Menarche, Marriage, and Conception: Their Influence on Maternal Health Services Utilization in the Juang Tribe of Odisha

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Abstract

Background: Puberty is a natural biological process, yet it can have adverse effects, particularly on rural and tribal girls in India. Early menarche makes them vulnerable to adolescent marriage and early conception, leading to a cascade of negative social and health outcomes.

Objectives: This study examines the influence of three key life-course events- age at menarche, marriage, and first conception, on maternal health service utilisation, specifically antenatal care (ANC) and institutional deliveries, among Juang tribal women in Odisha.

Materials and Methods: A cross-sectional study was conducted among 158 Juang mothers aged 15-49 (youngest child under five) from eight villages in Banspal block, Keonjhar, Odisha. Data were collected using a pretested interview schedule. Descriptive statistics were used to evaluate socio-demographic, reproductive, and maternal health indicators.

Results: The mean age at menarche among Juang women was 12.38 years. Early marriage (67.5%; mean: 16.35 ± 4.12 years) correlated with early conception (mean: 18.47 ± 2.35 years). ANC registration was high (95.6%), the highest rate reported in Odisha and eastern India. However, 50% of the participants reported home delivery, despite 98.1% of women receiving financial benefits. Despite willingness, 77% of participants denied using contraceptives. Caesarean births were rare (8.2%), and no cases of breastfeeding deprivation were reported. Child immunisation coverage was moderate (57.5%). **Conclusion:** Juang women show reproductive patterns aligning more with eastern India than with northern or southern regions. Despite high ANC uptake, gaps in institutional delivery and contraception persist. Culturally sensitive, community-based interventions are essential for improving maternal and child health outcomes.

Keywords: *Juang Tribe; Life Course Approach; Menarche; Early Marriage; Early Conception; Maternal Health Care Service Utilisation*

Introduction

India has the largest adolescent population globally, with 253 million individuals aged 10-19 years, of which approximately 47 percent are female (Census of India, 2011). Adolescent girls, particularly from low-

income groups, face multiple challenges, including early marriage, limited education, occupational deprivation, and poor health. Several socio-economic factors, such as large family size, illiteracy, gender inequality, and poverty, further compound their vulnerability.

The life course approach to maternal health emphasises the cumulative impact of events and exposures across an individual's life (Wagner et al., 2024). Early life reproductive events such as the timing of menarche, marriage and conception set a trajectory of limited education, early childbearing, and reduced autonomy, influencing their health seeking behaviours and impacting maternal health outcomes (Paul & Chouhan, 2019).

Menarche, the onset of menstruation, is a key indicator of pubertal development, yet it exposes many young girls to multiple social risks. Studies suggest, that in low-and-middle income countries, early menarche is linked to early marriage, early pregnancies, and premature school dropout (Sommer, 2013). In India, research indicates that age at menarche triggers social epidemiology, as this biological event is seen by society as a sign of social preparedness for marriage and childbearing. It increases the risk of early marriage, particularly for girls from rural, tribal, and low-income communities (Marphatia et al., 2017). Once married, decision-making power may shift from the woman to the husband or in-laws, often limiting autonomy in seeking maternal care and education (Osamor & Grady, 2016). Studies also show significant association between early marriage and conception age with lower odds of using antenatal care services and institutional delivery, two of the most critical components of maternal health care (Kamal & Ulas, 2022). Furthermore, an extended reproductive period due to early marriage also increases the likelihood of multiple and frequent conceptions, contributing to various adverse health outcomes for mother and child health (R. Prakash et al., 2011; Raj et al., 2010).

In this context, the present study examines the role of three major bio-social determinants-age at menarche, marriage, and first conception and their impact on the utilisation of maternal health services, particularly antenatal care (ANC) and institutional deliveries among the Juang tribe women of Odisha. The study also compares these factors in Juang women to other Indian populations, revealing how they influence maternal health service use across different demographic groups. This paper highlights critical insights for reproductive health program planners and policymakers in identifying the factors influencing maternal health and service utilisation, ultimately, improving health outcomes for marginalized adolescent girls and women.

Methods

The present study is a population based descriptive study conducted in Banspal block, Keonjhar district, Odisha, aimed at providing baseline information on the reproductive trajectory and healthcare utilisation patterns among Juang women.

The Juangs are one of the 13 Particularly Vulnerable Tribal Groups (PVTG) of Odisha, primarily residing in the Gonsaika hills of the Keonjhar district, and some are scattered in the Dhenkanal district. The majority of Juang settlements are located near forest areas due to their practice of shifting cultivation, but some Juangs live plains and engage in settled agriculture.

The study universe comprises ever-married women aged 15-49 years with the youngest child being under five years of age. The study was carried out in eight villages of Banspal block namely; Gonasika, Guptaganga, Kadalibadi, Upara Baitarini, Uparakundhei, Talakundhei, Talakansa and Ghungi. A map of the district and study block is provided as Figure 1. The block and villages were selected purposively based on the preponderance of Juang households as informed by the panchayat and Juang Development Agency (JDA). Accredited Social Health Activists (ASHAs) and Anganwadi Workers (AWWs) assisted in identifying 162 eligible women respondents, constituting the final sampling frame. Data were collected from 158 women based on their availability and willingness to participate, employing a non-probability convenience sampling approach at the individual level.

Figure 1: Block map of Keonjhar district (*GIS Odisha*, n.d.)

A pretested interview schedule covering women's reproductive performance, health care utilisation services, and breastfeeding practices was prepared and translated into local vernacular (*Odia*) for ease of administration. Although the Juang language belongs to the Austroasiatic linguistic group, majority of the respondents were proficient in *Odia*, which is commonly used for inter-community communication. No respondent reported difficulty in understanding and responding to the *Odia* version of the schedule.

Free, prior, and informed consent (FPIC) was obtained from all participants. Data was analysed for percentage distribution using SPSS version 20.0. Data maps were constructed using Microsoft Excel 2019. The Institutional research Ethical Committee approved the study (IEC/UU/2022-06).

Results

The demographic, socioeconomic profile and reproductive performance of the participants are presented in Table 1. Nearly half of the participants belonged to the 21-26 age group, indicating a concentration of young adult mothers. Marital trends underscored this demographic status, as the majority of individuals were married between the ages of 15 -17, followed by the age group 18-20. Early marriage in the age group 12-14 was less common but still present, suggesting the existence of socio-cultural sanctions on early marriages.

The impact of early marriage is evident in educational attainment, as most mothers had no formal education and only a small fraction had completed high school, indicating widespread illiteracy. Employment challenges and economic constraints were also evident, with women involved in wood cutting, forest produce collection, household activities, and labour work. A mere 13 percent of women reported a monthly family income above 5000 Rupees, underscoring substantial financial vulnerability.

The reproductive history revealed an average menarcheal age of 12.4 years. Concomitantly, 67.7 percent of women married before age 18, with a mean age at marriage of 16.35 ± 4.12 years. This early marriage was correlated with an early age at conception. The majority of women had their first child between the ages of 17 and 21, while 18.4 percent conceived between the ages of 12 and 16, putting both mothers and infants at increased risk for pregnancy-related complications and mortality.

Table 1: Socio-demographic and reproductive characteristics of the study group

Characteristics of the study participants	N	%
Age Group (in years)		
15-20	25	15.8
21-26	78	49.4
27-32	49	31
33-38	6	3.8
Educational status		
Illiterate (no formal schooling)	26	28.6
Below Primary	14	15.4
Primary	15	16.5
Middle	20	22
High school	14	15.4
Higher secondary (10+2)	2	2.2
Occupational status		
Wood collection /selling from jungle	38	41.8
Agricultural labour	9	9.9
House-wife and assist in household activities	43	47.3
Government job	1	1.1
Monthly family income (Rupees)		
<=3000	58	63.7
3001-5000	21	23.1
>=5000	12	13.2
Age at marriage		
12-14	19	12
15-17	88	55.7
Reproductive health statistics		**Years (SD)**
Mean Age at Menarche		12.38 ±1.50
Mean Age at marriage		16.35 ±4.12
Mean age at first conception		18.47 ±2.35

Table 2 presents the utilisation of healthcare services and breastfeeding practices among the study group. The findings revealed a high ANC registration rate of 95.6% with a preference for conventional modern medical care at government health facilities, most likely due to its accessibility and gratis services. Despite comprehensive ANC registration, 50% of childbirths occurred at home, while more than 98% of respondents accessed financial benefits through the scheme. This discrepancy suggests that although women have access to prenatal care and financial support, significant barriers still persist for institutional deliveries. Moreover, the high incidence of normal deliveries, although indicating a positive trend, appears to challenge the perceived utility of institutional delivery services, as half of them took place at home by traditional midwives. The findings also reveal that half of the Juang women expressed willingness for family planning, yet 77.2 percent had not opted for it. This indicates the existence of cultural and system barriers impeding the implementation of such services. Out of 22.8 percent of women who adopted family planning, reported preference for modern methods, while few opted for traditional methods. Child immunisation coverage was moderate, with 57.6% of children fully immunized. Bacillus Calmette-Guerin (BCG) showed the highest coverage (96.2%), followed by diphtheria-pertussis-tetanus (DPT) (77.8%), measles (75.3%), and vitamin-A supplementation (69.6%), reflecting varied immunisation rates among children in the study population.

Table 2: Healthcare services utilisation and Breastfeeding practices among the study group

Service	Categories	N	%
Antenatal Registration	Yes	151	95.6
	No	7	4.4
Type of Antenatal Check-up	Not done	7	4.4
	Government	146	92.4
	Private	5	3.2
Availing services	Not Taken	2	1.2
	Allopathic	151	95.5
	Traditional	5	3.8
Place of delivery	Home delivery	79	50
	Institutional delivery	79	50
Types of Delivery	Normal	145	91.8
	Caesarean	13	8.2
Financial assistant from govt	Yes	155	98.1
	No	3	1.9
Family Planning done	Yes	36	22.8
	No	122	77.2
Family planning methods	Traditional	10	6.3
	Modern	26	16.5
	Not Done	122	77.2
Attitude towards Family Planning	Favour	88	55.7
	Against	48	30.4
	Do not know	22	13.9
Complete immunization of child	Fully immunized	91	57.6
	Partially immunized	67	42.4
BCG	Yes	152	96.2
	No	6	3.8
DPT	Yes	123	77.8
	No	35	22.2
Measles	Yes	119	75.3
	No	39	24.7
Vitamin A	Yes	110	69.6
	No	48	30.4
Breast feeding practices			
Breast feeding after birth	Yes	154	97.5
	No	4	2.5
Breast feeding initiation	<1 hour	79	50
	> 1 hour	79	50
Duration of breastfeeding	1-2 Years	20	12.7
	2-3 Years	90	57
	3-5 Years	48	30.4

Almost all mothers breastfed their children after birth, and all continued for the recommended duration of 2 years, consistent with the global health recommendations. However, only half of the mothers initiated breastfeeding within the recommended first hour post-birth.

Discussions

The present study provides insight into the interrelationship between three key life-course events- age at menarche, age at marriage, and age at first conception and their influence on maternal health service utilisation, specifically antenatal care (ANC) and institutional deliveries. By comparing Juang women with other Indian populations across diverse geographic regions and social strata, the study highlights how early reproductive

transitions, in conjunction with socio-cultural factors, set a trajectory that shapes the health behaviours and service access of Indian women.

Reproductive and demographic challenges

Menarche, a biological marker of physical growth and reproductive maturity is influenced by various factors (Bagga & Kulkarni, 2000; Deo & Gattarji, 2004). Globally, improved healthcare and nutrition have lowered the average age of menarche (Pathak et al., 2014). This trend is also observed in India, where the mean menarcheal age has shifted over time (IIPS, 2021a; Pathak et al., 2014). In rural and tribal communities, menarche often signifies readiness for marriage and childbirth (Field & Ambrus, 2008).

The comparative account of the mean menarcheal age among Indian women (inter-regional and inter-state) over time is detailed in table 3. In studies from various parts of India, mean age at menarche ranged from 12 to 16 years. In the present study, the mean menarcheal age of Juang women was 12.38±1.50 years. Previous studies in Odisha have also reported similar ages for menarche (12-13 years) among the Juang, Bhumij, Sabar, Dongria Kondh, Munda, Mankidia and Bhatudi (Das, 2021; Dash, 2011; Kanrar & Goswami, 2020; Nanda & Dhar, 2017; Satapathy et al., 2014). Overall at the pan-Indian level, females in central, northern, and northeastern India tend to experience menarche later than those in western, eastern, and southern regions.

Table 3: Mean age at menarche among different populations of different geographical zones of India.

Area	Name of the population/region	Mean value	Source
East			
Odisha	Juang	12.38±1.50	Present study
Odisha	Munda	13.2	(Das, 2021)
Odisha	Dongria Kondh	12.74	(Nanda & Dhar, 2017)
Odisha	Mankidia	13.6	(Dash, 2011)
Odisha	Juang	12.7	(Kanrar & Goswami, 2020)
Odisha	Bhumij	12.6	(Satapathy et al., 2014)
Odisha	Sabara	12.9	(Satapathy et al., 2014)
Odisha	Bathudi	13.5	(Satapathy et al., 2014)
West Bengal	Santal	12.8	(Parvin & Kundu, 2018)
West Bengal	Rajbanshi community	12.52	(Sinha et al., 2020)
West Bengal	Schedule tribe of Birsingha	11.81	(Roy et al., 2021)
West Bengal	Santhal	14.1	(Ghosh & Malik, 2009)
Kolkata	Kulkata	12.3	(Banerjee et al., 2007)
Bihar	Koshi, North-Bihar	12.33	(Kiran et al., 2020)
Jharkhand	Munda	12.76± 0.35	(Tyagi et al., 1983)
Jharkhand	Oraon	12.80±0.40	(Tyagi et al., 1983)
West			
Maharashtra	Saoner, Nagpur	12.85	(Thakre et al., 2011)
Maharashtra	Rural adolescent girls	13.7	(Raj & Boehmer, 2013)
Maharashtra	Pune city	13.3	(Rokade & Mane, 2008)
Maharashtra	Buldana	13.44	(Adhao et al., 2020)
Gujarat	Rajkot	14.9	(Mitra et al., 2015)
Maharashtra	Gond	13.69±0.24	(Sharma & Chowdhury, 1995)
North			
Haryana	Ambala	13.65	(Choudhry & Talwar, 2016)

Delhi	Gujjars	13.9	(Dabral & Malik, 2004)
Punjab		14.3	(Pathak et al., 2014)
Uttar Pradesh	Aligarh	12.52	(Tarannum et al., 2017)
Uttar Pradesh	Bhotia Rajput caste	16.38±1.53	(L. Singh & Thapar, 1983)
Uttarakhand		13.6	(C. Prakash et al., 2010)
North-East			
Meghalaya	Khasi	13.22	(Deb, 2011)
Assam	Dibongia Deoris	13.85	(Sengupta & Borah, 2015)
Sikkim		12.52	(M. Pandey & Pradhan, 2017)
Arunachal Pradesh	Miji	12.98	(Asghar et al., 2016)
Arunachal Pradesh	Galo	13.92	(Asghar et al., 2016)
Arunachal Pradesh	Hills Miri	13.92	(Asghar et al., 2016)
Arunachal Pradesh	Sartang	13.61	(Asghar & Amung, 2020)
Nagaland	Zemi Naga	14.13	(Bhowmik et al., 1971)
Manipur	Lamkang	14.33	(Kameih et al., 2016)
Manipur	Angami Naga	15.0	(Suri, 1985)
Manipur	Kabui Naga	15.15	(Chakravarty, 1986)
Manipur	Tangkhul Naga	13.93	(De Groot et al., 2018)
South			
Karnataka	Irula	13.93	(Dakshayani et al., 2007)
Karnataka	Lamani	13.12±0.08	(Mane et al., 2012)
Andhra Pradesh	Yanadi	13.68	(Chandrika & Adilakshmi, 2014)
Andhra Pradesh	Yerukula	11.09	(D. Prakash, 2020)
Central			
Madhya Pradesh	Gond	12.08	(Sharma & Chowdhury, 1995)
Madhya Pradesh	Baiga tribe	15.2	(Reddy & Modell, 1997)
Madhya Pradesh	Abujhmaria	15	(G. D. Pandey & Goel, 1999)
Madhya Pradesh	Saharia	13.5 ± 0.84	(Biswas & Kapoor, 2005)
Chhattisgarh	Gadaba	13.25±0.27	(Verma & Verma, 2014)
Chhattisgarh	Dhur Gond	13.84	(Chandraker et al., 2009)

As previously mentioned, early menarche is linked to an increased risk of early marriage and lower educational attainment (Raj et al., 2015). Despite the legal marriage age for women in India being 21 years, 20.5% of women aged 20-24 married before 18 years in Odisha (IIPS, 2021a). This trend is particularly pronounced in the scheduled tribe areas (Marphatia et al., 2020). In the present study 67.5% of the Juang women married early, with a mean age of 16.35 ± 4.12 years and only one-sixth of them attending high school. A similar scenario has been noticed in other parts of India. The Thoti tribe of West Bengal and the Sahariya, Birhors, Kodaku, and Khairwar tribes of Madhya Pradesh and previous study among the Juangs of Odisha, reported the early age of marriage (Table 4).

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Table 4: Age at Marriage among different populations of different geographical zones of India.

State	Population	Mean age at marriage	Source
Odisha	Juang	16.35±4.12	Present study
Schedule caste	India	20.8	(Statista, 2014)
Schedule tribe	India	21.9	(Statista, 2014)
Other backward caste	India	21.3	(Statista, 2014)
East			
Odisha	Munda	16.6	(Das, 2021)
Odisha	Mankidia	15.04	(Dash, 2011)
Odisha	Kharia	17.2	(Pedi et al., 2013)
Odisha	Juang	15.6	(Kanrar & Goswami, 2020)
Odisha	Bhumij	15.65	(Satapathy et al., 2014)
Odisha	Bathudi	17.87	(Satapathy et al., 2014)
Odisha	Sabara	16.83	(Satapathy et al., 2014)
Odisha	Chukutiabhunjia	17.3	(Kosariya & Chakravarty, 2016)
West Bengal	Bankura	18.76	(Mandal et al., 2015)
Bihar	Whole state	16.4	(J. Singh & Anand, 2015)
West			
Gujarat	Rural and urban Jamn	19.6	(Unadkat et al., 2013)
Maharashtra	Rural Maharashtra	18.62	(Raj & Boehmer, 2013)
North			
Delhi	-	22.4	(Bhagat, 2016)
Rajasthan	Whole Rajasthan	19.4	(Bhagat, 2016)
Punjab	-	22.5	(Bhagat, 2016)
Punjab	Ludhiana	22.9	(Chaudhary et al., 2017)
Uttar Pradesh	Jaunsari	15.7	(Kshatriya et al., 1997)
Haryana	Jat	15.89	(Chandhiok et al., 2006)
Jammu and Kashmir	-	24.3	(Bhagat, 2016)

North-East			
Assam	Karbi	17.0	(Mazumder & Mukherjee, 2018)
Assam	Mising	19.17	(Mahanta, 2016)
Himachal Pradesh	-	22.4	(Bhagat, 2016)
South			
Andhra Pradesh	Thoti	12.8	(Elizabeth et al., 2000)
Kerala	-	21.3	(Thulaseedharan, 2018)
Karnataka	Tribes	21.8	(Udayar & Parveen, 2020)
Central India			
Chhattisgarh	Baiga	17.4	(Nandi et al., 2018)
Chhattisgarh	Dhurgond	16.3	(Chandraker et al., 2009)
Madhya Pradesh	Sahariya	14.0	(Biswas & Kapoor, 2005)
Madhya Pradesh	Birhors	14.8	(RMRCT, 2003)
Madhya Pradesh	Kodaku	14.5	(RMRCT, 2003)
Madhya Pradesh	Khairwar	14.5	(RMRCT, 2003)
Madhya Pradesh	Hill Korwa	23.8	(G. D. Pandey & Tiwary, 1996)

Marriage by elopement is one of the major reasons for early marriage in these tribes, which emphasizes the influence of indigenous cultural beliefs and customs governing age at marriage (Raley & Sweeney, 2009). Additionally, illiteracy, lack of awareness, and pressure from family and community, along with their underprivileged socio-economic status also impact early marriage (De Groot et al., 2018). In contrast, women in southern and northern India tend to marry later (19-23 years), likely due to higher education and economic independence (Marphatia et al., 2020). As per the World Health Organisation (WHO), about 16 million girls aged 15–19 years old give birth annually, accounting for 11 % of all births globally (World Health Organisation, 2014). In Odisha, data from NFHS-5 reveal that 21% of young women in this age group have already begun childbearing, particularly those girls with less than five years of schooling.

In line with the life course framework, early pregnancy marks a critical transition that can influence maternal and child health outcomes across generations. Early pregnancy is when a woman conceives although she is not biologically mature to conceive, increasing the risk of pregnancy-related complications such as anaemia, haemorrhage, preterm labour, low birth weight, maternal mortality, and neonatal (Kozuki et al., 2012). These negative health outcomes are primarily attributed to reduced awareness, limited access to antenatal care, and insufficient skilled birth attendants and healthcare facilities (Godha et al., 2013). The trend of age at first conception in the Indian population can be understood from table 5. The present study revealed that a substantial number of women were married before the age of 18 and thereby got exposed to early pregnancy, with a mean age at conception of 18.47±2.35 years, consistent with prior Juang studies (Kanrar & Goswami, 2020). The plausible explanations for early conception among the Juang tribe include poverty, socio-cultural beliefs linked with early menarche and, low literacy. Previous studies on different tribes of Odisha, such as the Mundas (16

years), Mankidias (16.2 years), Juang (17.2 years), Hill Kharia (17.98 years), and Bhumij (18.14 years) show similar age at conception (Das, 2021).

Table 5: Age at first conception among different populations of different geographical zones of India.

State	Community	Age at first conception	Source
Odisha	Juang	18.47±2.35	Present study
Odisha	Munda	16	(Das, 2021)
East			
Odisha	Mankidia	16.2	(Dash, 2011)
Odisha	Juang	17.02	(Kanrar & Goswami, 2020)
Odisha	Hill Kharia	17.98	(Pedi et al., 2013)
Odisha	Bhumij	18.14	(Goswami et al., 2009)
West Bengal	Santal	19.4 ±2.91	(Ghosh & Malik, 2009)
West			
Gujurat	-	19.5	(Vora et al., 2015)
Maharashtra	-	22.72	(Wadgave, 2011)
North			
Haryana	Jat women	19.82	(Chandhiok et al., 2006)
Delhi	-	21.56	(Acharya et al., 2015)
Punjab	-	23.4	(Chaudhary et al., 2017)
North-East			
Assam	-	18.2	(Mazumder & Mukherjee, 2018)
South			
Puducherry	-	22.4	(Rahman et al., 2019)
Tamil Nadu	-	21.0	(Vora et al., 2015)
Central			
Chhattisgarh	Baiga	19.24	(Nandi et al., 2018)

Nationally, Women from north India, particularly in regions like Delhi, Punjab, and Haryana, exhibit later ages at marriage and first conception, likely due to higher educational attainment and economic independence (Chaudhary et al., 2017). In contrast, the data shows the early age of conception among the tribes of eastern India (Odisha and West Bengal) as compared to the whole country (Table 5).

Thus, it is evident that in addition to the other socio-economic vulnerabilities, early age at menarche also poses significant risks for females, especially from rural and tribal populations, as it extends further to early marriage which, in turn is generally followed by an early pregnancy, illustrating how life-course transitions are influenced by socio-cultural contexts.

Maternal healthcare services

Early reproductive transitions like marriage and conception limit young women's autonomy and awareness, often constraining their healthcare-seeking behaviour. This limitation influences both ANC utilisation and the eventual place of delivery. The WHO defines ANC as the care provided by skilled healthcare professionals to pregnant women and adolescent girls in order to ensure the best health outcomes for both mother and infant during pregnancy. The components of ANC include risk identification, prevention and management of pregnancy-related or concurrent diseases, as well as health education and promotion. A minimum of four ANC visits are recommended, covering tetanus toxoid (TT) vaccination, infection screening, and identification of warning signs during pregnancy (World Health Organisation, 2016). Despite its

importance, universal ANC coverage remains elusive.In the present study, 95.6% of the Juang women had registered for ANC which is surprisingly the highest ever reported for a population of Odisha. It is so escalated that it is higher than the national and state level figures as per NFHS-5 (IIPS, 2021b). Figure 2 depicts the regional disparities in ANC coverage in India. While eastern states like Odisha generally show lower ANC utilization among tribes, West Bengal reports over 50%. The Northeastern states, except Arunachal Pradesh (36.5%) and Nagaland (20.7%), have substantial coverage. In North India, only Uttar Pradesh falls below 50%; other northern and southern states exceed this mark (Table 6).

Table 6: Antenatal care service utilisation among different populations of Indian states

State	Community/area	Percentage	Sources
India	-	85.1	(IIPS, 2021a)
Odisha	-	78.1	(IIPS, 2021a)
Odisha	Juang	95.6	Present study
Odisha	Munda	21.21	(Das, 2021)
Odisha	Juang	31.8	(Kanrar & Goswami, 2020)
Odisha	Tribes of Keonjhar	45.4	(Sivaraman et al., 2020)
Odisha	Shabar	48.2	(Dash, 2011)
Odisha	Kolha	46.7	(Dash, 2011)
Odisha	Ho	46.6	(Dash, 2011)
Jharkhand	Tribes	35	(Negi et al., 2010)
Andhra Pradesh	Tribes around Vishakhapatnam	87.8	(Srinivas et al., 2012)
Chhattisgarh	Tribes	66	(Negi et al., 2010)
Chhattisgarh	Kamar	57	(RMRCT, 2003)
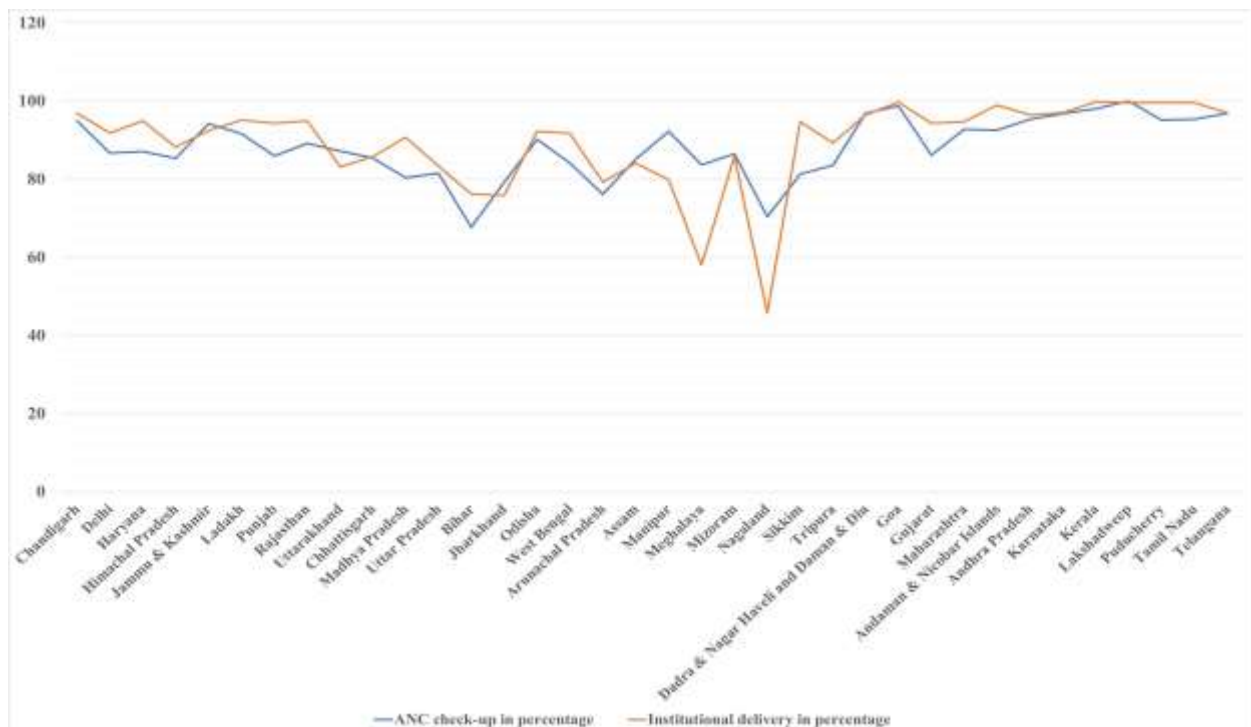
Figure 2: Discrepancy in ANC check-ups and institutional delivery according to NFHS-5

Studies have identified several reasons for low ANC utilisation such as lower maternal education, lower wealth quintile(s), higher birth order, father not accompanying for the ANC visit, less educated husbands, no access to media, less health awareness, high cost of transportation, teenage pregnancy and unintended pregnancy (Islam et al., 2022; Miteniece et al., 2018). Conversely, pregnancy registration, availing government schemes and having health insurance were associated with higher odds of ANC utilisation (Islam et al., 2022). Additionally, in rural and tribal areas, people prefer their traditional medicines for pregnancy and child care, which have been passed down to them across generations (Baniya, 2014). In contrast, women in north and south India were more likely to attend at least four ANC visits, which could be due to higher level of education attainment and greater media exposure, influencing women's autonomy to visit healthcare facilities (Asamoah et al., 2014). Therefore, a variety of factors are correlated with antenatal care service utilisation, including socio-demographic, socio-economic, cultural, service availability, as well as accessibility (Ayele et al., 2014; Joshi et al., 2014).

The ultimate goal of ANC services is to ensure a continuum of care from pregnancy through delivery to the postnatal period. Institutional delivery and caesarean delivery play a major life-saving intervention in it. According to NFHS-5 (Figure 2), most Indian states report high rates of institutional deliveries, with 80-90% of births occurring in healthcare facilities. However, Madhya Pradesh, Jharkhand, Bihar, Uttar Pradesh, and several northeastern states exhibit significantly higher home-based deliveries. While most Indian states including Odisha reports substantial institutional deliveries, individual studies, reveal a persistent preference for home births in rural and tribal regions (Table 7).

**Table 7: Delivery status among different populations in India**

State	Community /Area	Normal delivery (%)	Caesarean delivery (%)	Home delivery	Institutional delivery (%)	Sources
India		-	21.5	11.4	88.6	(IIPS, 2021a)
Odisha		-	21.6	7.8	92.2	(IIPS, 2021a)
Odisha	Juang	91.8	8.2	50	50	Present study
Odisha	Munda	-	6.02	-	58.24	(Das, 2021)
Odisha	Juang	-	-	-	10.7	(Kanrar & Goswami, 2020)
Odisha	Paraja	0	0	17	0	(Swain & Nayak, 2018)
Odisha	Tribes of Keonjhar	-	-	41.8	58.2	(Sivaraman et al., 2020)
West Ben	Santal	-	5.7	-	69.9	(Stiller et al., 2020)
Tamil Na	Irula	-	15.2	-	64	(Sravankumar, 2012)

The present study also shows, that despite the high rate of ANC registration and availing financial assistance under the Janani Sishu SurakhaYojna (JSSY), half of the women delivered at home with the assistance of traditional midwives. This trend is observed in other tribes of Odisha as well (Kanrar & Goswami, 2020; Sivaraman et al., 2020). This discrepancy reflects the pressure on healthcare providers to meet the state-declared goals without adequately addressing the acceptability of institutional delivery, especially in rural tribal-dominated areas. Factors such as long distances to health facilities, inadequate skilled health personnel, alien cultural setup, language barriers, socio-cultural norms, and the health-seeking behaviour of the rural and tribal women during pregnancy also play a key role in shaping the preference for place of delivery. In contrast, studies have shown that age at marriage, high level of female literacy, and access to maternal healthcare services are linked to higher institutional deliveries.

Additionally, increased trends of caesarean deliveries can also be linked with the decisions of women from tribal and rural backgrounds for utilisation of home-based deliveries. Data shows that caesarean deliveries have been rising during the last two decades (Boerma et al., 2018). This rise is associated with a reduction in maternal and child morbidity and mortality (Molina et al., 2015). Approximately 18.5 million caesarean births

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have been recorded each year globally, accounting for 19.1% of total births, which is beyond the cut-off recommended by the WHO (World Health Organisation, 2015).

Nationally, India's caesarean delivery rate has increased from 3% in 1992–93 to 17% in 2015–16 with southern Indian states showing significantly higher caesarean rates than other regions (Figure 3). However, in the present study merely, 8.2 percent of women reported caesarean deliveries, mirroring trends observed in other population-based studies (Das, 2021; Sravankumar, 2012; Stiller et al., 2020).
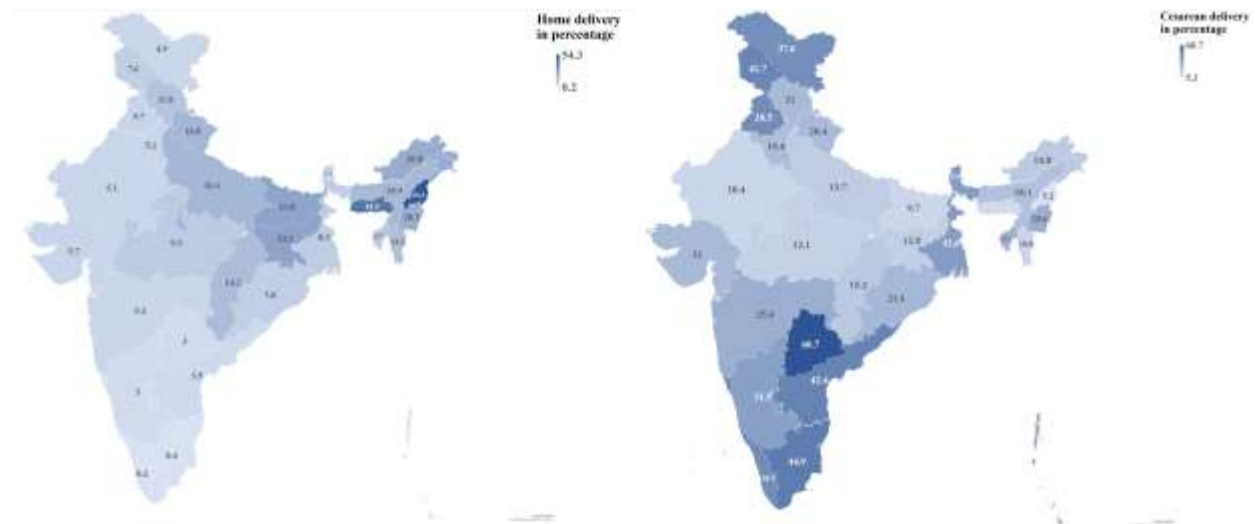
Figure 3: Trend in home-based deliveries and caesarean deliveries across Indian states according to NFHS-5

Overall, the early reproductive transitions among Juang women and in many other tribal and marginalized groups in India, show how socio-cultural and economic contexts contribute to maternal health vulnerabilities, highlighting the need for culturally sensitive, community-based interventions rooted in a life course perspective.

Conclusion

This study highlights the early onset of menarche, early marriage, and early conception among early-life Juang women in Odisha. These trends resonate with other tribal populations and communities throughout eastern India. Although ANC registration is notably high (95.6%) among Juang women, a significant proportion of deliveries still occur at home, attended by traditional midwives. This discrepancy underscores the persistence of cultural and infrastructural barriers impeding full utilisation of institutional health services, despite receiving financial incentives from schemes like the Janani Sishu Suraksha Yojana.

In essence, the study reveals challenges in accessing reproductive and maternal health services for Juang women in particular and other marginalised populations in general. Addressing these challenges requires a multifaceted outlook involving both qualitative and inferential methodology based on life course approach to gain a deeper and micro-level understanding of reproductive health dynamics to successfully implement culturally sensitive programs and foster community awareness. Policymakers must consider the unique needs of tribal women while respecting their socio-cultural contexts.

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