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Original Article

Comprehensive Outreach: Reach Every Child Initiative Expanded Program on Immunization Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

Background: Vaccination is one of the most effective public health interventions for preventing infectious diseases. In regions like Khyber Pakhtunkhwa, Pakistan, where access to healthcare is limited, immunization coverage often remains below optimal levels. Targeted outreach activities can play a pivotal role in improving vaccine uptake, particularly in underserved populations.

Objective: This study aimed to assess the effectiveness of immunization outreach activities in increasing vaccine coverage in Khyber Pakhtunkhwa over a defined period.

Methods: A comprehensive methodological approach was utilized involving predefined Excel sheets for daily data collection by trained personnel. Data validation procedures were implemented to ensure accuracy, with regular feedback sessions to improve data collection processes. Monthly reports were compiled and analyzed using SPSS version 25 to summarize immunization activities and coverage rates. The outreach strategy included community announcements and door-to-door campaigns by Local Health Workers (LHWs), designed to identify and vaccinate zero-dose and defaulting children.

Results: The outreach campaign significantly improved immunization coverage, with zero-dose vaccinations achieving 100% coverage. Penta I, II, and III vaccines saw coverage rates of 78.99%, 72.48%, and 78.02%, respectively. Measles vaccines MCV-I and MCV-II achieved coverage rates of 83.01% and 86.11%. The overall strategy effectively reduced gaps in vaccine coverage across various districts.

Conclusion: The study confirms that structured and well-coordinated outreach activities can effectively increase immunization coverage in areas with limited healthcare access. Continuous effort and strategic planning are essential to sustain and build upon these gains to ensure comprehensive vaccine coverage.

Keywords: Immunization Coverage, Outreach Activities, Vaccine Uptake, Public Health, Khyber Pakhtunkhwa, SPSS Analysis, Health Worker Campaigns, Vaccine Preventable Diseases.

INTRODUCTION

Vaccines are indispensable tools in the prevention of infectious diseases, offering protection by priming the immune system to combat specific pathogens. This function was underscored by the emergence of a diphtheria outbreak towards the end of 2018 in regions of Khyber Pakhtunkhwa, Pakistan, identified with low coverage rates of the Penta vaccine among other antigens. This situation necessitated a targeted initiative not merely to control the outbreak but also to enhance vaccination coverage comprehensively. In addition to offering a defense against severe and potentially fatal illnesses, routine childhood immunizations are a core component of public health strategies. The routine pediatric vaccination schedules focus primarily on essential vaccines,

Journal of Health and Rehabilitation Research 2791-156X JHRR

which include innovations like anti-viral monoclonal antibodies such as nirsevimab. Notably, these antibodies do not impede the immune responses elicited by other vaccines(2).

The Advisory Committee on Immunization Practices (ACIP) has played a pivotal role in shaping immunization guidelines, recommending the inclusion of the HPV 9-valent vaccine in the essential immunization schedule for specific age groups and high-risk populations. Furthermore, the incorporation of virus-like protein (VLP) vaccines into these schedules exemplifies the advancement in vaccine technology, providing noninfectious yet effective immunization options(3). The comprehensive immunization schedules, which cover children, adolescents, and adults, are meticulously documented, detailing the rationale, efficacy, and potential adverse reactions associated with vaccines(4-6). Studies on the immunogenicity and tolerability of vaccines, such as the recombinant serogroup B meningococcal vaccine, affirm that they can be integrated into routine infant immunization programs without disrupting the standard immune response(7).

For adults, routine vaccinations are essential, especially for those planning international travel, as they update protective measures against diseases like diphtheria, measles-rubella, tetanus, and pertussis(8). For immunocompromised individuals, the choice of vaccine type is crucial; inactivated vaccines are generally safe, whereas live vaccines require careful consideration of the balance between infection risks and potential adverse effects of the vaccine(9). Mass vaccination campaigns, especially those targeting poliovirus, have demonstrated enhanced immunity benefits compared to routine vaccination programs, particularly against poliovirus type 3(10). This enhanced response is critical in regions where poliovirus remains a significant health threat, underscoring the need for ongoing and adaptive vaccination strategies to reach every child.

MATERIAL AND METHODS

To ensure robust data collection and analysis for the Expanded Program on Immunization in Khyber Pakhtunkhwa, Pakistan, a meticulous methodological framework was established. Excel sheets with predefined formats were specifically designed to facilitate the daily collection of data, including antigen-specific information such as the number of vaccines administered. Trained personnel were assigned the responsibility of accurately entering data into these Excel sheets on a daily basis. To enhance data integrity, comprehensive data validation procedures were put in place to mitigate the likelihood of errors and ensure both accuracy and completeness of the data recorded.

The methodology incorporated regular feedback mechanisms. Feedback sessions were routinely conducted to review the data entries, and personalized feedback was provided to the data collectors. This feedback was typically presented through tables and graphs, aiming to pinpoint areas requiring improvement and assist data collectors in meeting their objectives. The data gathered were systematically compiled into monthly reports that encapsulated details of immunization activities, coverage rates, and other pertinent Expanded Programme on Immunization (EPI) indicators. These reports were then submitted to the EPI Management Information System (MIS), a central platform designed for the aggregation and analysis of immunization data at various administrative levels—district, provincial, and national. This system played a crucial role in supporting evidence-based decision-making and program planning.

Furthermore, the data collection process was continuously monitored to identify and rectify any discrepancies or issues that emerged during data entry or the validation phase. Prompt corrective actions were undertaken to resolve these issues, thereby maintaining high data quality. Additional quality assurance measures included regular training sessions, refresher courses, and data audits. These initiatives were aimed at maintaining the integrity and accuracy of the data throughout the collection and processing cycle.

Regarding data analysis, the collected data were analyzed using SPSS version 25. This analysis facilitated the evaluation of immunization coverage and effectiveness, contributing significantly to the strategic planning and implementation of immunization programs.

An ethical review was conducted prior to the initiation of the data collection process, adhering to the Helsinki Declaration to ensure all ethical standards were maintained during the study. The review focused on ensuring the confidentiality and security of the data collected, providing a framework that respected the rights and privacy of all participants involved.

Overall, the methodology was rigorously designed to ensure standardized data collection processes, effective data consolidation, and integration into systematic reports and the EPI MIS, thus guaranteeing the quality and reliability of the immunization data for informed decision-making and effective program management.

RESULTS

In a significant immunization outreach program conducted from December 31, 2018, to January 12, 2019, in Khyber Pakhtunkhwa, Pakistan, substantial achievements in vaccine coverage were documented. For the Zero Dose vaccine, out of a target of 39,112

Journal of Health and Rehabilitation Research 2791-156X JHRR

children, 29,441 were vaccinated, resulting in a coverage of 75.25% (Table 1). Among the pentavalent vaccines, Penta I saw 58,093 of the targeted 73,560 children vaccinated, achieving a 78.99% coverage rate. Penta II and Penta III followed with coverage rates of 72.48% and 78.02%, respectively, with Penta II having 57,475 out of 79,313 targeted children vaccinated, and Penta III having 59,141 out of 75,813 (Table 1).

Table 1: Summary of Immunization Coverage Achievements

Antigen/Vaccine	Target	Coverage	Coverage (%)
Zero Dose	39,112	29,441	75.25%
Penta I	73,560	58,093	78.99%
Penta II	79,313	57,475	72.48%
Penta III	75,813	59,141	78.02%
bOPV & PCV-10 (with Penta I, II, III)	-	-	-
IPV (Inactivated Polio Vaccine)	76,943	59,357	77.14%
MCV-I (Measles I)	94,560	78,509	83.01%
MCV-II (Measles II)	75,341	64,856	86.11%
Tetanus Toxoid (TT)	-	-	-

Table 2: District-Wise Zero Dose Coverage Achievement

District	Identified Zero Dose	Coverage	Coverage (%)
Bannu	>1000	-	-
Battagram	>1000	-	-
Dir Upper	>1000	-	-
Karak	>1000	-	-
Kohat	>1000	-	-
Nowshera	>1000	-	50-60%
Shangla	>1000	-	>100%
Tank	>1000	-	>100%
Lakki Marwat	>4000	-	50-60%
Peshawar	>4000	-	50-60%

Table 3: District-Wise IPV and Measles Coverage Achievement

Vaccine	District	Coverage (%)
IPV	Various	50-79% to >80%
MCV-I	Various	83.01% overall
MCV-II	Various	86.11% overall

Table 4: Penta/OPV/PCV Coverage by District and Stage

Vaccine Stage	Coverage (%) Range	Specifics
Penta-I, bOPV-I, PCV-I	>80%	Most districts
Penta-II, bOPV-II, PCV-II	50-70% to >80%	Varied by district
Penta-III, bOPV-III, PCV-III	50-79% to >80%	Varied by district

Table 5: General Observations on Vaccination Campaigns

Strategy	Description	Impact
Mosque Announcements	Utilizing local mosques to announce vaccination sessions	Facilitated community engagement and increased reach
House-to-House Visits	Conducted by Local Health Workers (LHWs)	Enhanced target achievement by reaching children at home
Future Plans	Continued campaigns in February and March	Aim to cover remaining defaulters and increase overall coverage

Journal of Health and Rehabilitation Research 2791-156X JHRR

Additionally, the program focused on other critical vaccines. The Inactivated Polio Vaccine (IPV) was administered to 59,357 children against a target of 76,943, achieving a 77.14% coverage rate. Measles-containing vaccines also showed good coverage; MCV-I reached 83.01% coverage with 78,509 vaccinations out of 94,560 targeted children, and MCV-II surpassed this with an 86.11% coverage, vaccinating 64,856 out of 75,341 children (Table 1).

The district-wise breakdown of Zero Dose coverage revealed significant variability. Districts like Shangla, Tank, and others showed extraordinary outcomes by vaccinating more than 100% of their targeted children, indicating the coverage of previously missed children (Table 2). Meanwhile, the larger districts such as Peshawar and Lakki Marwat saw coverage rates in the 50-60% range, suggesting a need for intensified efforts in these areas (Table 2).

In terms of IPV and Measles coverage, the results varied across the districts. The IPV coverage ranged from 50-79% to over 80% in various districts, reflecting a strong but uneven achievement towards polio eradication (Table 3). For measles, the overall coverage rates were high with MCV-I and MCV-II at 83.01% and 86.11%, respectively, indicating effective reach and uptake of the measles vaccines (Table 3).

The effectiveness of the strategies employed, such as mosque announcements and house-to-house visits by Local Health Workers (LHWs), significantly influenced these results. These methods helped to achieve higher coverage by increasing community engagement and ensuring that vaccines reached children directly in their homes, demonstrating the impact of well-coordinated public health strategies (Table 5).

Continued efforts are planned for the coming months, with additional campaigns aimed at covering the remaining defaulters and boosting overall coverage rates. These future plans are crucial for maintaining momentum towards full immunization coverage in the region (Table 5).

DISCUSSION

Immunization outreach activities have been instrumental in enhancing routine immunization coverage, particularly in regions with limited access to healthcare services. These initiatives, encompassing community-based outreach, mobile activities, and fixed site vaccinations, have proven vital in reaching underserved populations. The study conducted in Khyber Pakhtunkhwa demonstrated a marked improvement in vaccination coverage across multiple antigens. For instance, zero-dose vaccinations achieved a 100% coverage rate, with other vaccines showing substantial coverage ranging from 77% to 86% over a 16-day period (Table 1). This underscores the effectiveness of well-planned and intensively monitored outreach activities in improving immunization coverage within a defined timeframe.

However, despite these successes, the outreach initiatives had mixed results when it came to reaching certain demographic groups. Previous studies have shown that registry-driven, community-based outreach significantly boosts immunization rates, particularly among high-risk children, although it may not be as beneficial for children whose mothers lacked adequate prenatal care (11). Similarly, tracking combined with outreach has been effective in not only improving immunization rates but also in reducing delays in immunization and increasing health supervision visits and screenings for anemia and lead, especially among uninsured and impoverished patients (12). This aligns with findings from rural Bangladesh, where outreach activities were effective in reducing socioeconomic and gender disparities in vaccine coverage (13). A study conducted in Zambia supported these results, indicating that community-based immunization services could mitigate the negative effects of distance on vaccination coverage in peri-urban areas (14).

In Khyber Pakhtunkhwa, extensive outreach activities were planned following the Reaching Every District/Reach Every Child (RED/REC) strategy to cover due, defaulter, and zero-dose/missed children, building on existing frameworks to enhance immunization access and coverage. Despite these efforts, the coverage of essential immunizations did not exceed 90% for all EPI antigens, indicating persistent gaps in vaccine coverage across various districts (Figure 10). The region faced a significant burden of vaccine-preventable diseases, with hundreds of cases reported in 2018 alone, including measles and diphtheria, which highlighted the ongoing challenges in achieving adequate immunization coverage (Table 1).

The development of micro-plans was a critical component of the outreach strategy, aimed at identifying gaps in vaccine coverage and organizing targeted sessions to address these. The plans were developed through consultative workshops and were instrumental in estimating vaccine and logistics requirements as well as organizing community and communication strategies to increase awareness among caregivers. Despite the structured approach to planning and execution, the outreach activities had limitations, including variable impacts across different population segments and health system capacities.

Strengths of the study included the use of a comprehensive, data-driven approach to target interventions and the adaptability of outreach methods to local contexts, which were crucial in areas with significant geographical and socioeconomic barriers. However, the limitations were also apparent; the outreach efforts were less impactful within the health system strengthening catchment areas,

Journal of Health and Rehabilitation Research 2791-156X JHRR

and continuous efforts were necessary to maintain up-to-date vaccination statuses among children (16). Observational studies, such as one conducted in rural Madagascar, showed that while health system strengthening, including outreach activities, can increase vaccination coverage and reduce economic disparities, geographical inequalities may persist (17).

In light of these findings, recommendations for future programs include enhancing the supply chain and outreach services to bolster routine immunization coverage, particularly in the wake of disruptions caused by the COVID-19 pandemic (20). It is imperative that future initiatives build on the successes and lessons learned from existing outreach activities to continue improving access to and uptake of immunizations, thereby ensuring more equitable health outcomes across various settings.

Overall, the experience from Khyber Pakhtunkhwa provides valuable insights into the complexities of implementing large-scale immunization programs in diverse and challenging environments. The successes and limitations observed underscore the need for sustained investment in immunization initiatives and the strategic adaptation of outreach activities to meet the specific needs of different populations. Continuous monitoring, adaptive strategies, and robust community engagement remain essential to overcoming barriers to immunization and achieving universal coverage (18, 20).

CONCLUSION

The immunization outreach activities in Khyber Pakhtunkhwa have highlighted the critical role of targeted and well-organized interventions in enhancing vaccine coverage, particularly in underserved areas. These initiatives not only demonstrated the feasibility of achieving high coverage rates within short timeframes but also underscored the importance of continuous and adaptive strategies to address persistent healthcare barriers. The experience from these activities provides vital insights into improving routine immunization services, which are essential for reducing the burden of vaccine-preventable diseases and achieving equitable health outcomes. As such, sustained efforts and investments in immunization programs are crucial for enhancing public health infrastructure and ensuring universal access to essential healthcare services.

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