers with no symptoms were significantly higher in the adult mothers (31.05%) compared to the adolescent mothers (15.26%, $p < 0.001$). No significant difference was found in the experience of visual disturbances (Adolescent=12.67% vs Adult=11.65%) and recurrent abdominal pain (Adolescent=38.42% vs Adult=34.82%) after postpartum, however, in other reported symptoms of swollen leg (Adolescent=41.05 vs Adult=14.04), excessive bleeding after parturition due to prolonged labour (Adolescent=38.95% vs Adult=12.28%) and fatigue with headache (Adolescent=67.37% vs Adult=31.58%) statistically significant differences were observed in the two groups. Adolescent mothers suffered more from postpartum symptoms where fatigue with headache and swollen legs were more common (multiple responses were accepted). Adolescent mothers had significantly lower scores for "postpartum functional abilities" as evaluated by how effortlessly they were able to resume household, self-care, and child-care responsibilities at distinct postpartum periods (Adolescent= 46.63 ± 17.51 vs Adult= 57.13 ± 18.37 ; $p < 0.0001$). Significant differences in scores for "postpartum functional abilities" were found at specific time periods of one to seven days (Adolescent= 4.38 ± 3.40 vs Adult= 7.06 ± 5.16 ; $p < 0.0001$) and eight to fifteen days (Adolescent= 9.26 ± 4.06 vs Adult= 13.06 ± 4.86 ; $p < 0.0001$) among the two groups of mothers. Adolescent mothers recovered later and with much difficulty after childbirth. From 16 days onwards, no statistically significant differences were noticed in postpartum functional ability among the adolescent and adult mothers.

Table 3. Health and nutritional status of the adolescent and adult mothers with infant

Health and nutritional status	Adolescent mothers ≤ 19 years (n=57) Adjusted Mean \pm SD/Percent	Adult mothers > 19 years (n=118) Mean \pm SD/Percent
Maternal nutritional status¹		
Height (cm)	149.11 \pm 4.42	151.42 \pm 3.66
Weight (Kg)	51.78 \pm 5.62	55.42 \pm 6.22***

BMI	21.97±2.19	23.19±3.10
Underweight (< 18.5)	15.78	9.61**
Normal weight	79.44	75.98
Overweight	4.78	14.41***
Self-reported Postpartum symptoms of mothers²		
Mothers with any postpartum symptoms	84.74	68.95**
swollen leg	41.05	14.04***
recurrent abdominal pain	38.42	34.82
excessive bleeding immediately after parturition due to prolonged labour	38.95	12.28**
fatigue with headache	67.37	31.58**
visual disturbances	12.67	11.65
Postnatal functional ability score^{3,4}		
Between 1-7 days	4.38±3.40	7.06±5.16***
Between 8-15 days	9.26±4.06	13.06±4.86***
Between 16-30 days	14.45±6.21	18.52±5.52
Between 31-45 days	19.70±4.21	19.88±6.26
Total postnatal functional ability score	46.63±17.51	57.13±18.37***

¹Adjusted for education, occupation, income and parity,

²Multiple responses,

³Adjusted for education, occupation, income and parity,

⁴Household daily activities were provided scores

** p<0.01, *** p<0.001

DISCUSSION

Our results demonstrate that adult and adolescent mothers had similar access to, and utilization of ANC services provided by the public health centre (PHC) and sub-centre in the area. However, the distance of the PHC from the area of study was one of the major factors for the discontinuation of ANC services and the high prevalence of home deliveries. Adolescent mothers had lower maternal nutritional status as evaluated by BMI and experienced longer recovery after childbirth. Most of the women mentioned that during their ANC visits, health care providers contacted and counselled them on diet and nutrition; some of them claimed that ASHA representatives had also done the same while coming to their homes. However, a sizable portion of the adult and adolescent mothers did not interact with the healthcare providers on the topics of nutrition and food during pregnancy and lactation

periods. Dietary habits developed throughout adolescence may be a factor in nutrition-related issues with long-term health implications not only for her but also her children. In India, 18 percent of males and 40 percent of females had anaemia. Adolescents' ability to grow, fight off diseases, cognitive maturity and productivity at work are all negatively impacted by anaemia (UNICEF India Report: Adolescent Nutrition, 2019). A nationwide program called Weekly Iron and Folic Acid Supplementation (WIFS) was introduced by the national Ministry of Health and Family Welfare (MoHFW) in January 2013 to address the issue. The initiative expands upon 13 years of evidence-generated by UNICEF through pilots and gradual scale-ups on the use of weekly iron and folic acid supplements to address anaemia in adolescent girls in various Indian states with the aim of preventing micronutrient deficiencies and anaemia through providing the Iron Folic Acid Supplementation, deworming, pre and peri-conceptual folic acid supplementation, universal access to iodized salt, access to knowledge and support to stop use of tobacco products during pregnancy, maternal calcium and vitamin A supplementation (UNICEF India Report: Women Nutrition, 2019). This aim would not be successful until micro-level studies were conducted at community levels to record the various barriers of accessibility of these schemes and programmes. In the present study, the levels of nutritional guidance and supplements available to pregnant women who were adolescents or adults were likewise comparable but despite that considerably more adult mothers than adolescent mothers reported taking IFA supplements and a lesser number of adolescent mothers knew about the benefits and duration of consumption of IFA and calcium tablets. According to the mothers, the advised six-month duration for IFA and calcium consumption during pregnancy for adolescent and adult women was actually less in the present study. The finding of this study that calcium coverage was lagging behind IFA coverage corroborated with another study conducted in the North-Eastern region of India (Bora et al, 2022). The poor consumption of IFA and calcium supplements could be the result of 1) late registration into ANC services, which delayed the start of supplies and counselling for the 6-months regular consumption, 2) Giving the least importance to the consumption of supplements as most of them were not aware of the benefits of regular consumption and 3) non-encouragement by the elderly women of the households as they were sceptical on the reason of consumption. UNICEF report on maternal nutrition (2018) indicated that poor nutrition is more common among rural areas and large families with uneducated or unskilled parents from lower-income households and during pregnancy, poor diets lacking in key nutrients – like iodine, iron, folate, calcium and zinc – can cause anaemia, pre-eclampsia,

haemorrhage and death in mothers. They can also lead to stillbirth, low birthweight, wasting and developmental delays for children. This study also found that the maternal households of the adolescent mothers were mostly low-income households and higher numbers of adolescent mothers were school dropouts and mostly had less than 8 years of formal schooling. Like the findings of the present study, Nguyen et al. (2019) also reported that the adolescent mothers exhibited worse supplemental feeding practices and were shorter, more likely to be underweight and anaemic, less likely to use health services, and shorter than adult mothers. They also had lower levels of education, and less negotiating power, and lived in houses with worse hygiene. The mother's socioeconomic position, education, and weight were the factors that were most strongly linked to child stunting in adolescent pregnancies. Studies undertaken globally over the past 20 years (Islam *et al.*, 2013) have identified several potential risk factors for child malnutrition, including maternal illiteracy, low household income, food insecurities, a lack of exclusive breastfeeding, the use of pre-lacteals, and a lack of access to colostrum. A new study by Nguyen et al. (2019) at the International Food Policy Research Institute (IFPRI) found that stunting and underweight prevalence were 10 percentage points higher in children born to adolescent mothers than in children born to adult mothers, providing empirical insight into the linkages between adolescent births and child undernutrition. This was one of the consequences for having lesser knowledge of nutrient supplementations and diet during pregnancy and lactation, which was also evident in the present study. Our study contends that adolescent pregnancy entails significant risks for the health of both the mother and the child and highlights that these vulnerabilities persist even in situations where antenatal care is available. Here, the distance of PHC was not readily accessed due to which the prevalence of home delivery was similar among adolescents and adult mothers. The importance of expanded efforts to eliminate iron deficiency is illustrated by new research showing the advantages of iron supplements in enhancing birth weight. This is to be done by extending the reach of antenatal programs and boosting fortification particularly in rural area of India (Ramakrishnan, 2004). Various studies done in India and abroad clearly stated that healthy birth weights are more common among infants born to well-nourished mothers, and these infants are less likely to experience malnutrition in the future (Gernand *et al.*, 2016). Weight and BMI differed significantly between adolescents and adult women. Adolescent mothers had a greater percentage of underweight than women over the age of 20. It's possible that pregnancy and lactation slowed the growth of adolescent body mass, possibly because of inadequate energy and nutrient supplies required for body fat

deposition and muscle mass, brought on by the competition for nutrients during pregnancy between the needs of the growing foetus and her own body (King, 2003). UNICEF India reported (2019) that foetal stunting is largely caused by the mother's inadequate nutrition before conception and in the first trimester. This shows that to encourage adolescents and adult women to adopt recommended practices, it is necessary to focus on increasing awareness of the benefits not only to the counselled mothers but to the entire community at large. This is because as the elder women and other members of the family were not aware of the benefits and needs of ANC and consumption of nutrient supplements, so they generally do not encourage the pregnant women for the same (Sharma, 2021). This was also clear in the present community also. Moreover, health professionals should focus on improving the purpose of the ANC visits rather than focusing on the number of visits. As suggested by Ramakrishnan (2004) to reduce LBW, approaches that improve women's status and reproductive health together with nutrition-based interventions, such as increasing food intake and micronutrient status, notably iron status, are essential. A recent study using representative data on more than 60,000 mother-child pairs and path analysis of India's NFHS-4 data found a similar kind of result that of the present study where adolescent pregnancy was linked to child undernutrition through factors like poorer maternal nutritional status, lower educational attainment, less access to health services during antenatal or postnatal care and early childhood, inadequate complementary feeding practices, and worse living conditions than adult pregnancy (Nguyen et al., 2019). According to research (Atuhaire and Cumber, 2018) postpartum depression is more frequently diagnosed in adolescents and may increase the risk of delayed growth and development in the children of these women. In order to identify and treat postpartum depression, adolescents must get intensive medical care and mother interventions. Canadian research (Kington et al., 2012) found that mothers ranging from 15 to 19 experienced postpartum depression at a rate that was twice as high as mothers aged 25 and older. In addition to this, adolescent mothers aged 10–19 years had higher risks of eclampsia, puerperal endometritis, systemic infections, low birthweight, preterm delivery and severe neonatal conditions (Ganchimeg et al., 2014). Additionally, the rates of caesarean sections, operative vaginal births, and low birth rates were all considerably greater among women under the age of 19 than among older women. Furthermore, adolescent women who got appropriate antenatal care did not have a higher risk of having a poor obstetric outcome than adult women with a similar sociodemographic background (Bukulmez and Deren, 2000). According to another research (Namutebi et al., 2022), adolescent mothers

and their children are more likely to become ill and discomfort because they are not prepared for the demands of motherhood, lack of access to accurate health information, and receive little support from the family. The present study reported later recovery of adolescent mothers from obstetric discomforts after childbirth as evaluated by how effortlessly they were able to resume household, self-care, and child-care responsibilities at distinct postpartum periods. A study conducted by Nguyen et al. (2019) in 20 sub-districts in Bangladesh where MNCH program was being implemented found similar results showing that the adolescents recovered later and with greater difficulty after childbirth compared to adult mothers.

The limitation of the study was that the self-reported maternal functional following birth, which could be subject to recall bias. Adolescent mothers were more likely to be first-time mothers with less previous experience delivering childcare and childcare, thereby increasing their likelihood to report discomforts. However, to account for the number of births, we have incorporated parity into the model.

CONCLUSION

In North-East India, there is a dearth of empirical data that may be used to understand adolescent health, particularly in relation to adolescent postpartum health and nutritional status during lactation. Furthermore, there are few studies demonstrating the efficacy of interventions for such adverse effects as well as for improving parenting skills among adolescent mothers, even though up to 11 percent of births worldwide and a considerable in North-East India occur to adolescents and studies have shown that they bear a significant burden of common perinatal health risks and disorders. It is recommended that to encourage pregnant and postpartum women to adopt recommended practices of WHO, it is necessary to focus on increasing awareness of the benefits not only to the counselled mothers but to the entire community at large.

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