



Analysis of the Availability of Healthcare Human Resources at Health Centers in Central Sulawesi Province for 2024

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Abstract

Background: Equitable human resources for health (HRH) are essential for effective Puskesmas services, but aggregate workforce totals may conceal facility level gaps. **Objective:** To describe workforce composition and geographic distribution and quantify completeness of nine strategic health worker categories in Central Sulawesi Puskesmas in 2024. **Methods:** This descriptive secondary data study included all 219 operational Puskesmas. Actual 2024 HRH administrative records from the Central Sulawesi Provincial Health Office were analyzed using frequencies, percentages, and geographic ranges. Facility denominators and nine cadre completeness were reconciled with the official 2024 provincial health profile. **Results:** The nine health worker categories comprised 13,172 personnel. Midwives (5,043; 38.3%) and nurses (4,168; 31.6%) were the largest groups. Of 219 Puskesmas, 117 were inpatient and 102 non-inpatient. Only 96 facilities (43.8%) had all nine strategic workforce categories, while 123 (56.2%) lacked at least one. Dentists and medical laboratory technologists were the most frequently missing cadres. Workforce availability also varied geographically, indicating uneven staffing across districts and municipalities. **Conclusion:** Central Sulawesi has a substantial primary care workforce, but facility level completeness remains limited. Workforce planning should prioritize specific vacancies, equitable cadre distribution, and hard to reach settings rather than infer service readiness from provincial workforce totals alone.

Keywords: Human resources for health; Puskesmas; Workforce distribution; Primary health care; Central Sulawesi.

Introduction

Indonesia's health system places Puskesmas at the center of primary health care, with responsibilities spanning promotive, preventive, curative, rehabilitative, and palliative services within defined working areas. The Health Law emphasizes equitable access and the right to health, while Minister of Health Regulation No. 19 of 2024 provides the current regulatory framework for Puskesmas organization and workforce planning^{1,2}. Nationally, the size of the health workforce does not by itself guarantee complete staffing at

every primary care facility; the Indonesia Health Profile 2023 documents a large Puskesmas network and substantial health-worker numbers alongside differences in workforce availability across provinces and facilities³.

Central Sulawesi is a particularly relevant setting because its 13 districts and municipalities include urban, rural, mountainous, coastal, and island communities. The official 2024 provincial health profile recorded 219 operational Puskesmas,

comprising 117 inpatient and 102 non inpatient facilities, and reported that only 96 facilities had all nine strategic workforce categories available⁴. This pattern makes facility level workforce completeness, rather than provincial headcount alone, central to interpreting service readiness.

Contemporary health workforce frameworks distinguish total workforce supply from equitable distribution and service readiness. The World Health Organization's Workforce 2030 strategy emphasizes availability, accessibility, acceptability, and quality, while guidance for rural and remote areas highlights context specific attraction, recruitment, and retention policies^{5,6}. Indonesian evidence similarly shows that workforce supply can coexist with substantial geographic and facility level maldistribution, including inconsistent availability of important public-health cadres across primary-care facilities^{7,8}.

The key evidence gap for this study is therefore not simply the provincial number of health workers, but how workforce composition and reported geographic distribution relate to the completeness of strategic cadres at Puskesmas level. This study aimed to describe the type and number of health workers in Central Sulawesi Puskesmas in 2024, summarize their reported distribution across geographic categories, and quantify the proportion of facilities with complete availability of nine strategic workforce categories without inferring facility level adequacy from aggregate provincial totals.

Materials and Methods

Study Design

This was a descriptive observational study based exclusively on secondary administrative data. The study setting was the Central Sulawesi Provincial Health Office, Palu, Indonesia. The analytic data represented

Puskesmas and healthcare human-resources conditions during calendar year 2024. Data checking, tabulation, and manuscript analysis were conducted from August to September 2025. No interviews, focus groups, participant observation, or qualitative analytic procedures were included in the study reported in this article.

Sample

The study population comprised all operational registered Puskesmas in Central Sulawesi Province in 2024, and total sampling was applied. The final denominator was 219 Puskesmas across 13 districts/municipalities. Facility service type was reconciled with the official 2024 Central Sulawesi Province Health Profile, yielding 117 inpatient Puskesmas (53.4%) and 102 non-inpatient Puskesmas (46.6%)⁴.

Data Collection Technique

The principal source was the fixed 2024 healthcare human resources administrative extract maintained by the Central Sulawesi Provincial Health Office. The extract contained counts for nine workforce categories: general practitioners, dentists, nurses, midwives, public health personnel (SKM), nutritionists, pharmacists, environmental sanitation personnel, and medical laboratory technologists. It also contained district level Puskesmas, Pusling, and Pustu counts and reported personnel ranges by administrative geographic category. The extract was cross-checked against the official provincial health profile for the total number of operational Puskesmas, inpatient/non inpatient status, and the published indicator of completeness of nine strategic workforce categories⁴. The labels urban, rural, remote, and very remote were retained exactly as recorded in the source dataset; the fixed extract did not contain the

underlying classification criteria, so the study did not independently redefine these categories.

Data Analysis Technique

Univariate descriptive analysis was performed using frequencies and percentages. The nine reported cadre counts were summed and checked arithmetically; the internally consistent workforce denominator was 13,172 personnel, and cadre percentages were calculated against this total. Reported geographic ranges were summarized descriptively without converting ranges into estimated means or facility counts. Aggregate provincial cadre totals were treated as workforce composition indicators only and were not used to claim that individual Puskesmas met profession specific minimum staffing requirements. Facility level interpretation was limited to the official nine cadre completeness indicator reported in the provincial profile. Regulation No. 19 of 2024 was used as a normative policy reference rather

than as a basis for unsupported facility level adequacy calculations^{2,4}.

Lastly, the author extends heartfelt appreciation to all individuals and institutions that, directly or indirectly, contributed to the successful completion of this study on the availability and distribution of Human Resources for Health (HRH) in community health centers across Central Sulawesi Province. Their support and collaboration were invaluable in achieving the objectives of this research.

Results

This study analyzed the 2024 administrative record of Puskesmas and healthcare human resources maintained by the Central Sulawesi Provincial Health Office, with the Puskesmas as the principal unit of analysis for facility level completeness.

Community Health Center Data

Table 1. Distribution of Community Health Centers, Mobile Community Health Centers, and Assistant Community Health Centers in Central Sulawesi Province

No	District	Name Puskesmas		Pusling	Pustu
		Inpatient	Non-Inpatient		
1	Banggai Kepulauan	9	5	12	45
2	Banggai	13	14	27	105
3	Morowali	7	4	11	34
4	Poso	11	13	14	53
5	Donggala	15	3	18	70
6	Toli-toli	13	2	21	75
7	Buol	5	8	52	52
8	Parigi Moutong	16	8	23	71
9	Tojo Una-una	6	10	3	48
10	Sigi	10	9	19	48
11	Banggai Laut	3	7	23	23
12	Morowali Utara	6	8	5	49
13	Kota Palu	3	11	17	25
Total		117	102	245	698

Source: Central Sulawesi Provincial Health Office administrative data and Central Sulawesi Province Health Profile 2024. The Banggai inpatient/non-inpatient allocation was reconciled to the official provincial profile.

Central Sulawesi had 219 operational Puskesmas in 2024. After reconciliation with the official provincial profile, 117 (53.4%) were inpatient facilities and 102 (46.6%) were

non-inpatient facilities. The Banggai row was corrected to 13 inpatient and 14 non inpatient Puskesmas, resolving the previous 116/103 denominator inconsistency while preserving

the district total of 27 Puskesmas. The province also reported 245 Pusling and 698 Pustu⁴.

The service network is extensive, but the number of facilities should not be interpreted as evidence of equal service capacity. Workforce availability, logistics, referral support, and operational resources determine whether each facility can deliver timely and comprehensive primary care.

Type and quantity of manpower

The nine reported healthcare workforce categories comprised 13,172 personnel. Table 2 presents the number and percentage of each cadre using this internally reconciled denominator.

Midwives were the largest cadre (5,043; 38.3%), followed by nurses (4,168; 31.6%) and public health personnel (1,493; 11.3%). Pharmacists accounted for 680 workers (5.2%), nutritionists 481 (3.7%), environmental sanitation personnel 448 (3.4%), general practitioners 410 (3.1%), medical laboratory technologists 318 (2.4%), and dentists 131 (1.0%).

Midwives and nurses together represented 69.9% of the nine-cadre workforce, showing that provincial workforce composition was strongly concentrated in nursing and maternal-health personnel. Supporting public-health, pharmacy, nutrition, environmental-health, laboratory, medical, and dental cadres were numerically smaller.

Table 2. Analysis of the Distribution of Types and Number of Community Health Center Personnel in Central Sulawesi Province in 2024

Type of health worker	f	%
General Practitioner	410	3.1
Dentist	131	1.0
Nurse	4,168	31.6
Midwife	5,043	38.3
Health Promotion & Behavioral Sciences (SKM)	1,493	11.3

Type of health worker	f	%
Nutritionist	481	3.7
Pharmacist	680	5.2
Environmental Sanitation Specialist	448	3.4
Medical Laboratory Technologist	318	2.4
Total	13,172	100.0

Source: 2024 healthcare human-resources administrative extract, Central Sulawesi Provincial Health Office. Percentages use the internally reconciled denominator N=13,172.

These percentages describe provincial workforce composition only. They do not demonstrate whether every Puskesmas had each required cadre, because aggregate provincial totals can coexist with facility-level vacancies and unequal geographic distribution.

Distribution of health workers

The workforce distribution analysis used the geographic categories recorded in the secondary administrative dataset (urban, rural, remote, and very remote). Table 3 reports the recorded minimum to maximum personnel ranges per Puskesmas within each category.

The reported ranges generally decreased from urban to very remote categories. General practitioners ranged from 3-5 in urban Puskesmas to 1 in very remote Puskesmas, while dentists ranged from 1-2 to 0. Nurses and midwives remained the largest groups across all categories, but their reported ranges were also lower in remote and very remote settings. Grouped supporting cadres showed the same directional gradient.

Table 3. Analysis of Community Health Center Personnel Distribution in Central Sulawesi Province in 2024

Health-worker category	Urban	Rural	Remote	Very Remote
General practitioners	3–5	1–3	1–2	1
Dentists	1–2	0–1	0–1	0
Nurses	25–60	20–40	20–35	10–25

Health-worker category	Urban	Rural	Remote	Very Remote
Midwives	20–50	20–40	15–30	10–25
Public health (SKM)	10–16	5–10	3–5	1–3
Nutrition & pharmacy	4–7	2–4	2–3	1–2
Sanitation & laboratory	2–5	1–2	1	0–1

Source: 2024 healthcare human-resources administrative extract. Geographic labels and grouped supporting cadre ranges are reported as recorded in the source dataset; the study did not independently redefine the categories.

Because the source dataset reported ranges rather than a complete facility by cadre matrix, these values describe the recorded distribution

pattern and cannot be converted reproducibly into the number of facilities meeting a profession specific staffing standard. The source also did not provide the criteria used to assign the urban, rural, remote, and very remote labels.

Analysis of Human Resources Availability

The official provincial profile provided the facility level indicator needed to interpret workforce completeness. Table 4 therefore reports facility level completeness of the nine strategic health worker categories and clearly separates this indicator from aggregate provincial workforce composition.

Table 4. Facility Level Completeness of Strategic Puskesmas Workforce Categories, 2024

Facility-level indicator	n	%	Interpretation	Notes
Operational registered Puskesmas	219	100.0	Study denominator	All 13 districts/municipalities
Inpatient Puskesmas	117	53.4	Service type	Reconciled with official profile
Non-inpatient Puskesmas	102	46.6	Service type	Reconciled with official profile
Puskesmas with all nine strategic workforce categories	96	43.8	Complete nine-cadre availability	All nine strategic categories present
Puskesmas lacking at least one strategic workforce category	123	56.2	Incomplete nine-cadre availability	At least one strategic category absent
Dentists	131	1.0	Provincial workforce composition	Among most frequently missing cadres
Medical laboratory technologists	318	2.4	Provincial workforce composition	Among most frequently missing cadres
Profession-specific facility compliance	—	—	Not calculated	Facility by cadre matrix unavailable

Source: Central Sulawesi Province Health Profile 2024 and the 2024 HRH administrative extract. The available source supports overall nine-cadre completeness but not profession specific facility compliance rates or zero personnel counts by cadre.

Of 219 Puskesmas, 96 (43.8%) had all nine strategic workforce categories available, whereas 123 (56.2%) lacked at least one category. Dentists and medical laboratory technologists were identified as the cadres most frequently missing⁴.

Table 4 includes the provincial counts of dentists and medical laboratory technologists only as workforce composition context. These totals are not profession specific facility compliance rates and should not be interpreted

as proof that every Puskesmas met or failed a minimum staffing threshold.

The available source did not provide a complete Puskesmas by cadre matrix or reproducible profession specific zero personnel counts. Exact compliance percentages for each profession could therefore not be calculated from the aggregate dataset and were not inferred.

Discussion

Health Center (Puskesmas) Data in Central Sulawesi Province

The province wide coverage of 219 Puskesmas provides a substantial primary care network, but facility counts alone do not establish equal service capacity. Geographic conditions can make workforce placement and continuity more difficult even when facilities are physically present. Indonesian studies of early career doctors and the medical workforce in remote settings have shown that willingness to work outside urban centers is shaped by professional, personal, and contextual factors rather than vacancy numbers alone^{9,10}.

Retention is likewise influenced by resilience, career prospects, family considerations, infrastructure, incentives, professional support, and characteristics of remote practice. These factors have been documented among rural doctors, doctors and dentists, medical specialists, the wider Indonesian nursing workforce, and studies of recruitment and deployment in remote Indonesian provinces^{11,12,13,14,15,16}. Earlier international evidence also shows that successful rural staffing generally requires a package of educational, regulatory, financial, and professional support strategies rather than a single intervention¹⁷.

Accordingly, the Central Sulawesi service network should be interpreted through both facility availability and the distribution and continuity of the workforce required to make those facilities operationally effective.

Types and Number of Health Workers

Midwives and nurses together accounted for approximately 69.9% of the reported nine cadre workforce. Their numerical predominance is consistent with the broad service responsibilities of Puskesmas, especially

maternal child, nursing, community, and continuity of care functions. However, provincial composition should not be treated as proof of adequacy because a large number in one cadre cannot substitute for missing complementary professions at a specific facility.

Evidence published in Healthy Tadulako Journal reinforces this team based interpretation. Health-worker knowledge and work motivation have been associated with health-promotion practice in Puskesmas, while implementation of minimum service standards can be affected by staffing and workload conditions^{18,19}. Organizational factors are also relevant to health worker performance, and policy implementation at Puskesmas depends on the availability of appropriately qualified personnel and supporting resources^{20,21}. Consequently, workforce mix should be evaluated as a functional team rather than by ranking professions solely according to provincial headcount.

Distribution of Health Workers

The geographic ranges in Table 3 show a consistent descriptive gradient, with lower reported personnel ranges toward remote and very remote categories for doctors, dentists, nurses, midwives, public health personnel, and grouped supporting cadres. The dataset does not permit a district by district or facility by facility test of these ranges, so the finding should be interpreted as a pattern in the administrative extract rather than as a causal explanation of service outcomes.

This pattern is plausible within Indonesia's decentralized primary care system, where local governance and Puskesmas management affect resources available for community services²². It is also consistent with the primary health care principle that essential services should be accessible close to where people live²³. Systematic-review evidence indicates that rural

and remote retention improves when interventions address multiple determinants, including professional support and local context, rather than salary alone²⁴. Indonesian evidence has additionally documented continuing availability and accessibility challenges for remote, rural, and poor populations²⁵. For monitoring, WHO recommends combining health-system inputs with service-delivery and equity-oriented indicators rather than relying on aggregate totals in isolation²⁶.

Analysis of Health Human Resources (HRH) Availability

The most policy relevant result is that only 96 of 219 Puskesmas (43.8%) had all nine strategic workforce categories, while 123 (56.2%) lacked at least one. This facility-level completeness indicator provides a more defensible basis for workforce planning than comparisons between provincial totals and a single minimum number per Puskesmas. The coexistence of 131 dentists and 318 medical laboratory technologists at provincial level with their identification as the most frequently missing cadres illustrates why distribution matters.

The findings support a facility specific planning approach. Provincial and district managers need to identify which cadres are absent at each Puskesmas, distinguish persistent vacancies from temporary gaps, and align recruitment or redistribution with service type, workload, population, geographic accessibility, and infrastructure. Regulation No. 19 of 2024 can guide this process, but compliance should be calculated using a verified facility by cadre dataset rather than inferred from province wide headcounts².

This study has important limitations. The design is descriptive and uses routine secondary data, so it cannot establish causal relationships between workforce availability

and health outcomes. The fixed extract did not contain a complete facility by cadre staffing matrix, profession specific zero personnel counts, workload indicators, population denominators, or reproducible criteria underlying the urban/rural/remote/very remote labels. Accordingly, the analysis reports workforce composition, geographic ranges, and overall nine cadre completeness but does not estimate profession specific facility compliance or causal effects on service quality.

Recommendations for Future Research.

Future studies should link the provincial workforce registry to a verified Puskesmas by cadre matrix and analyze completeness separately by inpatient status, district, and geographic category. Adding population catchment, workload, vacancy duration, retention, and service output indicators would permit more precise needs based planning. Spatial analysis using geographic information systems could also identify clusters of workforce gaps and quantify travel or referral burdens in island, mountainous, and hard-to-reach areas.

Conclusion

Central Sulawesi's 2024 Puskesmas workforce comprised 13,172 personnel across nine reported categories and was dominated by midwives and nurses. The province had 219 operational Puskesmas, including 117 inpatient and 102 non-inpatient facilities. Facility level completeness remained limited: 96 Puskesmas (43.8%) had all nine strategic workforce categories, while 123 (56.2%) lacked at least one, with dentists and medical laboratory technologists identified as the most frequent gaps. These findings show that provincial headcounts should be interpreted separately from facility level completeness. Workforce policy should prioritize verified facility-specific vacancies and equitable deployment,

especially in hard-to-reach settings, while future monitoring should use a complete Puskesmas by cadre dataset.

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Conflict of Interest Statement

The author(s) declare no commercial, financial, or personal conflicts of interest related to this research. All authors approved the final manuscript and consented to its publication in *Healthy Tadulako Journal*.

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