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Interprovincial Coverage of Complete Basic Immunization for Infants: Challenges for Community Midwifery Care

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Abstract

Background: Complete basic immunization (CBI) is a key indicator of infant health services in the community, yet coverage varies widely across provinces and data sources. **Objective:** To describe provincial variation in CBI coverage, assess the persistence of low-performing provinces, and compare provincial rankings in routine reports and the 2023 Indonesia Health Survey (SKI). **Methods:** An ecological study using open secondary data: routine infant CBI reports for 2021 (34 provinces), the list of provinces with coverage below 90% in 2022, monthly routine reports through September 2023, and the 2023 Indonesia Health Survey (SKI) (children aged 12–23 months). Regional differences were tested using the Mann–Whitney test, and rank agreement was assessed using Spearman's correlation. **Results:** The median coverage in 2021 was 84.2% (IQR 73.6–89.9; range 42.7–100.0), and only eight provinces reached the 90% target. Coverage was higher in Java–Bali (90.3% vs. 81.3%; p = 0.030) and lower in eastern Indonesia (73.0% vs. 87.3%; p = 0.015). Ten of the 11 provinces with coverage below 90% in 2022 were among the 11 with the lowest coverage in 2021. SKI 2023 reported a national CBI of 35.8%, far below routine figures, but provincial rankings were highly consistent (ρ = 0.95; p < 0.001; n = 8). **Conclusion:** Provincial disparities in CBI are substantial and persistent; village midwives should improve record-keeping, use every mother–infant contact to verify immunization status, and prioritize catch-up campaigns in low-coverage areas.

Keywords: complete basic immunization; infants; provincial disparities; midwives; community midwifery

Introduction

Basic immunization is one of the most efficient public health interventions for preventing infant morbidity and mortality from vaccine-preventable diseases. Low coverage not only harms unprotected children but also increases the risk of outbreaks in the community. In Indonesia, complete basic immunization (IDL) for infants serves as an indicator of infant health care and is part of the services provided by midwives at posyandu, polindes, independent midwife practices, and puskesmas. The Ministry of Health has set a national IDL target of 90% and stated that 11 provinces were still below this target in 2022: Aceh, West Sumatra, Riau, North Kalimantan, West Kalimantan,

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West Sulawesi, Southeast Sulawesi, Maluku, East Nusa Tenggara, West Papua, and Papua (Ministry of Health of the Republic of Indonesia, 2023).

Immunization coverage in Indonesia is heavily influenced by location and socioeconomic conditions. An analysis of the 2012 Indonesia Demographic and Health Survey (IDHS) showed that only 32% of children aged 12–59 months were fully immunized, with significantly lower coverage among children in Maluku and Papua, children from the poorest households, children whose mothers had no formal education, and children whose mothers did not receive antenatal and postnatal care (Herliana & Douiri, 2017). These findings are important for community midwifery care because they demonstrate that immunization does not stand alone but is linked to the continuity of care from pregnancy through childbirth and the postpartum period—areas within the scope of midwifery practice.

In addition to differences in immunization rates, the method of measuring coverage also poses a challenge. Immunization coverage data can be derived from routine facility reports (administrative data) or from household surveys. Both often yield different figures due to differences in the population denominator, completeness of record-keeping, reliance on the Maternal and Child Health (MCH) booklet or the mother's memory, and the definition of the antigens being counted (Cutts et al., 2013). In Indonesia, these differences are particularly striking. The 2021 routine report recorded an infant IDL of 84.2% (Kusnandar, 2022), while the 2023 Indonesian Health Survey (SKI) reported that only 35.8% of children aged 12–23 months had received a complete basic immunization series according to the latest guidelines, with Bali having the highest rate (73.5%) and Aceh the lowest (3.9%) (Health Development Policy Agency [BKPK], 2024).

Most studies on immunization in Indonesia use individual-level data from a single survey and rarely compare administrative data sources with survey data at the provincial level. This study aims to (1) describe variations in infant IDL coverage across provinces based on 2021 routine data, (2) assess the persistence of low-capacity provinces in 2022–2023, and (3) compare provincial rankings in routine data and the 2023 SKI, as a basis for strengthening the role of midwives in community midwifery care.

Methods

Study Design. This is a descriptive-analytical ecological study with provinces as the unit of analysis, using publicly available aggregated secondary data. Administrative data and survey data were analyzed separately and then compared descriptively, as they differed in year, age group, and antigen definition.

Data Sources. The 2021 infant IDL coverage by province was obtained from the routine immunization program reports of the Directorate General of Disease Prevention and Control, Ministry of Health, as published by Databoks (Kusnandar, 2022). The list of 11 provinces with 2022 IDL coverage below 90% was taken from a Ministry of Health press release (2023). Monthly routine reports on immunization of infants aged 0–11 months through September 2023 were taken from ANTARA news coverage of the Minister of

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Health's briefing to Commission IX of the Indonesian House of Representatives (ANTARA, 2023). IDL coverage based on surveys was taken from the 2023 SKI, specifically the percentage of children aged 12–23 months who received a complete basic immunization series according to the latest guidelines, reported for the five provinces with the highest rates and the five provinces with the lowest rates (BKPK, 2024). A summary of the data sources is presented in Table 1.

Table 1. Research data sources

Source	Period	Population	Provincial Coverage
Routine immunization program reports (Kusnandar, 2022)	2021	Infants, IDL	34 provinces
Ministry of Health press release (2023)	2022	Infants, IDL < 90%	11 provinces (list)
Monthly routine report (ANTARA, 2023)	Through September 2023	Infants 0–11 months	Top 4 and bottom 5
SKI 2023 (BKPK, 2024)	2023	Children 12–23 months	National; top 5 and bottom 5

Operational definition. IDL in routine data is the percentage of infants who receive all scheduled basic immunizations before 12 months of age. In the 2023 SKI, IDL is the percentage of children aged 12–23 months who receive a complete series of basic immunizations according to the latest guidelines (BKPK, 2024). Because the guidelines and denominators differ, SKI figures are not used to assess trends relative to routine data, but rather to compare provincial rankings. The national target used is 90% (Ministry of Health of the Republic of Indonesia, 2023), and a target of 75% was used for the 2023 monthly routine reports (ANTARA, 2023).

Regional grouping. The Java–Bali region is defined as DKI Jakarta, West Java, Central Java, DI Yogyakarta, East Java, Banten, and Bali. The eastern region is defined as Papua, West Papua, Maluku, North Maluku, and East Nusa Tenggara.

Data analysis. Provincial coverage was summarized using the median and interquartile range (IQR), as well as the number of provinces below the 90% threshold and below the national average. Interregional differences were tested using the Mann–Whitney test. The continuity of provinces with low capacity was assessed by comparing the 11 provinces with an IDL < 90% in 2022 to the 11 provinces with the lowest scores in 2021. The consistency of the 2021 routine data rankings with the 2023 SKI rankings for provinces reported in both sources was assessed using Spearman's rank correlation. The test was two-tailed with $\alpha = 0.05$, and the analysis was performed using Python 3 (SciPy library).

Design limitations. The 2021 routine data were derived from secondary publications, and there were minor discrepancies between the figures in the text and the list of

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sources that could not be verified against the raw data. The 2023 SKI reported only ten provinces in the accessed source; therefore, the comparison covered only the eight provinces available in both sources. Ecological studies cannot draw conclusions at the individual level. This study uses publicly available aggregated data without individual identifiers; therefore, no ethical approval was required.

Results

Variation in IDL coverage across provinces in 2021. In the 2021 routine report, the median IDL coverage for infants across 34 provinces was 84.2% (IQR 73.6–89.9; range 42.7–100.0), with a national average of 84.2%. Only eight provinces met the 90% target (South Sulawesi, Bali, West Nusa Tenggara, Yogyakarta Special Region, Banten, Bengkulu, East Java, and East Kalimantan), while 26 provinces fell short of the target. A total of 17 provinces were below the national average, 10 provinces were below 75%, and three provinces were below 60% (Aceh, Papua, and West Sumatra). The difference between the highest and lowest provinces reached 57.3 percentage points (Table 2, Figure 1).

Table 2. Summary of infant IDL coverage by province and region, 2021 routine report (n = 34 provinces)

Measure	Value
Median (IQR), %	84.2 (73.6–89.9)
Range, %	42.7–100.0
Provinces that met the 90% target	8 (23.5%)
Provinces below 75%	10 (29.4%)
Median for Java–Bali (n = 7), %	90.3
Median for other provinces (n = 27), %	81.3
Median for the eastern region (n = 5), %	73.0
Median for provinces outside the eastern region (n = 29), %	87.3

Note. Mann–Whitney: Java–Bali vs. others, p = 0.030; Eastern Region vs. others, p = 0.015. Source: Kusnandar (2022), adapted by the author.

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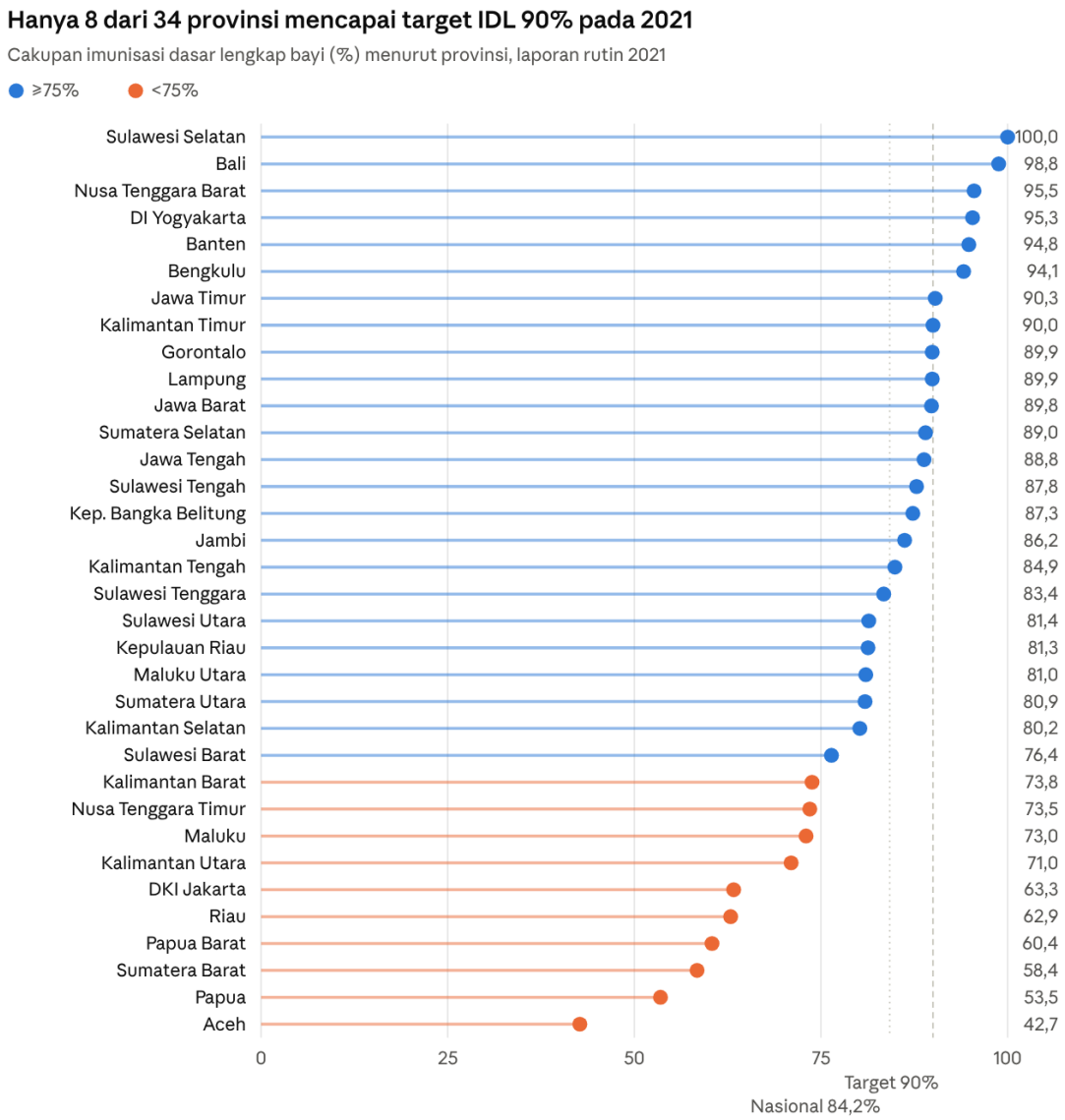


Figure 1. Only 8 of 34 provinces met the 90% IDL target in 2021. Source: Kusnandar (2022), adapted by the author

Regional differences. The median coverage in the Java–Bali provinces (90.3%) was higher than in other provinces (81.3%; p = 0.030), while the eastern region (Papua, West Papua, Maluku, North Maluku, and East Nusa Tenggara) had a median of 73.0% compared to 87.3% in other provinces (p = 0.015). Notable exceptions include DKI Jakarta (63.3%), which ranked among the 11 provinces with the lowest coverage in 2021, as well as Aceh (42.7%), West Sumatra (58.4%), and Riau (62.9%) in Sumatra.

Persistence of low-capacity provinces. In 2022, the Ministry of Health identified 11 provinces with an IDL below 90% (Aceh, West Sumatra, Riau, North Kalimantan, West Kalimantan, West Sulawesi, Southeast Sulawesi, Maluku, East Nusa Tenggara, West

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Papua, and Papua). Ten of these 11 provinces (excluding Southeast Sulawesi) were among the 11 provinces with the lowest coverage in 2021. Monthly reports through September 2023 show that only four provinces have reached the 75% target (DKI Jakarta 93.4%; Banten 85.6%; South Sulawesi 82.2%; Central Java 76.5%), while the lowest rates were in Mountainous Papua (8.9%), Central Papua (23.6%), Aceh (29.8%), Southwest Papua (31.3%), and West Papua (32.4%).

Comparison of routine data and survey data. The 2023 SKI survey shows that only 35.8% of children aged 12–23 months received a complete primary immunization series, far below the 2021 routine rate of 84.2%. The provinces with the highest rates in the SKI were Bali (73.5%), Yogyakarta Special Region (68.9%), Central Java (54.7%), East Java (50.7%), and Jakarta Special Capital Region (42.4%), while the lowest were Aceh (3.9%), Papua Pegunungan (4.0%), Central Papua (10.3%), Riau (13.9%), and West Sumatra (15.6%). In the eight provinces available in both sources, SKI coverage was 20.9–49.0 points (average 34.6 points) lower than the 2021 routine figures, but the rankings were highly consistent (Spearman's $\rho = 0.95$; $p < 0.001$; $n = 8$) (Table 3).

Table 3. Comparison of 2021 routine report IDL coverage and 2023 SKI coverage in provinces available in both sources

Province	2021 Routine Report (%)	2023 SKI (%)	Difference (points)
Bali	98.8	73.5	25.3
Special Region of Yogyakarta	95.3	68.9	26.4
Central Java	88.8	54.7	34.1
East Java	90.3	50.7	39.6
Jakarta	63.3	42.4	20.9
Aceh	42.7	3.9	38.8
Riau	62.9	13.9	49.0
West Sumatra	58.4	15.6	42.8

Note: The 2021 routine schedule for infants and the 2023 SKI schedule for children aged 12–23 months are based on the latest guidelines; therefore, the discrepancy does not solely reflect a reporting gap. Source: Kusnandar (2022); BKPK (2024).

Discussion

Persistent interprovincial disparities. Only eight of 34 provinces met the 90% IDL target in 2021, and the gap between the highest and lowest provinces reached 57 percentage points. Provinces with low coverage are concentrated in the eastern region (median 73.0%) and parts of Sumatra, while provinces in Java–Bali have relatively higher coverage (median 90.3%). This geographic pattern aligns with an analysis of the

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2012 SDKI data, which found lower rates of complete immunization coverage in Maluku and Papua, among the poorest households, among mothers with no education, and among children whose mothers did not receive antenatal and postnatal care (Herliana & Douiri, 2017). This continuity is also evident in the latest data: 10 of the 11 provinces with an IDL below 90% in 2022 were already in the lowest group in 2021, and Aceh, West Papua, and the other Papua provinces remained in the lowest group in the September 2023 routine report. This indicates that the barriers faced are structural in nature—such as distance, the availability of personnel and vaccine logistics, and social conditions—and will not be overcome by short-term campaigns alone.

Discrepancy between routine data and survey data**.** The 2023 SKI figure (35.8%) is significantly lower than the 2021 routine report (84.2%). This discrepancy should not be interpreted as a direct decline in coverage. Cutts et al. (2013) explain that routine and survey figures may differ due to the denominator, completeness of record-keeping, the survey's reliance on the KIA booklet or maternal recall, and the definition of the antigen being counted. In this study, the SKI assessed children aged 12–23 months according to the latest guidelines, whereas routine reports counted infants with IDL in different age groups and denominators; furthermore, the years of measurement differed, and some immunizations may have been administered late and only recorded after the age of 12 months. Although the numerical rates are not comparable, the provincial rankings from both sources are highly consistent ($\rho = 0.95$), indicating that both sources agree on which provinces require the most attention: Aceh, Riau, and West Sumatra. The 3.9% rate in Aceh is very low and warrants further investigation, including potential issues with record-keeping, the availability of KIA books, and community acceptance; the available data do not allow the cause to be determined.

Why midwives are crucial for increasing coverage. An analysis by Herliana and Douiri (2017) shows that mothers who do not receive antenatal and postnatal care tend to have children who are not fully immunized. Continuity of care from pregnancy through the postpartum period is at the core of midwifery care; therefore, every mother–infant interaction managed by a midwife—such as postpartum visits, neonatal visits, weigh-ins at posyandu, and family planning services—can be utilized as a screening point for immunization status. *The Lancet* series' framework for quality midwifery care positions midwives as providers of continuous care integrated into the health system (Renfrew et al., 2014; ten Hoope-Bender et al., 2014), and this role is relevant to immunization: midwives are closest to mothers and infants during the early days of life when the immunization schedule begins. However, the data used here do not examine midwives' contribution to immunization coverage; this argument is conceptual and needs to be tested with data linking service contacts to immunization status.

Implications for community midwifery care. First, village midwives need to ensure that every infant they serve has a complete immunization record in the Maternal and Child Health (MCH) booklet and is reported to the system, as discrepancies between routine data and survey data may stem from recording errors. Second, home visits or outreach efforts for infants who have missed immunizations should be prioritized in provinces and districts with the lowest coverage. Third, routine mother–infant contacts should be used to check immunization status and provide counseling to hesitant

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parents. Fourth, the open and consistent publication of immunization coverage data by province and district will facilitate evaluation.

Limitations. This study is ecological in nature and uses secondary data from third-party publications; data from 2021 and 2022–2023 come from different sources and years, and SKI reported only ten provinces in the accessed source, so comparisons are limited to eight provinces. Differences in the definition of IDL between routine data and SKI data prevent direct trend analysis. Factors influencing coverage, such as distance, vaccine availability, and vaccine hesitancy, were not measured. Future studies should use complete provincial- and district-level SKI data or individual-level data.

Conclusion

IDL coverage varies greatly across provinces: only eight of 34 provinces reached the 90% target in 2021, with a range of 42.7–100.0%, and provinces with low capacity remained relatively consistent in 2021, 2022, and 2023. The 2023 SKI survey recorded an IDL rate of only 35.8% for children aged 12–23 months; differences in rates compared to routine figures are related to variations in definitions and data sources, but provincial rankings are consistent ($\rho = 0.95$). Village midwives need to strengthen record-keeping, take advantage of every mother–infant contact to check immunization status, and prioritize outreach in low-capacity areas, while immunization data by province and district need to be published openly and consistently.

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