

# Gap identification for improvement in maternal and early infant health care practices among tribal pregnant women in an aspirational tribal district Sirohi, Rajasthan

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## ABSTRACT

**Background:** Sirohi is one of the aspirational districts of Rajasthan which is also tribal-dominated. The maternal and early infant health indicators are worrisome compared to regional or national statistics. First-trimester registration of pregnant women is 54% in district Sirohi, which is much less as compared to registration in the state of Rajasthan (63%) and India (59%). Four antenatal care (ANC) visits of pregnant women are 32% in district Sirohi, which is also much less as compared to ANC visits in the state of Rajasthan (39%) and India (51%). However, there was no tribal-specific data regarding maternal and early infant health. **Objective:** The study aims to identify gaps for improvement in maternal and early infant health care practices among tribal pregnant women in an aspirational tribal district of Sirohi, Rajasthan. **Materials and Methods:** It was a cross-sectional study conducted among 560 tribal pregnant women to assess the existing maternal, and early infant health care knowledge and practices through a pre-validated questionnaire in the tribal population of district Sirohi Rajasthan. **Result:** Nineteen per cent (19.5%,  $n = 109$ ) of tribal pregnant women got married between the age of 10 and 17 (less than the legal age of marriage of 18 years). There is a significant relationship between early age at marriage and low educational status  $P < 0.001$ ,  $r = 0.241$  among participants. Measurement of weight, blood pressure and urine examination was done in 32.5% ( $n = 181$ ), 19.5% ( $n = 109$ ) and 7.1% ( $n = 39$ ), respectively, among tribal pregnant women. The majority (94.6%) of the pregnant tribal women (385/407) were anaemic. Approximately 60% ( $n = 337$ ) of mothers were unaware of thermal protection (skin-to-skin care). Sixty per cent ( $n = 334$ ) of tribal pregnant women preferred to seek consultation regarding antenatal and infant health care from doctors, while 40.1% ( $n = 224$ ) were more comfortable seeking advice from traditional birth attendants (TBAs). **Conclusion:** The study finds inadequate knowledge and practice towards maternal and early infant care among tribal pregnant women. As TBAs influence tribal pregnant women, systematic training and involvement of TBAs in maternal and child health are indispensable.

**Keywords:** Maternal and early infant health care, pregnant women, tribal

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## Background

Sirohi is one of the aspirational districts of Rajasthan.<sup>[1]</sup> The maternal and early infant health indicators are worrisome compared to regional or national statistics. Anaemia affects

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57% of pregnant women (15–49 years old) in Sirohi district, compared to 47% in Rajasthan state and 50% in India.<sup>[1]</sup> First-time registration of pregnant women is at 54%, compared to Rajasthan state (63%) and India (59%). Pregnant women make four antenatal care (ANC) visits, which is 32% compared to 39% in Rajasthan state and 51% in India.<sup>[1]</sup> The consumption of IFA tablets (>100 days) among pregnant women was found to be 18%, compared to Rajasthan state (17%) and India (30%). Initiation of breastfeeding within one hour post-delivery was found to be 28.6%, compared to Rajasthan state (28.4%) and India (41.6%).<sup>[1]</sup> The percentage of infants (0–6 months) exclusively breastfed was found to be 39.6%, compared to 58.2% in Rajasthan state and 54.9% in India. Apart from being an aspirational district, Sirohi is a partly tribal district of Rajasthan. It is assumed that the indicators are worse than what the general population of district Sirohi reported.<sup>[1]</sup> To compound the situation, Rajasthan is one of the 10 least literate states in India. It also has the lowest female literacy rate (57.6%) in the country (National Statistical Office Report 2017–2018), making it the most difficult state for girls' education.<sup>[2]</sup> Indigenous people have the right, according to Article 33, to determine their own identity or membership based on their customs and traditions.<sup>[2]</sup> Women in tribal communities face lots of challenges regarding their reproductive, maternal, neonatal and child health issues due to a lack of health education among women. Well-informed women have improved decision-making capacity and can demand equal access to health services. Women are believed to be more judicious and are more inclined to think of their family's needs. Therefore, they are likely to utilize the available services/funds judiciously.<sup>[3,4]</sup> However, there are limited studies describing maternal mortality among tribal women. Early marriage, childbirth, a low body mass index and a high incidence of anaemia are all known risk factors for maternal mortality. India, unfortunately, tops the list of the 10 countries with the highest number (5.22 lakhs) of early infant deaths, in 2019s.<sup>[5]</sup> There is a scarcity of data among the tribal population. At 17%, the rate of institutional delivery is the lowest among tribal women.<sup>[6]</sup> However, it is a big increment from 18% in National Family Health Survey-3 (2005–2006) and 57% in CES 2009.<sup>[7]</sup> Recent Rapid Survey on Children data shows that as many as 54.7% of tribal women benefited from the Janani Suraksha Yojana, the highest among all the social groups.<sup>[7]</sup> The Scheduled Tribe (ST) IMR in India was the highest in the world among the indigenous population, next only to the federally administered area in Pakistan. India cannot be proud of this despite the health system effort. Health disparities exist across sub-populations, especially in the tribal population. Community-based interventions on building women's groups for awareness generation on maternal and child health (MCH) are the best and most cost-effective approaches to improving access to health services.<sup>[8]</sup> Several studies from government and non-government organizations in India have successfully established the intervention through a peer group approach as one of the ways to reduce health disparities.<sup>[9,10]</sup> Thus, this study is planned to assess and document the existing maternal, and early infant health care practices among tribal pregnant women of district Sirohi for improving maternal and early infant health

care practices using innovative health interventions among tribal women in aspirational district Sirohi Rajasthan.

## Materials and Methods

### Study design and setting

A cross-sectional study was conducted among tribal pregnant women of district Sirohi with the help of a pre-validated questionnaire. The tribal population of district Sirohi is 292,470 spread across 477 villages.<sup>[10]</sup> There are five tehsils in district Sirohi including Sirohi, Sheoganj, Pindwara, Abu Road and Reodar. We took samples from three tribal dominant tehsils of district Sirohi (Sheoganj, Pindwara and Abu Road). The study was approved by the Institutional Ethics Committee of the Institute (IEC Number: AIIMS/IEC/2021/3722). All willing tribal pregnant women till the completion of the second trimester (26<sup>th</sup> week of pregnancy) volunteering to written informed consent enrolled in the study. Participants were recruited from PHC/sub-centre or Anganwadi, and tribal pregnant women were traced with the help of ASHA and ANM of a particular village.

### Sample size estimation

This study is a part of (registration number: CTRI/2023/02/049854) percentage of pregnant women receiving  $\geq 4$  ANC check-ups was 32% in district Sirohi. It was expected to have an absolute increase of about 15% in ANC check-ups post-intervention among the tribal pregnant women using an innovative module in district Sirohi. Considering the two proportions  $P_1 = 32\%$ ,  $P_2 = 47\%$  (expected), level of significance = 5% and power = 80%, using the following formula, the sample size was calculated:  $n = (Z_{\alpha/2} + Z_{\beta})^2 \times (P_1(1 - P_1) + P_2(1 - P_2)) / (P_1 - P_2)^2$ .<sup>[11]</sup> The sample size obtained was  $n = 163$  in each block, further assuming a default rate of 15%, a total of  $189 \times 3 = 561$  women were enrolled. This study was a part of the project innovative health intervention among tribal women for improvement in maternal and early infant health care practices in the aspirational district of Sirohi, Rajasthan.

### Statistical analysis

Data were analyzed using Statistical Package (SPSS version 23). Nominal data was described using frequency and percentage and Pearson correlation was performed for association between variables. A  $P$ -value of  $<0.05$  is considered significant.

## Result

### Demographic profile of participants

The sociodemographic features of the studied participants are given in Table 1. From the second trimester till 26 weeks of their pregnancies, 560 women participated in the study. Out of 560 females, 76.9% ( $n = 440$ ) belong to the second trimester. The mean age of participants was  $25.7 \pm 4.5$  and the age at marriage was  $19.1 \pm 2.3$ . Approximately 19% (19.5%,  $n = 109$ ) of females married at the ages of 10–17 years.

Approximately 51% ( $n = 285$ ) of participants were uneducated, while 13.2% ( $n = 74$ ) completed their primary education, 36.1% ( $n = 179$ ) completed their secondary education, and only 3.9% ( $n = 22$ ) were graduates. The husbands of the majority of the participants were wage earners (61.2%,  $n = 342$ ) and lived in kutcha houses (56.8%,  $n = 318$ ).

In Table 2, the individuals' average weight was  $47.21 \pm 7.84$  kg, and the random glucose level was  $99.15 \pm 12.78$ . The systolic blood pressure: optimal ( $<120$  mm/Hg) was 71.3% ( $n = 335$ ) and diastolic blood pressure: optimal ( $<80$  mm/Hg) was 56.3% ( $n = 265$ ). Only 367 tribal pregnant women out of 560 participants agreed to haemoglobin level testing and

approximately 1.9% ( $n = 7$ ) were in the normal range ( $Hb > 11\%$ ), and 13.9% ( $n = 51$ ) were in the severe range ( $Hb < 7\%$ ).

### Knowledge of the participants

In Table 3, only 29.9% ( $n = 167$ ) of the 560 participants said the antenatal check-up area was necessary for childbirth preparations, whereas 79.9% ( $n = 440$ ) stated that ANC check-ups should start at any time during pregnancy. In knowledge tests about anaemia, 64.5% ( $n = 367$ ) of participants were incorrect about the signs and symptoms of anaemia.  $N = 79.1\%$  ( $n = 443$ ) tribal pregnant women were unaware of the range of normal Hb levels. Only 61.8%  $n = 345$  respondents correctly identified their dose for the tetanus vaccination given during pregnancy, and 77.9%  $n = 434$  females think that the immunization is necessary if it was given during previous pregnancies. The optimal birthweight of a newborn was unknown to 45.7% of the  $n = 256$  participants, while only 39.1% of the  $n = 219$  individuals correctly responded. Moreover, 41.7% ( $n = 232$ ) of the participants reported that the initial examination happened 12–24 hours after the baby was born. The proper way to give mothers breast milk,  $n = 390$ , 69.8% of female respondents said from both sides and  $n = 141$ , 25.2% of female respondents don't know the proper technique. In the question–answer session regarding breastfeeding, 76.8% of the  $n = 430$  participants stated that breastfeeding protects the infant from infection. 66.8% of the  $n = 370$  participants correctly identified the age at which a child should be exclusively breastfeeding. Regarding colostrum, 90.6% of the sample ( $n = 502$ ) accepted that mothers' first condensed milk is necessary. In terms of breastfeeding, 78.5% of the  $n = 435$  participants stated that mother's milk is the best nutrition for a baby until six months in place of top milk; this demonstrates adequate baseline knowledge.

**Table 1: Sociodemographic variable among participants  $n=560$**

	Minimum	Maximum	Mean±SD
Age	14	45.0	25.7±4.5
Age at marriage	11	31.0	19.1±2.3
<b>Variables</b>	<b>n</b>		<b>%</b>
Age during marriage			
10–17 year	109		19.4
18–25 year	441		78.8
≥26 years	10		1.8
Age			
10–20	49		8.6
21–30	460		80.4
31–40	111		11.0
Trimester			
First trimester	131		23.1
Second trimester	440		76.9
Education			
Educated	275		49.1%
Uneducated	285		50.9%
Education status			
Primary	74		13.2%
Secondary	179		31.9%
Graduation and above	22		3.9%
Women's occupation			
Home maker	330		58.9%
Working	230		41.1%
Family type			
Joint	257		45.9%
Nuclear	303		54.1%
Husband occupation			
Agriculture	82		14.7%
Government job	8		1.4%
Private job	127		22.7%
Wage earner	342		61.2%
House condition			
Kutcha	318		56.8%
Pucca	242		43.2%
Income range			
Class-I	161		43.6%
Class-II	156		42.3%
Class-III	30		8.1%
Class-IV	22		6.0%
Class-V	0		0.0%

**Table 2: Frequency of parameters among participants**

	Minimum	Maximum	Mean±SD
Weight (in kg) ( $n=560$ )	31	88	47.21±7.839
Random blood sugar (mg/dL) ( $n=367$ )	68	140	99.15±12.78
	<b>Variables</b>	<b>n</b>	<b>%</b>
Systolic blood pressure (mm/Hg) ( $n=467$ )	Optimal ( $<120$ )	332	71.3
	Normal (121–129)	113	24.8
	High normal (130–139)	16	3.4
	Grade-1 hypertension (140–159)	3	0.6
	Grade-2 hypertension ( $>160$ )	3	0.6
Diastolic blood pressure (mm/Hg) ( $n=467$ )	Optimal ( $<80$ )	265	56.3
	Normal (81–84)	63	13.4
	High normal (85–89)	44	9.3
	Grade-1 hypertension (90–99)	87	18.5
	Grade-2 hypertension ( $>100$ )	8	1.7
Haemoglobin (Hb%) ( $n=367$ )	$<7\%$ (Severe anaemia)	51	13.9
	$>7\% \leq 10\%$ (Moderate anaemia)	97	26.4
	10–11% (Mild anaemia)	212	57.7
	$>11\%$ (Normal)	7	1.9

**Table 3: Questions regarding knowledge among participants**

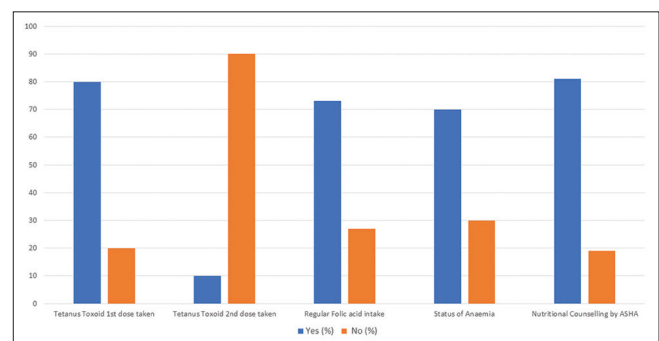
Knowledge question		Count	Percentage
<b>Antenatal care</b>			
Are proper antenatal check-ups necessary for a healthy pregnancy? (n=559)	Yes	167	29.9
	No	392	70.1
When a pregnant woman should start ANC check-ups? (n=551)	1 <sup>st</sup> Trimester	111	20.1
	Any time during pregnancy	440	79.9
<b>Anaemia</b>			
Symptoms of anaemia (n=560)	Correct	193	35.5
	Incorrect	367	64.5
Normal Haemoglobin levels among pregnant women should be? (n=560)	Less than 11 mg/dL	43	7.7
	More than 11 mg/dL	74	13.2
	Don't know	443	79.1
<b>Vaccination</b>			
Are TT injections required if received during previous pregnancies? (n=558)	No	123	22.1
	Yes	434	77.9
How many TTs injections are required during pregnancy? (n=558)	1	213	38.2
	2	345	61.8
<b>Infant health care</b>			
What is the ideal weight of a baby after birth? (in kg) (n=560)	Less than 2.5	85	13.2
	Between 2.5 and 4.5	219	39.1
	Don't know	256	45.7
How many hours, days or weeks after the birth did the first check by a health worker took place? (n=557)	Hours (12–24)	232	41.7
	Days (2–5)	92	16.5
	Weeks (1–2)	155	27.8
	Don't know	78	14.0
Did you give thick milk that comes first or something else? (n=554)	Cow milk/goat milk	84	15.2
	Ghee	25	4.5
	Honey	10	1.8
	Mother first condensed milk	435	78.5
Initiation of breastfeeding should be done (n=544)	Within 1 h	150	27.6
	Within 2–3 h	235	43.2
	Within 30 min	61	11.2
	Within 6 hours	98	18.0
<b>Breastfeeding</b>			
Does breast feeding protect the infant from infection? (n=560)	Yes	430	76.8
	No	130	23.2
Exclusively breast feeding should be done till six months. (n=554)	Yes	370	66.8
	No	184	33.2
Is mother's first milk necessary for newborn? (n=554)	Yes	502	90.6
	No	52	9.4
Is mother's milk best nutrition for babies until six months in place of top milk. (n=560)	Yes	435	78.5
	No	125	22.3
How frequently a baby should be breast fed? (n=551)	Every two hours	188	34.1
	When the baby cries	363	65.9
Is it necessary to burp the baby after breast feeding? (n=560)	No	161	28.7
	Yes	399	71.3
What is the correct way to feed baby during breast feeding? (n=559)	Don't know	141	25.2
	From both side	390	69.8
	From one side	28	5.0

### The practice of the participants

According to Table 4, questions regarding practices during pregnancy  $n = 376$  (67.5%) women reported that their weight was not measured during antenatal check-ups, while  $n = 513$  (92.9%) reported that urine test was not done. In Figure 1, a total of 88.6% ( $n = 485$ ) received the first dose of tetanus toxoid injection whereas only 11.37% ( $n = 73$ ) received a second dose of TT injection. Many tribal pregnant women informed that ASHA workers provided nutritional and health-related counselling; however, they failed to follow her advice. Although tribal pregnant women informed that they were taking iron-folic acid tablets regularly, however, we found a high prevalence of anaemia among participants [Figure 1]. In the infant health care domain, 88.8% ( $n = 487$ ) tribal mothers gave the thick milk that comes after the birth of the baby however, 11.1% ( $n = 61$ ) mothers did not give thick milk to their baby. Only 13.8% ( $n = 77$ ) mothers gave skin-to-skin care within 24 hours and 60.4% ( $n = 337$ ) mothers did not know about thermal care practice. 40.9% ( $n = 288$ ) mothers informed that the cord was cut with a clean blade during delivery.

### Discussion

This study aims to provide a comprehensive picture of pregnant mothers' knowledge and practices regarding newborn care to help design an evidence-based intervention in order to achieve SDG-3 related to maternal and infant health care practices. With respect to ANC check-ups based on the effectiveness of the health care system, the World Health Organization recommends at least four ANC visits.<sup>[11]</sup> It encourages institutional deliveries, lower maternal mortality, and an increase in child survival. In our study, we have found a low level of knowledge about ANC and its components among tribal pregnant women. Only 29.9% ( $n = 167$ ) of participants were aware of the importance of ANC check-ups for childbirth preparation. Contradictory to our study, in other studies knowledge regarding registration for ANC was high among pregnant women from rural areas of Jaipur district of Rajasthan.<sup>[12]</sup> Poor knowledge about the importance of ANC during pregnancy leads to the lesser utilization of ANC services which adversely affects the mother and child's health. A study done in western Kenya among 979 pregnant women reported that 59% had attended ANC clinics while 39% had not visited ANC clinics for their current



**Figure 1: Health parameters of tribal pregnant women**

**Table 4: Questions regarding practice among participants**

Practice question	Count	Percentage
<b>Antenatal care</b>		
During antenatal check-up, was your weight measured? (n=557)	No	376 67.5
	Yes	181 32.5
During antenatal check-up, was your blood pressure measured? (n=560)	No	451 80.5
	Yes	109 19.5
During antenatal check-up, was your urine test done? (n=552)	No	513 92.9
	Yes	39 7.1
<b>Nutrition</b>		
Do you take iron and folic acid tablets regularly (n=554)	No	194 35.0
	Yes	360 65.0
Do you take three meals regularly (n=556)	No	409 73.6
	Yes	147 26.4
Do you include green leafy vegetables in your diet every day (n=559)	No	85 15.2
	Yes	474 84.8
Did ASHA/ANM provide the supplementary food from sub-centre/Anganwadi (n=559)	No	135 24.2
	Yes	424 75.8
<b>Infant Health Care</b>		
Did you give thick milk to your baby that comes first after childbirth? (n=548)	No	61 11.1
	Yes	487 88.8
Thermal care practice includes? (n=558)	Bathing within 24 h	74 13.3
	Covered with a heavy blanket	70 12.5
	Skin-to-skin care within 24 h	77 13.8
	Don't know	337 60.4
Whom do you prefer to consult during pregnancy? (n=558)	Doctor	334 59.9
	Midwife/LHW/ FTH	224 40.1
During delivery, the cord was cut with a clean blade (n=557)	No	34 6.1
	Yes	228 40.9
	Don't know	295 52.9

**Table 5: Correlation of age at marriage with haemoglobin, weight and educational status**

Independent variable	Dependent variable	r	P	Coefficient of variance
Age at marriage	Hb status	0.016	0.748	0.002
	Weight	0.056	0.256	-0.003
	Education obtained	0.241	<0.001	0.058

pregnancy.<sup>[13]</sup> A study regarding MCH handbook intervention reported that prior intervention in the Vietnamese population reported that the proportion of pregnant women and mothers who correctly know that at least three ANC visits are necessary during pregnancy had been as high (91.9%) and increased after intervention (93.7%).<sup>[14]</sup> However, in our study, 79.9% of the  $n = 399$  tribal women believed ANC check-ups should start at any point in pregnancy. This finding may be related to the fact that the tribal group lacks access to ANC services for maternal health care. In tribal areas, poor health infrastructure causes an imbalance between the supply and demand of health care needs which can affect the utilization of ANC by tribal women.<sup>[15]</sup>

A number of studies carried out in various nations have reported that the use of ANC is significantly affected by factors such as maternal age, education, socioeconomic status, parity, previous complicated obstetrical history, support from spouse, inadequate and poor-quality services, distance from a health care facility, and cultural beliefs and practices.<sup>[16]</sup> Our study shows that 49.1% of pregnant women were uneducated, and 19.4% of married women were between the ages of 10 and 17 at the time of marriage. There is also a significant correlation between marital age and educational status ( $P < 0.001$ ;  $r = 0.241$ ), with marriage age variation statistically explaining 5.8% of the variation in participants' educational outcomes [Table 5].

National Institute of Medical Statistics (NIMS) reported that ANC utilization was extremely low among ST women in four states, viz., Chhattisgarh, Madhya Pradesh, Odisha and Rajasthan.<sup>[17]</sup> Furthermore, our study emphasized the need to raise awareness about the importance of early ANC among both tribal pregnant women and their family members. There was mixed finding concerning the practice of various components of ANC service by the tribal pregnant women. According to our findings, only 32.5% of pregnant women checked their weight 19.5% of their blood pressure, and only 7.1% undergone for urine tests during all three trimesters. Anaemia is a significant indicator of poor health among pregnant women.<sup>[7]</sup> In our study, 64.5% of females don't know about the symptoms of anaemia despite their practices study revealed that 65.0% of females used regular iron and folic acid and only 26.4% of participants accepted that they had taken three meals regularly. It was noticed that 75.8% ( $n = 424$ ) of women accepted that ASHA/ANM provided supplementary food, still, women have not adequately practised the proper intake of nutrition during pregnancy.

Colostrum is the perfect food for newborns. According to UNICEF and WHO, it should be introduced within the first hour of birth.<sup>[18]</sup> De Benoist *et al.* attempted to investigate colostrum feeding practices in newborn babies as well as breastfeeding practices among mothers of the Khos tribal community in the Dehradun district of Uttarakhand.<sup>[19]</sup> Their result showed that colostrum avoidance occurred among 92% ( $P \leq 0.005$ ) of children. Similarly, Mukherjee and Venugopal (2018)<sup>[20]</sup> through their study among the Pakistani population stated that a significant proportion of mothers (45%) provided pre-lactal feeding, and 44.8% did not provide colostrum to their newborns. In our study, the majority of tribal females (78.5) accepted that after baby birth, first colostrum milk should be given instead of ghee, honey, or other things.

For infant health care, WHO recommends preventive measures such as skin-to-skin contact, immediate placement of the baby on the mother's chest, and delayed bathing with a minimum six-hour gap after birth for a newborn, as these can prevent the neonatal complication of hypothermia.<sup>[23,25]</sup> According to our findings, only 13.8% of mothers were aware of kangaroo care (skin-to-skin contact) while 60.4% ( $n = 337$ ) of mothers don't know about thermal protection. A study conducted in

Sindh Pakistan reported that 57% of the mothers were familiar with Kangaroo care (skin-to-skin contact) and 57.1% used it with their babies.<sup>[21]</sup> An Ethiopian study by Mose *et al.*<sup>[22]</sup> reported that approximately 35.5% and 50.3% of mothers had good knowledge and a positive attitude towards skin-to-skin care practice, respectively.

Tribes residing in remote locations usually prefer to consult traditional health care practitioners for their health care probably due to long distances to travel for specialized health services or due to their socio-religious beliefs. In our study 59.9% ( $n = 334$ ) of tribal women prefer to consult doctors regarding antenatal and infant health care, however, 40.1% ( $n = 224$ ) still prefer to consult with traditional birth attendants (TBA) and believe in a holistic approach. The study by Oshonwoh *et al.*<sup>[24]</sup> from Nigeria found that while there was a high level of knowledge (88.8%) among TBAs, there was a low level of perception (51.1%) about their practices. Therefore, in tribal areas, strategies incorporating training and support of TBAs can significantly reduce perinatal and neonatal deaths.

## Conclusion

In tribal areas improvement in communication and service delivery and implementation of effective monitoring and evaluation in order to increase the effective utilization of ANC services are required. In our study, high-risk factors such as inadequate prenatal coverage and ignorance of thermal care for early baby health care were identified. The services of TBAs for the care of pregnant women and children were taken by tribal communities, therefore programmers and involving training regarding MCH care for traditional birth attendants could reduce the number of perinatal and neonatal mortality.

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## Conflicts of interest

There are no conflicts of interest.

## References

1. Health atlas of aspirational district (April ed., pp. 1-364, Rep.). (2018). Access from: [https://nhm.gov.in/New\\_Updates\\_2018/NHM\\_Components/RMNCHA/ADP/Health\\_Atlas\\_For\\_Web\\_18th\\_April.pdf](https://nhm.gov.in/New_Updates_2018/NHM_Components/RMNCHA/ADP/Health_Atlas_For_Web_18th_April.pdf).
2. Shoeb Khan/TNN/Updated: Sep 9, 2. (n.d.). Rajasthan is the worst performer in literacy of girls: Nso report: Jaipur News-Times of India. Retrieved December 16, 2022. Available from: <https://timesofindia.indiatimes.com/city/jaipur/rajasthan-is-the-worst-performer-in-literacy-of-girls-nso-report/articleshow/78006119.cms>.
3. United Nations declaration on the rights of indigenous peoples for indigenous peoples. (n.d.). Retrieved September 13, 2007. Available from: <https://www.un.org/development/desa/indigenouspeoples/declaration-on-the-rights-of-indigenous-peoples.htm>
4. Davidson PM, McGrath SJ, Meleis AI, Stern P, Digiacomio M, Dharmendra T, *et al.* The health of women and girls determines the health and well-being of our modern world: A white paper from the International Council on Women's Health Issues. *Health Care Women Int* 2011;32:870-86. doi: 10.1080/07399332.2011.603872.
5. Newborns: Improving survival and well-being (no date) World Health Organization. World Health Organization. Available at: <https://www.who.int/news-room/fact-sheets/detail/newborns-reducing-mortality>.
6. Altman R, Sidney K, De Costa A, Vora K, Salazar M. Is institutional delivery protective against neonatal mortality among poor or tribal women? A cohort study from Gujarat, India. *Matern Child Health J* 2017;21:1065-72. doi: 10.1007/s10995-016-2202-y.
7. NATIONAL FAMILY HEALTH SURVEY (NFHS-3) 2005-06. (Rep.). (n.d.). Available from: <https://dhsprogram.com/pubs/pdf/frind3/frind3-vol1andvol2.pdf>. [Last accessed on 2023 Jun 20].
8. Concurrent Assessment of Janani Suraksha Yojana (JSY) Scheme in Selected States of India, 2008 Bihar, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh. Sponsored by UNFPD. (pp. 1-59, Rep.). (2009). New Delhi. Development and Research Services (P) Ltd, New Delhi. Available from: <https://nhm.gov.in/WriteReadData/4892s/78619790621474872646.pdf>. [Last accessed on 2023 Jun 20].
9. Tribal health in India bridging the gap and roadmap for the future. Ministry of health and family welfare and ministry of tribal affair, Government of India. 2013. Available from: <http://tribalhealthreport.in>. [Last accessed on 2023 Jun 20].
10. Sirohi district: Population 2011-2022 data-corona virus: Covid 19 data. Retrieved December 20, 2022. Available from: <https://www.census2011.co.in/census/district/442-sirohi.html>.
11. Ayalew TW, Nigatu AM. Focused antenatal care utilization and associated factors in debre tabor town, northwest Ethiopia, 2017. *BMC Res Notes* 2018;11:819.
12. Devi BA, Mathur RN, Sisodia GS, Manohar RK, Gite AR, Bharadwaj MK. Knowledge, attitude, and practices of pregnant women towards antenatal care in rural health training centre in Achrol, Jaipur, Rajasthan. *Int J Community Med Public Health* 2022;9:2579-83.
13. Perumal N, Cole DC, Ouédraogo HZ, Sindi K, Loechl C, Low J, *et al.* Health and nutrition knowledge, attitudes and practices of pregnant women attending and not-attending ANC clinics in Western Kenya: A cross-sectional analysis. *BMC Pregnancy Childbirth* 2013;13:146.
14. Aiga H, Nguyen VD, Nguyen CD, Nguyen TT, Nguyen LT. Knowledge, attitude and practices: Assessing maternal and child health care handbook intervention in Vietnam. *BMC Public Health* 2016;16:129.
15. Johansson P, Knox-Nicola P, Schmid K. The Waponahki tribal health assessment: Successfully using CBPR to conduct a comprehensive and baseline health assessment of Waponahki tribal members. *J Health Care Poor Underserved* 2015;26:889-907.

16. Hijazi HH, Alyahya MS, Sindiani AM, Saqan RS, Okour AM. Determinants of antenatal care attendance among women residing in highly disadvantaged communities in Northern Jordan: A cross-sectional study. *Reprod Health* 2018;15:106.
17. Saha UC, Saha KB. An overview of utilization of antenatal care services among the scheduled tribe of major states in India. *Anthropol* 2000;2:37-42.
18. <https://www.unicef.org/india/stories/breastfeeding-best-possible-start-life>. Accessed on 19<sup>th</sup> June 2023.
19. de Benoist B, Andersson M, Takkouche B, Egli I. Prevalence of iodine deficiency worldwide. *Lancet* 2003;362:1859-60.
20. Mukherjee K, Venugopal PN. Colostrum avoidance and breastfeeding practices among mothers of Khos tribal community of Uttarakhand: A community-based cross-sectional study. *J Anthropol Surv India* 2018;67:45-55.
21. Memon J, Holakouie-Naieni K, Majdzadeh R, Yekaninejad MS, Garmaroudi G, Raza O, *et al.* Knowledge, attitude, and practice among mothers about newborn care in Sindh, Pakistan. *BMC Pregnancy Childbirth* 2019;19:329.
22. Mose A, Adane D, Abebe H. Skin-to-Skin care practice and its associated factors among postpartum mothers in gurage zone, southern Ethiopia: A cross-sectional study. *Pediatric Health Med Ther* 2021;12:289-97.
23. Sarker BK, Rahman M, Rahman T, Rahman T, Khalil JJ, Hasan M, *et al.* Status of the WHO recommended timing and frequency of antenatal care visits in Northern Bangladesh. *PLoS One* 2020;15:e0241185.
24. Oshonwoh FE, Nwakuwo GC, Ekiyor CP. Traditional birth attendants and womens health practices: A case study of Patani in Southern Nigeria. *J Public Health Epidemiol* 2014;6:252-61.
25. Priyadarshi M, Balachander B, Gupta S, Sankar MJ. Timing of first bath in term healthy newborns: A systematic review. *J Glob Health* 2022;12:12004.