



RESEARCH

Mapping Health Service Gaps in West Bandung Regency: Evidence from Sub-district Data and Implications for Regional Planning

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Abstract

Demographic and geographical differences between sub-districts can lead to unequal health service provision and lower the quality of health care. This study maps health service gaps in West Bandung Regency by examining how health facilities and health workers are distributed across its 16 sub-districts. It also identifies the challenges and policy responses the local government has set out on health service equity. We used a descriptive design that combines quantitative and document analysis. Using sub-district data from regional statistics, we compared population, population density, health facilities, and health workers. We also reviewed the West Bandung Regency Medium-Term Development Plan (RPJMD) 2025–2029 and Minister of Health Regulation Number 6 of 2024 on Technical Standards for Fulfilling Minimum Service Standards in Health. The data show wide gaps between sub-districts. Sub-districts with larger populations do not always have a matching share of health facilities and health workers. The population-to-health-center and population-to-health-worker ratios also show a wide range, which means some sub-districts carry a heavier potential service burden than others. The policy documents show that the local government recognizes four challenges: uneven service distribution, geographical barriers, shortages of facilities and health workers, and social factors that affect service quality. In response, the government plans to build health facilities, strengthen the health workforce, improve primary health care, and expand community health programs. By combining distribution data with policy analysis, this study provides an initial map of health service equity and a basis for needs-based regional health planning.

Keywords Health Facilities; Health Workforce; Spatial Equity; Health Services; Needs-Based Planning; Kabupaten Bandung Barat

INTRODUCTION

Health services are among the basic services that need to be provided fairly to all members of society. Within the Sustainable Development Goals (SDGs) framework, equitable access to health services is an important component of achieving healthy lives and improving social well-being (Chattu et al., 2023; Wong et al., 2016). However, health service equity is not determined only by the availability of health facilities, but also by how facilities and health workers are distributed according to regional characteristics and population needs (Eker & Imam, 2025). Unequal distribution of health services remains a challenge in various countries, particularly in regions with diverse geographical characteristics and population densities (Turkar et al., 2025). Therefore, the spatial distribution of health facilities is an important issue in regional development planning because it can influence people's opportunities to obtain adequate health services.

Various studies have shown that the distribution of health facilities does not always reflect service needs evenly. Health facility equity needs to be evaluated not only based on the number of facilities available, but also by considering the relationship between facility distribution and population needs (Ahmadi-Javid et al., 2017). The accessibility of primary healthcare services is also influenced by facility distribution, population density, and the distribution of health workers (M. Du & Zhao, 2022; Tan et al., 2021). A needs-based planning approach further emphasizes the importance of balancing healthcare supply with service demand when planning health facilities (Goetschius, 2024a). Recent studies on healthcare facility equity and facility optimization also highlight the importance of considering spatial characteristics, population distribution, and service capacity in planning more equitable health services (Benhlina et al., 2023; A. A. Murad & Azmain, 2026)

In Indonesia, equitable access to health services has also become an important issue in regional development. The spatial distribution of public facilities, including health facilities, remains uneven and is influenced by differences in regional characteristics (Novita Listyaningrum et al., 2025). Studies on healthcare access in West Java also indicate that health facility location planning needs to consider population distribution and projected service demand to support more equitable health service provision (Nashir et al., 2023). Research on the distribution of health centers in Indonesian cities further shows that evaluating facility distribution can help identify areas that still require improvements in health service provision (Sadali et al., 2023). Although many previous studies have applied Geographic Information Systems (GIS), buffer analysis, network analysis, and location-allocation models, studies that integrate the distribution of health facilities, health workers, and regional policy analysis within a single framework remain relatively limited, particularly at the regency level (Nicholson et al., 2023)

West Bandung Regency was selected as the study area because it has diverse regional characteristics, ranging from urban and peri-urban areas to rural areas with hilly and mountainous topography. These conditions have the potential to influence the provision and equity of health services between sub-districts. Based on *West Bandung Regency in Figures 2026*, the regency has 12 hospitals, 32 health centers, and 49 auxiliary health centers distributed across 16 sub-districts with different population characteristics (BPS-Statistics of Bandung Barat Regency, 2026). Lembang Sub-district, for example, has four health centers and two hospitals, while several sub-districts, such as Sindangkerta, Saguling, and Batujajar, have only one health center and no hospital. Variations can also be observed in the distribution of health workers, with Cililin having approximately 335 health workers, while

Sindangkerta and Saguling each have only 32 health workers (BPS-Statistics of Bandung Barat Regency, 2026). On the other hand, Ngamprah has the highest population density at 5,834 people/km², while Padalarang and Lembang have among the largest populations in the regency (BPS-Statistics of Bandung Barat Regency, 2026). These conditions indicate that the distribution of health facilities and health workers does not always correspond directly to demographic characteristics, potentially resulting in variations in health service provision between sub-districts (Nicholson et al., 2023).

The importance of equitable health services is also reflected in national and regional policies. Minister of Health Regulation Number 6 of 2024 concerning Technical Standards for the Fulfillment of Minimum Health Service Standards emphasizes the responsibility of local governments to ensure the availability of basic health services that meet quality standards and are supported by adequate health facilities and human resources (BPS-Statistics of Bandung Barat Regency, 2026). In line with this, the 2025–2029 West Bandung Regency RPJMD identifies several health development challenges, including disparities in health services between regions, limitations in health workers, the need to improve health service facilities and infrastructure, and the persistence of various public health problems (West Bandung Regency Government, 2025). These conditions highlight the importance of evaluating the distribution of health facilities and health workers as a basis for developing more equitable and effective health service policies (Jalilian et al., 2025).

Based on these considerations, this study aims to (1) analyze variations in the distribution of health facilities between sub-districts in West Bandung Regency, (2) analyze variations in the distribution of health workers as one of the components of health service provision, and (3) identify challenges and local government policy responses in supporting equitable health services. Unlike previous studies that generally focus on spatial accessibility analysis or health facility location optimization, this study integrates descriptive statistical analysis of health facility and health worker distribution with an analysis of regional policy documents. This approach is expected to contribute to the development of needs-based health service equity strategies and provide an empirical basis for local governments in determining health service development priorities according to the characteristics and needs of each sub-district.

RESEARCH METHODS

2.1 Research Design

This study uses a descriptive approach combining quantitative analysis and document analysis. Quantitative analysis is used to describe variations in the distribution of health facilities, health workers, and demographic characteristics across sub-districts in West Bandung Regency. Meanwhile, document analysis is used to identify challenges in health service equity, local government policy responses, and policy implications related to health service provision (Mao & Huo, 2023).

The research process began with secondary data collection and processing concerning regional characteristics, population, health facilities, and health workers at the sub-district level. Descriptive analysis was then conducted to examine the distribution of health facilities, the population-to-facility ratio, the distribution of health workers, and the population-to-health-worker ratio to identify variations in health service provision across regions. The quantitative results were then interpreted through document analysis of the 2025–2029 West Bandung Regency RPJMD and regulations related to Minimum Service Standards in the health sector (Ministry of Health of the Republic of Indonesia,

2024); (West Bandung Regency Government, 2025) to identify equity challenges, local government policy responses, and relevant policy implications.

This study does not aim to directly measure health service accessibility or determine the optimal location of health facilities. The analysis is based on facility distribution, health worker distribution, and demographic characteristics available in secondary data. Therefore, the results describe variations in health service provision and potential differences in service burden between sub-districts, rather than measuring actual public accessibility based on distance, travel time, transportation networks, or the service coverage area of each health facility (Guagliardo, 2004).

2.2 Research Location

The study was conducted in West Bandung Regency, West Java Province, which consists of 16 sub-districts with an area of approximately 1,283.43 km² (BPS-Statistics of Bandung Barat Regency, 2026). West Bandung Regency was selected as the study area because it has diverse regional characteristics, including urban, peri-urban, and rural areas with mountainous and highland terrain. This diversity of characteristics potentially influences the provision and distribution of health services between regions.

Based on *Kabupaten Bandung Barat dalam Angka 2026*, each sub-district shows different demographic characteristics and health service availability. Ngamprah has the highest population density, while Lembang and Padalarang are the sub-districts with the largest populations. On the other hand, the distribution of hospitals, health centers, auxiliary health centers, and health workers does not always follow the pattern of population size and density (BPS-Statistics of Bandung Barat Regency, 2026). These variations make West Bandung Regency a relevant area for studying the distribution of health facilities, the distribution of health workers, and challenges in health service equity at the sub-district level.

2.3 Data Collection

Research data were obtained from three main documents consisting of one regional statistical document, one regional development planning document, and one health service regulation. The main quantitative data were sourced from *Kabupaten Bandung Barat dalam Angka 2026*, which was used to obtain data on area, population, population density, number of hospitals, health centers, auxiliary health centers, and health workers, including medical personnel, nursing personnel, midwifery personnel, pharmaceutical personnel, community health personnel, nutrition personnel, and therapy personnel (BPS-Statistics of Bandung Barat Regency, 2026). The data were analyzed at the sub-district level to describe variations in demographic characteristics, health facility distribution, and health worker distribution across regions. In addition, comparisons between population size and the number of health facilities and health workers were used to calculate population-to-facility ratios and population-to-health-worker ratios as descriptive indicators for identifying variations in potential health service burden between sub-districts (Etches et al., 2006).

Policy analysis was conducted using the 2025–2029 West Bandung Regency RPJMD as the main planning document, particularly to identify health service equity challenges, geographical and socio-economic conditions, as well as local government policy responses and programs (West Bandung Regency Government, 2025). Meanwhile, Regulation of the Minister of Health Number 6 of 2024 concerning Technical Standards for Compliance with Minimum Health Service Standards was used as

a normative reference to understand the framework for fulfilling basic health services (Ministry of Health of the Republic of Indonesia, 2024). The three sources were used complementarily: statistical data were used to identify variations in the distribution of health facilities, the distribution of health workers, and potential service burdens empirically; the RPJMD document was used to identify regional challenges and policy responses; while the Minimum Service Standards regulation was used to provide a normative context for health service provision.

Table 1. Data Sources, Data Types, and Relevance in Study

No.	Documents / Data Sources	Data Types	Data Obtained	Relevance to Study
1	Kabupaten Bandung Barat dalam Angka 2026	Quantitative	Area, number population, density population, number House hospital, hall health, community health center, community health center maid, and amount power medical, personnel nursing, power midwifery, labor pharmacy, manpower health community, energy nutrition and energy therapy at the level subdistrict	Used For describe characteristics demographics, variations distribution facility health, distribution power health, as well as count ratio resident to facility health and energy health as indicator descriptive potential burden service health.
2	Kabupaten Bandung Barat RPJMD 2025–2029	Qualitative and quantitative	Issue strategic health, condition service health, challenges equality, conditions socio-economic conditions geographic and spatial, as well as direction development policies and programs health	Used For identify challenge equality service health and analyze response policy Government Kabupaten Bandung Barat against problem service health.
3	Minister of Health Regulation Number 6 of 2024 concerning Technical Standards Compliance Standard Minimum Health Services	Policy / Regulation	Provision about Standard Minimum Service (SPM) in the field health, services health basic facilities service health, sources Power health, as well as not quite enough answer government area	Used as framework normative For understand standard service base health and contextualize findings about provision facilities and manpower health in Kabupaten Bandung Barat.

Source: Processed by authors, 2026

2.4 Data Analysis

This study uses descriptive quantitative analysis and qualitative document analysis. The two approaches are used complementarily to identify variations in health service provision empirically while also understanding local government policy challenges and responses. Descriptive quantitative analysis was selected because this study aims to describe the distribution patterns of health facilities, the availability of health workers, and variations in potential service burden between sub-districts, rather than test causal relationships or directly measure health service performance (Pál et al., 2021). Meanwhile, document analysis is used to understand the policy context and health development issues that cannot be fully explained through statistical data alone (Dalglish et al., 2021).

Quantitative analysis was conducted descriptively through several stages. Data on area, population, population density, number of health facilities, and number of health workers at the sub-district level were compiled and tabulated. The data were then compared across sub-districts to identify variations in demographic characteristics, patterns of health facility distribution, and differences in the availability of health service resources between regions. Population density was used to describe the concentration of population, while the number of health facilities and health workers was used to describe the availability of health service resources in each sub-district. Population-to-facility and population-to-health-worker ratios were then calculated, including population per health center, population per hospital, and population per health worker. These ratios were used as descriptive indicators to compare potential health service burdens between regions (Kpebo et al., 2022). The use

of these ratios was not intended to measure actual service capacity or facility performance, as this study does not include data on bed capacity, patient visits, service coverage, or health service utilization.

The quantitative results were then presented in tables and graphs to illustrate the distribution patterns of health facilities and variations in potential service burden between sub-districts. The analysis focused on identifying areas with combinations of characteristics such as a large population, high population density, relatively limited health facility availability, or a relatively low number of health workers compared with other regions. These characteristics were used as initial indications of differences in health service provision that may require further attention in regional health development planning.

Document analysis was conducted using the 2025–2029 West Bandung Regency RPJMD and Regulation of the Minister of Health Number 6 of 2024 concerning Technical Standards for Compliance with Minimum Health Service Standards (Ministry of Health of the Republic of Indonesia, 2024; West Bandung Regency Government, 2025). The documents were analyzed through several stages, including reading and reviewing information related to health development, identifying health service problems, extracting relevant information, and grouping findings based on themes (Kpebo et al., 2022). The document analysis results were then classified into several main issues, namely (1) health service equity between regions, (2) geographical constraints and service accessibility, (3) availability of health facilities and infrastructure, and (4) availability and distribution of health human resources. Each issue was then compared with local government programs and strategies to identify the alignment between identified health service problems and planned policy responses.

The quantitative and document analyses were then integrated to obtain a more comprehensive understanding of health service provision in West Bandung Regency. Findings on population characteristics, health facility distribution, and potential service burden were used as an empirical basis for interpreting health development challenges identified in policy documents. The research findings were further compared with previous studies to identify similarities, differences, and the contribution of this study to supporting regional needs-based health service planning (ŞENOL et al., 2023).

RESULTS AND DISCUSSION

3.1 Variations in the Distribution of Health Facilities across Subdistricts

The analysis results show considerable variation in the provision of health facilities among subdistricts in Kabupaten Bandung Barat. The differences can be seen in various types of health facilities, including hospitals, health halls, health centers, and auxiliary health centers (Pustu).

Table 2. Distribution Health Facilities According to Subdistricts in Kabupaten Bandung Barat

Subdistrict	Hospital	Health Hall	Health Center	Auxiliary Health Center (Pustu)
Rongga	0	0	1	6
Gununghalu	0	2	1	6
Sindangkerta	0	0	2	6
Cililin	2	2	2	3
Cihampelas	0	6	2	4
Cipongkor	0	1	2	3
Batujajar	0	8	1	0
Saguling	0	0	1	3
Cipatat	0	3	3	2

Padalarang	4	26	3	2
Ngamprah	2	16	2	3
Parongpong	0	13	2	1
Lembang	2	16	4	3
Cisarua	1	2	2	2
Cikalongwetan	1	4	2	1
Cipeundeuy	0	1	2	4

Source: Processed by authors, 2026

Based on Table 2, the distribution of health facilities in Kabupaten Bandung Barat shows variation among subdistricts. Overall, there are 12 hospitals, 100 health halls, 32 health centers, and 49 auxiliary health centers (Pustu) distributed across 16 subdistricts. Although health facilities are available across all subdistricts, the distribution pattern shows a concentration of facilities in certain areas compared to other subdistricts.

The concentration of health facilities is particularly evident in subdistricts with urban characteristics and higher population activity. Padalarang has the highest number of hospitals, with four units, followed by Lembang and Ngamprah, with two units each. In addition, Padalarang also has the highest number of health halls, namely 26 units. On the other hand, several subdistricts in the southern part of the region with rural characteristics, such as Rongga, Sindangkerta, and Saguling, do not have hospitals or health halls. This condition shows that the distribution of health facilities tends to be concentrated in service centers with higher levels of regional development and economic activity (Shao & Wu, 2026).

The concentration pattern of health service facilities in certain areas has also been found in various previous studies. Research related to the distribution of public facilities shows that facility provision often follows population concentration, regional development, and the level of accessibility of an area, so that areas that function as activity centers tend to have a greater number of facilities compared to peripheral areas (Yin et al., 2018). However, an approach based only on the number of facilities is not sufficient to describe service equity because it does not consider differences in population size and service needs among regions .

At the primary health service level, variations in distribution are also visible among subdistricts. Lembang has the highest number of health centers, namely four units, while Cipatat and Padalarang each have three units. Most other subdistricts have only one to two health centers. Similar variations can also be seen in the distribution of auxiliary health centers, with the highest number found in Rongga, Gununghalu, and Sindangkerta, each with a total of six units. The existence of health centers in certain areas shows efforts to provide health services closer to communities, particularly in areas with wide geographical coverage or dispersed settlement characteristics.

Although so, the number of facilities does not always indicate the same level of service accessibility. Areas with a greater number of facilities do not necessarily have better service accessibility if the number of residents to be served is also much larger. On the other hand, subdistricts with a limited number of facilities may face a higher potential service burden if they serve a large population or a large area. This finding is consistent with the concept of spatial equity in public services, which considers not only the presence of facilities but also the relationship between facility distribution, population needs, and regional characteristics (Chen & Fu, 2023).

Thus, the distribution of health facilities in Kabupaten Bandung Barat shows variations in provision among regions, which can be examined more deeply through population-based indicators. The

analysis of the number of facilities needs to be complemented by calculations of the population-to-health-facility ratio to identify subdistricts that have a higher potential service burden and to understand differences in health service needs among subdistricts.

3.2 Ratio Resident to Health Facilities

The distribution of the number of health facilities does not fully reflect the level of service provision in each subdistrict because each region has a different population size. Therefore, the analysis was continued by calculating the ratio of residents to health facilities to describe the potential service burden in each subdistrict. The ratio was calculated for hospitals, health halls, health centers, and auxiliary health centers (Pustu) by dividing the number of residents by the number of facilities in each subdistrict.

In this study, the ratio was used as a descriptive indicator to compare variations in health facility provision among regions, not as a measure of current service capacity because the study did not use data regarding facility capacity, number of patient visits, or service area coverage. Although the ratio was calculated for all types of health facilities, the visualization only focused on the ratio of residents to health centers. Health centers were chosen because they are primary-level health service facilities available in all subdistricts, allowing for a more representative comparison among regions compared to hospitals, health halls, and auxiliary health centers, which have different distributions and service functions.

Table 3. Ratio of Residents to Health Facilities in Kabupaten Bandung Barat

Subdistrict	Residents	Residents / Hospital	Residents / Health Hall	Residents / Health Center	Residents / Auxiliary Health Center
Rongga	64,518	–	–	64,518	10,753
Gununghalu	83,484	–	41,742	83,484	13,914
Sindangkerta	78,791	–	–	39,396	13,132
Cililin	102,048	51,024	51,024	51,024	34,016
Cihampelas	147,673	–	24,612	73,837	36,918
Cipongkor	108,275	–	108,275	54,138	36,092
Batujajar	117,581	–	14,698	117,581	–
Saguling	36,877	–	–	36,877	12,292
Cipatat	149,074	–	49,691	49,691	74,537
Padalarang	191,965	47,991	7,383	63,988	95,983
Ngamprah	187,028	93,514	11,689	93,514	62,343
Parongpong	119,132	–	9,164	59,566	119,132
Lembang	206,935	103,468	12,933	51,734	68,978
Cisarua	84,421	84,421	42,211	42,211	42,211
Cikalongwetan	136,432	136,432	34,108	68,216	136,432
Cipeundeuy	93,590	–	93,590	46,795	23,398
Kabupaten Bandung Barat	1,907,824	158,985	19,078	59,620	38,935

Source: Processed by authors, 2026

Based on Table 3, the ratio of residents to health facilities shows variation among subdistricts in Kabupaten Bandung Barat. At the primary care level, an average of one health center serves around 59,620 residents. However, there is a considerable difference among regions. Batujajar has the highest population-to-health-center ratio, namely 117,581 people per health center, followed by Ngamprah (93,514 people), Gununghalu (83,484 people), Cihampelas (73,837 people), and Cikalongwetan (68,216 people). In contrast, Saguling (36,877 people), Sindangkerta (39,396 people), and Cisarua (42,211 people) have relatively lower ratios compared to the average of Kabupaten Bandung Barat.

The ratio of residents to health halls also shows considerable variation among subdistricts. On average, one health hall serves approximately 19,078 residents. Padalarang has the lowest population-to-health-hall ratio, namely approximately 7,383 people per health hall, followed by Parongpong (9,164 people), Ngamprah (11,689 people), Lembang (12,933 people), and Batujajar (14,698 people). In contrast, Cipongkor (108,275 people), Cipeundeuy (93,590 people), Gununghalu (41,742 people), and Cisarua (42,211 people) have relatively higher ratios. In addition, Rongga, Sindangkerta, and Saguling do not yet have health halls, so health services in these three subdistricts depend more on other types of health facilities.

The ratio of residents to hospitals was not analyzed as the main indicator because the distribution of hospitals in Kabupaten Bandung Barat is still concentrated in several subdistricts. Of the 16 subdistricts, only six have hospitals, while the other ten subdistricts do not yet have this facility. In addition, hospitals are health service facilities that serve communities across administrative regions, so the population-to-hospital ratio is not sufficiently representative to describe variations in health service provision at the subdistrict level.

Among supporting health facilities, the ratio of residents to auxiliary health centers (Pustu) also shows variation among regions. Cikalongwetan (136,432 people per auxiliary health center), Parongpong (119,132 people per auxiliary health center), and Padalarang (95,983 people per auxiliary health center) have the highest ratios, while Rongga (10,753 people per auxiliary health center), Saguling (12,292 people per auxiliary health center), and Sindangkerta (13,132 people per auxiliary health center) have the lowest ratios. This variation shows that the provision of supporting health facilities also differs among subdistricts, although auxiliary health centers basically function as complementary facilities to services provided by health centers.

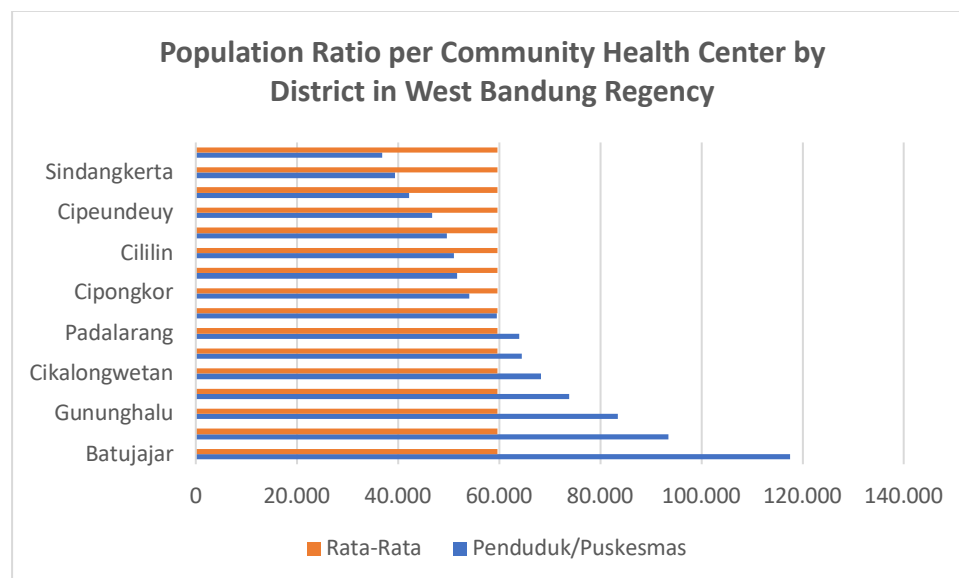


Figure 1. Ratio of Population per Health Center According to Subdistricts in Kabupaten Bandung Barat. Source: Processed by authors, 2025

Figure 1 presents a visualization of the population-to-health-center ratio as the main indicator of primary health service provision in Kabupaten Bandung Barat. Health centers were chosen as the focus of the visualization because they are primary-level health service facilities available in all subdistricts, allowing for a more representative comparison among regions compared to hospitals, health halls, and auxiliary health centers, which have different distributions and service functions. Figure 3 shows

the variation in the population-to-health-center ratio more clearly by sorting the values from the highest to the lowest. The average for Kabupaten Bandung Barat is 59,620 people per health center, which is used as a comparator to identify subdistricts that have a higher potential primary health service burden compared to the regency average. It can be seen that Batujajar, Ngamprah, Gununghalu, Cihampelas, and Cikalongwetan are above the average line, whereas most other subdistricts are at or below the average value.

The difference in ratios shows that the number of residents served by each health center is not the same in every subdistrict. Subdistricts with higher ratios potentially face greater primary health service pressure because each health center serves a larger population. On the other hand, subdistricts with lower ratios have a relatively smaller potential service burden. The difference in ratios shows that the number of residents served by each health center is not the same in every subdistrict. Subdistricts with higher ratios potentially face greater primary health service pressure because each health center serves a larger population. On the other hand, subdistricts with lower ratios have a relatively smaller potential service burden. This finding is consistent with previous studies showing that the provision of public service facilities does not always develop proportionally with population growth, which can result in variations in service levels among regions (Chang et al., 2023; Zhou et al., 2026). However, the population-to-health-center ratio in this study is only used as a descriptive indicator of potential service burden and cannot be interpreted as a measure of service capacity or health service quality directly.

Overall, the analysis results show that the ratio of residents to various types of health facilities still varies among subdistricts in Kabupaten Bandung Barat. These variations indicate that the provision of health facilities is not yet fully proportional to population distribution. Therefore, health facility planning needs to consider not only the number of available facilities, but also population characteristics and service needs in each region. This approach is consistent with the concept of needs-based planning, which emphasizes that the provision of public service facilities should be adjusted to community needs to support more effective and equitable service distribution (Gossip et al., 2023)

3.3 Variations Distribution of Health Workers

Besides availability of health facilities, health workers are an important component that influences the ability of an area to provide health services (Kumar et al., 2026). Therefore, analysis of the distribution of health workers was conducted to identify variations in the availability of health workers between sub-districts in Kabupaten Bandung Barat. Health worker data were grouped based on six categories, namely medical personnel, nursing staff, midwifery staff, pharmaceutical workforce, community health workers, and nutritional workforce. The number of health workers in each sub-district was then calculated in aggregate to provide a general description of the distribution of health workers between regions.

Table 4. Distribution of Health Workers According to Subdistricts in Kabupaten Bandung Barat

Subdistrict	Medical Personnel	Nursing Staff	Midwifery Staff	Pharmaceutical Workforce	Community Health Workers	Nutritional Workforce	Number of Health Workers
Cililin	21	150	131	21	6	6	335
Lembang	55	132	79	29	10	7	312
Cikalongwetan	23	131	52	15	6	5	232
Cipatat	21	27	30	8	8	3	97
Padalarang	13	25	33	4	3	2	80

Cipeundeuy	7	10	37	5	6	2	67
Gununghalu	9	23	29	2	2	1	66
Cisarua	7	16	30	5	2	2	62
Sindangkerta	6	10	33	4	6	2	61
Cihampelas	11	15	25	4	3	2	60
Cipongkor	7	7	39	3	2	2	60
Ngamprah	10	13	28	5	1	3	60
Batujajar	5	18	22	3	2	1	51
Parongpong	14	9	13	3	5	4	48
Rongga	3	8	17	1	2	1	32
Saguling	3	7	16	3	2	1	32

Source: Processed by authors, 2026

Based on Table 4, the distribution of health workers shows considerable variation between sub-districts in Kabupaten Bandung Barat. Cililin has the highest number of health workers, with a total of 335 people, followed by Lembang with 312 people and Cikalongwetan with 232 people. On the other hand, Rongga and Saguling have the lowest number of health workers, each with 32 people. The difference shows that the availability of health workers is not yet evenly distributed between regions.

Variation in distribution is also seen in each group of health workers. Nursing staff are the largest group in most sub-districts, especially in Cililin (150 people), Lembang (132 people), and Cikalongwetan (131 people). Meanwhile, midwifery staff also show relatively high numbers, with the largest numbers found in Cililin (131 people), Lembang (79 people), and Cikalongwetan (52 people). On the other hand, community health workers and nutritional workers are groups with more limited numbers in almost all sub-districts, with most areas having fewer than ten workers in each category.

In terms of spatial distribution, the number of health workers tends to be higher in several sub-districts, such as Cililin, Lembang, and Cikalongwetan. This condition shows the concentration of health workers in certain areas, while several other sub-districts have relatively fewer health workers. However, the absolute number of health workers cannot yet be used to evaluate service adequacy because it does not consider the number of residents served, the workload of health workers, service area coverage, and the characteristics of health facilities in each sub-district (Lake et al., 2026; Zhao et al., 2024).

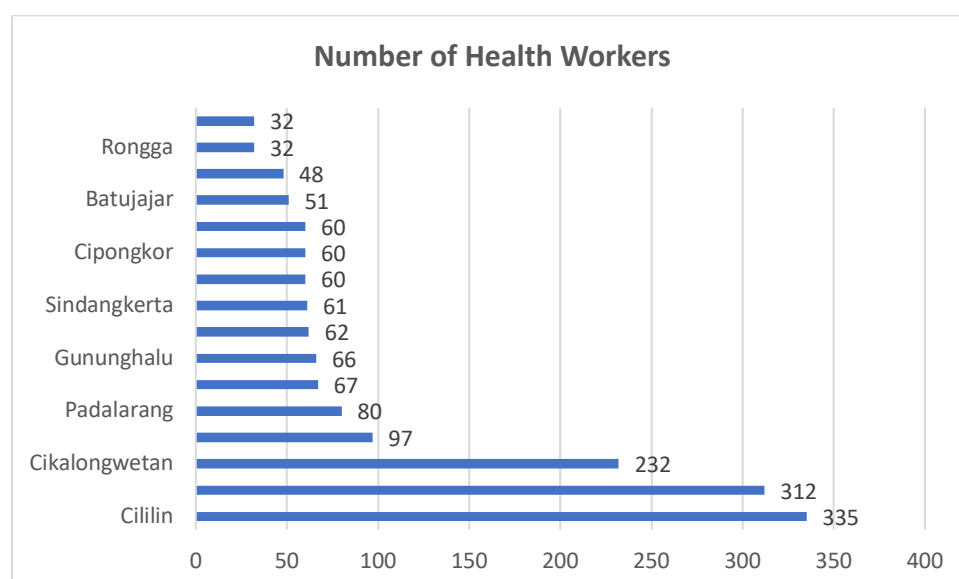


Figure 2. Distribution of the Number of Health Workers According to Subdistricts in Kabupaten Bandung Barat. Source: Processed by authors, 2026

Figure 2 shows variations in the number of health workers between sub-districts based on the total of six categories of health workers. Cililin, Lembang, and Cikalongwetan have the highest number of health workers compared to other sub-districts, while Rongga and Saguling have the lowest numbers. The difference shows that the distribution of health workers still has an uneven pattern between regions.

Although areas with a higher number of health workers potentially have greater human resource support, this interpretation needs to consider the characteristics of the population and service needs in each sub-district (Lake et al., 2026; Zhao et al., 2024). A sub-district with a high number of health workers does not necessarily have a better level of service if the number of residents who must be served is also large. On the other hand, areas with fewer health workers can have a greater service burden if the ratio between health workers and population shows an imbalance. Therefore, further analysis is conducted through the ratio of residents to health workers to describe potential variations in the service burden of health workers.

3.4 Differences in the Provision of Health Workers

Besides observing the distribution of the number of health workers in absolute terms, ratio analysis is required to understand the difference in the number of residents theoretically served by each health worker in each sub-district. This is important because an area with a larger number of health workers does not necessarily have a better level of human resource availability if the number of residents served is also large (Anand & Bärnighausen, 2004). Therefore, the ratio of residents to health workers was calculated by comparing the number of residents with the total number of health workers consisting of medical personnel, nursing staff, midwifery staff, pharmaceutical workforce, community health workers, and nutritional workforce. This ratio is used as a descriptive indicator to describe variations in the potential service burden of health workers between regions, not as a measure of the actual adequacy of health workers (Etches et al., 2006).

Table 5. Ratio Resident towards Health Workers in Kabupaten Bandung Barat

Subdistrict	Number of Residents	Number of Health Workers	Ratio Population/Health Workers
Rongga	64,518	32	2,016.2
Gununghalu	83,484	66	1,265.0
Sindangkerta	78,791	61	1,291.7
Cililin	102,048	335	304.6
Cihampelas	147,673	60	2,461.2
Cipongkor	108,275	60	1,804.6
Batujajar	117,581	51	2,305.5
Saguling	36,877	32	1,152.4
Cipatat	149,074	97	1,537.9
Padalarang	191,965	80	2,399.6
Ngamprah	187,028	60	3,117.1
Parongpong	119,132	48	2,481.9
Lembang	206,935	312	663.3
Cisarua	84,421	62	1,361.6
Cikalongwetan	136,432	232	588.1
Cipeundeuy	93,590	67	1,397.0
Kabupaten Bandung Barat	1,907,824	1,755	1,087.1

Source: Processed by authors, 2026

Based on Table 5, the ratio of residents to health workers shows considerable variation between sub-districts in Kabupaten Bandung Barat. On average, one health worker serves around 1,087 residents in Kabupaten Bandung Barat. However, some sub-districts have ratios that are considerably higher than the regency average. Ngamprah has the highest ratio, namely around 3,117 residents per health

worker, followed by Parongpong (2,482 residents/health worker), Cihampelas (2,461 residents/health worker), and Padalarang (2,400 residents/health worker). The high ratio shows that, relatively, the number of residents compared with the availability of health workers is greater than in other sub-districts.

On the other hand, some sub-districts have lower ratios of residents to health workers. Cililin has the lowest ratio, namely around 305 residents per health worker, followed by Cikalongwetan (588 residents/health worker) and Lembang (663 residents/health worker). The lower ratio value shows that the number of health workers is relatively larger compared to the number of residents served. This condition can be related to the distribution of health service facilities that are more developed in certain areas and the different characteristics of health services between sub-districts (Hutagalung et al., 2020).

The difference in ratios between sub-districts shows that the distribution of health workers in Kabupaten Bandung Barat is not yet fully even. Some areas with large populations, such as Ngamprah and Padalarang, have relatively high population-to-health-worker ratios, while several other areas have a relatively large number of health workers compared to their population. These findings show that health worker planning needs to consider not only population size, but also the distribution of health facilities, regional characteristics, and public service needs (Anand & Bärnighausen, 2004), (Hutagalung et al., 2020).

However, the ratio of residents to health workers in this study cannot be used to directly evaluate the adequacy of health workers or the quality of services. This is because this indicator does not yet consider differences in the types of health workers, levels of competence, actual workload, service hours, number of patient visits, and service area coverage (Etches et al., 2006), (Kessler et al., 2024). Therefore, this ratio is used as an initial indicator to identify variations in the potential pressure on health services between sub-districts.

3.5 Non-conformity of Health Facility Distribution with Population Concentration

The distribution of health facilities in Kabupaten Bandung Barat shows that the number of facilities does not yet fully follow the concentration of population in each region. Sub-districts with large populations do not always have a larger number of health facilities compared to other areas. Lembang, for example, is the sub-district with the largest population, with 206,935 people, and has four health centers, while Ngamprah, with a population of 187,028 people, only has two community health centers, resulting in a higher ratio of residents per health center.

A similar condition is seen in Padalarang, which has a population of 191,965 people and three health centers. Although it has relatively more health facilities compared to several other sub-districts, the large population means that each facility still has to serve a relatively high number of residents. These findings show that health facility planning is not sufficient to consider only the total population, but also needs to consider the spatial distribution of the population and service needs at the local level (A. Murad et al., 2021a). These findings are consistent with previous studies showing that the distribution of public service facilities does not always fully follow population distribution patterns, which can create variations in service provision between regions (A. Murad et al., 2021a).

3.6 Concentration Health Services in the Subdistrict with Urban Functions

The distribution of health facilities shows a trend of service concentration in several sub-districts that have characteristics as centers of regional activities. Padalarang is an example, with the highest number of hospitals and health centers, with four and 26 units, respectively. Lembang and Ngamprah also show relatively high concentrations of health facilities compared to other sub-districts.

On the other hand, some sub-districts, such as Rongga, Sindangkerta, and Saguling, have relatively limited numbers of health facilities. This condition shows that the provision of health services has different spatial patterns between regions, where areas with urban functions tend to have more diverse facilities compared to areas with rural characteristics (Mukherjee & Mondal, 2022)

This pattern is consistent with previous research showing that the distribution of health facilities can be influenced by the spatial characteristics of an area and population concentration (Mukherjee & Mondal, 2022) Therefore, equality in health services needs to consider the relationship between facility locations, regional spatial structure, and public needs (Mukherjee & Mondal, 2022a; Shen, 2022)

3.7 Potential Differences in Health Service Burden Between Regions

Analysis of health facilities and health workers shows variations in the potential service burden between sub-districts in Kabupaten Bandung Barat. Sub-districts with higher population-to-health-center ratios and population-to-health-worker ratios potentially face greater service pressure compared to areas with lower ratios. For example, Ngamprah has the highest population-to-health-worker ratio, namely around 3,117 residents per health worker, although it is one of the sub-districts with the largest population in Kabupaten Bandung Barat. This condition indicates a potential imbalance between population needs and the availability of health workers.

However, this study does not measure current service capacity because it does not use data on the number of patient visits, service hours, service area coverage, and health worker workload (Luo & Wang, 2003). Therefore, these findings cannot be used to conclude that there is a direct lack of services, but rather as an initial indication of the need for health service planning based on regional needs (*needs-based planning*) (Luo & Wang, 2003). This finding is consistent with previous research emphasizing that the distribution of health service facilities needs to consider spatial needs and population characteristics so that public services can be distributed more evenly (Lopes et al., 2021).

3.8 Challenges in Developing Health Services in Kabupaten Bandung Barat

3.8.1 Inequality Distribution Facility Health Services

Analysis results show that distribution facility health in Kabupaten Bandung Barat still shows variation between sub-districts. Hospital as a reference health service facility is only available in six sub-districts, namely Cililin, Padalarang, Ngamprah, Lembang, Cisarua, and Cikalongwetan, while ten other sub-districts do not yet have a hospital. At the primary care level, the number of health centers also shows differences between regions. Lembang has four health centers, while most other sub-districts only have one to two health centers. This condition shows that the availability of health facilities does not yet fully follow variations in population and service needs in each region.

This imbalance is further seen through the analysis of the ratio of residents to health centers. Some sub-districts with large populations have higher ratios compared to the average of Kabupaten Bandung Barat, such as Batujajar (117,581 people/health center), Ngamprah (93,514 people/health center), and Cihampelas (73,837 people/health center). This condition shows a difference in potential service burden between regions, although it cannot be directly interpreted as limited service capacity because this study does not use data on facility capacity and the number of patient visits.

These findings are consistent with previous studies showing that the distribution of health service facilities does not always fully follow population distribution patterns (Tan et al., 2021). Differences in the location and number of facilities may contribute to variations in health service provision between regions, particularly when facilities tend to be concentrated in areas with higher levels of urbanization and economic activity.

In the context of Kabupaten Bandung Barat, this condition is also in line with the 2025–2029 Kabupaten Bandung Barat RPJMD, which identifies equality of access to basic health services as one of the development challenges in the region (*RPJMD KBB*, n.d.). The document emphasizes that the provision of health services needs to consider equality of basic service facilities as well as increasing the reach of services to the community. Thus, the main challenge is not only increasing the number of health facilities, but also ensuring the distribution of facilities according to the characteristics and needs of each region.

3.8.2 Limitations in Educational Infrastructure and Facilities

Besides the distribution of facilities, the geographical characteristics of Kabupaten Bandung Barat become an important factor that influences equality of health services. Kabupaten Bandung Barat has diverse regional conditions, with several sub-districts located in hilly areas and areas with rural characteristics. Differences in topography and settlement patterns can cause variations in the ease with which the public can reach health service facilities, especially in areas that have greater distances to service centers.

Although this study does not directly measure accessibility using distance, travel time, or transportation networks, variations in the distribution of facilities between regions indicate potential differences in the ease of access to health services. Sub-districts with limited facilities and more challenging geographical characteristics potentially face different service barriers compared to areas with more concentrated health facilities.

These findings are consistent with previous studies indicating that access to health services is influenced not only by the availability of facilities but also by spatial factors, including facility location and regional characteristics. The distribution of public facilities is also closely related to spatial equity, as communities in different areas may experience different opportunities to access services due to differences in location and spatial conditions (Luo & Wang, 2003).

The 2025–2029 Kabupaten Bandung Barat RPJMD also places geographical conditions and regional connectivity as aspects that need to be considered in the development of basic services (*RPJMD KBB*, n.d.). This shows that equality of health services requires an approach that is not only oriented toward the development of new facilities, but also considers interregional connectivity and the spatial characteristics of the communities served.

3.8.3 Imbalance in the Distribution of Health Human Resources

Besides physical facilities, the availability of health human resources becomes an important challenge in the provision of health services. The research results show that the number of health workers varies considerably between sub-districts. Cililin has the highest number of health workers, with 335 people, followed by Lembang with 312 people and Cikalongwetan with 232 people. On the other hand, Rongga and Saguling only have 32 health workers each.

The difference in the absolute number of health workers shows the concentration of health human resources in certain areas. However, when compared with the population through the ratio of population per health worker, it can be seen that several sub-districts with large populations have higher ratios. Ngamprah, for example, has a ratio of 3,117 residents per health worker, far above the average of Kabupaten Bandung Barat of 1,087 residents per health worker.

This condition shows that the challenge of health human resources is not only related to the total number of health workers, but also to the distribution of health workers according to regional needs. The planning of health facilities and human resources should consider the spatial distribution of the population and service needs to reduce the concentration of resources in particular areas (Goetschius, 2024a).

The 2025–2029 Kabupaten Bandung Barat RPJMD also identifies the improvement of the quality and equity of health human resources as one of the needs in regional health development (*RPJMD KBB*, n.d.). Therefore, strategies for improving health services need to consider the distribution of health workers between regions, not only increasing the total number of health workers.

3.8.4 Challenges in the Quality of Public Health Services and Health Issues

Besides aspects of the distribution of facilities and human resources, health development in Kabupaten Bandung Barat also faces challenges in improving service quality and addressing community health problems. Based on the 2025–2029 Kabupaten Bandung Barat RPJMD (*RPJMD KBB*, n.d.), several health issues that remain a concern of the regional government include improving the quality of basic health services, fulfilling the Minimum Health Service Standards (SPM), reducing the prevalence of stunting, as well as improving maternal and child health services.

These problems show that the success of health development is not only determined by the number of facilities and health workers, but also by the ability of the service system to reach community groups in need. The availability of health facilities needs to be supported by service quality, strengthening promotive and preventive services, as well as interventions based on the social conditions of the community.

These findings are consistent with previous research showing that health service equity is a multidimensional issue influenced by spatial, social, and economic factors (Turkar et al., 2025). Thus, health development in Kabupaten Bandung Barat needs to be directed not only toward increasing the quantity of health facilities, but also toward strengthening a service system that responds to the characteristics and needs of communities in each region.

3.9 Government Policy Responses in Kabupaten Bandung Barat

Based on the results of the analysis of the distribution of health facilities, the ratio of residents to health facilities, and the distribution of health human resources, several main challenges were found in the provision of health services in Kabupaten Bandung Barat. These challenges are not only related to the availability of health facilities and human resources in quantitative terms, but also include aspects of spatial equity, service accessibility, geographical conditions, and community health problems.

To understand the extent to which the regional government responds to these challenges, an analysis of the 2025–2029 Kabupaten Bandung Barat RPJMD was conducted. Document analysis was carried out by identifying health development issues, problems formulated by the regional government, as well as planned programs and strategies to overcome these problems. The results of the analysis were then classified based on the relevance between the health service challenges found in this study, the problems identified in the policy document, and the planned policy responses of the regional government.

Table 6. Challenges Health Services and Response Policy Government West Bandung Regency

Challenge	Policy Response
Inequality in the distribution of health facilities	Improvement of health infrastructure and equity in basic services through the development of health facilities.
Geographical constraints and access to services	Development of area-based health services and improvement of interregional connectivity.
Imbalance in health facilities and human resources	Strengthening health facilities, improving competence, and increasing equity in the distribution of health human resources.
Community health problems	Strengthening maternal and child health services, Posyandu, stunting reduction programs, and nutrition interventions.

Source: Processed by authors, 2026

Based on Table 6, the policy response of the Government of Kabupaten Bandung Barat to health service challenges shows an approach that includes aspects of facility distribution, regional accessibility, human resources, and improvement of community service quality. This approach is consistent with the health equity perspective, which emphasizes the importance of equitable distribution of health resources in providing opportunities for communities in different areas to obtain health services (Eker & Imam, 2025).

In terms of health facility equity, the regional government responds to inequality in service distribution through the improvement of health facilities and infrastructure as well as the development of basic service facilities. This policy is relevant to the research findings, which show that the distribution of health facilities does not always fully follow the population distribution pattern. Previous studies have found that mismatches between population distribution and the location of health facilities can contribute to variations in service levels between regions (Etches et al., 2006; Tan et al., 2021). Therefore, health facility planning needs to consider spatial characteristics and population needs at the local level, not only the total population.

Besides the number of facilities, aspects of location and service accessibility also become important considerations in health development. The regional government's response through area-based health service development and improvement of interregional connectivity shows that health equity is not only related to the availability of facilities, but also to the ability of the public to reach these facilities. Previous research has demonstrated that access to health services is influenced by spatial factors, including facility location, population distribution, and regional characteristics (Wood et al., 2023). The distribution of public facilities also needs to be considered from a spatial justice perspective

because communities in different locations may experience different opportunities for access (Luo & Wang, 2003).

In terms of health human resources, policies to improve the quality and equity of health workers become a response to variations in the distribution of health workers between regions. The research results show that the number of health workers and the ratio of residents to health workers differ between sub-districts, so increasing the total number of health workers is not sufficient if it is not accompanied by distribution according to regional needs. Previous research indicates that health human resource planning needs to consider the spatial distribution of the population and service needs to avoid the concentration of resources in particular areas (A. Murad et al., 2021b)

Meanwhile, policies related to community health problems through the strengthening of maternal and child health services, Posyandu, and stunting reduction programs show that health development is not only oriented toward curative aspects, but also includes promotive and preventive approaches (*RPJMD KBB*, n.d.). Previous research has shown that health equity is a multidimensional issue influenced by health service factors, socioeconomic conditions, and community characteristics (X. Du et al., 2023a). Thus, improving community health requires a combination of facility provision, strengthening human resources, and interventions addressing social factors that influence health conditions.

Overall, the policy responses in the 2025–2029 Kabupaten Bandung Barat RPJMD cover most of the challenges identified through the empirical analysis in this study. However, policy implementation still needs to consider the characteristics of each sub-district so that health service development is more aligned with regional needs (needs-based planning). This approach is consistent with the principle that increasing the number of facilities and health workers in aggregate does not necessarily produce equitable services if their distribution does not consider variations in population, geographical conditions, and community needs (Hutagalung et al., 2020; Kumar et al., 2026).

DISCUSSION

This study aims to analyze variations in the distribution of health facilities and health human resources between sub-districts in Kabupaten Bandung Barat and identify the challenges and policy responses of the regional government in realizing health service equity. The research results show that the provision of health facilities and health human resources has spatial variations between regions and does not yet fully follow the population distribution pattern. Sub-districts with large populations do not always have a higher number of health facilities and health workers compared to other regions. In addition, the calculation of the ratio of residents to health centers and health workers shows differences in potential service burdens between sub-districts. These findings answer the research question that the provision of health services in Kabupaten Bandung Barat has a distribution pattern that is not yet uniform, both in terms of facilities and health human resources. Thus, health service needs cannot be determined only based on the total population, but need to consider regional characteristics, facility distribution, availability of health workers, and potential service burdens in each sub-district.

The findings of this study are consistent with previous research showing that health service equity is a spatial and multidimensional issue. Previous studies have shown that the distribution of health facilities does not always follow population distribution patterns and that geographical characteristics

and facility locations can influence opportunities to access health services (Mshana et al., 2023). The findings are also consistent with the needs-based planning approach, which emphasizes that health facility and resource planning should consider regional needs rather than relying solely on equal distribution across administrative areas (Goetschius, 2024b). However, unlike studies that directly measure accessibility through distance, travel time, or network analysis, this study focuses on identifying variations in the distribution of health facilities and health workers based on available secondary data.

The research results also have relevance to the sustainable development agenda, particularly Sustainable Development Goal (SDG) 3 concerning good health and well-being and SDG 10 concerning reduced inequalities (Dalgıç, 2025). Health service equity is important in ensuring that populations in different areas have opportunities to obtain basic health services. Therefore, the results of this study show the importance of implementing health service planning based on regional needs (*needs-based planning*) to support more inclusive health development. This approach allows the regional government to determine intervention priorities based on variations in the characteristics of each sub-district, rather than only based on conditions at the aggregate regency level.

The position of this study lies in its effort to connect the analysis of health facility and health human resource distribution with the context of regional development planning. Some previous studies largely use spatial approaches based on Geographic Information Systems (GIS), network analysis, or accessibility measurements to evaluate health service equity, whereas this study uses a descriptive approach that integrates demographic characteristics, health facility distribution, the ratio of residents to facilities, health worker distribution, and analysis of regional policy documents. This approach allows the study not only to describe the empirical conditions of health service provision, but also to connect them with development challenges and the policy responses of the Government of Kabupaten Bandung Barat. The contribution of this study is to show that the evaluation of health service equity at the regional level is not sufficient based only on the aggregate number of health facilities and health workers, but also needs to consider variations in needs between regions as a basis for health development strategies based on regional needs.

This study has several limitations. The analysis does not yet use detailed spatial data on the location of health facilities, road networks, travel time, service radius, and the current capacity of each facility. In addition, the study does not yet consider the level of service utilization, such as the number of patient visits, the workload of health workers, and health worker requirement standards based on the type of service facility. Therefore, this study is not intended to measure health service accessibility or directly evaluate the adequacy of health facilities and health workers, but rather to provide an initial description of variations in health service provision between regions. Further research can integrate GIS-based spatial analysis, facility capacity data, and health service utilization indicators to produce a more comprehensive evaluation of health service equity.

IMPLICATIONS POLICY

Therefore, strengthening health policy should not only be directed toward increasing the number of health facilities and health workers in aggregate, but also toward the suitability between the distribution of health resources and community needs. The needs-based planning and spatial equity approaches are relevant to ensure that health service planning considers demographic characteristics, geographical conditions, and potential service burdens at the sub-district level [1]..

Therefore, strengthening health policy should not only be directed toward increasing the number of health facilities and health workers in aggregate, but also toward the suitability between the distribution of health resources and community needs. The needs-based planning and spatial equity approaches are relevant to ensure that health service planning considers demographic characteristics, geographical conditions, and potential service burdens at the sub-district level.

Table 7. Challenges, Policy Responses, and Policy Implications for Health Service Equity in Kabupaten Bandung Barat

Challenge	Policy Response	Policy Implications
1. Distribution of health facilities is not yet fully equitable	Improvement of health facilities and infrastructure, development of health service facilities, and equity in basic services	Priority development of health facilities needs to consider population distribution, the ratio of residents to facilities, and interregional service needs. The spatial equity approach emphasizes the importance of suitability between facility distribution and community needs, not only the total number of facilities (Mukherjee & Mondal, 2022).
2. Differences in geographical characteristics and service accessibility	Area-based health service development and improvement of interregional connectivity	Health facility location planning needs to consider geographical conditions, settlement patterns, and regional accessibility. Spatial factors play an important role in determining the ability of the public to obtain health services (Wood et al., 2023).
3. Variations in the distribution of health workers between sub-districts	Improvement of health worker quality, fulfillment of health worker needs, and strengthening of service capacity	Placement of health workers needs to consider the ratio of residents to health workers, regional characteristics, and service needs so that the distribution of human resources is more in accordance with local needs (Kumar et al., 2026).
4. Community health problems and social factors	Strengthening maternal and child health services, Posyandu, stunting reduction programs, and public nutrition interventions	Health policy needs to integrate promotive, preventive, and social aspects because improving health status is influenced not only by physical facilities, but also by community social conditions (Mukherjee & Mondal, 2022).

Source: Processed by authors, 2026

First, health facility planning needs to be more responsive to variations in needs between sub-districts. The research results show that a large population is not always followed by a higher number of health facilities. Sub-districts with large populations, such as Ngamprah and Padalarang, have high service needs, while some other areas have fewer facilities compared to the characteristics of the population served. Therefore, determining priorities for health facility development needs to consider a combination of population size, the ratio of residents to health centers, existing facility distribution, and regional characteristics.

This approach is in line with the concept of spatial equity, which emphasizes that equity in public services is not only related to similarities in the number of facilities, but also to the suitability between service locations and community needs (Mukherjee & Mondal, 2022). Research also shows that mismatches between the distribution of health facilities and population distribution can produce variations in service levels between regions (Etches et al., 2006).

Second, health service planning needs to consider geographical characteristics and interregional connectivity. Kabupaten Bandung Barat has diverse geographical conditions, including rural areas, mountainous areas, and areas with different levels of urban development. This causes health service needs between sub-districts to differ and cannot be treated uniformly.

The regional government's response through area-based health service development shows an appropriate policy direction. However, policy implementation needs to be supported by more detailed spatial information about the location of health facilities, transportation networks, and travel time to health service facilities. This is consistent with previous research indicating that location factors and

regional characteristics are important aspects in understanding access to health services (Birch et al., 2020).

Third, the distribution of health workers needs to become an important part of regional health service planning. The research results show variations in the number of health workers and the ratio of residents to health workers between sub-districts. Some areas have relatively high numbers of health workers, while other areas show potentially greater service burdens because the number of residents that must be served is larger.

Therefore, policies to improve health workers should not only focus on increasing the total number of workers, but also on developing a more comprehensive distribution strategy according to regional needs. The needs-based planning approach can be used to determine priorities for health worker placement by considering population size, service characteristics, and geographical conditions of the region (X. Du et al., 2023b).

Fourth, health service equity needs to be understood as a multidimensional issue that is not only related to health facilities and health workers. Analysis of the RPJMD document shows that Kabupaten Bandung Barat still faces challenges such as stunting, fulfillment of Minimum Health Service Standards (SPM), and improvement of the healthy quality of life of the community.

The government's response through strengthening Posyandu, maternal and child health services, and nutrition intervention programs shows that health development also requires a promotive and preventive approach. Previous research similarly emphasizes that health equity is influenced by a combination of health service factors, social conditions, and community characteristics (Mukherjee & Mondal, 2022).

Thus, the main policy implication of this study is the need to strengthen health service planning based on regional needs (*needs-based planning*) by integrating demographic indicators, health facility distribution, service ratios, and health worker availability. The regional government can use these indicators as an initial basis for determining priority areas before conducting further evaluations using accessibility data, facility capacity, and health service utilization levels.

This approach is important because increasing the number of facilities and health workers in aggregate does not always produce equitable services if their distribution does not consider variations in needs between regions. Thus, strengthening the regional health information system and integrating spatial data become important steps to support evidence-based decision-making (*evidence-based planning*) in health development in Kabupaten Bandung Barat.

CONCLUSION

This study aims to analyze variations in the distribution of health facilities and health human resources between sub-districts in Kabupaten Bandung Barat and identify the challenges and policy responses of the regional government in supporting health service equity. The research results show that the provision of health facilities and health human resources is not yet distributed proportionally across all sub-districts. Population size and population density are not always followed by comparable availability of health facilities and health workers. Variations in the ratio of residents to health centers and health workers show differences in potential service burdens between regions.

The document analysis also shows that the Government of Kabupaten Bandung Barat has identified various challenges in the provision of health services, including inequality in service distribution, geographical constraints, limitations in facilities and health human resources, and social factors that influence the quality of community health services. Various programs for health facility development, fulfillment of health workers, improvement of primary health services, and strengthening of community health services have been formulated as regional policy responses.

The main contribution of this study lies in the integration of health facility distribution analysis, health human resource distribution, and regional policy analysis within a framework supporting the needs-based planning approach. Unlike many previous studies that focus on spatial accessibility analysis using Geographic Information Systems (GIS), this study shows that descriptive analysis based on secondary data can also provide an initial description of variations in health service provision and connect them with regional development challenges and government policy responses.

This study still has limitations because it does not yet consider the geographical location of health facilities, community travel time, road networks, health facility service capacity, and health service utilization levels. Therefore, further research is recommended to integrate GIS-based spatial analysis, health facility capacity, health worker requirement standards, and service utilization indicators so that the evaluation of health service equity can be conducted more comprehensively and become a more precise basis for health development policy formulation.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

During the preparation of this work, the author used generative AI tools to assist with language editing and improving the readability of the manuscript. The AI tool was used solely to refine grammar, wording, and overall clarity of the text. The author reviewed and edited the output as necessary and takes full responsibility for the content of this publication.

No generative AI tools were used for the development of the research design, data collection, data analysis, interpretation of results, or the formulation of the study's conclusions

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