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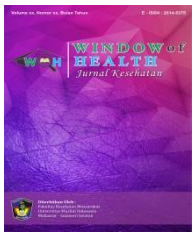

RESEARCH ARTICLE
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Appraisal of the Immunization Management in Yogyakarta City, Indonesia: A Case Study

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ABSTRACT

In 2022, Complete Basic Immunization (CBI) coverage in Yogyakarta City exceeded the provincial target of 95%; however, one health center reported coverage below the city target of 93%, indicating potential challenges in immunization program management. This study aims to evaluate immunization management in Yogyakarta City by assessing input, process, and output components of program implementation. Method: This study employed a qualitative case study approach. Informants were selected using snowball sampling until data saturation was achieved, resulting in six participants from two health centers representing different levels of immunization coverage. Data were collected through in-depth interviews and direct observations, transcribed verbatim, and analyzed using content analysis. Result: Two major themes emerged from the findings. First, human resource capacity was identified as a key challenge, particularly limited compliance with immunization training requirements and insufficient workforce readiness to support service delivery. Second, weaknesses in monitoring practices were observed, as immunization coverage monitoring was implemented less frequently than required by regulations. Despite these operational barriers, both health centers achieved the city's immunization coverage target in 2023. Conclusion: High immunization coverage in Yogyakarta City reflects strong program performance; however, sustaining and improving coverage requires strengthening workforce competency and ensuring routine monitoring implementation. These findings suggest that maintaining immunization outcomes in urban settings depends not only on coverage achievement but also on continuous health system capacity development and program oversight.

Keywords: Immunization; Coverage; Evaluation; Management

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INTRODUCTION

In 2023, it was reported that 14.5 million children worldwide did not receive any vaccines, with Indonesia ranking sixth-highest worldwide.[1] On the other hand, vaccination is one of the most effective public health strategies for reducing morbidity and death from vaccine-preventable diseases (VPDs), especially in children under five.[2,3] Immunization is a cost-effective strategy that meaningfully increases population health outcomes and strengthens global efforts to achieve Universal Health Coverage (UHC).[4] Recently, Indonesia has made significant progress in improving access to Complete Basic Immunization (CBI), which includes the BCG, DPT-HB-Hib, polio, and measles-rubella vaccines, as part of the National Expanded Program on Immunization (EPI).[5–7] After the COVID-19 pandemic, CBI coverage in Indonesia increased to 94.9% in 2023.8 However, vaccination coverage disparities persist, particularly across Indonesia's geographically and demographically diverse regions.[9] In a decentralized health system, cities like Yogyakarta, which are characterized by their relatively advanced health infrastructure, provide an optimal setting for assessing the efficacy and equity of immunization initiatives.[10]

Immunization management starts with planning, which is determining the population target number, and then subsequently with logistics preparation, including the health worker who will carry the task. Standard immunization management procedures also involve organizing service schedules, assigning responsibilities among health workers, recording immunization activities, and reporting coverage data through designated health information systems to support program monitoring and evaluation. Furthermore, monitoring immunization coverage is conducted not only to assess achievement of coverage targets but also to identify children who have missed or not completed their basic immunization schedule.[11,12] Although these management procedures are well established in national immunization programs, previous studies have predominantly focused on immunization coverage outcomes and vaccine uptake, with limited attention to how immunization management processes are implemented and function at the service delivery level. Variations in planning, recording, reporting, and monitoring practices may influence program performance even in areas with high coverage achievements. Therefore, examining immunization management practices is important to identify implementation gaps and generate evidence for strengthening immunization service delivery.

Previous studies have shown that weaknesses in immunization program management, including inadequate human resources among immunization managers and service providers, limited logistical planning, and inconsistent recording and reporting systems, may hinder the achievement of vaccination coverage targets.[13] These operational constraints can disrupt vaccine availability, delay service delivery, and reduce the ability of health facilities to identify and follow up children with incomplete immunization status. In addition, irregular monitoring and evaluation activities may limit timely corrective actions and contribute to suboptimal immunization performance.[14] Based on our preliminary study, one health centre in Yogyakarta City (health centre B) failed to achieve the Complete Basic

Immunization (CBI) target in 2022. Preliminary findings suggested that parental concerns regarding post-immunization adverse events contributed to vaccine refusal, resulting in incomplete immunization among eligible children. This local challenge highlights the need to evaluate immunization management beyond coverage achievement by examining how program inputs and implementation processes influence service outcomes.

The success of an immunization program depends not only on achieving coverage targets but also on the quality and consistency of program implementation according to established standards and guidelines. Evaluating immunization programs is essential to assess whether critical components—including workforce readiness, vaccine logistics, service delivery, recording and reporting systems, and monitoring activities—function effectively to support complete immunization coverage.[15] Program evaluation provides systematic and continuous information on implementation processes and outcomes, enabling health facilities to identify operational gaps, monitor program performance, and make evidence-based decisions for program improvement and sustainability.[16] In the context of routine immunization services, such evaluation is particularly important to ensure that high coverage reflects effective program management rather than solely target attainment.

Although Yogyakarta City has consistently reported high immunization coverage, limited evidence exists regarding how immunization management processes contribute to program performance at the health centre level. To address this gap, this study employed a qualitative case study approach to evaluate the implementation of the Complete Basic Immunization (CBI) Program in Yogyakarta City. The analysis was guided by the WHO Health System Framework and the Donabedian evaluation model. Using the Donabedian framework, the study examined three dimensions of program implementation: structure (input), process, and outcome to identify operational factors influencing immunization delivery and coverage achievement.[17] By focusing on health centres with different immunization performance profiles, this study provides context-specific evidence to support local decision-making and strengthen routine immunization services in urban decentralized health systems.

METHOD

Research Design

This study employed a qualitative research approach with a case study design, and data reporting followed the COREQ checklist. A qualitative case study was selected to enable an in-depth exploration of immunization management processes within real-world health service settings and to understand contextual factors influencing program implementation. The first author is a female PhD holder who is responsible for writing the manuscript after creating the rough draft. The second author is a female graduate student responsible for interviewing the informant and conducting the observation. Before data collection, we provided the informant with information about this study's purpose and the procedures for obtaining oral and written consent, including the recording and publication of the results.

Location and Research Instrument

This research was conducted at two health centres in Yogyakarta City that represent high coverage immunization (100%) (health centre A) and the lowest coverage in Yogyakarta City that is (health centre B) (93%). The informants were selected using the snowball sampling technique, beginning with key informants who were the officers responsible for the immunization programs at the respective health centres. Snowball sampling was chosen to identify participants with direct experience and knowledge of immunization management; however, to reduce potential selection bias, participant recruitment continued until no new information emerged and informants from different program roles were included. The instruments used in this study included interview guidelines and observation sheets, which were developed to explore various aspects of the immunization program. These aspects encompassed input components—such as human resources, infrastructure, and funding—and process components, including planning, implementation, recording and reporting, as well as monitoring and evaluation.

Data Collection and Analysis

Data were collected through face-to-face in-depth interviews and direct observations conducted during working hours at both health centres. Each interview lasted approximately 30–45 minutes. Six informants participated in the study. The sample size was considered sufficient because data saturation was reached after the sixth interview, where no additional themes, perspectives, or explanatory information emerged. Audio recordings were transcribed verbatim and analyzed using qualitative content analysis. Data analysis was conducted in several stages: familiarization with transcripts, open coding, grouping similar codes into categories, and synthesizing categories into overarching themes. Using MS Excel, a total of 165 initial codes were identified across six transcripts and subsequently organized into final themes reflecting input and process dimensions, while outcome data were derived from secondary immunization coverage records.

To enhance trustworthiness, credibility was established through triangulation of interview and observation findings and discussion among researchers during coding and theme development. Dependability was strengthened by maintaining documentation of analytic decisions throughout the study process, while confirmability was supported through verbatim transcription and systematic coding to minimize researcher interpretation bias.

This research has received ethical approval from the Research Ethics Committee of Ahmad Dahlan University, with protocol number 012308166.

RESULTS

Characteristic Informant

Six female informants participated in this study. One informant was under 30 years old, three were aged over 30 years, and two were above 40 years. The participants represented multiple roles involved in immunization management at the health centre level, including heads of health centres,

immunization program coordinators, and pharmacy staff (Table 1). This variation in professional roles was intended to capture perspectives from managerial, operational, and logistical aspects of immunization implementation.

The inclusion of health centre leaders provided information regarding program governance, planning, and monitoring processes, while immunization officers and pharmacy personnel contributed insights into day-to-day service delivery, vaccine management, and implementation challenges. The combination of these perspectives enabled a more comprehensive understanding of factors influencing immunization program performance across different organizational functions. All informants had direct involvement in immunization-related activities within their respective facilities, enabling the study to explore operational experiences and identify barriers and enabling factors affecting immunization management across settings with varying coverage achievements.

Table 1. Informant characteristics and their position

Informant	Age	Sex	Capacity
1	44	Female	Key informant, the Head Health Center A
2	36	Female	Person in Charge of the Immunization Program in Health Center A
3	36	Female	Pharmacy Staff in Health Center A
4	45	Female	Key informant, the Head of Health Center B
5	28	Female	Person in Charge of the Immunization Program in Health Center B
6	32	Female	Pharmacy Staff in Health Center B

Barrier found in Immunization Management

We assess immunization management by government regulations at two health centers exhibiting varying levels of complete basic immunization coverage in Yogyakarta City. Using the Donabedian framework, the findings were organized into input, process, and outcome dimensions. Two dominant barriers emerged from the analysis: (1) limitations in human resource capacity and (2) inconsistent implementation of immunization coverage monitoring (Figure 1).

Theme 1. Human Resource Capacity as a Barrier to Immunization Implementation (Input Dimension)

Input assessment covered human resources, infrastructure, and funding. Among these components, human resources emerged as the primary implementation barrier in both health centres. Although staffing and infrastructure were generally available, gaps in workforce readiness and training compliance limited program implementation. Participants reported challenges related to workforce availability during outreach activities and unequal staff competency.

"When we provide (out of the building) services such as to schools and conduct screenings in the community, it is sometimes insufficient due to the numerous schools and students." Sometimes, we provide external services with two teams" (Informant 1)

"The challenge was the shortage of midwives; for instance, when tasked with assignments such as School Children Immunization Month, which is called BIAS or screening, we are constrained to the personnel available within the capacity." (Informant 2)

"The challenge is that one midwife has not been active in the service for an extended period and is reluctant to get new knowledge. Despite the presence of three midwives, one individual possesses inadequate skills, including a fear of administering injections to patients. (Informant 1)

Indeed, the patient-to-midwife ratio is adequate. However, if it pertains to our program, it is lacking. (Informant 4)

Two individuals out of three have completed immunization training, while one has not" (Informant 1)

"The health worker consists of two midwives, one with a Diploma 3 degree and the other with a Diploma 4 degree; one has completed training while the other has not" (Informant 4)

"There are two officers, both of whom are Diploma 3 midwifery graduates; one has had training, while the other has not." (Informant 5)

These findings suggest that the challenge was not merely the number of health workers but also workforce preparedness and training coverage. Several staff involved in immunization services had not received formal immunization training despite regulatory expectations. Limited training participation potentially reduced flexibility in service delivery and increased workload concentration among trained personnel.

Theme 2. Inconsistent Monitoring of Immunization Coverage (Process Dimension)

The second barrier identified was related to monitoring and evaluation practices. According to regulatory standards, Local Area Monitoring (LAM) should be conducted monthly to support early identification of coverage gaps and corrective action. However, findings showed inconsistency across study sites.

"Immunization coverage monitoring typically occurs every 6 months." (Informant 2)

"To date, we have been instructed to perform it (monitoring) every three months, as the coverage service has thus far been done every 6 months (Informant 5).

DISCUSSION

This study aims to examine immunization management in Yogyakarta City, which is known for its high immunization coverage in Indonesia. The evaluation comprises three aspects: input, process, and output. We compare the Ministry of Health regulations with those implemented in the field. The results of this case study underline essential problems in the input domain of immunization management in Yogyakarta City. Rather than reflecting a complete shortage of personnel, the findings suggest that challenges were more closely related to workforce readiness, uneven training participation, and limitations in staff allocation during routine and outreach immunization activities. The inadequate

number of trained health professionals and insufficient training opportunities hinder the best possible delivery of immunization campaigns.

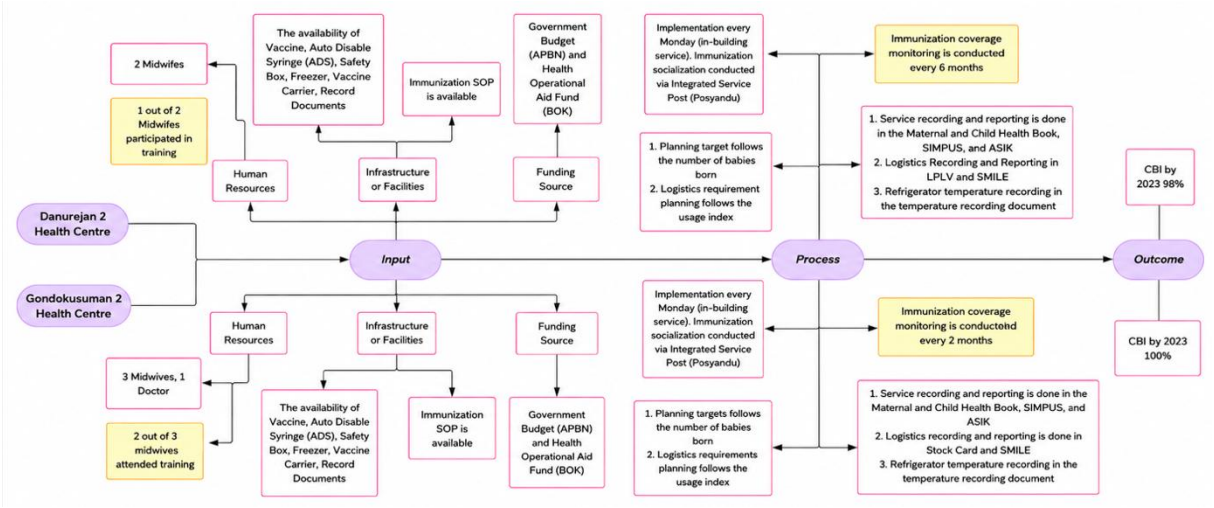

Figure 1. Visualization of the theme that reflects the evaluation framework

These findings align with earlier research done in low- and middle-income nations, which usually show that a lack of training and workforce shortages significantly compromise the efficacy of immunization campaigns.[18,19] Our findings further indicate that limited training participation may be influenced by operational constraints, including competing service responsibilities, limited workforce availability, and difficulties releasing staff for formal training while maintaining routine service delivery. Such conditions may result in unequal competency distribution among health workers and reduce program adaptability during periods of increased service demand. Moreover, the World Health Organization (2020) underlines clearly that attaining and maintaining high vaccination coverage depends on a health workforce that is not only sufficiently employed but also well-trained and routinely supported by capacity-building activities. Even well-designed immunization programs are unlikely to reach their desired public health results without deliberate investments in human resource development.[20]

The second major challenge is the component of monitoring and assessment, specifically concerning the Local Area Monitoring (LAM) deployment. According to national regulations, LAM should be conducted monthly to enable early identification of immunization gaps and timely corrective actions. However, neither health centre complied with this standard, with monitoring activities being conducted every two months and every six months, respectively. This inconsistency hampers quick reaction to coverage gaps and timely decision-making. Previous research has stressed how crucial continuous and regular data monitoring is to guarantee the success of immunization campaigns.[21,22] Routine monitoring functions as a feedback mechanism that supports adaptive program management and strengthens accountability within immunization services.

Our findings suggest that non-compliance with monitoring schedules may not solely reflect procedural shortcomings but also operational constraints, including competing workloads, limited personnel availability, and insufficient prioritization of monitoring activities within routine service delivery. Similar challenges have been reported in several African countries, where monitoring activities were often deprioritized due to competing responsibilities and weak accountability mechanisms. Monitoring produces feedback loops, reducing delays in corrective action and could likely cause.[23] These findings indicate that improving immunization performance requires strengthening not only monitoring frequency but also institutional support mechanisms that enable regular data review and integration of monitoring activities into routine health service workflows.

Ultimately, the results highlight the need for targeted system strengthening strategies that address the two main barriers identified in this study: human resource capacity and monitoring compliance within immunization management. Interventions should focus on expanding access to immunization training, ensuring adequate workforce allocation, and strengthening routine monitoring practices through supportive supervision and institutional commitment. Achieving consistent high immunization coverage depends mostly on system strengthening.[24] Importantly, this study demonstrates that high coverage achievement does not necessarily indicate optimal program management. Despite achieving the immunization target, both health centres experienced limitations in workforce preparedness and inconsistencies in monitoring implementation. This finding suggests that evaluating implementation processes alongside outcome indicators is essential to ensure long-term program sustainability.

The experience of Yogyakarta provides practical lessons for urban immunization programs in low- and middle-income settings. Rather than focusing solely on coverage targets, program improvement efforts should prioritize strengthening workforce competency and establishing routine monitoring systems that support timely corrective action and continuous service improvement.

CONCLUSIONS AND RECOMMENDATIONS

This study evaluated immunization management in Yogyakarta City using a qualitative case study approach across input, process, and outcome dimensions. Although Yogyakarta achieved Complete Basic Immunization (CBI) coverage above the provincial target and both health centers reached the city target in 2023, the findings revealed that high coverage achievement did not necessarily reflect optimal program implementation. The main barriers identified were limitations in human resource capacity—particularly unequal participation in immunization training and gaps in workforce readiness—and inconsistent implementation of immunization coverage monitoring. These challenges indicate that sustaining immunization performance requires attention not only to outcome indicators but also to the quality of program implementation processes. To strengthen immunization management, health authorities should prioritize continuous competency-based training for immunization personnel, establish mechanisms to

ensure equitable training participation, and reinforce routine monitoring practices through structured supervision and periodic performance review. Strengthening these implementation components may improve the sustainability and quality of immunization services in urban health systems.

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