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Hospital Distribution Shows Moderate Inequality and Four Underserved Subdistricts

Distribusi Rumah Sakit Menunjukkan Ketimpangan Sedang dan Empat Kecamatan yang Kurang Terlayani

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Abstract

General Background: Equitable hospital distribution is essential for healthcare accessibility, yet aggregate health infrastructure statistics mayconceal disparities across smaller administrativeareas. **Specific Background:** Hospital availability in periurban regions may differ considerably between subdistricts despite seemingly sufficient regional healthcare resources. **Knowledge Gap:** Existing Indonesian healthcare distribution studies predominantly examine district or provincial disparities, leaving subdistrict-level inequalities insufficiently explored. **Aims:** This ecological cross-sectional study assessed hospital distribution, population-adjusted inequality, and differences in hospital availability across population density groups. Administrative data covering 18 subdistricts in 2025 were analyzed using hospital-to-population ratios, Lorenz curves, Gini coefficients, and population densitytertiles. **Results:** Thirty-three hospitals and 3,771 beds served 2,041,260 residents, equivalent to 1.85 beds per 1,000 population. Hospital availability ranged from zero to 3.46 facilities per 100,000 residents. Four subdistricts, representing approximately 317,600 residents (15.6%), had no hospitals. The population-based Gini coefficient was 0.37, indicating moderate inequality, while the area-based coefficient reached 0.54. The highest population density tertile contained 54.5% of hospitals and five of seven specialty facilities. **Novelty:** This study quantifies fine-scale healthcare infrastructure disparities through integrated population-based and spatial inequality measures within a periurban administrative setting. **Implications:** Healthcare infrastructure planning should incorporate subdistrict-level distribution indicators rather than relying exclusively on aggregate regional hospital and bed statistics.

Highlights:

- Approximately 15.6% of residents lived in areas without a local hospital.
- Population-adjusted and land-area concentration coefficients reached 0.37 and 0.54, respectively.
- The most densely populated tertile contained 54.5% of all facilities and five of seven specialty centers.

Keywords: Health Facilities, Health Services Accessibility, Healthcare Disparities, Hospital Bed Capacity

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Introduction

Health insurance only helps if there is somewhere to use it. Indonesia's national scheme, Jaminan Kesehatan Nasional (JKN), now covers most of the population, yet coverage has not removed supply-side gaps [1,2]. JKN payments flow disproportionately to regions that already have advanced hospitals [3]. Insurance status is still tied to who uses hospital care [4], and national surveys show clear regional and urban-rural differences in utilisation [5,6]. Where districts have more beds, people are admitted more often; where travel takes longer, they are admitted less [7,8].

Hospitals, beds, and specialists cluster in Java and in the large cities [9-11]. The finer the geographic unit, the larger the gap. For specialists, Muharram et al. found a Gini index of 0.53 between districts in 2022 but 0.44 between provinces [12], and most geographic variation in utilisation lies at district level [13]. Geospatial work on obstetric, gynaecological-oncology, and cardiac services tells a similar story: acceptable national averages, large populations beyond timely reach [14-16]. Nearly all of these studies stop at the kabupaten/kota or concern remote island provinces [17]. Distribution inside crowded peri-urban regencies, where a healthy regency total can hide clustering along a few corridors, has received little attention.

Sidoarjo is one such regency. It borders Surabaya, the provincial capital, and had 2,041,260 residents in 2025 [18]. Studies in Iranian cities found beds concentrated in central, wealthier districts, with Gini indices above 0.55 [19]; in Chinese cities, resource density shifts between urban, suburban, and rural zones [20]. We are not aware of an equivalent analysis for kecamatan in Indonesia. Our aims were to describe hospital distribution across Sidoarjo's 18 subdistricts in 2025, to measure inequality relative to population, and to see whether hospital density tracked population density.

Material and Method

A. Study Design and Setting

This ecological cross-sectional study used routinely collected aggregate data and is reported according to STROBE. Subdistricts were the unit of analysis. All 18 were included (total area 714.245 km²), so no sampling was involved. Reference year: 2025.

B. Data Sources

BPS Sidoarjo's *Sidoarjo Regency in Figures 2026* supplied hospital counts by subdistrict and type, plus the 2025 regency population [18]. Bed totals came from the Ministry of Health hospital information system, SIRS [21]; land areas came from BPS [22]. Physician and dentist counts, available for the regency and for the five subdistricts with the most hospitals, were taken from BPS and District Health Office tables as compiled in the 2026 feasibility study of Universitas Muhammadiyah Sidoarjo Hospital [23].

Subdistrict population for 2025 was not in our dataset. To estimate it, we multiplied the June 2022 population density published by the Sidoarjo Civil Registration Office [24] by BPS land area, then applied each subdistrict's share of the resulting total to the BPS 2025 figure of 2,041,260. The method assumes little change in the relative distribution of residents between 2022 and 2025.

C. Eligibility

We included every hospital BPS listed as operating in Sidoarjo in 2025, general or specialty, public or private.

D. Variables

Hospitals per 100,000 population in each subdistrict was the primary outcome. Secondary outcomes were hospitals per 100 km², beds per 1,000 at regency level, and physicians and dentists per 10,000. Before looking at hospital counts, we split subdistricts into tertiles of population density, six in each. Workforce data existed only for the five hospital-rich subdistricts; counts for the other 13 were obtained by subtraction from the regency total.

E. Statistical Analysis

Densities and percentages were calculated for each subdistrict. To summarise inequality we used a Lorenz curve and the Gini coefficient [25-27], ordering subdistricts by hospitals per capita and plotting cumulative hospitals against cumulative population. The coefficient equals one minus twice the area under that curve (trapezoidal rule). Zero would mean hospitals are spread exactly in line with population. Values nearer one mean concentration in a few places. We repeated the calculation with land area in place of population as a supplementary measure, and compared tertiles with rate ratios. Every unit was enumerated, so there are no significance tests or confidence intervals.

Two sensitivity analyses were run: a Gini coefficient for general hospitals only, and a leave-one-out version dropping each subdistrict in turn. Scaling 2022 shares up to the 2025 total alters the rates but neither the Gini coefficient nor the ranking of subdistricts. We used Python 3.13 (NumPy 2.5, Matplotlib 3.11).

Result and Discussion

A. Results

1. Distribution of Hospitals

In 2025 Sidoarjo had 33 hospitals, 26 general and 7 specialty, with 3,771 available beds. For 2,041,260 residents that comes to 1.85 beds per 1,000; population density was 2,858 per km². The regency-wide rate of 1.62 hospitals per 100,000 hides a spread from 0 to 3.46 (Table 1, Figure 1). Sidoarjo subdistrict led with seven hospitals. Waru and Taman had five each, Krian and Sukodono three. Eight subdistricts

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had a single hospital. Four had none at all: Krembung, Jabon, Tanggulangin, and Wonoayu, home to an estimated 317,600 people (15.6%). Every specialty hospital lay in the north or centre of the regency, three of them in Taman.

Table 1. Hospitals, population, and hospital density by subdistrict, Sidoarjo Regency, 2025

Subdistrict	Area (km²)	Est. population	Pop./km²	General	Specialty	Total	Per 100,000	Per 100 km²
Sidoarjo	62.6	202,382	3,235	6	1	7	3.46	11.2
Waru	30.3	197,223	6,505	4	1	5	2.54	16.5
Sukodono	32.7	121,721	3,725	3	0	3	2.46	9.2
Taman	31.5	205,574	6,519	2	3	5	2.43	15.9
Sedati	79.4	96,380	1,213	2	0	2	2.08	2.5
Balongbendo	31.4	53,102	1,691	1	0	1	1.88	3.2
Krian	32.5	164,328	5,056	3	0	3	1.83	9.2
Tarik	36.1	62,018	1,720	1	0	1	1.61	2.8
Porong	29.8	69,494	2,330	1	0	1	1.44	3.4
Prambon	34.2	90,426	2,642	1	0	1	1.11	2.9
Buduran	41.0	93,772	2,286	0	1	1	1.07	2.4
Tulangan	31.2	100,858	3,232	1	0	1	0.99	3.2
Gedangan	24.1	120,109	4,992	0	1	1	0.83	4.2
Candi	40.7	146,267	3,597	1	0	1	0.68	2.5
Krembung	29.6	73,152	2,476	0	0	0	0.00	0.0
Jabon	81.0	54,546	673	0	0	0	0.00	0.0
Tanggulangin	32.3	95,744	2,965	0	0	0	0.00	0.0
Wonoayu	33.9	94,162	2,776	0	0	0	0.00	0.0
Sidoarjo Regency	**714.2**	**2,041,260**	**2,858**	**26**	**7**	**33**	**1.62**	**4.6**

Source: hospital counts and regency population from BPS Sidoarjo [18]; land area from BPS [22]; subdistrict population estimated from civil-registration density (June 2022) [24] scaled to the BPS 2025 regency total. Est., estimated; Pop., population.

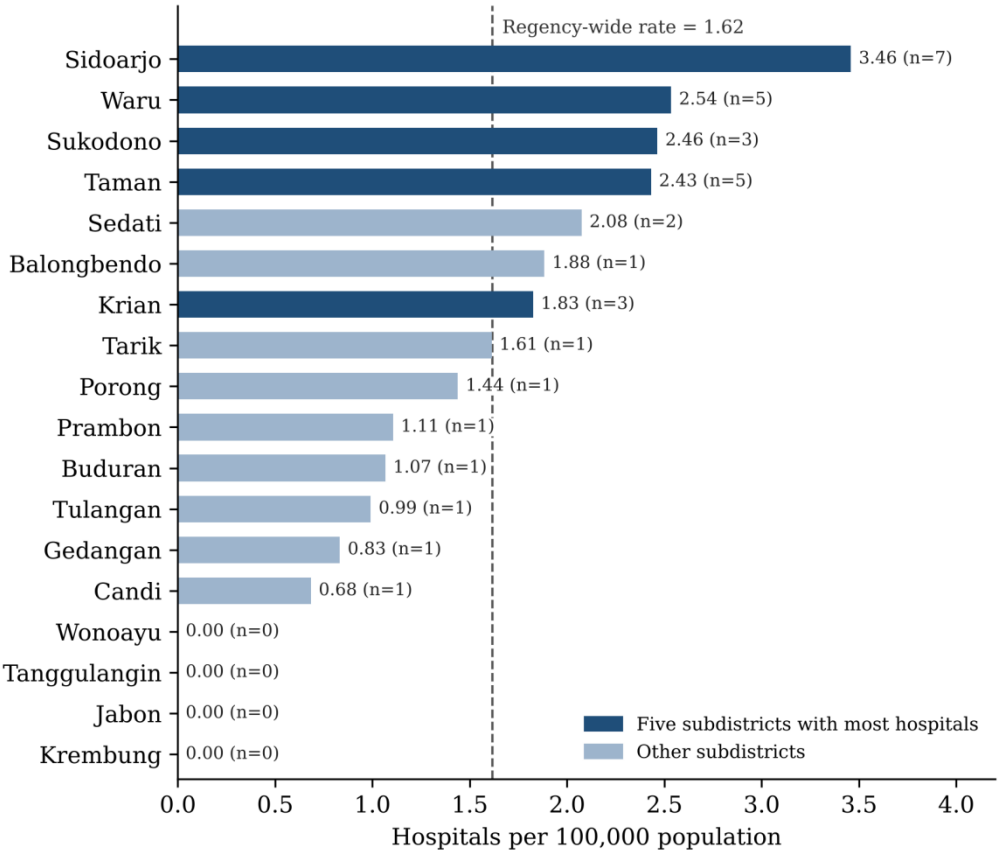


Figure 1. Hospitals per 100,000 population by subdistrict, Sidoarjo Regency, 2025. Dark bars mark the five subdistricts with the most hospitals; n is the number of hospitals. The dashed line is the regency-wide rate.

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3. Inequality and Population Density

The population-based Gini coefficient came to 0.37 (Figure 2). Leaving out one subdistrict at a time moved it only between 0.34 and 0.40. For general hospitals alone it rose to 0.44. Against land area the coefficient was 0.54, or 0.49 with the two large coastal subdistricts, Jabon and Sedati, removed; hospitals are more concentrated in space than people are.

Population density turned out to be a poor predictor of hospital supply (Table 2). Only the densest tertile stood out, at 1.88 hospitals per 100,000, against 1.40 and 1.37 in the low and middle tertiles (rate ratio 1.34, densest versus least dense). It also had five of the seven specialty hospitals and 54.5% of all hospitals for 46.8% of residents. The middle tertile is the odd one. It contains Sidoarjo subdistrict, with more hospitals than anywhere else, and three of the four subdistricts that have none.

Table 2. Hospital distribution by tertile of subdistrict population density, Sidoarjo Regency, 2025

Indicator	Low density	Middle density	High density
Population density range, per km²	673-2,330	2,476-3,235	3,597-6,519
Subdistricts	Jabon, Sedati, Balongbendo, Tarik, Buduran, Porong	Krembung, Prambon, Wonoayu, Tanggulangin, Tulangan, Sidoarjo	Candi, Sukodono, Gedangan, Krian, Waru, Taman
Population, % of regency	21.0	32.2	46.8
Land area, % of regency	41.8	31.3	26.8
Hospitals, n (% of regency)	6 (18.2)	9 (27.3)	18 (54.5)
Specialty hospitals, n	1	1	5
Subdistricts without a hospital, n	1	3	0
Hospitals per 100,000 population	1.40	1.37	1.88
Rate ratio (reference: low density)	1.00	0.98	1.34

Tertiles were defined by estimated population per km², six subdistricts each.

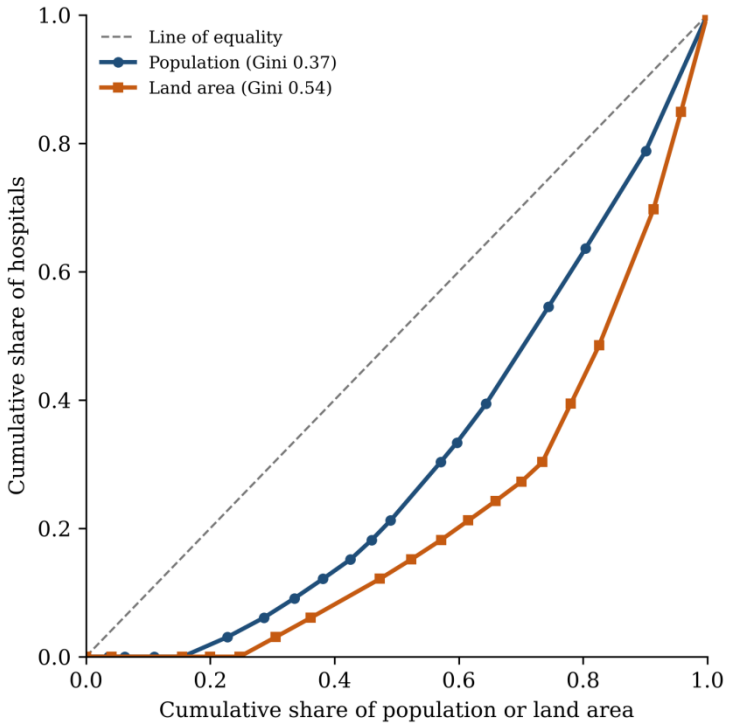


Figure 2. Lorenz curves of hospital distribution relative to population and to land area across the 18 subdistricts of Sidoarjo Regency, 2025.

4. Health Workforce

Sidoarjo, Waru, Taman, Krian, and Sukodono hold about 43.7% of the population. They also had 985 of the regency's 1,544 physicians (63.8%) and 307 of its 531 dentists (57.8%), or 11.05 physicians and 3.44 dentists per 10,000, compared with 4.86 and 1.95 elsewhere. The grouping comes from the source document and was based on hospital counts, so these figures describe the pattern but do not test it.

B. Discussion

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Roughly one Sidoarjo resident in six lives in a subdistrict with no hospital. Even so, overall inequality is moderate. A Gini of 0.37 sits well below the 0.55 or more reported for beds in Iranian cities [19], though that study counted beds and we counted facilities, so the comparison is loose.

We expected hospital density to climb steadily with population density. It did not. The low and middle tertiles were almost identical, and the middle one mixed the best-served subdistrict with three that have nothing. What Sidoarjo shows, then, is less an urban-rural gradient than a handful of subdistricts in the south of the regency (Krembung, Tanggulangin, Wonoayu, Jabon) that investment has passed by. National studies point the same way, with hospitals and specialists drawn to economically stronger areas [9,11] and gaps widening at finer scales [12,13]. Sambodo et al. showed that JKN payments favour regions with more advanced services [3]; such a pattern could entrench clustering, although our data cannot show that it does. Specialty care follows the metropolitan corridor. Five of the seven specialty hospitals are in the densest tertile, including Waru and Taman on the Surabaya border.

On its own, 1.85 beds per 1,000 tells us little about access. In Indonesia, bed supply is linked to inpatient use, but density and proximity explain only part of the geographic variation [7]. Travel time and cost matter too [8,28]. Service-specific studies have found provinces that meet density benchmarks while many residents remain beyond acceptable travel times [14,16]. A modified two-step floating catchment area analysis, which balances supply and demand within travel-time catchments rather than inside administrative lines, would give a truer picture [29].

Health workers follow the hospitals. Physician density in the five hospital-rich subdistricts was 2.3 times that of the rest, dentist density 1.8 times, in line with national data showing dentists and specialists among the least evenly spread cadres [12] and with current efforts to redistribute specialists [11]. A workforce Gini coefficient was not possible, since the source broke out only those five subdistricts.

For managers and planners the message is simple: regency totals do not show where capacity is missing. Before more beds are licensed in subdistricts that already have several hospitals, the application could be checked against subdistrict density and travel times. Referral routes from primary health centres and emergency transport in the four subdistricts without a hospital deserve a closer look. The District Health Office already has the data to track subdistrict hospital density and the Gini coefficient every year.

Several limitations apply. The 2025 subdistrict populations are estimates built from 2022 civil-registration shares. For Sidoarjo subdistrict our estimate (202,382) was within 1% of the BPS figure in the feasibility study (201,241), but that checks one subdistrict out of 18. We counted facilities, not beds or staff, because those data were incomplete; size, class, specialty mix, occupancy, and JKN contracts are therefore ignored. With 33 hospitals, one opening or closure would shift the Gini coefficient noticeably. No inference about individual access or outcomes is possible from an ecological design. Cross-border use is a further problem. People in the northern subdistricts can go to hospitals in Surabaya, so their real access is probably better than our counts suggest; at the same time, Sidoarjo hospitals near the border may treat many Surabaya residents, leaving less capacity for local people. Neither flow is captured here. Lastly, part of the data came from a hospital feasibility study led by one of the authors. That hospital project was not assessed.

Conclusion

Hospitals in Sidoarjo are moderately unequally distributed relative to population, and the shortfall is concentrated rather than spread. Four southern subdistricts with about 15% of residents have no hospital. Hospital density barely changes with population density except in the most crowded tertile. Regency-wide bed ratios should not drive planning or licensing on their own. Next steps are bed and specialty data for each hospital, official BPS population by subdistrict, and travel-time analysis that accounts for patients crossing to and from Surabaya.

Data Availability

The subdistrict-level analytic dataset is provided as a supplementary file. All source data are publicly available from BPS Sidoarjo, the Ministry of Health SIRS, and the Sidoarjo Open Data portal.

Declaration of Artificial Intelligence Use

The author declares that no artificial intelligence tools were used in the conduct of the research, including data collectionand statistical analysis.

References

[1] R. Agustina, T. Dartanto, R. Sitompul, et al., “Universal health coverage in Indonesia: Concept, progress, and challenges,” The Lancet, vol. 393, pp. 75–102, 2019, doi: https://doi.org/10.1016/S0140-6736(18)31647-7.
[2] N. Maulana, P. Soewondo, N. Adani, et al., “How Jaminan Kesehatan Nasional (JKN) coverage influences out-of-pocket (OOP) payments by vulnerable populations in Indonesia,” PLOS Global Public Health, vol. 2, Art. no. e0000203, 2022, doi: https://doi.org/10.1371/journal.pgph.0000203.
[3] N. P. Sambodo, E. Van Doorslaer, M. Pradhan, et al., “Does geographic spending variation exacerbate healthcare benefit inequality? A benefit incidence analysis for Indonesia,” Health Policy and Planning, vol. 36, pp. 1129–1139, 2021, doi: https://doi.org/10.1093/heapol/czab015.
[4] Q. Cheng, R. A. Fattah, D. Susilo, et al., “Determinants of healthcare utilization under the Indonesian national health insurance system: A cross-sectional study,” BMC Health Services Research, vol. 25, Art. no. 48, 2025, doi: https://doi.org/10.1186/s12913-024-11951-8.
[5] A. D. Laksono, R. D. Wulandari, N. Rohmah, et al., “Regional disparities in hospital utilisation in Indonesia: A cross-sectional analysis data from the 2018 Indonesian Basic Health Survey,” BMJ Open, vol. 13, Art. no. e064532, 2023, doi: https://doi.org/10.1136/bmjopen-2022-064532.

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[6] R. D. Wulandari, A. D. Laksono, Z. K. Nantabah, et al., "Hospital utilization in Indonesia in 2018: Do urban-rural disparities exist?" BMC Health Services Research, vol. 22, Art. no. 491, 2022, doi: https://doi.org/10.1186/s12913-022-07896-5.
[7] J. Mulyanto, A. E. Kunst, and D. S. Kringos, "The contribution of service density and proximity to geographical inequalities in health care utilisation in Indonesia: A nation-wide multilevel analysis," Journal of Global Health, vol. 10, Art. no. 020428, 2020, doi: https://doi.org/10.7189/jogh.10.020428.
[8] M. Ipa, A. D. Laksono, R. D. Wulandari, et al., "The role of travel time on hospital utilization in the islands area: A cross-sectional study in the Maluku region, Indonesia, in 2018," Indian Journal of Community Medicine, vol. 48, pp. 269–273, 2023, doi: https://doi.org/10.4103/ijcm.ijcm_229_22.
[9] S. A. Paramita, C. Yamazaki, E. P. Setiawati, et al., "Distribution trends of Indonesia's health care resources in the decentralization era," International Journal of Health Planning and Management, vol. 33, pp. e586–e596, 2018, doi: https://doi.org/10.1002/hpm.2506.
[10] J. Mahqfiroh et al., "Assessing inequality in health service accessibility based on hospital distribution in Indonesia," Journal of Health Policy and Management, 2025.
[11] A. Abdullah, Y. Farianti, L. Trilaksono, et al., "A dual hospital-university specialist training reform to address workforce shortage and geographic maldistribution in Indonesia: Integrative qualitative policy process review," JMIR Medical Education, vol. 12, Art. no. e90270, 2026, doi: https://doi.org/10.2196/90270.
[12] F. R. Muharram, H. A. Sulistya, J. B. Swannjo, et al., "Adequacy and distribution of the health workforce in Indonesia," WHO South-East Asia Journal of Public Health, vol. 13, pp. 45–55, 2024, doi: https://doi.org/10.4103/WHO-SEAJPH.WHO-SEAJPH_28_24.
[13] J. Mulyanto, A. E. Kunst, and D. S. Kringos, "Geographical inequalities in healthcare utilisation and the contribution of compositional factors: A multilevel analysis of 497 districts in Indonesia," Health & Place, vol. 60, Art. no. 102236, 2019, doi: https://doi.org/10.1016/j.healthplace.2019.102236.
[14] B. A. Tjokroprawiro, H. A. Sulistya, F. R. Muharram, et al., "Geospatial access to emergency obstetric surgery in Indonesia: Is travel time for access too long?" Annals of Global Health, vol. 90, Art. no. 82, 2024, doi: https://doi.org/10.5334/aogh.4598.
[15] B. A. Tjokroprawiro, H. A. Sulistya, A. A. Rahma, et al., "Geographic barriers to gynaecological cancer care in Indonesia: A geospatial and infrastructure analysis," BMJ Open, vol. 16, Art. no. e112112, 2026, doi: https://doi.org/10.1136/bmjopen-2025-112112.
[16] I. Dakota, F. R. Muharram, C. E. C. Z. Multazam, et al., "Modelling the coverage gap in percutaneous coronary intervention in LMIC: A geospatial analysis of cath lab coverage in Indonesia," Open Heart, vol. 13, Art. no. e003702, 2026, doi: https://doi.org/10.1136/openhrt-2025-003702.
[17] Y. Leosari, J. A. Uelmen, R. M. Carney, et al., "Spatial evaluation of healthcare accessibility across archipelagic communities of Maluku Province, Indonesia," PLOS Global Public Health, vol. 3, Art. no. e0001600, 2023, doi: https://doi.org/10.1371/journal.pgph.0001600.
[18] Badan Pusat Statistik Kabupaten Sidoarjo, Kabupaten Sidoarjo dalam Angka 2026. Sidoarjo, Indonesia: BPS Kabupaten Sidoarjo, 2026.
[19] Y. Chavehpour, A. Rashidian, A. Woldemichael, et al., "Inequality in geographical distribution of hospitals and hospital beds in densely populated metropolitan cities of Iran," BMC Health Services Research, vol. 19, Art. no. 614, 2019, doi: https://doi.org/10.1186/s12913-019-4443-0.
[20] Y. Li, J. Li, J. Geng, et al., "Urban-sub-urban-rural variation in the supply and demand of emergency medical services," Frontiers in Public Health, vol. 10, Art. no. 1064385, 2023, doi: https://doi.org/10.3389/fpubh.2022.1064385.
[21] Kementerian Kesehatan Republik Indonesia, "Sistem Informasi Rumah Sakit (SIRS) Online." Jakarta, Indonesia: Kementerian Kesehatan RI.
[22] Badan Pusat Statistik Kabupaten Sidoarjo, "Luas Wilayah Menurut Kecamatan di Kabupaten Sidoarjo," Table 1.1.1, Kabupaten Sidoarjo dalam Angka 2026. Sidoarjo, Indonesia: BPS Kabupaten Sidoarjo, 2026.
[23] Tim Penyusun Studi Kelayakan, Studi Kelayakan (Feasibility Study) Rumah Sakit Universitas Muhammadiyah Sidoarjo. Sidoarjo, Indonesia: Universitas Muhammadiyah Sidoarjo, 2026. Unpublished report.
[24] Dinas Kependudukan dan Pencatatan Sipil Kabupaten Sidoarjo, "Kepadatan Penduduk Menurut Kecamatan, Juni 2022," Open Data Kabupaten Sidoarjo, 2024. [Online]. Available: https://opendata.sidoarjokab.go.id/dataset/kepadatan-penduduk-menurut-kecamatan. [Accessed: Oct. 11, 2026].
[25] Z. Ren, P. Song, X. Chang, et al., "Inequality of obstetric and gynaecological workforce distribution in China," International Journal for Equity in Health, vol. 17, Art. no. 3, 2018, doi: https://doi.org/10.1186/s12939-017-0716-6.
[26] K. Hara, S. Kunisawa, N. Sasaki, et al., "Examining changes in the equity of physician distribution in Japan: A specialty-specific longitudinal study," BMJ Open, vol. 8, Art. no. e018538, 2018, doi: https://doi.org/10.1136/bmjopen-2017-018538.
[27] Y. Ao, Q. Feng, Z. Zhou, et al., "Resource allocation equity in the China's rural three-tier healthcare system," International Journal of Environmental Research and Public Health, vol. 19, Art. no. 6589, 2022, doi: https://doi.org/10.3390/ijerph19116589.
[28] D. J. Weiss, A. Nelson, C. A. Vargas-Ruiz, et al., "Global maps of travel time to healthcare facilities," Nature Medicine, vol. 26, pp. 1835–1838, 2020, doi: https://doi.org/10.1038/s41591-020-1059-1.
[29] J. Zhang, P. Han, Y. Sun, et al., "Assessing spatial accessibility to primary health care services in Beijing, China," International Journal of Environmental Research and Public Health, vol. 18, Art. no. 13182, 2021, doi: https://doi.org/10.3390/ijerph182413182.

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