IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

PSYCHOLOGICAL IMPACT AND CHALLENGES OF CHILD IMMUNIZATION PROGRAM IN UTTARAKHAND

[1]Meenakshi Chaubey, [2]Neha
[1]Assistant Professor, [2]Counsellor
[1]Department of Value Education,
[1]Koneru Lakshmaiah Education Foundation, Hyderabad, India,

Abstract : This dissertation investigates the child immunization program in Uttarakhand, assessing its progress and identifying psychological impact and challenges. Immunization is crucial for child survival, offering protection against life-threatening diseases. Despite global advancements and India's significant improvements in child health, including being polio-free since 2014, disparities in immunization coverage persist. The Government of India launched Mission Indradhanush to accelerate immunization coverage, yet Uttarakhand's immunization rate remains low. This study provides an evidence-based analysis of immunization coverage across Uttarakhand's districts, highlighting issues like geographical barriers, staff limitations, and logistics problems. The psychological challenges comprise dissociative behavior of modern techniques and equipment such as injections, and medical drugs. A higher level of mistrust in healthcare due to misinformation or negative past experiences with healthcare services. Recommendations for improving immunization rates include enhancing staff training, improving vaccine supply chains, and increasing community awareness. The findings aim to support policymakers and health service providers in developing effective strategies to achieve full immunization coverage in Uttarakhand.

IndexTerms **- Psychological impact, Challenges, Uttarakhand, Immunization coverage, Geographical barriers, Healthcare mistrust, Vaccine supply chain, Community awareness.**

I. INTRODUCTION

Immunization is defined as a process wherein a person is made immune or resistant to an infection, typically by the administration of a vaccine. The vaccine safely and effectively uses a small amount of a weakened or killed virus or bacteria or bits of lab-made protein that imitate the virus to prevent infection by that same virus or bacteria. Immunization is not only a health measure but also an investment in the future, as it significantly lowers child mortality rates and reduces the incidence of preventable diseases
. Uttarakhand, with its hilly terrain and predominantly rural population, faces unique obstacles in reaching full immunization. With nearly 70% of its population living in rural areas, healthcare services are hard to reach, especially in remote villages. As of 2017-18, the state's immunization coverage stood at just 61.32%, ranking it among the lowest in India. This figure is alarming, given the country's achievements in vaccine production and supply. Around 40% of children in Uttarakhand remain at risk of diseases that are preventable with vaccines, revealing deep-rooted challenges such as geographical inaccessibility, healthcare shortages, and psychological barriers like mistrust of modern medicine.

Culturally, India's diverse beliefs and practices often influence perceptions of vaccines. Misinformation, fear of adverse effects, and mistrust in healthcare systems fuel vaccine hesitancy in many communities. Studies have shown that culturally informed health education is necessary to address these concerns. Furthermore, the COVID-19 pandemic has heightened awareness about vaccine hesitancy, making it crucial to adopt strategies that address both logistical issues and community-based psychological fears. Uttarakhand's immunization gaps reflect the larger challenge of improving vaccine uptake in difficult-to-reach areas, offering key lessons for the rest of India in achieving universal coverage

2. LITERATURE REVIEW.

. In 1985, the universal immunization programme (UIP) started with BCG, OPV, DPT and measles. Then in 2002-03, Hepatitis-B vaccine was introduced in some selected districts in India. During 2006-10, J.E vaccine was added to UIP in selected endemic districts in phased manner. In 2010, 2nd dose of measles vaccine (MCV-2) was included in UIP in India. In 2011, Hepatitis-B vaccine was added to UIP across the country. In order to eradicate polio from the country Pulse Polio immunization programme was launched in India in 1995. Under this program, children under 5 years of age are given additional oral polio drops in December and January every year on fixed days. From year 1999-2000, house to house vaccination of missed children was also introduced.

In 2010, it was estimated that 1.7 million children died from vaccine preventable diseases. Approximately, 19.3 million children are not completely vaccinated. National vaccine policy was introduced in 2011. The policy provides guiding principles for functioning of immunization programme in the country. The year 2012-13 was declared as year of intensification of Routine Immunization in India (IRI). Focus has increased on 239 poor performing districts. Mission Indradhanush: The Union Ministry of Health and Family Welfare launched Mission Indradhanush in December 2014. Mission Indradhanush depicts seven colours of the rainbow. It targets immunization of children against seven vaccine preventable diseases, namely – Diphtheria, Pertussis, Tetanus, Childhood Tuberculosis, Polio, Hepatitis-B and Measles. Earlier the increase in full immunization coverage was 1% per year which has increased to 6.7% per year through the two phases of Mission Indradhanush. Intensified Mission Indradhanush (IMP): Intensified Mission Indradhanush was launched by the Prime Minister of India, Sh. Narendra Modi, on 8th October 2017. It involves intensive preparation, implementation and integration of sessions into regular immunization micro plans. Under IMI four consecutive immunization rounds were conducted for 7 days in 173 selected districts [5].IMI 2.0: To boost routine immunization coverage in the country, GOI has introduced IMI 2.0 to ensure reaching the unreached with all available vaccines and increase the coverage of children and pregnant ladies from December 2019 to March 2020.

New Vaccines: The following new vaccines have been added to the vaccination programs:

1) Pentavalent Vaccine (DPT, Hep-B, Hib): It contains five antigens i.e., Hepatitis B, Diphtheria, Pertussis, Tetanus & Haemophilus Influenza b (Hib).

2) Japanese Encephalitis (JE) Vaccine: J.E vaccine was introduced in year 2006 to cover 104 endemic districts in phased manner, using SA 14-14-2 vaccine imported from China.

3) Pneumococcal Vaccine (PcV): It was launched in May 2017 to reduce infant mortality and morbidity caused by Pneumococcal Pneumonia.

4) Inactivated Polio Vaccine (IPV): As a part of the polio endgame strategy IPV was introduced in India on 30th November 2015.

India has made substantial progress in improving child health in the last two decades. However, the country continues to account for a disproportionate burden of the global morbidity and mortality in children less than five years. Despite having 17% of the global under-five population, 27% of deaths in this age group in 2018 were in India [6, 7]. A substantial proportion of mortality in children in India is vaccine preventable [8]. Only 63% of children in India were fully immunized—i.e., three doses of diphtheria-tetanus-pertussis (DTP) vaccine, three doses of polio vaccine, one dose of Bacillus Calmette–Guerin (BCG) vaccine, and one dose of measles vaccine—according to the National Family Health Survey (NFHS) conducted in 2015–16 [9]. National averages mask subnational disparities in vaccine coverage. States in the south consistently report higher full vaccine coverage compared to those in the north [9]. Several studies have described differences in immunization coverage by socioeconomic status, access to antenatal care, caste, religion, gender, and urban/rural settings [10–13].

The situation in Uttarakhand is more severe. In 2005-06, full immunization coverage was around 60%. However, in 2015-16, it declined to around 58% [14]. While the situation in India and world has slightly improved, it has deteriorated further in Uttarakhand. Figure 1 below represents the progress in coverage of immunization in Uttarakhand recorded by three national family health surveys (NHFS).

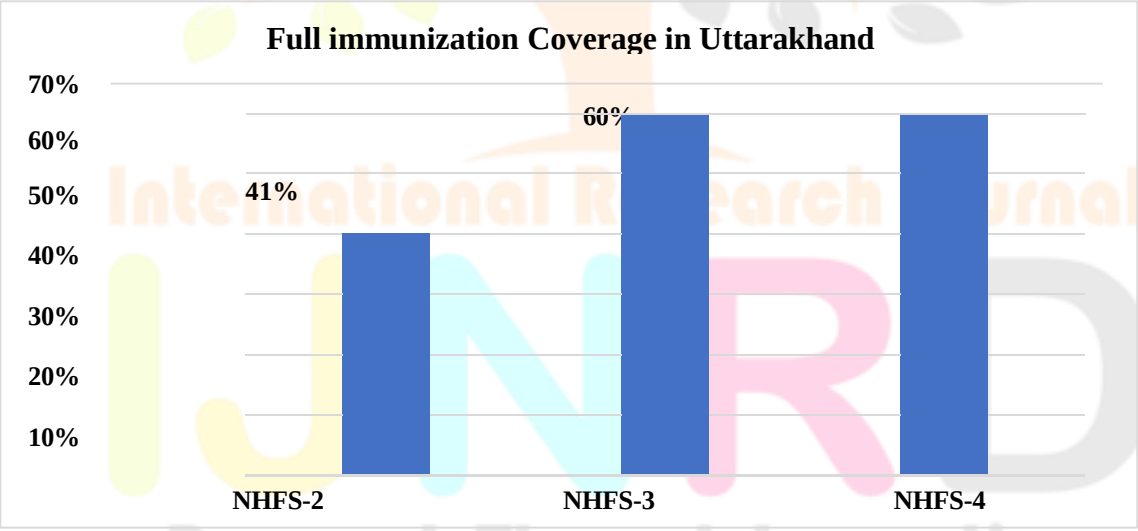

Figure 1: Full immunization coverage in Uttarakhand

As indicated by Figure 1 above, the progress of full immunization coverage in Uttarakhand increased from 41% in NHFS-2 to 60% in NHFS-3. However, the situation deteriorated after NHFS-3 as Uttarakhand was able to achieve only 58% full immunization coverage in NHFS-4. Despite an increase in the resources and vaccine availability, the low immunization coverage in Uttarakhand is a cause of concern.

UNICEF is partnering with various stakeholders for improving immunization coverage in Uttarakhand, including government of Uttarakhand. UNICEF supports Global Alliance for Vaccines and Immunization (GAVI) through proposal development, the annual progress report, and implementation. UNICEF is an active member of the National Technical Advisory Group, the Immunization Action Group, and the Polio Expert Advisory Group to support policy development. It ensures the commitment to child rights is matched with action for every boy and girl everywhere by improving routine immunization coverage and saving children's lives. It works with partners and other stakeholders to narrow the immunization gaps among the poor, marginalized, less educated groups in all geographic locations, rural and urban. By doing so, it ensures that every child who comes for vaccination is not turned away and receives the required and appropriate vaccine and doses. This entails ensuring that every level has the resources required – vaccinators, supplies, skills, motivation and community involvement.

While discussing immunization coverage in Uttarakhand it would be more prudent to highlight the coverage of respective vaccines in Uttarakhand. It found that the coverage in Uttarakhand has improved significantly in NHFS-4. We found that the coverage of

polio vaccination in Uttarakhand initially increased from NHFS-2 to NHFS-3. However, it went a steady decline from NHFS-3 to NHFS-4. The possible reason identified in the UNICEF and NHFS study is that lots of people are missing on the third dose of polio. This is resulting in an overall decline in immunization percentage.

3. STATEMENT OF PROBLEM

The study attempts to analyze the progress and psychological impact in coverage of child immunization in Uttarakhand and bring awareness to the trends of child immunization in the state. It also focus on identification of various issues hampering the success of child immunization in Uttarakhand.

4. RESEARCH DESIGN

The current research has been conducted to determine the effectiveness of immunization programme in Uttarakhand by gauging the coverage of immunization in the state of Uttarakhand. For comprehensive analysis of immunization coverage, the study has been extended to district wise analysis in Uttarakhand. Subsequently, various factors hampering the progress of vaccination in Uttarakhand have been identified and suitable mitigation measures have been suggested.

5. DATA COLLECTION

The data used for this study is secondary data collected from various research articles and reports of government & multilateral agencies, residents interview depicting coverage of immunization and psychological impact in India and Uttarakhand. Primarily the data has been sourced from authentic sources such as UNICEF, WHO, GOI reports and research articles published in reputed journals.

The Himalayan state of Uttarakhand has been selected for the study. Uttarakhand is 20th most populous state of India having 13 districts. Around 65% of the state's area is covered by forest and around 86% of the state's area is mountainous. As the state falls under one of the difficult geographical areas of the country, this study will be crucial to determine the extent of coverage of child immunization in such areas. In order to provide comprehensive analysis in vaccine coverage, the study incorporates district-wise analysis. The study will incorporate coverage on respective vaccines in various districts of Uttarakhand. Various issues hampering progress of immunization in Uttarakhand have been highlighted and remedial action have been suggested. This study will be helpful for the government to focus on the areas which are lacking in child immunization

6. DATA ANALYSIS AND RESULTS

Immunization acts as a protective shield, keeping families and communities safe. By vaccinating our children, we are also protecting the most vulnerable members of our community, including newborn babies.

The Infant Mortality Rate (IMR), which is widely accepted as a crude indicator of the overall health scenario of a country or a region, is defined as the infant deaths (less than one year) per thousand live births in a given period and for a given region. The grave issue of child mortality and morbidity be significantly improved through suitably designed immunization.

Infant mortality and morbidity rates have significantly improved in India in last two decades. In the last two decades, India has made significant progress in improving health indicators, particularly those related to child health. The country was certified polio-free in 2014 and eliminated maternal and neonatal tetanus in 2015. The reduction in infant mortality rate and under 5 mortality rate in the country can be attributed to enhanced coverage of immunization throughout the country. Despite the progress, infectious diseases continue to contribute to a significant proportion of child mortality and morbidity in India. Nearly one million children die before their fifth birthday in India. About one of every four of these deaths are caused by pneumonia and diarrhea - two leading infectious causes of child deaths worldwide, even though many of them can be saved by interventions such as breastfeeding, immunization and access to treatment. To accelerate full immunization coverage and to reach the unreached, the Government of India launched an ambitious programme called Mission Indradhanush, the largest immunization program in the world in terms of the number of beneficiaries, geographical coverage and quantities of vaccine used, with nearly 27 million new-borns targeted for immunization annually. It is also important here to explain what full immunization means. A child is said to be fully immunized if the child receives all due vaccines as per the national immunization schedule within the age bracket. Accordingly, the progress of child immunization coverage has increased in the state, the reduction in total coverage has been because a significant proportion of children are missing on the third dose of polio in Uttarakhand

The data has also been segregated into Kumaun and Garhwal division. The Table 2 below shows comparison of vaccine coverage in the Kumaun and Garhwal divisions of Uttarakhand.

Table 2: Distribution of vaccine coverage in Kumaun and Garhwal divisions in Uttarakhand [16]

Indicators	**Uttarakhand [U]**	**Garhwal [G]**	**Kumaun [K]**
Children age 12-23 months fully immunized (BCG, measles, and 3 doses each of polio and DPT) (%)	57.7	53.94	61.60
Children age 12-23 months who have received BCG (%)	92.9	81.81	94.63

Children age 12-23 months who have received 3 doses of polio vaccine (%)	68	61.66	72.58
Children age 12-23 months who have received 3 doses of DPT vaccine (%)	80	71.09	84.53
Children age 12-23 months who have received measles vaccine (%)	80.6	73.87	83.30
Children age 12-23 months who have received 3 doses of Hepatitis B vaccine (%)	59.4	50.84	58.83
Children age 12-23 months who received most of the vaccinations in public health facility (%)	91	78.50	93.65
Children age 12-23 months who received most of the vaccinations in private health facility (%)	6.3	3.77	3.63

The above data indicates that Kumaun region has achieved greater coverage of child immunization, as compared to Garhwal region. In several parameters, percentage achievement of Kumaun region is higher than the state values. Garhwal region has not shown significant achievement in terms of vaccine coverage, which is a cause of concern. The performance of the state in these parameters is not significant due to low coverage of immunization in the Garhwal region. Here the psychological impact of low coverage of immunization has few contributing factors such as –

1. Parental Anxiety and Fear regarding vaccinations often stems from concerns about their child's safety. Studies show that parents often weigh the potential side effects of vaccines against the perceived severity and likelihood of the diseases they prevent. Studies highlight that exaggerated concerns about rare side effects can overshadow the benefits of immunization.
2. Misinformation and Rumors - social media and informal networks play a critical role in spreading misinformation. Studies on vaccine hesitancy indicate that exposure to unverified information, such as claims linking vaccines to autism or infertility, amplifies parental fears.
3. Cognitive Biases: Psychological theories such as the availability heuristic, suggest that parents are more likely to recall and fear dramatic but rare vaccine side effects reported in the media than the statistical reality of vaccine safety.
4. Lack of trust in the Healthcare System caused by negative past interactions with healthcare provider which leads to distrust. Studies highlight that mistrust is exacerbated by conspiracy theories portraying vaccines as tools for population control or corporate profit.

In order to identify attributing factors for low coverage of immunization in Uttarakhand, it is imperative to analyse the district wise performance in these parameters. This analysis will help the policy planners and administrators to identify the low performing districts and take appropriate steps for betterment. In subsequent sections, the district wise performance of both Kumaun and Garhwal regions has been analysed. As no updated date is available on the official website of Uttarakhand Health Department, the values obtained in the national family health surveys have been used for this analysis. The Table 3 below shows district wise vaccination coverage in the Kumaun region of Uttarakhand.

Distribution of child immunization in various districts in Kumaun region of Uttarakhand [16]

Indicators	**Kumaun**	**Pithoragarh**	**Almora**	**Champawat**	**Bageshwar**	**Nainital**	**Udham Singh Nagar**
Children age 12-23 months fully immunized (BCG, measles, and 3 doses each of polio and DPT) (%)	61.60	74.2	60.6	68.4	60	59	47.4
Children age 12-23 months who have received BCG (%)	94.63	96.8	97.8	98.9	89.6	91.6	93.1

Children age 12-23 months who have received 3 doses of polio vaccine (%)	72.58	77.8	71.8	80.2	70.9	72.6	62.2
Children age 12-23 months who have received 3 doses of DPT vaccine (%)	84.53	89.9	83.7	83.7	89.6	76.2	75.8
Children age 12-23 months who have received measles vaccine (%)	83.30	90.3	85.5	86.3	80.5	78.5	78.7
Children age 12-23 months who have received 3 doses of Hepatitis B vaccine (%)	58.83	71.5	52.3	52	60	61.1	56.1
Children age 12-23 months who received most of the vaccinations in public health facility (%)	93.65	91.4	96.5	95.8	94.8	89.8	93.6
Children age 12-23 months who received most of the vaccinations in private health facility (%)	3.63	2.1	3.5	4.2	0	8	4

It is observed that the coverage of full immunization in the hilly districts is at par with the state figures. This assumes significance considering that these hilly districts encounter challenges owing to geographical constraints. The coverage of immunization in Nainital and Udham Singh Nagar districts, which contain plain areas as well, is below the state values. This calls for enhanced focus on these areas and identification of reasons for comparatively lower immunization. There are few psychological barriers such as

1. Fear of Needles (trypanophobia) and concerns about child's immediate discomfort such as crying or being in pain are common psychological barriers to vaccination.
2. Anticipatory Anxiety which parents may experience heightened anxiety before vaccination appointment due to worries of managing their child fear.

The above analysis revealed that immunization coverage statistics in Haridwar and Tehri-Garhwal district are quite deplorable. While no study has been taken by the government to identify the cause, this poor immunization coverage can be attributed to low rates of literacy and awareness in the region [17]. It can be inferred that due to lack of literacy and awareness about immunization and its benefits, a significant portion of population has not adhered to the immunization schedule prescribed by the government. One of the other issues affecting immunization coverage is migration. Migration can be termed as an important determinant for childhood immunization. In Uttarakhand, the districts in plain areas are having industrial areas. Due to these industrial areas, lots of migrants are residing in Haridwar and Udham Singh Nagar districts. It is quite a possibility that these migrants may be utilizing immunization facilities at their resident districts. A study conducted in this regard has already demonstrated that the migrants usually prefer to utilize these health services in their resident districts as they are having poor knowledge about availability and utilization of local health. Another important factor affecting the practice of immunization is maternal literacy. Maternal literacy has been found to be closely associated with child immunization. Poor immunization coverage in Tehri-Garhwal has been found to be due to low levels of maternal literacy. Maternal literacy coupled with inaccessibility and insufficient health facilities in Tehri-Garhwal, has produced such terrible results [19].

The situation in Kumaun region can be termed as satisfactory as most of the districts have achieved almost fair utilization of child immunization. Higher levels of literacy can be termed as on the positive influencers in the region. The districts of Pithoragarh and Nainital have been found to be well equipped with health facility, and along with high literacy this has resulted in higher immunization coverage in the region [17]. One of the issues observed in the state which affects immunization practice is lack of female health personnel in the state. Unavailability of female service providers has been observed to be a hurdle to immunization practices. It has been studied that mother(s) are usually hesitant to visit a health centre due wherein female doctors are not present. This leads to poor knowledge on importance of immunization among those mothers [20]. Thus, such mothers are not able to participate in immunization leading to low immunization coverage and adverse effect on the health of children.

7.LIMITATIONS AND RECOMMENDATION

The analysis above suggests that it is imperative to modify the implementation strategy in Uttarakhand.

Reasons for low immunization coverage: The aforementioned statistics have highlighted that immunization coverage in Uttarakhand is still quite low. The adverse effects of immunization harm the most important natural resource of the state i.e., the human resource. A vulnerable human resource may not be able to contribute much to the states progress. Before designing steps to increase immunization in the state, it would be more prudent to first identify various factors attributing to poor immunization in the state. Poor management of health data and statistics in official websites of Uttarakhand government posed significant challenges to identify the various hurdles to immunization coverage in Uttarakhand.

1. **Ignorance**: It has been observed that lack of knowledge on immunization schedule adversely affects the immunization coverage. Several parents in the remote as well as in semi-urban/urban areas are either not aware or inadvertently fail to adhere to the immunization schedule,

2. **Lackadaisical approach of parents and health staff**: One of the major reasons for low immunization coverage is the lackadaisical approach demonstrated by health staff and the parents. At times the efforts of the health staff are quite demotivating for the parents. The rigid and non-cooperating nature of the health staff at remote vaccination centers and the administrative process is quite unwelcoming for the parents.
3. **Inaccessibility to immunization facility**: Due to geographically challenging terrain and distributed residential settlements in hilly districts of Uttarakhand, immunization centers are often set up at such locations which are convenient for health professionals.
4. **Improper scheduling of immunization:** Often the timings of immunization are scheduled as per the convenience of staff manning these vaccination centers and the vaccines are given at pre-defined time slots only. Due to geographical limitations and lack of transport facilities, it is quite a possibility that a child may not reach the vaccination center at the fixed time slot.
5. **Capacity building:** One of the most important pillars of any program is the capability of the persons engaged in the promotion of the program. If the person is skillful and well-versed in the program, it will have a positive impact on the program. It has been observed that a lackadaisical approach by the health staff adversely affects immunization coverage.
6. **Bias in Data Collection-** Many studies rely on self-reported data, which can be influenced by recall bias and social desirability. Incorporate objective measures, such as healthcare records, alongside self-reports to validate findings and minimize bias.
7. **Non-Representative Sampling-**Limited sample diversity restricts the generalizability of results across different socio-cultural and geographical contexts. Design studies with larger, more diverse samples to include underrepresented groups and capture regional and cultural variations.
8. **Cultural and Digital Context Gaps:** Studies may overlook the impact of cultural norms or the rapidly evolving role of social media in spreading vaccine misinformation. Integrate cultural sensitivity and real-time analysis of digital misinformation trends to develop tailored and effective intervention strategies.
9. **Underrepresentation of Systemic Factors:** Research often focuses on individual beliefs while neglecting barriers like healthcare access, misinformation, and logistical challenges. Broaden the scope to include systemic and structural influences, emphasizing the role of healthcare infrastructure and the public.

8. CONCLUSION

India has been credited for making significant strides in the area of child health improvement during the past two decades. However, the country continues to account for a disproportionate burden of global morbidity and mortality in children less than five years. Despite having 17% of the global under-five population, 27% of deaths in this age group in 2018 were in India [1, 2]. A substantial proportion of mortality in children in India is vaccine preventable [3]. The situation is particularly grim in Uttarakhand where the full immunization coverage hovers around the half way mark in many districts. The biggest resource that Uttarakhand have is the human resource. However, considering the progress of immunization in Uttarakhand, it can be easily stated that this human resource is quite vulnerable and may not be able to make desired contribution in the progress of the state or country. One of the most important issue affecting the immunization coverage has been observed to be literacy and unawareness of the immunization program. Due to low literacy, lack of knowledge and various myths associated with the immunization, a significant proportion of the population is either left out of the vaccination programmes or is partially vaccinated. The attitude of service providers in going the extra mile for enhanced vaccination, further deteriorates the prospects of community participation. Immunization has globally been appreciated as a key component for primary health care and indisputably the most important human right. It is a recognized form of the best health investment and insurance, which can be bought. Though Uttarakhand has increased the immunization coverage in last two decades, a lot is still to be done. The study has highlighted various factors that have significant effect on immunization in the state. Various mitigation strategies have also been suggested. From parental anxiety to societal influences, child immunization programs face multiple psychological challenges. Addressing these barriers requires a nuanced, research-based approach that incorporates transparent communication, community engagement, and evidence-driven interventions. In regions like Uttarakhand, where geographical and cultural complexities add another layer of difficulty, tailored strategies are essential for maximizing vaccine coverage and safeguarding public health.India's commitment to improving access to vaccines has been a particularly important intervention in reducing child mortality and morbidity, and immunization remains a priority amongst decision-makers at the highest levels of government. Regular and effective immunization implementing strategies may be able to eradicate many diseases that plague India.

REFERENCES

1. **World Health Organization (WHO), https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_1 [accessed on 15.06.2021].**
2. **National Health Mission (NHM), Ministry of Health and Family Welfare (MOHFW), http://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=824&lid=220 [accessed on 12.06.2021]**
3. **Hindustan Times article on immunization in different states of India https://www.hindustantimes.com/dehradun/at-61-full-immunisation-uttarakhand-lags-at-bottom/story-vR4T4LqE1aiLBgo5SDujpK.html**
4. **Immunization coverage in India, 2017-18, HMIS data released by PIB https://pib.gov.in/PressReleseDetail.aspx?PRID=1526575**
5. **K. Park. Park's Textbook of Preventive and Social Medicine (2019).**
6. **UNICEF. Levels & trends in child mortality, estimates developed by the UN inter-agency group for child mortality estimation, 2019.**
7. **United Nations Department of Economic and Social Affairs Population Division. World population prospects: the 2019 revision. New York: United Nations; 2019.**

8. **Liu L, Chu Y, Oza S, Hogan D, Perin J, Bassani DG, et al. National, regional, and state-level all-cause and cause-specific under-5 mortality in India in 2000- 15: a systematic analysis with implications for the sustainable development goals. Lancet Glob Health. 2019;7(6):e721–e3.**
9. **https://doi. org/10.1016/S2214-109X(19)30080-4. 4. International Institute for Population Sciences. India National Family Health Survey (NFHS-4), 2015–16. Mumbai: International Institute for Population Sciences; 2017.**

Mathew JL. Inequity in childhood immunization in India: a systematic review. Indian Pediats. 2012;49(3):203–23. https://doi.org/10.1007/s13312- 012-0063-z

10. **Rammohan A, Awofeso N. District-level variations in childhood immunizations in India: the role of socio-economic factors and health infrastructure. Soc Sci Med. 2015;145:163–72.**

https://doi.org/10.1016/j. socscimed.2015.05.004

11. **Singh A. Gender based within-household inequality in childhood immunization in India: changes over time and across regions. PLoS One. 2012;7(4):e35045. https://doi.org/10.1371/journal.pone.0035045.**
12. **Singh PK. Trends in child immunization across geographical regions in India: focus on urban-rural and gender differentials. PLoS One. 2013;8(9):e73102. https://doi.org/10.1371/journal.pone.0073102**
13. **World Health Organization (WHO). Department of Immunization, Vaccines and Biologicals.**
14. **Global Action Vaccine Plan 2011 – 2020. World Health Organization**
15. **Government of Uttarakhand. Government of Uttarakhand Department of Medical Health and family welfare. State Health Infrastructure.**
16. **Census of India 2011, Provisional Population Totals, Rural and Urban distribution of Uttarakhand series 6, Uttarakhand, India: Directorate of census operations, pages: 59; 2011.**
17. **Nath, L., Kaur, P., & Tripathi, S. (2015). Evaluation of the Universal Immunization Program and Challenges in Coverage of Migrant Children in Haridwar, Uttarakhand, India. Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine, 40(4), 239–245.**
18. **Sharma, S., Saini, J. and Goutam, N. Monitoring report of Tehri Garhwal district, Uttarakhand. PRC, IEG, pages:37, September-October 2013.**
19. **Herald Sun https://www.heraldsun.com.au/news/victoria/study-finds-fearmongering-on-social-media-on-vaccinating-kids/news-story/ef3a229158c4332069d8d04b87df724f?utm_source=chatgpt.com**
20. **Bisht, I. Health Programmes and Empowerment of Rural Women: An evaluation. Doctoral thesis submitted in 2014. Retrieved from http://shodhganga.inflibnet.ac.in/bitstream/10603/114128/9/thesis.pdf**