

Effectiveness of Strategic Targeted Interventions to Improve Childhood Vaccination in District Nuh (Mewat) Haryana, India.

Running Title: Effectiveness of interventions to improve childhood vaccination in Mewat

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Abstract

Introduction: In India, baseline ranking of the districts was done in the year 2017 to prioritize the district interventions. Such districts were called as the aspirational districts. District Mewat of State Haryana, with a total population of around one million along with large gaps in majority of the health related indicators, was listed at the bottom and hence, expectedly required maximum efforts. Since then, multiple strategic interventions were put in place in the district to improve childhood vaccination coverage. *Objective:* To assess the effectiveness of multi-pronged strategic public health interventions targeted and implemented to improve immunization coverage in district Nuh (previously named Mewat), Haryana, India. *Methodology:* It is an observational study. The data was collected from reports / records. The collected data was presented in analyzed form as the list of interventions, percentages and proportions, and the indicators like reported vaccination coverages pertaining to the period before (i.e., 2016 or before) and after (i.e., 2017 onwards) declaration of Mewat district as an aspirational district, and were compared in the light of socio-demographic and cultural characteristics, etc. *Results:* The socio-demographic and cultural milieu of district Mewat expectedly posed unique challenges to improving vaccination coverage. The reported coverage of Measles/ MR vaccine increased from 67% in 2016 to 71.9% in 2019. *Conclusion:* In spite of the challenges, coverage of vaccination could be successfully improved. *Recommendation:* The findings of the study would be helpful in guiding the future course of action amid challenges in the district and similarly situated areas in the country.

Keywords: Challenges, Coverage, Mewat, Full immunization, Vaccination,

Introduction

There are diversity of challenges in improving health status in different parts of the country. All over the country, baseline ranking of the districts was done by NITI Aayog to prioritise, develop strategies and target the interventions.[1] Thus aspirational districts in India were identified which required dedicated efforts in the form of planning and implementing strategic interventions specific for them.[1] Mewat district of State Haryana was ranked at the bottom of the list of such aspirational districts and hence, expectedly requiring maximum efforts.[1] The drive to transform the aspirational districts through mass movement was announced and started in the year 2017.[1]

According to Census 2011, ~86% of the population lived in rural areas in Mewat, and 22.29% of population composed of children under 6 years of age. The district had been challenged with the constraints of limited availability of facilities, shortage of doctors / pediatricians / paramedical personnel, and a high birth rate.[2,3]

Health of children under five years is a determinant of future health of a nation. As vaccination is an evidence-based key public health tool to prevent and control morbidity and mortality due to fatal childhood infectious diseases, health of the children, in turn, could be improved with the improvement in coverage of vaccination against vaccine preventable diseases.

The Central and State Governments with the assistance of National Health Mission and technical bodies planned and implemented multi-pronged strategic social and public health interventions to improve childhood vaccination coverage contributing to achievement of the global goal of universal health care. As it has been around three years since Mewat was assessed and ranked at the bottom of the aspirational districts and multiple strategic

interventions were put in place, it became warranted to evaluate the effect as regards vaccination coverage and guide the future course of action.[1] Hence, this study was conducted.

Objective: To assess the effectiveness of multi-pronged strategic public health interventions targeted and implemented to improve immunization coverage in district Nuh (previously named Mewat), Haryana, India.

Materials and Methodology

This health services research was an observational study and was conducted in district Nuh (previously named as Mewat). It was accomplished in approximately four and half months in the year 2020. There were a total of three Community Health Centers (CHCs) located in the district ie, CHC Nuh, CHC Punhana, and CHC Firozpur Zhirkha. Data from all the sub-centers, PHCs and CHCs in the district Mewat were included in the study, summarized and presented. Data in view of the desired information was collected from reports / records using a self-designed and pretested questionnaire.

The data so collected was presented in analyzed form as details of relevant interventions and the challenges overcome, and percentages and proportions to bring out the results and draw conclusions. Indicators like reported vaccination coverages pertaining to the period before (i.e., 2016 or before) and after (i.e., 2017 onwards) declaration of Mewat district as an aspirational district were analyzed and compared in the light of socio-demographic and cultural characteristics, etc. Approval from the Institutional Ethics Committee was sought before carrying out the study.

Results

Socio-demographic characteristics and the expected challenges in implementation of

National Immunization Program in district Mewat:

The socio-demographic characteristics of district Mewat as available in Census 2011 reports, rural health statistics and survey records of health department are summarized in brief in table-1.[2,3]

As described in the table 1, literacy rate and female literacy rate in district Mewat were 54% and ~37% respectively which were very low in comparison to the national and State averages. Because of that, there might be barriers / challenges in improving vaccination coverage in the district like - blind beliefs among the beneficiaries, ignorance or unawareness of

the health problems, risks of lack of vaccinating the child and even the health facilities or services operating around them, resulting into non-utilization of the vaccination services.[2,4,5]

The proportion of children under 6 years of age was ~23% of the total population, whereas in India and State, the same was ~14% and 13% respectively.[2,4,5] This showed in comparison to the national and State numbers, in district Mewat, much larger proportion of the population was under 6 years and that the vaccination load per unit population (i.e., per thousand or per lac or per million) was also relatively much higher.

Table 1: Socio demographic characteristics of India, State Haryana and District Mewat[2-5]

	India	Haryana	Mewat
Average population catered by a PHC (Total Rural population / number of PHCs)	27728	34730	56773
Average population catered by a sub-center (Total Rural population / number of sub-centers)	5183	6271	10267
Under six children as percentage of the total population	13.53%	13%	22.8%
Literacy rate	74%	76.64%	54.08%
Female literacy rate	65.5	66.77%	36.6%
Population density(persons/SqKm)	382	573	723
Major occupation of residents	Agriculture	Agriculture	Agriculture
Religion Hindu	79.8%	87.46%	20.27%
Muslim	14.2%	7.03%	79.20%
Others	6%	5.51%	0.53%
Urban	27.82%	34.79%	11.29%
Rural	72.18%	66.21%	88.71%

Note: the figures are rounded off to nearest decimals;

(From: Census 2011 / Survey records of Health Department, District Mewat, Haryana, India. & the report Rural Health Statistics) [2-5]

The population density in district Mewat was 723 persons per square kilometers that was nearly double than that of the rest of State Haryana. It was thus an additional

hindering factor in prevention and control of vaccine preventable diseases (VPDs) and other communicable diseases. [2,4,5]

In district Mewat, around 79% of the population was Muslim population whereas rest of the population was Hindu i.e., ~22%. Others comprised 0.53% of the total population. Thus the socio-cultural milieu was different in this part of the State and country, and posed unique challenges in implementation of vaccination coverage in district Mewat. [2,4,5]

Nearly 88% of the population in district Mewat lived in rural areas where there were expectedly scarcity of the resources and additional challenges to providing vaccination services and other healthcare, and infrastructure. [2,4,5]

As per the data given in Census 2011 and Rural Health Statistics report 2019, the total average population (rural) catered by a sub-center is 5183 in India and 6271 in Haryana. This average population was almost double the national figures and much higher than the population load of the sub-center in Haryana State. Similarly the population (average) catered by a primary health center (PHC) at national and State Haryana level were 27728 and 34730 respectively whereas, in district Mewat, the average population catered by a PHC was 56773. Hence, in district Mewat, the population catered at grass root levels by the health facilities PHCs and Sub-centers was much higher than the rest of the nation and the State Haryana. Also, this population catered was much higher than the recommended norms i.e., 30000 per PHC and 5000 per sub-center, meaning thereby in Mewat, the health authorities had faced challenges of assuring accessibility to healthcare including the vaccination services. [2,4,5]

Gamut of interventions targeted to improve vaccination in district Mewat:

Mewat district was at the bottom of all the districts in India and was enlisted as an aspirational district in 2017.[1] As the vaccination coverage in the district had been very low, to increase the vaccination

coverage, the interventions namely Mission Indradhanush (MI), Intensified Mission Indradhanush (IMI), Intensified Mission Indradhanush (IMI 2.0) were implemented in district Mewat in campaign mode.[6,7,8] In spite of these vaccination missions, sustainability of the vaccination coverage that would be improved (with the help of these campaigns) posed another challenge in efforts towards achievement of the coverage goals.

To address the sustainability of these achievements, multi-pronged strategies for involvement of the community members and community opinion leaders (COPL) including religious leaders, elected local rural self-government members (Panchayati Raj Institution members), etc were adopted and implemented. This also expectedly helped in demand generation of vaccination services from the community.

The interventions which targeted such sustainability issues and involvement of community for vaccination against VPDs are Mobile Mitra Project, Chetnalaya Core Group Polio Project (CGPP), Catholic Relief Services, implementation of supportive supervision tool for routine immunization session, review meetings of civil surgeon/ deputy civil surgeon/deputy civil surgeon – National Health Mission/ District Immunization Officer/ Chetnalaya HO and CGPP team (along with sharing of minutes with State Headquarters) and mass media communication through leading local newspapers.

Issues of vaccine hesitancy and barriers to vaccination were addressed and facilitated with the help of studies conducted by Central Government agencies and department of Community Medicine, SHKM Govt Medical College, Nalhar, Nuh.[9,10] The research projects on such issues conducted in Mewat district (as available from the records of the health department and Community Medicine

department, SHKM GMC, Nalhar, Nuh) are listed below:

1. Vaccine hesitancy in Mewat (conducted by Immunization Technical Support Unit, Ministry of Health and Family Welfare)[9]
2. Barriers to childhood vaccination as perceived by accredited social health activists and multipurpose health workers in Mewat, Haryana (India): A qualitative research (conducted by Ram B. Jain, Arun Kumar, Ekta Sharma, et al. – Accepted for publication in 2019)[10]

For full and effective utilization of the public resources, vaccine procurement and cold chain maintenance concerns were among the top most priorities. This was assured and made robust by developing and operationalizing electronic vaccine intelligence network (e-VIN) in line with the national guidelines.[11]

Accessibility to immunization services was improved and made sustainable with the help of introduction of supplementary interventions like Tika express (Jeep Bolero), mobilization support van, and involvement of the existing workforce e.g., Rashtriya Bal Swasthya Karyakram (RBSK) teams for vaccination.

Simultaneously, improvement in the quality of childcare and vaccination services was attempted through upgradation of health care facilities of different levels as per Indian Public Health Standards (IPHS).[12-16]

Hence, in short, the existing interventions were strengthened and new multipronged strategies were developed and implemented by/through Government agencies/departments to improve the coverage of childhood vaccination in district Mewat. The interventions in brief are presented/ summarized in Table 2.

Table 2: List of interventions related to childhood vaccination implemented / scaled up in district Mewat / Nuh 2017 onwards

SN	Type/ Name of intervention	Areas where implemented	Main components or brief overview of the intervention
1	Mission Indradhanush	Whole district	Intensified Routine Immunization (RI) drive through operational planning & communication planning including mobile vaccination sessions.
2	Intensified Mission Indradhanush (IMI)	Whole district	Mission Indradhanush Intensified drive and Strengthening of RI System
3	Intensified Mission Indradhanush 2.0 (IMI 2.0)	Whole district	<ol style="list-style-type: none"> 1. Microplanning for IMI vaccination sessions based on a head count survey with <ul style="list-style-type: none"> . Flexible timings. . Additional sessions including mobile sessions for hard to reach and migratory areas. . Conduction of sessions by other departments (ESI, Railways, Defence) . Deployment of additional HR for vaccination 2. Immunization supply chain management for IMI 2.0 3. Trainings and orientation 4. IMI 2.0 intensive communication campaign 5. Real time recording and reporting through the portal (both coverage & communication activities). 6. Monitoring and evaluation <ul style="list-style-type: none"> • National, state & partners monitoring. • Communication support & monitoring. • Concurrent monitoring-based Post IMI coverage evaluation survey. 7. System strengthening immunization week.
4	Mobile Mitra Project	Selected areas of Nuh / Difficult villages (phased manner)	<p>Community mobilization through Cluster Coordinators and Mobilizer Mitra:</p> <p>Participate in block and district level meetings on immunization;</p> <p>Provide support in developing district communication plan for immunization;</p> <p>Influencer identification and their community meetings;</p> <p>Capacity building of accredited social health activists (ASHAs) and ASHA facilitators (AFs) for record keeping and updating for immunization;</p> <p>Capacity building of ASHAs and AFs for social mobilization to strengthen immunization;</p> <p>Community meetings;</p> <p>Provide support in updating micro plans;</p> <p>Community mobilization for village health and nutrition days (VHND);</p> <p>Identification and deployment of influencers (Imam/ Religious leader, etc.);</p> <p>Mobilization activities — booth decoration on Supplementary Immunization Activity (SIA) days, inauguration, mosque announcements, polio class, polio rallies, Bullawa Tollies and</p>

			<p>others;</p> <p>Advocate involvement of males like fathers / adolescents, shopkeepers and barber during community meetings;</p> <p>Active participation during campaigns;</p> <p>Weekly review meeting of block level Medical Officers, Cluster Coordinators and Mobile Mitras;</p> <p>Handholding of ASHA in preparation, updating of duelist for Routine Immunization (RI) sessions;</p> <p>Support ASHA during follow up visits of Routine Immunization (RI);</p> <p>Decoration of RI session site with information education and communication (IEC) material;</p> <p>Active surveillance for VPDs through House to House visits during COVID-19;</p> <p>Additional responsibilities like awareness generation during House to House visits, social media like Whatsapp, Facebook and Instagram</p>
5	Chetanalaya - Core Group Polio Project (CC GPP)	Selected areas of Nuh / Difficult villages (phased manner)	<p>Reached out directly to people in NCR and villages of Haryana (rural)</p> <p>Comprehensive community development initiatives were carried out through rights based and participative approaches without discrimination based on color, color caste or creed.</p> <p>For example,</p> <ol style="list-style-type: none"> 1. Measles & Rubella campaign, 2. Polio SIA campaign. 3. IMI campaign, 4. Diphtheria outbreak response. 5. RI sessions 6. Special immunization camps, <p>Provide health education for vaccination and address rumors / misinformation;</p> <p>Training of ASHA facilitators for supportive supervision.</p>
6	Catholic Relief Services (CRS)	Selected areas of Nuh / Difficult villages (phased manner)	<p>Provision of overall technical assistance in MMP such as — recruitment, capacity building, communication intervention, monitoring and reporting (through Chetanalaya);</p> <p>Child health</p>
7	Supportive supervision tool for RI session	Selected areas of Nuh / Difficult villages (phased manner)	Used by CG - PP team and Mitras / Cluster coordinators.
8	Review meetings (including sharing of minutes with Sate HQ)	Selected areas of Nuh / Difficult villages	With Civil Surgeon (CS) / Deputy CS/ Deputy CS – National Health Mission / District Immunization Officer / Chetanalaya HO and CG PP team

		(phased manner)	
9	Use of Mass media	Whole district	Mass media communication through local leading news papers.
10	Vaccine hesitancy project entitled “Vaccine Hesitancy in Mewat, Haryana”	Selected areas of Nuh / Difficult villages (phased manner)	Understanding the magnitude of vaccine hesitancy and identification of its underlying factors and to suggest evidence - based strategies to address these factors of vaccine hesitancy.
11	Utilization of Google sheet for data reporting	Selected areas of Nuh / Difficult villages (phased manner)	Strengthening of Information System regarding vaccination activities.
12	Supportive supervision tool (Phone application for supervision)	Selected areas	Online real time reporting of supportive supervision activities.
13	Electronic Vaccine Intelligence Network (e-VIN)	Whole district	Strengthening and digitalization of immunization supply chain processes i.e., including monitoring of vaccine stocks, flows, and storage temperatures.
14	Introduction of “Tika express” (Jeep Bolero)	For outreach areas	For mobilization support
15	Introduction of “Mobilization support vans”*	For outreach areas	For mobilization support
16	Involvement of Rashtriya Bal Swasthya Karyakram (RBSK) teams for vaccination	Whole district	For participation in sessions & vaccination campaigns
17	Upgradation of different health facilities as per Indian Public Health Standards (IPHS)	Selected areas	Strengthening of infrastructure and health workforce

*with the help of Mewat Development Agency, Mewat

Outcomes achieved:

The district level outcomes are presented in Table 3 and 4. Overall, reported vaccination coverage in district Nuh (previously Mewat) has been increasing since it was declared an aspirational district in the year 2017. Vaccination coverage of BCG vaccine increased from 63% in 2016 to 86.2% in 2019. Similarly, reported coverage of Pentavalent (2nd

dose) and Pentavalent (3rd dose) vaccines increased from 61% and 55% respectively in 2016 to 67.3% and 61.3% respectively in 2019. The reported coverage of Measles/ MR vaccine was 67% in 2016 and it increased to 71.9% in 2019. The coverage of Pentavalent (1st) vaccine was recorded to be 68% in 2016, whereas its coverage in 2017 was 53%, which consistently increased every year since then, and was 64% in 2019.

Table 3: Year-wise coverage of childhood vaccines in district Mewat

SN	Type of vaccine	2016	2017	2018	2019
1	BCG	63%	72%	63%	86.2%
2	Penta 1	68%	53%	57%	64.2%
3	Penta2	61%	44%	50%	67.3%
4	Penta 3	55%	37%	41%	61.3%
5	Measles / MR	67%	39%	47%	71.9%*

*May be higher due to special campaigns launched for measles / MR vaccination

Table 4: Year-wise achievements of Intensified Pulse Polio Program (IPPI) campaigns in district Mewat

	IPPI target achievement (%)*			
	2017	2018	2019	2020
Number of IPPI rounds / campaigns in the year	2	1	3	2
IPPI round 1	105.35%	103.03%	106.39%	99.67%
IPPI round 2	101.6%		98.96%	121.91%
IPPI round 3			94.33%	
Yearly Average (Total)	103.45%	103.03%	99.88%	110.79%

*IPPI – Intensified Pulse Polio Immunization Program.

The achievement regarding Intensified Pulse Polio Program (IPPI) campaigns have been constantly high after 2016 that is ~100% till 2019 and 2020 as well. The consistency in high achievements of IPPI campaigns could be because of easier vaccine administration through the oral route, less likelihood of resistance or hesitancy than the injectable vaccines, attainment of near eradication global status of poliomyelitis, and thus expectedly higher motivation levels and the commitment at all management levels.

There occurred an outbreak of diphtheria also with the reported 154 cases and 34 deaths in 2018. The control measures were put in place and thereafter, the morbidity

and mortality due to diphtheria reduced to 23 cases and 8 deaths in 2020 (till Oct).

Discussion

The impediments in achieving the goal of universal childhood immunization coverage were many as for example, the unique socio-cultural milieu of district Mewat, low literacy rates of the population, heavy beneficiary loads (due to the recorded high birth rates) and thus gaps in infrastructure development and other resources including human resource, etc.[2,3-5] [Table 1]

The older surveys i.e., DLHS – 3 and 4 reflected the prevalence of fully vaccinated children in district Mewat as 11% and

27.3% respectively which showed increasing trend of vaccination coverage in the district.[17-18] The reports of National Family Health Survey - 4 (NFHS – 4) conducted in 2015-16 showed that the vaccination coverage in district Mewat was much less than the rest of Haryana and India. Correspondingly, the morbidity due to acute respiratory infections (ARI) was higher in Mewat than the National and State averages.[19] Thus, the gaps, and also the challenges, were expectedly much higher in district Mewat than other parts of the State and country. This nationwide survey, however, provided the older picture of vaccination coverage and the most recent NFHS – 5 was due to be conducted in State of Haryana and district Mewat.[20] Thus, in the existing scenario, the reported coverage of vaccination was considered as the appropriate indicator to assess the changes in vaccination coverage before and after the multiple interventions targeted to improve the coverage i.e., 2017 onwards. This would also probably minimize the measurement bias.

The operational researches conducted in Mewat to address the barriers and vaccine hesitancy were also available which expectedly facilitated the improvement of vaccination coverage in the district.[9-10]

The current health services research provided an insight into the implemented interventions, challenges faced, and improvements in vaccination coverage. The findings of the study would be helpful in guiding the future course of action in the district Mewat and similarly situated other areas or districts in the country.

Limitation

One limitation of the study is that the vaccination coverage taken into consideration for measuring the change was the reported coverage. However, assuming the same bias in the before and after the intervention period, it would not affect it much.

Conclusions

Challenges in improving childhood vaccination coverage in district Mewat are many, they are however, successfully attempted to be overcome. Childhood vaccination coverage has consistently improved in district Mewat after declaration of the district as an aspirational district, and the multipronged strategic interventions for the same have been effective. Hence, the gaps in vaccination coverage have been decreased.

Recommendation

The multiple intervention efforts for attaining the universal vaccination coverage in district Mewat must be continued and scaled up in the areas where required. For the maximum impact, in Mewat region, the national immunization program must be implemented in a well fitted manner according to the existing socio-cultural milieu and as per their practical applicability as discussed above. Further studies may be conducted to provide more evidence-based recommendations for improvements in the implementation of national immunization program and thence the vaccination coverage.

Ethical approval

SHKM / IEC / 2020/ 115.

Conflict of Interest

No conflict of interest.

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None.

Disclaimer

The findings and conclusions, etc in this article are those of the authors only and do not necessarily represent those of their organizations.

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