ORIGINAL ARTICLE

A cross-sectional study to assess the quality of immunization services provided through the Routine Immunization program in both urban and rural areas of Dehradun

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ABSTRACT

Background: Vaccines are considered as tugboats of preventative health. The availability of the vaccine, as well as the quality of the vaccination at the outreach session site, are critical for improving vaccination coverage and lowering the prevalence of vaccine-preventable diseases. **Aims & Objectives**: Evaluation of Routine Immunization services provided at outreach session sites. **Methodology**: The study was conducted in rural and urban field practice areas of the Government Doon Medical College, Dehradun. 32 Routine Immunization session sites (16 each from urban and rural field practice areas) were selected through the Systematic Random Sampling method, with equal representation of best and worst-performing session sites. **Results**: - Out of the 32 session sites monitored, only 9.37% had their due lists updated, and only 31.24% had a head-count survey completed. ASHA mobilized beneficiaries at all sessions, although AWW mobilized beneficiaries only at 22 session sites. Alternate vaccine delivery services were not functional at any session sites. Vaccines were available at all session sites, while paracetamol was only available at 65.62% of session sites, and zinc was not available at any site. Only 21.87% of the ANMs were following injection safety guidelines. In the majority of cases, the four essential messages following immunization were not delivered. **Conclusion**: The quality of immunization services can be improved by providing regular training to ANMs and supportive supervision. District health officials must ensure the availability of multiple logistics at the immunization Session site and the implementation of alternate vaccine delivery services

KEYWORDS

Session Site, Routine Immunization, Quality

INTRODUCTION

The Universal Immunization Program (UIP) was launched in the year 1985 (1), which was the world's largest health program to protect all children of the world from vaccine-preventable diseases. Under UIP, Routine Immunization (RI) services are provided both at health facilities and outreach session sites. Routine Immunization is vital in preventing the spread of infectious diseases, reducing morbidity and mortality, and promoting public health and well-being. It is a key component of global efforts to achieve universal health coverage and eliminate vaccine-preventable diseases. In other words, we can say it is a way to achieve 100% immunization under the Universal Immunization Program. To give a boost to the ongoing RI services, in 2014 the Government of India launched the program Mission Indradhanush (MI) Under UIP, which aimed at giving full immunization coverage to all children under 2 years of age and all pregnant females (2), still the immunization coverage of India remains at 76% only by 2022(3). Routine Immunization sessions at the community level are organized at outreach

session sites, at a location other than a health facility. Outreach session sites should not be far away from the residing population in the community for maximum utilization. Along with the vaccines, session sites are supplied with injection/syringes, Cotton swabs, metallic instruments to open vaccine ampoules, vaccine carriers, icepacks, Records keeping material, and cleaning equipment. In addition to vaccination, promotive, preventive, and treatment services are provided at the outreach session site by Auxiliary Nurse Midwifery (ANM) (4). Not only the availability of vaccines and other logistics, but also making them available and affordable for all strata of children and pregnant females, irrespective of their social class, is equally important. This study aims to assess the quality of immunization services provided through the routine immunization program in both urban and rural areas of Dehradun.

OBJECTIVES

- To assess the quality of routine immunization services provided at outreach session sites in urban and rural areas of Dehradun.
- To recommend corrective measures based on identified gaps for improvement in routine Immunization services

MATERIAL & METHODS

Study Design and Study Setting: This was a cross-sectional study conducted in the rural and urban field practice areas of the Community Medicine department at the Government Doon Medical College, Dehradun, over 8 months (May -Dec 2023).

Sampling Technique: - This study is an extension of a study that was carried out to evaluate immunization coverage and its determinants in the same study setting. The sample size was calculated based on the NFHS-5 survey, which shows the Full Immunization coverage of Uttarakhand as 76%.

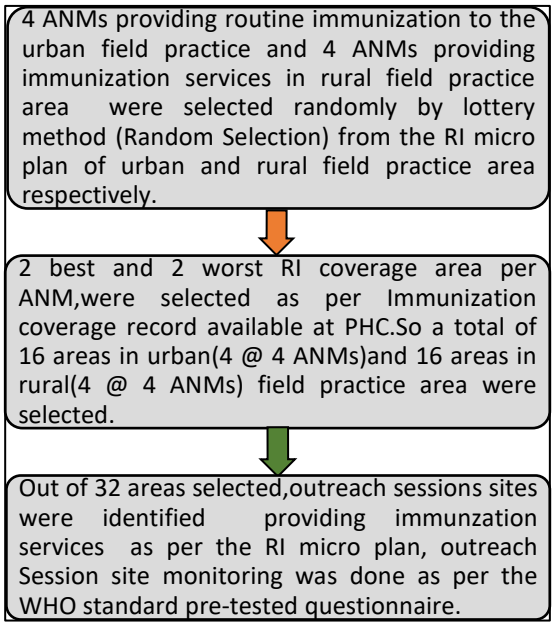
The sample size for house-to-house estimation of RI was estimated to be 320 by using the formula by taking a non-response rate of 10%.

$$N = \frac{Z_{(\alpha-2)}^2 P(1-P)}{d^2}$$

So, in this study total 32 sessions catering to the RI needs of populations (320 household & 10 household per session site) were selected,16 outreach session areas were chosen at random from 35 outreach session sites in the rural field practice region, and 16 outreach session areas were chosen at random from 25 outreach session sites in the urban field practice area through multi-stage random sampling (Probability sampling)

For the Selection of 32 Session sites,16 each from UHTC and RHTC following method was used, as mentioned in Figure 1.

Figure 1: - Sampling Technique & Data Collection Process



Inclusion Criteria

- Session site as per the Routine Immunization micro plan.

Exclusion Criteria

- Mission Indradhanush micro-plan session site.
- Those ANMs who were not willing to participate

Data collection tool: -A pre-tested, pre-designed session site monitoring instrument (WHO VHND-session site monitoring format) was used to elicit anonymous data for the assessment of quality of immunization services.

Data analysis: All collected data were compiled, tabulated, and analysed by using SPSS 22.0 version and Microsoft Excel 2017.

Ethical Consideration: The study Protocol was approved by the Institutional Ethics Committee (Reference No**. -** GDMC/IEC/2023/17), Government Doon Medical College & Hospital, Dehradun, Uttarakhand. Consent for session-site monitoring was taken from the ANM. However, all personal information of the study participants was kept confidential.

RESULTS

Session-site monitoring results

Monitoring of 32 outreach session sites was done (16 selected session sites, each from rural and urban field practice areas) to assess the quality of immunization services provided to beneficiaries. The results of monitoring are as follows:

*Multiple-choice answers

RI outreach sessions of rural and urban field practice areas were held as per the RI micro plan; alternate vaccine delivery was not operational at any session sites, and ASHA was found to be mobilizing beneficiaries at all session sites, as shown in Table 1.

Table 1: -Assessment of outreach session site for both urban & rural field practice area (N=32)

S. no	Variables	Response	Frequency (%)
1	Session done in the same location	Yes	32 (100)
		No	0 (0)
2	The vaccine was delivered to the session site by	Alternate Vaccine Delivery	0 (0)
		ANM	22 (68.8)
		ASHA	10 (31.2)
3	Mobilizer/s working at the session site*	ASHA	32 (100)
		AWW	20 (62.5)

Figure 2 illustrates the availability of vaccination records with ANMs (Auxiliary Nurse Midwives) at session sites, based on a sample size of 32. RCH register was updated at all the session sites. The headcount survey was available at 10 session sites only.

Fig 2: Availability of Vaccination records with ANMs at Session Site (n=32)

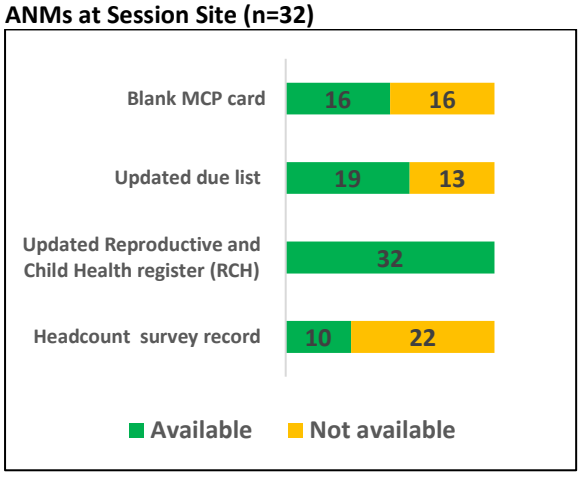


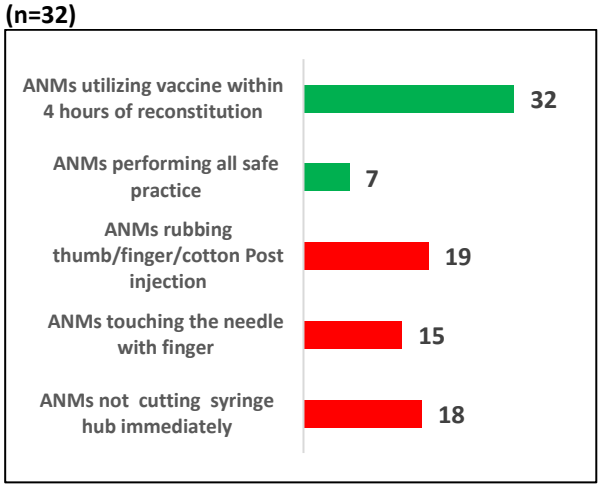
Table 2 provides details on logistics availability and its quality monitored at 32 outreach session sites. Both 0.1 ml AD syringes and 0.5 ml AD syringes were available for all 32 sessions. In 75% (24) of sessions, the number of 5ml reconstitution syringes was equal to or greater than the total number of BCG (Bacillus Calmette-Guérin), MR (Measles-Rubella), and JE (Japanese Encephalitis) vaccines. Hub-cutters are used for cutting the needle's sharp ends and collecting the sharp waste. The hub cutter was available and functional at all 32 sessions. General waste and bio-medical waste need to be discarded in black and red bags respectively, at the session site. These bags were available in 15 (46.8%) session-site. None of the session sites had a yellow bag for bio-medical waste disposal. Paracetamol was available in 65 session sites. Oral Rehydration Solution (ORS) was available in 59% of the session sites. Zinc was not available in any session site.

Table 2: Status of availability of various logistics at outreach session-site (N=32)

S.no	Variables	Frequency (%)
1	Paracetamol	21 (65.6)
2	ORS	19 (59.4)
3	Zinc	0 (0)
4	Vitamin A	32 (100)
5	Spoon for vitamin A	9 (28.1)
6	AEFI kit	25 (78.1)
7	Working Hub cutter	32 (100)
8	Availability of the Red & black bag	15 (46.9)
9	0.1 ml AD syringe available at the session	32 (100)
10	0.5 ml AD syringe available at the session	32 (100)
11	Adequate number of 5ml reconstitution syringe (=/> total no of BCG+MR+JE)	24 (75)

Figure 3 outlines injection practices of Auxiliary Nurse Midwives (ANMs) across 32 outreach session sites. ANMs at all sessions adhered to the protocol of not using vaccines after 4 hours of reconstitution. In 18 Session sites, ANMs did not cut the syringe hub immediately after administering injections. ANMs were found touching the needle in 15 Session sites. ANMs were found rubbing Thumb/Finger/Cotton after injection at 19 session sites observed. All safe injection Practices were followed only in 7 Session sites (out of 32) observed.

Fig 3: Status of safe injection practices by ANM (n=32)



**Multiple-choice responses*

Table 3 presents data related to the source of information regarding immunization among beneficiaries**.** ASHA (Accredited Social Health Activist) informed about sessions to 62 out of 64 beneficiaries. AWW (Anganwadi Worker) informed about sessions to 44 out of 64 beneficiaries. ANM (Auxiliary Nurse Midwife) was not informed about any sessions based on the provided data. ANM (Auxiliary Nurse Midwife) was a source of information for immunization and immunization services in 15.62% (10) of beneficiaries. ASHA (Accredited Social Health Activist) was the predominant source of information, reported in 96.87% of the beneficiaries. Social media, religious leader, poster/banner were the source of immunization and immunization services in only 6.25%, 4.68%, and 3.12% of the beneficiaries, respectively.

Table 3: Status of source of information regarding immunization among beneficiaries (n=64*)

S.no.	Variables	Outcome	Frequency (%)
1	Who mobilized you to the RI session Site?	ASHA AWW ANM	62 (96.9) 44 (68.8) 0
2	Source of information for immunization?	ANM ASHA Social media Religious leader Poster/banner	10 (15.6) 62 (96.9) 4 (6.3) 3 (4.7) 2 (3.1)

**2 beneficiaries per RI session site*

*ANM interaction with 2 random beneficiaries from each session site was observed. So, here N is equal to 64 (2X32).

Table 4 provides data related to communication provided by ANMs to the mother/immediate caregiver; 2 beneficiary responses were collected at each session site (2@32=64). ANMs explained to mothers or caregivers at 16 out of 64 beneficiaries about the vaccine being given and the disease prevented by it. ANMs communicated the side effects of immunization in 46 out of 64 beneficiaries. Information about the date, time, and venue of the next vaccine was given in 56 out of 64 beneficiaries. ANMs advised caregivers to keep the immunization card safe in 20 out of 64 beneficiaries. Advising caregivers with the child for 30 minutes after immunization was observed in only 26 out of 64 beneficiaries.

Table 4: Status of communication by ANMs to mother/immediate caregiver (n=64)

S.no	Variable	Responses	Frequency (%)
1	Informed the caregiver about which vaccine is given to the child and what disease it will prevent.	Yes No	16 (25) 48 (75)
2	Informed the caregiver regarding the Side effect/effects of the vaccine that is given to the child.	Yes No	46 (71.9) 18 (28.1)
3	Informed the caregiver when to come for the next visit	Yes No	56 (87.5) 08 (12.5)
4	Informed the caregiver to keep the immunization card safe	Yes No	20 (31.3) 44 (68.8)
5	Informed caregiver to wait with child for 30 minutes for observation after vaccination.	Yes No	24 (37.5) 40 (62.5)

**2 beneficiaries per RI session site*

DISCUSSION

Immunization remains a cornerstone of public health, offering a cost-effective and powerful intervention for reducing morbidity and mortality associated with vaccine-preventable diseases. This study assessed the quality of immunization services across 32 session sites—equally distributed between rural and urban field practice areas in Dehradun—highlighting strengths and areas for improvement in service delivery.

All sessions were conducted in accordance with the Routine Immunization (RI) microplan, aligning with findings by Patra et al. (5). However, this compliance rate exceeds that reported in other studies, such as those by Patel et al. (90%) (6), Kumar et al. (97.1%) (7) and, Morgan et. al. (82%) (8).

Alternate Vaccine Delivery (AVD) mechanisms were notably absent across all observed sites. In over two-thirds of sessions, ANMs transported vaccines to the site, while ASHAs undertook this task in fewer than one-third of sessions. This indicates a deviation from ideal AVD protocols, which are

intended to reduce the burden on health workers and ensure cold chain maintenance.

Beneficiary mobilization was actively undertaken by ASHAs at all session sites. However, AWWs participated in only two-thirds of the sessions. These findings are comparable to Kumar et al. (7), who reported ASHA and AWW involvement at 75.7% and 76.5% of sites, respectively.

Documentation practices revealed inconsistencies. While all session sites maintained updated RCH registers, headcount survey records were present at only two-thirds of sites. Moreover, updated due lists were available at just 60% of sessions, lower than the reported by Patra et al. (91.7%) (5), and Siddiqui et al. (84.1%) (9). This gap in beneficiary tracking can adversely impact immunization coverage and follow-up.

Vaccine availability was adequate across all sites, with all Universal Immunization Programme (UIP) vaccines in stock in contrary to that Siddiqi et al. reported vaccine shortage in 11.3% of immunization centres (9). Proper labelling of vials with opening date and time was observed universally in the current study, which is higher than rates reported in earlier studies—89.7% (Kumar et al.), 70.8% (Patra et al.), and 11.1% (Das et al.) (5,7,10). Additionally, none of the ANMs used reconstituted vaccine vials beyond four hours or kept opened vials beyond 28 days, in adherence to national guidelines. This is consistent with findings from Das et al. (10) and Patel et al. (6).

While AD syringes (0.1 ml and 0.5 ml) were universally available, reconstitution syringes (5 ml) were present at only 75% of session sites. MCP cards were available at just 50% of sites, lower than the 82.4% availability reported by Kumar et al. (7). On a positive note, hub cutters were available and functional at all sites, exceeding the 73.5% availability reported in studies from Bihar, Kerala, and Gujarat.

The availability of essential medicines was suboptimal. Paracetamol syrup/tablets were available at approximately 66% of sites, ORS at 59%, and zinc tablets were unavailable at any session site. Although Vitamin A supplements were universally available, dosing spoons were present at only 28% of sites. This lack of essential supportive care items may hinder beneficiary trust and service utilization during Village Health and Nutrition Days (VHNDs).

Waste management infrastructure was insufficient, with red and black disposal bags available at fewer than half the session sites (46.9%). Anaphylaxis kits were not present at seven sites (21.87%), which is better than the Morgan et al. (0%) (8), posing significant safety concerns. Furthermore, unsafe injection practices were frequently observed: failure to cut syringe hubs immediately post-use (56.2%), touching of needles before injection (46.8%), and rubbing the injection site with a thumb/finger or cotton (59.3%). These rates are higher than those documented by Patra et al. (5), and Qanbar et al. (11), highlighting an urgent need for refresher training and strict adherence to injection safety protocols.

Health education practices also showed room for improvement. Four key messages were communicated to only 53.9% of beneficiaries, which is lower than reported by Patra et al. (62.5%) and Kumar et al. (58.8%) (5,7) but higher than Nath et al. (28%) and Qanbar et al. (27.9%) and Morgan et al (25%) (12,11,8). The most frequently delivered message was regarding the next vaccination visit (87.5%), while the least conveyed was information about the administered vaccine and its corresponding disease (25%).

Post-vaccination observation—critical for managing adverse events following immunization (AEFI)—was advised in only 40% of cases, similar to findings by Kumar et al. (7) but slightly lower than Patra et al. (45.8%) (5).

CONCLUSION

- Extensive awareness and effective communication with beneficiaries are essential and can be provided by using various mass media platforms.
- Additionally, regular training and supportive supervision of vaccination providers (ANMs) will reduce vaccination errors and foster confidence in beneficiaries.
- All barriers identified are correctable at the level of district health management, and reforms are required in the state health policy. The major barriers identified are correctable and were related to a deficit of logistics, and awareness about vaccination in the community.
- Time constraints in service delivery by ANMs were due to the non-implementation of alternate vaccine delivery services on VHND days.

RECOMMENDATION

- Supportive supervision should be mandatorily done at the RI Session site regularly. This will build the capacity and confidence of healthcare workers (ANMs, ASHA & AWW) and will also help in addressing the problems of particular sessions immediately.
- Training for ANM shall be organized regularly to update their knowledge of the immunization program.

- The due list should be checked in the evening meeting of ANMs on VHND days at PHC. So, that habit of updating the due list preparation on the same day of the VHND session is inculcated in ANMs.
- Good vaccination practice is the mainstay of building trust among beneficiaries visiting session sites. So, Supervision of ANM's skills by medical officers shall be ensured at the session site only.
- Bio-medical waste management training shall also be given to ANM for proper segregation of generated waste at the session site.
- Ensuring continuous supply of medicine for minor ailments following immunization like paracetamol tablet and syrup formulation at all session sites builds trust in the community.
- Availability of Zinc and ORS shall also be ensured at all centers.
- Availability of all logistics related to vaccination shall be ensured.
- Alternate vaccine delivery practices should be implemented, so that ANMs can directly reach the RI session site on time and complete all work related to vaccination including U-WIN portal entry on VHND days.
- A headcount survey shall be conducted biannually to add migrating beneficiaries to the due list for vaccination.

LIMITATION OF THE STUDY

This study was conducted in only the urban and rural field practice areas of Dehradun. So, study findings cannot be generalized to the entire Dehradun.

AUTHORS CONTRIBUTION

All authors have contributed equally.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil

CONFLICT OF INTEREST

There are no conflicts of interest.

DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process.

REFERENCES

1. Sokhey J, Kim-Farley RJ, Bhargava I. The Expanded Programme on Immunization: A Decade of Progress in India. Annals of tropical paediatrics. 1989 Mar 1;9(1):24-9.
2. National Health Portal of India. Mission Indradhanush (Internet). New Delhi: NHP; 2014. Available from: https://www.nhp.gov.in/mission-indradhanush1_pg
3. Union Health Minister Dr Mansukh Mandaviya releases NFHS-5 report (Internet). Pib.gov.in. 2020 (cited 2024 Jun 24). Available from:https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1823047
4. UNICEF India. Immunization and child health (Internet). New Delhi: UNICEF. Available from:https://www.unicef.org/india/whatwedo/immunization#:~:text=According%20to%20NFHS%2D5%2C%202019.
5. Patra S, Kar M, Parida S, Malini S, Sonali P, Satapathy D. A cross-sectional study on evaluation of routine immunization sessions in Ganjam district of Odisha, India. Trends Clin Med Sci. 2023;385-90. doi:10.30538/psrp-tmcs2023.si-imrv059
6. Patel N, Unadkat S, Sarkar A, Rathod M, Dipesh P, Patel N. Assessment of cold chain maintenance for routine immunization in Jamnagar district, Gujarat. Int J Med Sci Public Health. 2018 Jan 1;7:1-5.
7. Das MK, Arora NK, Mathew T, Vyas B, Sindhu M, Yadav A. Documentation of vaccine handling and service delivery at outreach immunization sessions across 27 districts of India. Heliyon. 2018 Dec 1;4(12).
8. Morgan CJ, Saweri OP, Larme N, Peach E, Melepia P, Au L, Scoullar MJ, Reza MS, Vallely LM, McPake BI, Beeson JG. Strengthening routine immunization in Papua New Guinea: a cross-sectional provincial assessment of front-line services. BMC Public Health. 2020 Jan 23;20(1):100.
9. Siddiqi DA, Abdullah S, Dharma VK, Khamisani T, Shah MT, Setayesh H, Khan AJ, Chandir S. Assessment of vaccination service delivery and quality: a cross-sectional survey of over 1300 health facilities from 29 districts in Sindh, Pakistan, conducted between 2017–18. BMC Health Services Research. 2022 Jun 1;22(1):727.
10. Das BR, Bora PJ. Effect of mobile-based supportive supervision on cold chain point management and routine immunization service delivery. International Journal of Medical Science and Public Health.2019 Jan 1;8(1):1-5.
11. Qanbar MA, Jasim AK, Mahmood AA. Assessment of immunization session practices in primary health care centers in Al-Najaf province. Journal of Public Health in Africa. 2023 Oct 24;14(9):2754.
12. Nath L, Kaur P, Tripathi S. Evaluation of the universal immunization program and challenges in coverage of migrant children in Haridwar, Uttarakhand, India. Indian Journal of Community Medicine. 2015 Oct 1;40(4):239-45.