

Exploring Immunization Coverage and Determinants among Bhunjia Tribal Children in Chhattisgarh, India

Satyajeet Singh Kosariya¹, Anuradha Chakraborty², Brijesh Kumar Nagwashi³

How to cite this article:

Satyajeet Singh Kosariya, Anuradha Chakraborty, *et al.*, Exploring Immunization Coverage and Determinants among Bhunjia Tribal Children in Chhattisgarh, India. *Community Pub Health Nurs.* 2024;9(3):099-106.

Abstract

This study investigates the immunization status of children among the Bhunjia tribe in Chhattisgarh, India, highlighting the factors influencing vaccination coverage in this marginalized community. The primary aim was to assess the immunization rates and identify barriers affecting vaccine uptake. Using a cross-sectional survey methodology, data were collected from 206 mothers of children aged 11 to 59 months. The findings revealed that only 33.01% of children were fully immunized against six vaccine-preventable diseases, with notable coverage disparities: BCG vaccination was received by 86.41% of children, while measles coverage was only 34.95%. A significant barrier identified was the lack of awareness, with 43.24% of mothers unaware of the need for immunization. Additionally, logistical challenges such as distance to healthcare facilities contributed to low vaccination rates. The analysis also indicated that the availability of approachable roads was significantly associated with improved immunization status, emphasizing the importance of health infrastructure in tribal areas. The results underscore the urgent need for targeted public health interventions to raise awareness and improve accessibility to immunization services. By addressing the unique challenges faced by the Bhunjia tribe, healthcare initiatives can enhance vaccination coverage and ultimately contribute to better child health outcomes in this and similar communities. Overall, this study highlights the critical role of community engagement and infrastructure development in promoting immunization among vulnerable populations.

Keywords: Immunization, Bhunjia Tribe, Vaccination Coverage, Child Health, Awareness, Barriers, Chhattisgarh.

INTRODUCTION

Immunization for children aged 11-59 months in Chhattisgarh, India, is a critical component of public health aimed at preventing childhood diseases. The

state's immunization program focuses on delivering vaccines against common infectious diseases, such as measles, polio, and hepatitis B. Access to these vaccines is facilitated through extensive outreach programs and health camps, particularly in rural areas. The government collaborates with

Author's Affiliation: ¹Scientific Officer, District Scene of Crime Unit, Korba, Home Police Department, Government of Chhattisgarh 4925677, India, ²Assistant Professor, Centre for Woman Studies, Pt. Ravishankar Shukla University, Raipur 492001, Chhattisgarh India, ³Scientific Officer, Regional Forensic Science Laboratory, Ambikapur, Sarguja, Home Police Department, Department of Chhattisgarh 497001, India.

Corresponding Author: Satyajeet Singh Kosariya, Scientific Officer, District Scene of Crime Unit, Korba, Home Police Department, Government of Chhattisgarh 4925677, India.

E-mail: satyajeetkosariya@gmail.com

Received on: 10-10-2024 **Accepted on:** 11-11-2024

various stakeholders, including non-governmental organizations, to enhance vaccination coverage Tribal children in India, particularly those aged 11-59 months, face significant challenges that impact their health, nutrition, and overall development. This age group is crucial for physical and cognitive growth, yet many tribal communities experience higher rates of malnutrition, morbidity, and mortality compared to non-tribal populations (Ghosh, 2017).¹ According to the 2019 National Family Health Survey (NFHS-5), tribal children are disproportionately affected by undernutrition, with stunting rates often exceeding the national average (International Institute for Population Sciences, 2020).²

Mahanta *et al.*, (2018) found in their study that access to healthcare services, education, and proper sanitation remains limited in many tribal regions, exacerbating the vulnerabilities of these children.³ Mishra *et al.*, (2019) found that cultural practices, economic constraints, and geographical isolation further hinder efforts to improve health outcomes for tribal children. Moreover, traditional beliefs and practices around child-rearing can influence health-seeking behaviors and nutritional choices.⁴ Addressing these challenges requires a multifaceted approach that incorporates community participation, culturally sensitive interventions, and the strengthening of healthcare infrastructure.

Efforts to enhance the well-being of tribal children must consider their unique socio-cultural contexts and focus on sustainable development strategies to ensure that these vulnerable populations receive adequate support during this critical period of their lives.

The Bhunjia tribe, one of the 42 scheduled tribes in Chhattisgarh, represents a vulnerable population, with a total of 10,603 members (Tiwari, 2001).⁵ They primarily inhabit the remote, hilly forests of Gariyaband in Chhattisgarh and Nuapada in Odisha, typically residing 30-100 km from urban centers. The Bhunjia are divided into two main social groups: Choukhtia and Chinda Bhunjia, with a newer subdivision called KholarajiaBhunjia emerging from the Choukhtia group. This isolation has preserved their unique cultural practices, including the custom of "kandbyah," where girls are symbolically married to an arrow before menstruation, reflecting their deep-rooted traditions.

Sabar (2014) and Kosariya (2019) found in their study that the Bhunjia community speaks a dialect influenced by Halbi, blending elements from Odia, Marathi, and Chhattisgarhi, and primarily practices

monogamous marriage, although polygamy is noted. Their housing consists of mud and wood structures, with a distinctive cooking area called "lalbangala," which is culturally significant and strictly protected from outside contamination. The Bhunjia primarily consume rice, with a rich tapestry of traditional foods and rituals marking their daily lives. Despite facing socio-economic challenges, they maintain a vibrant cultural identity deeply connected to their land and traditions.^{6,7}

RESEARCH METHODOLOGY

The data for this study were collected by employing the following research methods:

a. Study Design

This research employs a cross-sectional study design to assess the immunization status of children aged 11-59 months in the Bhunjia tribe of Chhattisgarh, India. This design allows for the collection of data at a single point in time, facilitating an analysis of immunization coverage and associated factors.

b. Sample Selection

A total of 206 mothers from the Bhunjia community were surveyed regarding the immunization history of their youngest living children within the specified age range (11-59 months) at the time of the survey. In this study, the participants were selected using a stratified random sampling technique to ensure representation from various households within the community. This method helps mitigate biases and ensures diverse perspectives on immunization practices.

c. Data Collection Tools

Data was collected using a structured questionnaire developed specifically for this study. The questionnaire included the following sections:

1. Demographic Information: Basic details about the mothers and their children, including age, sex, and education level.
2. Immunization Status: Questions regarding the vaccination history of the youngest child, including specific vaccinations received (BCG, DPT, Polio, Measles) and the number of doses administered.
3. Place of Immunization: Information on where the immunizations were administered (e.g., Anganwadi centers, primary health centers, private hospitals).

4. Reasons for Incomplete Immunization: A checklist of potential reasons for not vaccinating children, including awareness, cultural practices, logistical barriers, and health worker availability.
5. Health Infrastructure Assessment: Questions addressing the availability of health facilities, literacy levels, distance from health centers, and the presence of mobile networks.

d. Data Analysis

Data analysis was conducted using statistical software. The following methods were employed:

1. Descriptive Statistics: Frequencies and percentages were calculated to summarize the immunization status and other categorical variables. For example, the proportion of children who received each type of vaccine and the percentage of children fully immunized were analyzed.
2. Regression Analysis: Multiple regression analysis was performed to identify predictor variables associated with child immunization status. The dependent variable was categorized into two groups: full immunization and incomplete immunization. The independent variables included living index, literacy, health center availability, mobile network access, active Mitanin (community health workers/Asha Workers), the approachability of roads, sub-caste, and distance from the district center.
3. Correlation Analysis: A correlation matrix was generated to examine the relationships between immunization status and other variables, helping to identify significant associations.

Ethical Considerations

This study is a part of the research work done for Ph.D. thesis and it has been approved by the institutional ethics committee.

Informed consent was obtained from all participants before data collection. The study ensured confidentiality and anonymity of the respondents by assigning unique identifiers to each questionnaire. The research was conducted following ethical guidelines established by relevant health authorities and institutions.

Limitations

The study acknowledges potential limitations, including recall bias among mothers regarding their children's immunization history and the

cross-sectional nature of the study, which limits the ability to infer causality. Additionally, the study's findings may not be generalizable beyond the Bhunjia tribe due to the specific cultural and socioeconomic context of the population.

AIMS AND OBJECTIVES

The present study centered around the following aims and objectives-

The primary aims of the study were

1. To assess the immunization status of children aged 11-59 months among the Bhunjia tribe of Chhattisgarh, India.
2. To identify the factors influencing their vaccination coverage/undertaken.

Objectives of the study centered around

1. To evaluate the overall immunization coverage among Bhunjia children aged 11-59 months, focusing on specific vaccinations such as BCG, DPT, polio, and measles.
2. To analyze the sociodemographic characteristics of the mothers and their children, including age, sex, literacy levels, and socioeconomic status, and their correlation with immunization status.
3. To identify the primary healthcare facilities utilized for immunization among the Bhunjia tribe, including the role of Anganwadi centers and other health institutions.
4. To explore the reasons for incomplete immunization among Bhunjia children, examining factors such as lack of awareness, cultural practices, and accessibility issues related to healthcare services.
5. To assess the impact of health infrastructure variables, including the availability of health centers, mobile networks, and transportation access, on the immunization status of children.
6. To perform a multiple regression analysis to determine the key predictors of immunization status among the Bhunjia children, identifying which variables significantly affect vaccination coverage.
7. To provide recommendations for public health interventions and policy improvements aimed at enhancing immunization rates among the Bhunjia tribe, taking into account the cultural and geographical context of the community.

These aims and objectives were the guidelines of the research process, facilitating a comprehensive understanding of the immunization landscape within the Bhunjia tribe and informing strategies to improve child health outcomes.

Hypothesis: The present work was conducted considering the following hypothesis:

Null Hypothesis (H₁): There is no significant relationship between the accessibility of roads and the immunization status of Bhunjia tribal children.

Alternative Hypothesis (H₂): There is a significant relationship between the accessibility of roads and the immunization status of Bhunjia tribal children.

REVIEW OF LITERATURE

Review of Literature provided the guidelines for the present study. Relevant reviews done has been sub divided into the following sub sections:

a. Introduction to Immunization in Tribal Communities:

As per the study done by Choudhury *et al* (2019) immunization is a critical public health strategy that significantly reduces morbidity and mortality from vaccine-preventable diseases. However, vaccination coverage in tribal communities, such as the tribe population in assam, India, often lags behind national averages due to various socio-cultural and infrastructural barriers.⁸ Whoever the study done by Kumar *et al.*, (2020) indicate that immunization rates among marginalized populations are influenced by factors such as awareness, accessibility of health services, and cultural practices.⁹

b. Immunization Status and Coverage:

The immunization status of children in India varies widely among different regions and communities. For instance, the National Family Health Survey (NFHS-5) reported that while immunization rates in urban areas were relatively high, rural and tribal regions displayed lower coverage rates.¹⁰ Study done by Prajapati *et al.*, (2021) highlighted that tribal populations face challenges related to healthcare access, leading to lower vaccination uptake.¹¹

c. Factors Influencing Immunization

Yadav *et al.*, (2020) revealed that numerous studies have identified several factors influencing immunization rates among tribal communities. A lack of awareness about the importance of

vaccinations has been cited as a major barrier, with many mothers expressing uncertainty about the necessity and timing of immunizations.¹² Study conducted by Rani *et al.*, (2021) cultural beliefs and practices often affect health-seeking behavior, as some families may prioritize traditional medicine over immunization.¹³

Infrastructure-related barriers also play a significant role in determining immunization coverage. Research indicates that the availability of health facilities and transportation significantly impacts vaccination rates. Communities with accessible healthcare services tend to have higher immunization rates.¹⁴ Bhattacharyya *et al.*, (2021) also revealed that moreover, logistical issues, such as the distance to health centers and inadequate transportation options, further hinder immunization efforts in remote tribal areas.¹⁵

Importance of Health Infrastructure

Mahanta *et al.*, (2020) in their study described that the health infrastructure in tribal regions is often inadequate, which negatively affects immunization coverage. Studies have shown that health centers that are easily accessible, combined with the presence of community health workers, lead to improved vaccination rates.¹⁶

RESULTS

After doing the analysis of the data collected for the present study the following results were reflected-

a. Assessment of Immunization in Bhunjia Tribal Children

The results reflected from **Table 1** highlights key vaccination findings among 206 children. Only 41.75% received three doses of DPT and Polio vaccines, while 86.41% were vaccinated with BCG. Measles vaccination was notably low at 34.95%. Alarmingly, a considerable percentage of children(21.23%) were not administered with the 21.23% of children had no Polio vaccine doses, and only 33.01% were fully immunized against six key diseases. Additionally, 49.6% received at least one dose of vitamin A.

Table 1: Table showing Immunization status of Bhunjia child (11-59 Month) who received vaccination by type of vaccination

| Type of vaccination | No. | Percent |
|---------------------|-----|---------|
| Polio - 0 | 44 | 21.36 |
| BCG | 178 | 86.41 |

| Type of vaccination | No. | Percent |
|--|------------|---------------|
| DPT Doses | | |
| No. DPT | 7 | 3.40 |
| 1 | 55 | 26.70 |
| 2 | 35 | 16.99 |
| 3 | 86 | 41.75 |
| Do not remember | 23 | 11.17 |
| Polio doses | | |
| No Polio | 7 | 3.40 |
| 1 | 55 | 26.70 |
| 2 | 35 | 16.99 |
| 3 | 86 | 41.75 |
| Do not remember | 23 | 11.17 |
| Measles | 72 | 34.95 |
| Full (BCG + 3 DPT + 3 Polio + Measles) | 68 | 33.01 |
| No.of children who had no Vaccination | 4 | 1.94 |
| Vitamin A Dose | | |
| No Vitamin A dose | 70 | 33.98 |
| 1 | 77 | 37.38 |
| 2 | 20 | 9.71 |
| 3 | 5 | 2.43 |
| Do not remember | 34 | 16.50 |
| Iron folic acid Tablets/Liquid | 5 | 2.43 |
| Total number of children | 206 | 100.00 |

b. Findings regarding the utilization of health care services at the local health centers

Table 2 shows that most Bhunjia children were immunized at anganwadi centers, with only 2.81% receiving vaccinations from private hospitals.

Table 2: Table showing place of immunization

| Place of Immunization | Numbers | Percent |
|-----------------------|---------|---------|
| Aganwadi Centre | 131 | 73.60 |
| Sub Centre | 30 | 16.85 |
| PHC | 4 | 2.25 |
| CHC | 8 | 4.49 |
| Private Hospital | 5 | 2.81 |
| Total | 176 | 100.00 |

c. Reasons for incomplete immunization among Bhunjia children under study

Table 3 highlights reasons for incomplete immunization: 43.24% of parents were unaware of its importance, 29.73% were busy with traditional occupations, 10.81% feared post-vaccination fever, 5.51% had a fear of injections, 2.70% reported

unavailable health workers, and 8.11% found the facilities too distant.

Table 3: Table showing reason for incomplete/no immunization

| Reason | Number | Percent |
|---------------------------------------|--------|---------|
| Unaware of need of immunization | 16 | 43.24 |
| Absorbed in traditional occupation | 11 | 29.73 |
| Fear of injection | 2 | 5.41 |
| Absence of Health worker | 1 | 2.70 |
| Fever | 4 | 10.81 |
| Immunization centre away from village | 3 | 8.11 |
| Total | 37 | 100 |

d. Regression analysis variables

Table 4 depicts the independent and dependent variables selected for the statistical analysis.

Table 4: Dependent and Independent Variables used in Regression Analysis Child Immunization and their Level of measurement

| Name of variables | Measurement | |
|-----------------------------------|-------------------------|---|
| Dependent variable | | |
| Place of Delivery | Full Immunization | 0 |
| | Incomplete immunization | 1 |
| Independent variable | | |
| Living Index | Good | 0 |
| | Not Good | 1 |
| Literacy | Literate | 0 |
| | Illiterate | 1 |
| Health Centre | Present | 0 |
| | Absent | 1 |
| Mobile Network | Available | 0 |
| | Unavailable | 1 |
| Active Mitanin | Active | 0 |
| | Not Active | 1 |
| Approachable road | Available | 0 |
| | Unavailable | 1 |
| Sub Caste | Choukhutia | 1 |
| | Chinda | 0 |
| Distance from village to district | Around 50 Km | 0 |
| | More than 50 Km | 1 |

e. Multiple Regression Analysis for Predictors of Child Immunization

This analysis categorizes child immunization status into full and incomplete immunization. Eight independent variables were assessed for their impact on immunization. Multiple regression results in **Table 5** highlight that only one variable, approachable road, is significantly associated with higher immunization rates (beta = 0.186, p = 0.015).

Table 5: Predictor variable for Dependent Variable Immunization With their Beta Coefficients

| Variable | β-Coefficient | Std. Error | Sig. |
|---------------------------------------|---------------|------------|-------|
| (Constant) | 0.536 | 0.219 | 0.015 |
| Living Index | 0.111 | 0.191 | 0.562 |
| Literacy | -0.047 | 0.066 | 0.478 |
| Health Centre Availability in Village | -0.148 | 0.229 | 0.518 |

| Variable | β-Coefficient | Std. Error | Sig. |
|-----------------------------------|---------------|------------|---------|
| Mobile Network | 0.128 | 0.228 | 0.576 |
| Active Mitanin | 0.054 | 0.096 | 0.572 |
| Approachable Road | 0.186 | 0.076 | 0.015** |
| Distance of Village from District | -0.081 | 0.075 | 0.280 |

Significance ≤ 0.01 : Highly Significant
 Significance between 0.05 and 0.01 : Significant at 1-5% level
 Significance between 0.01 and 0.06 : Significant at 6-10% level
 Significance ≥ 0.0 : Not Significant.

f. Results of Correlation matrix

The correlation matrix in **Table 6** confirms a significant relationship between immunization and approachable road at the 0.05 significance level, making it the most critical factor influencing immunization in Bhunjia villages.

Table 6: Correlation Matrix for Immunization

| | Living Index | Literacy | Health Centre Availability in Village | Mobile Network | Active Mitanin | Approachable Road | Sub cast | Distance of Village from District | Immunization |
|---------------------------------------|--------------|----------|---------------------------------------|----------------|----------------|-------------------|----------|-----------------------------------|--------------|
| Living Index | 1 | | | | | | | | |
| Literacy | .072 | 1 | | | | | | | |
| Health Centre Availability in Village | .073 | .156* | 1 | | | | | | |
| Mobile Network | .061 | .146* | 0.928** | 1 | | | | | |
| Active Mitanin | -.080 | .076 | 0.024 | 0.139* | 1 | | | | |
| Approachable Road | -.062 | -.151* | 0.431** | 0.465** | 0.210** | 1 | | | |
| Sub cast | -.054 | .142* | -0.258** | -0.189** | 0.486** | -0.348 | 1 | | |
| Distance of Village from District | .054 | -.142* | 0.258** | 0.189** | -0.486** | 0.348 | -1 | 1 | |
| Immunization | .012 | -.064 | 0.042 | 0.077 | 0.052 | 0.167* | 0.041 | -0.041 | 1 |

*. Correlation is significant at the 0.05 level (1-tailed)

**. Correlation is significant at the 0.01 level (1-tailed)

Findings

Based on the multiple regression analysis, the beta value for approachable roads is 0.186, with a significance level of 0.015, which is less than the 0.05 threshold. This indicates that the null hypothesis is rejected, and the alternative hypothesis is proved. Therefore, the accessibility of roads significantly influences the immunization status of Bhunjia children.

Comparative Discussion

The immunization status of children among the Bhunjia tribe in Chhattisgarh, India, reveals significant insights when compared to broader trends in immunization coverage across other tribal and rural populations in India. This discussion will highlight the findings from the Bhunjia tribe study and compare them with existing literature

on vaccination coverage, barriers to immunization, and the impact of health infrastructure in similar contexts. Discussion has been organized under the following heads.

Immunization Coverage in the Bhunjia Tribe

The results of the study indicates that only 33.01% of Bhunjia children are fully immunized, which aligns with findings from other tribal populations in India. For example, a study by Kumar *et al.* (2020) reported that immunization coverage in tribal areas of Madhya Pradesh was similarly low, with only about 35% of children fully vaccinated. The variation in immunization rates among different tribal groups may be attributed to differences in local healthcare access, cultural practices, and educational levels.¹⁷

While the Bhunjia children showed high coverage for BCG vaccination (86.41%), the lower rates for measles vaccination (34.95%) are concerning. This pattern is consistent with research by Parmar *et al.* (2020), which found that even when initial vaccinations are received, later vaccinations often see significant drop-offs. This suggests a need for continuous community engagement and follow-up mechanisms to ensure that children receive all recommended vaccinations.¹⁸

Barriers to Immunization

The findings from the Bhunjia study identified several barriers to immunization, with 43.24% of mothers unaware of the need for vaccinations and 29.73% engaged in traditional occupations that limited their access to immunization services. These barriers reflect similar challenges reported in other studies. For instance, Yadav *et al.* (2020) highlighted that cultural beliefs and lack of awareness significantly hindered immunization uptake in tribal areas of Rajasthan.¹² Furthermore, Rani *et al.* (2021) noted that misconceptions regarding vaccinations often lead to delays or refusals, echoing the experiences of the Bhunjia mothers.¹³

Logistical barriers, such as distance to healthcare facilities and fear of injections, also played a role in the Bhunjia tribe's immunization rates. Similar findings were reported by Prajapati *et al.* (2021), who noted that geographical accessibility and the presence of health workers are critical determinants of immunization coverage in tribal regions. This highlights the need for tailored strategies that address both educational and infrastructural barriers.¹¹

The Role of Health Infrastructure

The analysis of health infrastructure within the Bhunjia community revealed that a significant percentage of immunizations were conducted at Anganwadi centers (73.60%). This reliance on community health workers is supported by Mahanta *et al.* (2020), who emphasized the importance of integrating immunization services within existing community health frameworks.¹⁶ Sharma *et al.*, (2018) have shown that improving the accessibility and quality of these services can lead to enhanced vaccination rates.¹⁴

In contrast, the presence of private healthcare facilities was minimal, with only 2.81% of vaccinations taking place in private hospitals. This finding is consistent with observations made by Bhattacharyya *et al.* (2021), where limited access to private healthcare in rural and tribal settings often restricts families' choices for immunization. The heavy reliance on government services necessitates a strengthening of these facilities to ensure they meet the community's needs effectively.¹⁵

CONCLUSION

The immunization status of children in the Bhunjia tribe underscores the challenges faced by tribal populations in India regarding vaccination coverage. While the findings align with broader patterns observed in similar communities, they also highlight specific barriers related to awareness and healthcare access. Addressing these barriers through targeted public health interventions and strengthening health infrastructure is crucial for improving immunization rates among the Bhunjia and other tribal populations. Future research should continue to explore effective strategies for increasing vaccination uptake while considering the unique cultural and socio-economic contexts of these communities.

REFERENCES

1. S. Ghosh, "Nutritional status and health-seeking behavior among tribal children in India: A review.," *Journal of Health, Population, and Nutrition*, vol. 36, no. 1, pp. 1-10, 2017.
2. IIPS, "National Family Health Survey (NFHS-5)," International Institute for Population Sciences, India, 2020.
3. J. Mahanta, S. Dutta and A. Ranjan, "Health and nutritional status of tribal children in India: A

- review," *Indian Journal of Pediatrics*, vol. 85, no. 8, pp. 635-641, 2018.
4. P. Mishra, H. Thakur and M. Pradhan, "Socio-cultural factors influencing health-seeking behavior among tribal communities in India," *International Journal of Community Medicine and Public Health*, vol. 6, no. 2, pp. 525-530, 2019.
 5. V. K. Tiwari, Chhattisgarh ki Janjatiya, New Delhi: Himalaya Publishing House, 2001.
 6. B. Sabar, "Chuktia Bhunjia A Neglected tribe of Orissa, India," *Antrocom Online Journal of Anthropology*, vol. 10, no. 1, pp. 99-109, 2014.
 7. S. S. Kosariya, M. Chakravarty and N. Sen, "Factors Affecting the Utilization of Maternal Health Care Services among Bhunjia tribe of Chhattisgarh (India)," *The Oriental Anthropologist*, vol. 18, no. 2, pp. 245-253, 2019.
 8. S. Choudhury, D. Hazarika and S. Dey, "Immunization status and its determinants in the tribal population of Assam, India," *International Journal of Public Health*, vol. 64, no. 4, pp. 547-555, 2019.
 9. S. Kumar, P. Singh and A. Chaurasia, "Barriers to immunization among marginalized communities in India: A qualitative study," *Health Policy and Planning*, vol. 35, no. 3, pp. 301-309, 2020.
 10. IIPS, "National Family Health Survey (NFHS-5) 2019-21," International Institute for Population Sciences & ICF, Mumbai, 2022.
 11. R. Prajapati, S. Choudhary and A. Verma, "Immunization coverage and its determinants in tribal districts of Madhya Pradesh, India.," *Journal of Epidemiology and Global Health*, vol. 11, no. 2, pp. 144-151, 2021.
 12. A. Yadav, .S. Singh and S. Shukla, "Awareness and perception of mothers regarding immunization in a tribal area of Rajasthan, India," *Journal of Family Medicine and Primary Care*, vol. 9, no. 4, pp. 1991-1995, 2020.
 13. S. Rani, R. Kumari and B. Prasad, "Cultural factors influencing immunization uptake in tribal communities of India: A qualitative analysis.," *Asian Pacific Journal of Public Health*, vol. 33, no. 5, pp. 511-519, 2021.
 14. R. Sharma, K. Gupta and S. Bhattacharya, "Health infrastructure and vaccination coverage: A study in rural India," *BMC Health Services Research*, vol. 18, no. 1, p. 372, 2018.
 15. S. Bhattacharyya, A. K. Yadav and A. Sinha, "Challenges in vaccination coverage in tribal areas: A systematic review," *Journal of Community Health*, vol. 46, no. 2, pp. 302-312, 2021.
 16. J. Mahanta, B. Borkakoty and R. Barman, "Role of community health workers in improving immunization coverage in rural areas of Assam, India," *Indian Journal of Community Medicine*, vol. 45, no. 1, pp. 20-25, 2020.
 17. S. Kumar, R. Patel, M. Singh and A. Gupta, "Immunization coverage in tribal areas of Madhya Pradesh: A cross-sectional study," *Journal of Public Health*, vol. 43, no. 3, pp. 345-352, 2020.
 18. R. Parmar, N. Prajapati and K. Shringarpure, "Vaccination coverage of children in Vaccination coverage of children intribal Narmada district of Gujarat: a cross sectional study," 2020, vol. 7, pp. 609-614, Int J Community Med Public Health.