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Disparities in basic immunization coverage: a case study of supply and demand factors in two community health centers in Bogor, Indonesia

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Abstract

Purpose: To identify and analyze the factors influencing complete basic immunization (CBI) coverage at two community health centers (CHCs) with contrasting coverage levels. **Methods:** This study employed a qualitative approach with a case study design. Informants were purposively selected and included health workers, community health volunteers, and parents. We collected data through in-depth interviews and document review, then analyzed it using a qualitative thematic approach. **Results:** Supply-side factors included the number and competence of health workers, availability of facilities and infrastructure, and funding support. Demand-side factors comprised community knowledge and awareness, sociodemographic characteristics, and trust in vaccines. Ciapus faced shortages of health personnel and community resistance to immunization, while Bojong Nangka demonstrated active collaboration between health workers and the community. **Conclusion:** The disparity in CBI coverage between Bojong Nangka and Ciapus CHC is caused by an imbalance between supply and demand factors. In Ciapus, low coverage was driven by limited human resources, inadequate infrastructure, and insufficient funding (supply-side), as well as poor public knowledge, awareness, and trust in vaccines, and the minimal involvement of local leaders (demand-side). In contrast, Bojong Nangka succeeded by strengthening its supply and demand components. Comprehensive interventions are necessary to enhance immunization services, increase public awareness and participation, and thereby achieve equitable CBI coverage.

Keywords: basic immunization; health workers; public trust; supply-demand factors

INTRODUCTION

Complete Basic Immunization (CBI) is one of the most effective public health interventions for preventing infectious diseases, reducing morbidity and mortality, and long-term disabilities in children. In Indonesia, immunization is not only a health intervention but also considered a fundamental right of every child and a state responsibility, as mandated in law No. 17 of 2023 on Health and regulated through the Ministry of Health Regulation No. 12 of 2017 concerning the Implementation of Immunization [1,2]. Despite strong legal and policy frameworks, disparities in national immunization coverage persist between regions, indicating uneven implementation and acceptance nationwide [3].

The CBI program aims to protect infants and children from vaccine-preventable diseases, including tuberculosis, measles, rubella, hepatitis B, pertussis, diphtheria, poliomyelitis, neonatal tetanus, meningitis, and pneumonia [4]. A child is considered fully immunized when they have received vaccines, including the hepatitis B birth dose (Hb0), Bacillus Calmette–Guérin (BCG), DPT-HB-Hib (combined vaccine for diphtheria, pertussis, tetanus, hepatitis B, and Haemophilus influenzae type b), inactivated poliovirus vaccine (IPV), and the measles-rubella (MR) vaccine, according to the national immunization schedule. This program has been recognized as one of the most cost-effective public health strategies for reducing global childhood morbidity and mortality [5–7].

Immunization coverage in Bogor Regency during the 2018–2022 period showed significant fluctuations. In 2018, basic immunization coverage was recorded at 90.37%, and it increased slightly to 92.37% in 2019. However, in 2020, there was a sharp decline to 78.9%, likely due to the impact of the COVID-19 pandemic. In 2021, coverage rose again to 87.6%, and in 2022 it reached its peak at 95.8%. Although the overall immunization coverage in Bogor Regency generally increased, two community health centers (CHCs) stood out for their highly variable trends among the 101 CHCs in the regencyBojong Nangka CHC and Ciapus CHC. Bojong Nangka CHC recorded a decline from 93.15% in 2018 to 73.25% in 2021, but saw a sharp increase to 187.5% in 2022. Meanwhile, Ciapus CHC also experienced fluctuations, with its highest coverage at 90.6% in 2019 and a drastic decline to only 15.35% in 2022 [8].

The factors influencing low immunization coverage in certain areas, such as in Ciapus CHC, include various aspects such as sociodemographic conditions, limited healthcare workforce, inadequate infrastructure and facilities, insufficient knowledge and awareness, lack of trust in vaccines, and inadequate funding. These factors directly or indirectly contribute to reduced access to and quality of immunization services, ultimately affecting the community's decision to immunize their children[9—12]. Therefore, this study selected Bojong Nangka CHC and Ciapus CHC as case studies to further explore the factors contributing to the low immunization coverage in Ciapus CHC.

By examining aspects such as the sociodemographic conditions of the community, the availability and competency of healthcare workers, and the utilization of funding in both CHCs, this study aims to provide deeper insights. The resulting recommendations are expected to help improve immunization coverage, not only at Ciapus CHC but also in other areas with similar conditions. The findings of this study are also intended to serve as valuable input for policymakers in optimizing health policies, particularly those related to immunization programs, so that immunization coverage can increase more evenly across all regions of Bogor Regency.

METHODS

This study employed a qualitative research design, utilizing a non-experimental case study approach, to gain an in-depth understanding of the factors contributing to the disparity in CBI coverage across two CHC service areas in Bogor Regency. The research sites were selected purposively: Bojong Nangka CHC, which recorded a very high CBI coverage of 187.5%, and Ciapus CHC, which had a notably low coverage of only 15.35% in 2022.

Research participants included a diverse group of stakeholders directly involved in the immunization program. These informants included the heads of the respective CHC, immunization officers (midwives and nurses), Posyandu (integrated health service posts) cadres, immunization program coordinators, and parents of children within the immunization age group. In total, 14 informants participated in the study, representing varied social characteristics in terms of educational background, social roles, and community standing.

Data collection was conducted through in-depth interviews and a review of documents. The interview guide was developed based on key research variables, which included aspects such as the healthcare workforce, infrastructure and facilities, sociodemographic conditions, community knowledge, and trust in immunization. All interviews were audio-recorded, transcribed verbatim, and analyzed using a qualitative analytical approach.

To ensure the validity of the findings, triangulation of sources and member checking were applied. Triangulation involved comparing data from various types of informants, while member checking entailed validating the transcribed results with the respective participants. This research has received ethical approval from the Research Ethics Committee of the Faculty of Public Health, Universitas Indonesia, with approval number: Ket-653/UN2.F10.D11/PPM.00.02/2024.

RESULTS

This study illustrates the disparity in complete basic immunization coverage between the two CHCs in Bogor Regency. Bojong Nangka CHC has demonstrated success in implementing its immunization program, whereas

Ciapus CHC faces various obstacles. The complete basic immunization (IDL) coverage at Bojong Nangka and Ciapus Health Centers in 2022 did not reflect the actual situation due to errors in target data recording. At Bojong Nangka, the reported coverage reached 187% due to input errors, while at Ciapus it was only 15.35% because of inaccurate reporting. However, in 2023 both centers achieved the 95% target, although coverage at Ciapus declined to 88% in 2024. This contrast is influenced by multiple factors on both the provider and user sides, with trust in vaccines emerging as the most critical determinant. One health worker observed, "If the community trusts us, they will come to the posyandu independently, even if they live far away." But if they don't trust us, even if we pick them up, they will still refuse."

On the provider side, Bojong Nangka benefits from having health workers specifically assigned to handle immunization. The presence of focused personnel who routinely conduct outreach and reporting allows the program to run smoothly and reliably. This consistency fosters a positive reciprocal relationship, as community members observe the commitment of health workers and, in turn, feel more confident in the services provided. In contrast, Ciapus suffers from a limited number of health workers, often resulting in the postponement of immunization activities. A local health cadre explained, "There's only one midwife here. If she's out on duty or has another task, the immunization session gets canceled." This unpredictability leads to public doubt regarding the benefits and safety of immunization.

Supporting infrastructure in Bojong Nangka also reinforces community trust. The availability of cold boxes and operational vehicles enables health workers to reach remote areas while maintaining the quality of vaccines. Residents observe proper storage practices, which alleviates concerns about vaccine safety. Conversely, Ciapus lacks essential resources, including vehicles and cold storage, making vaccine distribution suboptimal. A health officer reported, "Sometimes the vaccines arrive late, and we don't have a cool box. People start questioning whether the vaccines are still viable." Such conditions raise doubts about the safety and effectiveness of vaccines, particularly when they are administered under less-than-ideal circumstances.

Funding is another factor that either strengthens or undermines public trust. Bojong Nangka effectively utilizes operational funds from multiple sources, including village funds, to support outreach, education, and transportation. Consistent financial support enables health workers to maintain a regular presence in the community. This also allows for sustained health education activities, which enhance community knowledge and confidence in the immunization program. In contrast, Ciapus relies on a single funding source, which often experiences delays. One health worker lamented, "The budget often arrives late, so we can't go out to the field. When that happens, people get disappointed because activities are suddenly cancelled". Sudden cancellations due to budget delays confuse the community and erode their trust in the program.

On the demand side, parents' decisions to immunize their children are influenced by their trust in vaccines. In Ciapus, distrust remains deeply rooted. People frequently hear misinformation claiming that vaccines cause illness, are not halal, or contain harmful substances. The lack of communication with the community and religious leaders allows such rumors to spread unchecked. A health cadre shared, "Many people say vaccines cause fever, and some even say they're haram. We've tried to explain, but they still don't believe us." The absence of support from respected figures makes residents more hesitant to bring their children to the posyandu.

Table 1. Key factors influencing low CBI coverage in Ciapus: respondent perspectives

Research variable	Key findings	Informant quote
Health Personnel	Shortage of trained staff; multitasking led to missed sessions.	"We only have one midwife; if she's busy with other activities, immunization is postponed."
Infrastructure	Limited cold chain facilities and medical supplies; logistical challenges.	"There are times when we lack vaccines or cold boxes, especially during outreach."
Funding	Heavily reliant on limited DAK; often delayed, causing program disruption.	"Sometimes the budget runs out, even though there are still catch-up immunizations."
Community Knowledge & Awareness	Low awareness and understanding; prevalence of misinformation.	"Some are afraid immunization will make children sick or say it's not halal."
Community Trust & Leadership	Lack of involvement from community/religious leaders; trust issues persisted.	"Some people say they don't trust vaccines because religious leaders haven't said anything about it."
Socio-Demographic Factors	Low education, high mobility, and remote areas reduced access.	"Many families move around or live far, so it's hard to reach them regularly."

In contrast, Bojong Nangka demonstrates that trust can be built and reinforced through consistent community engagement and the involvement of local leaders. Religious and community figures actively advocate for immunization and participate in outreach efforts. When messages come from trusted individuals, residents are more likely to accept them and believe that vaccination is safe and beneficial. One health officer affirmed, “The role of the ustadz (religious leader) here is huge. If a trusted authority states that vaccination is important, the community tends to follow his guidance. Many used to be skeptical, but now they even ask to be picked up for immunization.”

Community knowledge and awareness in Bojong Nangka are also better established, thanks to regular education efforts. Health workers and cadres routinely visit homes, remind parents of immunization schedules, and explain the benefits in simple terms. In Ciapus, the opposite is true. Limited education efforts result in many parents being unaware of immunization schedules. As a result, they are more susceptible to myths and hoaxes and lack sufficient information to weigh the benefits of vaccines for their children. A local cadre remarked, “Many mothers don’t know the immunization schedule. If we don’t come to their homes, their children might miss the window for vaccination.”

Sociodemographic factors also play a role in shaping vaccine trust. The community in Ciapus generally has lower education levels and high mobility, making them not only difficult to reach but also less exposed to accurate health information. Many families move frequently or live in hard-to-reach areas, resulting in children often missing immunization opportunities. In contrast, Bojong Nangka’s residents tend to be more settled and have strong social networks—such as posyandu and women's groups (PKK)—which help disseminate information more effectively.

Overall, the findings of this study show that trust in vaccines does not develop on its own—it is built through consistent health service delivery, adequate facilities and infrastructure, ongoing communication, and support from community leaders. When these elements are integrated, as seen in Bojong Nangka, communities gain confidence and are more willing to participate in immunization programs. On the other hand, when service systems are weak, information is lacking, and trust is not established—as in Ciapus—immunization coverage remains low even when vaccines are available. Therefore, interventions to improve immunization coverage must be designed holistically, with community trust in vaccines as the foundational element.

There was also limited community trust and leadership involvement, which weakened public confidence in immunization. Many residents hesitated because religious or local leaders did not openly support vaccination. As one informant stated, “Some people say they don't trust vaccines because religious leaders haven’t said anything about it.”

In addition, socio-demographic challenges such as low education and the remote, mobile nature of some communities made regular access to immunization services more difficult. A health worker shared, “Many families move around or live far, so it’s hard to reach them regularly.”

Table 2. Key factors influencing CBI coverage in Bojong Nangka: respondent perspectives

Research variable	Key findings	Informant quote
Health Personnel	Dedicated immunization team with clear division of tasks.	“We have a specific team for immunization; everything is well-coordinated.”
Infrastructure	Sufficient cold boxes and operational vehicles.	“Here, cold boxes are sufficient, and we have vehicles for outreach.”
Funding	Well-utilized Village Operational Assistance Funds (BOK) and village budget.	“BOK funds are used for sweeping, transportation, and outreach—plus support from the village budget.”
Community Knowledge & Awareness	Active education by health workers and cadres increased awareness.	“We continuously educate parents through posyandu and house visits.”
Community Trust & Leadership	Strong support from religious and community leaders.	“When religious leaders support it, people trust and participate more.”
Socio-Demographic Factors	Higher education, stable community, and better accessibility.	“The community is easy to mobilize, and access is not a problem.”

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In addition, socio-demographic challenges such as low education and the remote, mobile nature of some communities made regular access to immunization services more difficult. A health worker shared, “Many families move around or live far, so it’s hard to reach them regularly.”

Funding mechanisms were also well managed. The Puskesmas actively utilized the Village Operational Assistance Funds (BOK) along with additional support from the village government. These funds were used to support sweeping activities, transportation, and community outreach. One respondent noted, “BOK funds are used for sweeping, transportation, and outreach—plus support from the village budget.”

On the demand side, community knowledge and awareness were significantly improved through continuous health education efforts. Health workers and cadres regularly educated parents at posyandu and during home visits, leading to increased understanding and participation. As one cadre explained, “We continuously educate parents through posyandu and house visits.”

Trust and leadership support were also critical factors. The active involvement of religious and community leaders increased public confidence in immunization, leading to higher participation rates. A community member stated, “When religious leaders support it, people trust and participate more.”

Lastly, socio-demographic factors such as higher education levels, a stable population, and better geographic accessibility facilitated immunization efforts. The community was generally cooperative and easy to mobilize. As one health worker said, “The community is easy to mobilize, and access is not a problem.”

DISCUSSION

The low coverage of CBI in the working area of Ciapus CHC is closely associated with a lack of public trust in vaccines. This mistrust is primarily influenced by widespread negative perceptions, including beliefs that vaccines may cause infertility, contain harmful substances, or are not permissible (halal) according to religious law [13]. These misconceptions are reinforced by local religious leaders, who either directly or indirectly express doubts about immunization programs. In an in-depth interview, a posyandu cadre stated that some parents refrain from bringing their children for immunization out of fear of committing a religious transgression, as they believe vaccines may not be religiously sanctioned.

This phenomenon is consistent with UNICEF’s findings (2020), which highlight vaccine hesitancy as a key determinant of low immunization coverage, especially in communities where social and religious norms strongly influence health behaviors. In such settings, parents' decisions to immunize their children are not solely based on health information but are deeply shaped by prevailing belief systems [14]. When religious leaders convey uncertainty or resistance toward vaccines, communities tend to adopt similar stances, even when those views conflict with medical recommendations.

The role of religious leaders is therefore critical, particularly in areas like Ciapus where religiosity is high. However, many of these leaders lack access to accurate scientific information regarding vaccine safety and halal status. WHO and GAVI (2023) have emphasized the need to actively involve faith leaders in immunization advocacy, recommending evidence -based training and the dissemination of religious rulings that endorse vaccination. The absence of engagement from religious leaders constitutes a structural barrier that must be addressed to improve immunization uptake [15].

Experiences from other regions demonstrate that engaging religious leaders can be an effective strategy. In Aceh, the Religious Leader Engagement initiative significantly improved immunization coverage by training local preachers and religious scholars, who then conveyed health messages in religious forums, citing Indonesia’s Fatwa Council (MUI) Fatwa No. 4 of 2016, which affirmed the halal status of vaccines. In Bali, a cross-cultural approach was employed, involving dialogue with traditional leaders and utilizing local media, which helped mitigate vaccine hesitancy rooted in local belief systems. Similar strategies could be adapted in Ciapus, including religious leader training programs, the integration of health messages into religious sermons, and collaborative campaigns involving the CHC, local offices of religious affairs (KUA), and MUI [16]. These efforts should also incorporate community-based educational media that reflect local cultural and spiritual values.

Geographical factors also play an essential role. The hilly and hard-to-reach terrain of the Ciapus CHC area makes it challenging to conduct outreach immunization activities. This finding is consistent with Nainggolan et al. (2016), who stated that geographical accessibility greatly influences the level of health service delivery. This condition contrasts with Bojong Nangka, where the service area is relatively easily accessible [17].

In addition, the success of Bojong Nangka cannot be separated from cross-sector collaboration and community participation. This supports the findings of Rahmani et al. (2022), which highlight that the involvement of religious and community leaders has a positive impact on immunization acceptance. Well-targeted budget support also strengthens the program through funding for outreach (sweeping) activities, transportation, and health promotion [18].

The findings of this study have significant social implications for improving the protection of children's health from vaccine-preventable diseases. Children who have not been immunized are at risk of experiencing long-term health problems and increasing the economic burden on their families. This study demonstrates that strengthening collaboration between health workers, community leaders, and local governments can enhance public trust and participation in immunization programs. The broader implementation of such collaborative efforts has the potential to expand access to essential health services, protect vulnerable groups, and enhance community resilience against infectious disease outbreaks. Additionally, improving data accuracy and optimizing the use of health budgets can help create a more responsive and sustainable immunization system.

CONCLUSION

The disparity in CBI coverage between Bojong Nangka and Ciapus CHC is due to both supply and demand factors. On the supply side, the number and skill of health workers, the quality of infrastructure, and funding availability all affect program performance. On the demand side, community knowledge, trust in vaccines, and the involvement of local figures, such as religious leaders and health cadres, play a central role. In Ciapus, where vaccine hesitancy is widespread, trust in vaccines is the most critical factor. Despite vaccine availability, parents often refuse immunization due to fears, misinformation, and limited engagement by trusted figures or health workers.

To address this, several strategies must prioritize rebuilding trust. First, human resources must be distributed more equitably. The Bogor District Health Office should ensure that the CHC in low-coverage areas like Ciapus has sufficient, well-trained personnel dedicated to immunization. Second, infrastructure must be improved—particularly cold chain systems, outreach vehicles, and digital tools like ASIK tablets—to ensure timely and professional services. A well-prepared and visible health team can boost community confidence.

Third, culturally sensitive health education should be continuous, utilizing local languages and addressing specific misconceptions, particularly those related to religion and vaccine safety. Trusted community figures, such as religious leaders and health volunteers, must be actively involved and supported through training and incentives. Lastly, strengthening the ASIK data system and ensuring sustainable funding through cross-sectoral collaboration are key to maintaining consistency and reliability. Above all, restoring trust in vaccines must be the foundation of all immunization efforts in Ciapus.

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