

Spatial analysis of advanced level health facilities in Jambi city in 2023

Suci Ramadhani¹, Dwi Noerjoedianto², Andy Amir³

¹Mahasiswa Ilmu Kesehatan Masyarakat, Universitas Jambi, Jambi, Indonesia

^{2,3}Dosen Ilmu Kesehatan Masyarakat, Universitas Jambi, Jambi, Indonesia

ARTICLE INFO

Article history:

Received Feb 15, 2024

Revised Feb 23, 2024

Accepted Feb 27, 2024

Keywords:

FKTL
Medical Facility
Spatial Analysis
Spread

ABSTRACT

Background: The national health insurance system which implements a tiered referral system requires BPJS participants to visit the community health center as a First Level Health Facility (FKTP) before seeking treatment at an Advanced Level Health Facility (FKTL). **Research Objective:** To determine the availability and distribution of Jambi City Advanced Level (FKTL) facilities. **Research method:** Quantitative with an exploratory descriptive design. **Research results:** Show that all sub-districts in Jambi City have been reached by FKTL, Putri Ayu Community Health Center made the most referrals to FKTL at 5,927 due to being close to several FKTL, while the FKTL with the highest referrals was DKT Jambi Hospital, namely around 65,375. The most common illnesses referred to FKTL are hypertension, diabetes mellitus, coronary heart disease, stroke and kidney failure. Raden Mattaheer Regional Hospital is a hospital that receives many referrals for this disease, one of the reasons is because it has the largest number of specialist doctors in Jambi City. **Conclusion:** The distribution of Jambi City Hospitals is quite even, the number of FKTL referrals can be influenced by the distance or distribution of health centers close to the FKTL and the availability or ability of medical personnel to treat referral diseases.

This is an open access article under the [CC BY-NC](#) license.



Corresponding Author:

Suci Ramadhani,
Ilmu Kesehatan Masyarakat,
Universitas Jambi,
Jambi, 36361, Indonesia
Email: suciirmadni11@gmail.com

INTRODUCTION

BPJS Health has decided to expand cooperation with health facilities. Health facilities are facilities used to provide health services to individuals, whether in the form of promotive, curative, preventive or rehabilitative. (Prasetyo et al., 2020) Through this facility, various individual health efforts can be carried out, starting from providing health information and counseling, preventing disease, treating disease, to providing care and rehabilitation for individuals in need. BPJS implements a referral system or what is usually referred to as health facilities 1, 2 and 3. (Betan et al., 2023)

The national health insurance system, which implements a tiered referral system, requires BPJS participants to visit a community health center as a First Level Health Facility (FKTP) before going to hospital for treatment.(Yamin & Khadafie, 2024) This tiered referral system aims to strengthen primary services in order to control quality and costs, which is known as a managed care system. One strategy is to collaborate with various health facilities to control quality and budget.(Lubis et al., 2022)

Fasilitas Kesehatan Tingkat Lanjutan (FKTL) yang bermitra dengan BPJS Kesehatan di Kota Jambi terdapat 14 Fasilitas Kesehatan Tingkat Lanjutan (FKTL). FKTL tersebut bertanggung jawab untuk memberikan pelayanan kesehatan kepada peserta BPJS yang telah dirujuk oleh Fasilitas Kesehatan Tingkat Pertama (FKTP). (Ramadhani, 2020)

Advanced Level Health Facilities (FKTL) in collaboration with BPJS Health in Jambi City there are 14 Advanced Level Health Facilities (FKTL). The FKTL is responsible for providing health services to BPJS participants who have been referred by the First Level Health Facility (FKTP).(Ramadhani, 2020)

A visit to an advanced level health facility can be influenced by patient factors in selecting health services including suggestions from lower health facilities, according to location or close accessibility, completeness of health facilities at a health facility, more affordable health service costs (Utilization of JKN) , patient diagnosis or emergency, availability of health workers.(Ahkam & Muchlis, 2021)

With the rapid progress of the times, the need for information is increasingly complex and diverse. Currently, people need information related to geography. One technology that can provide geographic information is a Geographic Information System (GIS).(Sholawati et al., 2023)

In the health sector, the use of Geographic Information Systems (GIS) can be used in spatial analysis that links regional conditions (conditions on the earth's surface) with disease occurrence.(Subagiyono & Febriani, 2023) Apart from that, we can also carry out environmental hazard analysis, map health service needs, and analyze accessibility to health services by mapping the location of health services and health workers so that later we can also describe visits to health facilities.(Setiyadi et al., 2021)

Results of research conducted by Achmad Nur Rafi M (2022), DKK regarding "Spatial Analysis of Distribution Patterns and Affordability of Health Facilities Based on Geographic Information Systems in the City of Surakarta in 2022". The distribution pattern of health facilities such as community health centers creates a dispersed distribution pattern, while public hospitals tend to have a random distribution pattern. In terms of accessibility of health facilities for residential areas in the city of Surakarta, it has met SNI standards regarding Housing Environmental Planning Procedures, but it is still necessary to pay attention to several existing deficiencies.(M & Sigit, 2022)

In previous research regarding the distribution of health facilities in Jambi City conducted by Nurul Hikmah, et al regarding "Spatial Analysis of the Distribution of First Level Health Facilities (FKTP) in Jambi City" explained that the distribution of FKTP in Jambi City was uneven, there was 1 sub-district with a high concentration based on FKTP distribution heatmap. Analysis of needs based on population shows that 6 sub-districts require additional distribution of FKTP. Therefore, BPJS Health is advised to emphasize the distribution of health facilities in areas that still require additional FKTP..(Hikmah et al., n.d.)

In the city of Jambi there are still sub-districts that do not have FKTL, therefore it is necessary to look at the extent of FKTL distribution in order to provide an overview of BPJS participants in utilizing referral health services. Accessibility of hospital health facilities in Jambi City is measured based on SNI 03-1733-2004 standards with a coverage radius of 3000 meters from the hospital point. Although by analogy it can cover the entire area around the health facility. A map depicting the existence of FKTLs in Jambi City created through a geographic information system can be used to determine locations based on various variables such as type of accessibility, number of visits, and

distribution of FKTPs, making it easier for BPJS Health participants to determine reference FKTLs. With this map function, the FKTL distribution pattern can be analyzed whether it is uniform, random (Random Pattern) or clustered (Clustered Pattern).

FKTL distribution and FKTL accessibility are very important for quality health services. The level of FKTL accessibility is related to the number of visits. The closer the FKTL accessibility is to residential areas, the higher the number of visits and the easier it is to get health services quickly.

From this description, researchers are interested in conducting research on "Spatial Analysis of Advanced Level Health Facilities (FKTL) in Jambi City in 2023" which will result in a map with information on the location or points of FKTL, number of FKTP, number of referral visits, and coverage of FKTL. With this map image, you can see how FKTL is distributed in Jambi City, whether it has reached all areas or not and you can see how BPJS participants choose reference FKTL.

RESEARCH METHOD

This research is a quantitative type with an exploratory descriptive design using a Geographic Information System (GIS) approach. Research will be carried out in all FKTLs in collaboration with BPJS Health in eleven sub-districts in Jambi City. Sampling was carried out using the total sampling method. The instruments used in this research include Google Earth Pro and Quantum GIS Software (QGIS). Data collection methods are primary data (health facility coordinate points) and secondary (FKTL visit data and Jambi Health BPJS data, number of FKTP, number of hospital medical personnel). Data analysis was carried out univariately.

RESULTS AND DISCUSSIONS

Distribution of Puskesmas and Referral Rates of Puskesmas to FKTL

Puskesmas is a health service facility that organizes public health efforts and individual efforts. (Nurlinawati et al., 2019) Jambi City has 20 Puskesmas where referrals will be made to FKTL in collaboration with BPJS Health.

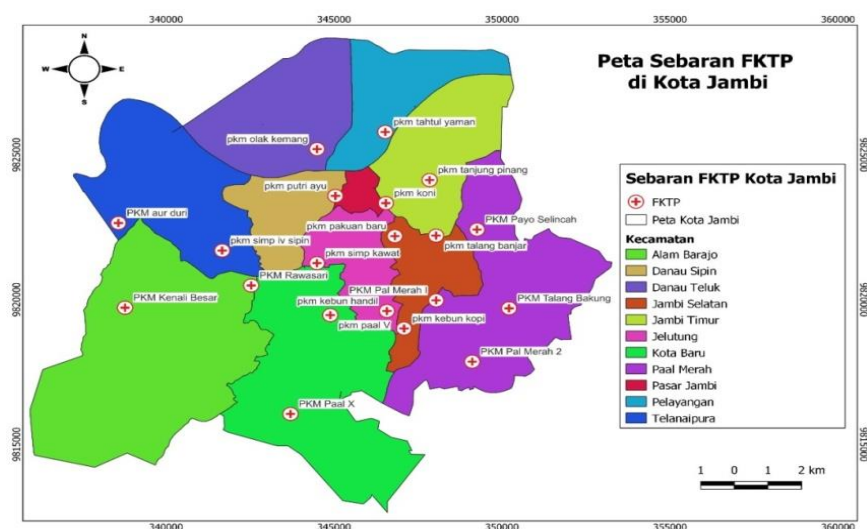


Figure 1. Distribution of Jambi City Health centers

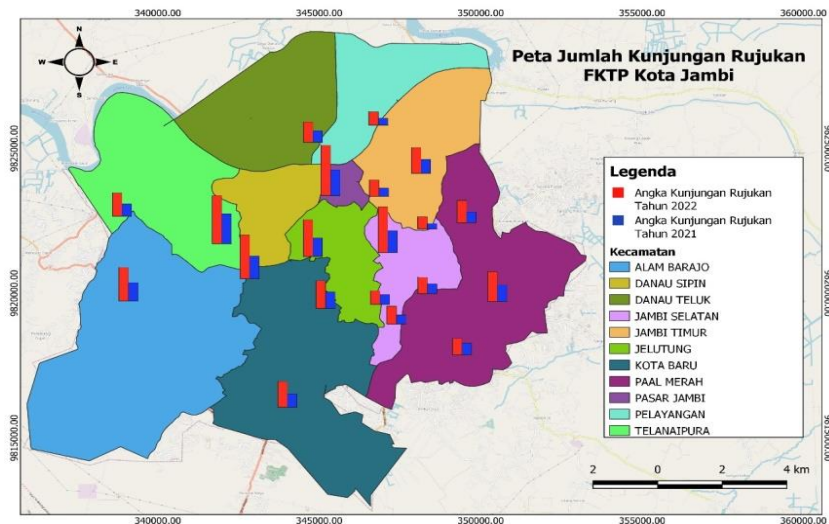


Figure 2. Map of the number of FKTP (Puskesmas) referral visits in Jambi City

According to Figure 2, it can be seen that from the results of mapping using Quantum Geographic System (QGIS) using graphs to see the referral numbers for Jambi City Health Centers, Putri Ayu Health Center is the Community Health Center that makes the most referrals to FKTL with 5,927 referrals located in Lake Sipin District. This Health Center close to Arafah Islamic Hospital, Baiturrahim Hospital, Bhayangkara Hospital, DKT Hospital, Theresia Hospital.

In line with Desvi Suriati's statement (2023), the high number of referrals from community health centers to FKTL is due to the lack of availability of human resources both in terms of quantity and quality, the absence of standard operational procedures, incomplete health facilities and infrastructure, the types of medical indications suffered by patients, the availability of medicines. Insufficient medicines and patient behavior can trigger an increase in referral rates at First Level Health Facilities (FKTP), especially community health centers. (Suriati et al., 2023)

Distribution of Advanced Health Facilities

Advanced level health facilities refer to health facilities that will be provided to patients after they receive a diagnosis or early detection in primary or first level health care. There are 14 Advanced Level Health Facilities (FKTL) in partnership with BPJS Health in Jambi City consisting of General Hospitals and special hospitals, both government and private.

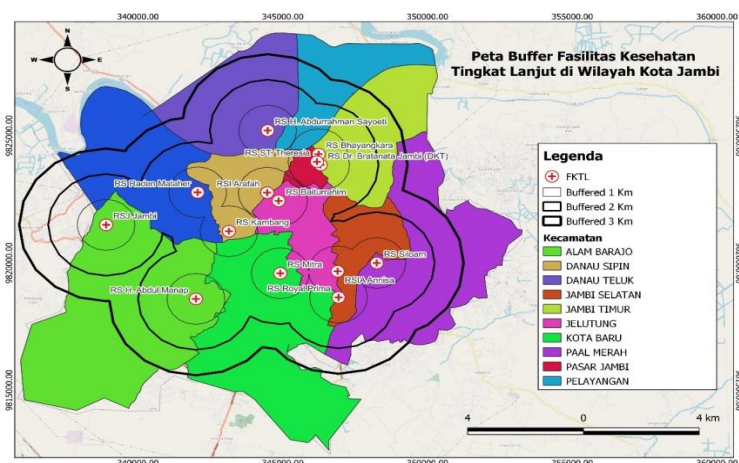


Figure 3. Buffer Map of Jambi City FKTL Distribution

It is known that the results of mapping using the Quantum Geographic System (QGIS) Advanced Health Facilities (FKTL) have been distributed in 8 sub-districts in Jambi City and there are still 3 sub-districts that do not have FKTL. The FKTL location point on the map is marked with a dot. Buffer analysis of the FKTL points is used to see the coverage of the FKTL service area.

The results of the analysis show that the affordability of Advanced Level health facilities (FKTL) with service affordability of 3 km is classified which is modified to obtain specific results.(Arief et al., 2023) Where the classification is divided into 3, namely distances of 1 km, 2 km and 3 km, indicating that overall all sub-districts in Kota Jambi is reachable by FKTL, however there are several sub-district areas that are not reached by hospitals, these areas are far from busy areas and have inadequate accessibility so there are no hospital health facilities in these areas. These areas include the tip of Pelayangan. The distribution of Advanced Level Health Facilities (FKTL) in Jambi City is 14 FKTL spread across 8 sub-districts and 3 sub-districts that do not yet have FKTL, namely Danau Sipin, Pelayangan and Paal Merah sub-districts. This map makes it easier for Jambi City BPJS participants to find referral (specialized) health services.

This research is in line with research conducted by Wijayanti (2017) which states that the use of health facility distribution maps that have been created makes it easier for people in Boyolali District to search for health service information that can be utilized by BPJS Health participants in obtaining services.(Wijayanti & Universitas, n.d.) Apart from that, there is also research conducted by Dui Puspitasari (2024) which states that mapping the distribution of hospitals in Kendal Regency based on the Geographic Information System (GIS) application can provide information about the distribution of hospitals in Kendal Regency. The distribution of hospitals in Kendal Regency is uneven. (Puspitasari, 2024)

Number of Referral Visits to Advanced Health Facilities (FKTL) and Number of Medical Personnel (Specialist Doctors)

To obtain special services, you need to get a referral from a First Level Health Facility (FKTP) and the referral given is according to the capabilities of the targeted Advanced Health Facility (FKTL).(Khotima et al., 2023)

Table 1. Number of referral cases to Jambi City FKTL

FKTL	2022	%
RS Abdul Manap	42.320	11,1
RSJ Jambi	12.061	3,16
RSUD H. Abdurrahman Sayoeti	582	0,15
RS Royal Prima	9.595	2,52
RS Siloam Jambi	7.847	2,1
RS DKT Jambi	65.375	17,15
RSIA Annisa	7.964	2,1
RS Baiturrahim	30.782	8,1
RS Mitra	7.581	2
RS Bhayangkara	52.955	13,9
RS. ST. Theresia	27.397	7,19
RS Islam Arafah	56.782	14,9
RS Kambang	24.580	6,45
RSUD Raden Mattaher	35.261	9,25
TOTAL	381.082	100

Source: BPJS Health Jambi 2022

According to the data above, the highest number of referral cases occurred at the DKT Jambi hospital, namely around 65,375 cases or 17.15% of 18,453 people. Meanwhile, the hospital that received the fewest referrals was H. Abdurrahman Sayoeti Regional Hospital, namely 582 cases or 0.15% of 404 people.

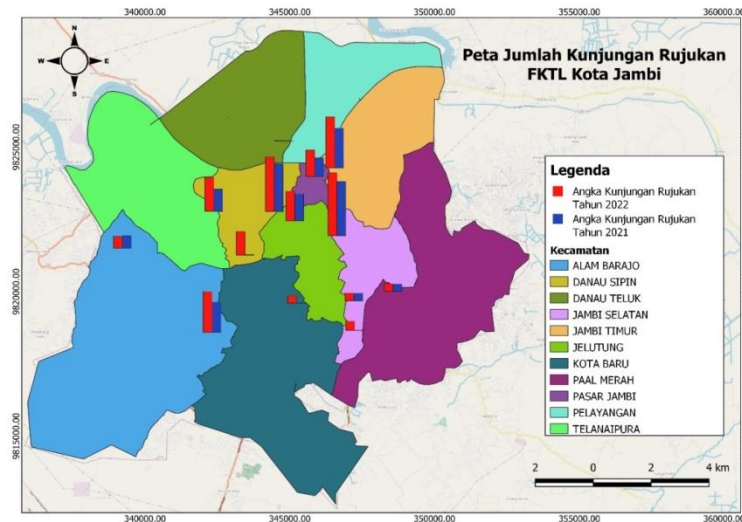


Figure 4. Map of the number of FKTL referral visits in Jambi City

Based on Figure 4. regarding the map of the Number of Referral Visits for FKTL Jambi City which is displayed in graphic form, DKT Jambi Hospital is the highest referral visiting hospital, namely around 65,375 cases, which is located in East Jambi District, where there are 2 Community Health Centers, namely Tanjung Pinang and Talang Banjar Community Health Centers. DKT Hospital is close to Bhayangkara Hospital and ST Theresia Hospital, these 2 hospitals are located in Pasar Jambi District.

Research conducted by John Amoah Nuamah, Williams Agyemang Duah, Gmakikube Prosper Ninorb and Borbor Gladstone Ekeme) stated that spatially, 139 communities representing 50.5% of society do not have access to health facilities that meet the distance threshold according to the World Health Organization (WHO) and the Ghana Health Service to reach health centers, Community Based Health Planning and Services (PKBM), and hospitals. Ideally, this implies that the majority of the population would have to travel more than 5 km to access health services. This study found that poor spatial distribution of health facilities has negative implications for access to primary health care centers in the district. Poor road conditions are the main barrier to household accessibility to district hospitals. In addition, availability, affordability, adequacy and acceptability which are the main determinants of access to basic health services were found to be quite good. (Amoah-nuamah et al., 2023)

In accordance with Muhammad Bayu Nanda's statement (2021), the farther the distance from a health service, the lower the demand and the closer the hospital will definitely be. (Nanda, 2021)

Research conducted by Dewi Astuti, DKK (2024) shows that the relationship between the distance to a referral hospital and the number of referral requests is related to the perception of those who want to get services that are more convincing for them, namely going to a hospital that is close to where they live. Considering the same distance and better and more complete service, this is what causes them to ask to be referred directly to the nearest hospital (Astuti et al., 2024)

Diseases that can be referred to Advanced Level Health Facilities (FKTL) are diseases outside of the 155 diseases covered by BPJS at First Level Health Facilities (FKTP), however if the disease is included in the 155 diseases that can be treated by FKTP has a high level of severity. (Ns et al., 2023) and cannot be treated effectively at FKTP and the treatment given does not show improvement, the doctor can consider a referral for further diagnosis and therapy. (Ekaputri, 2023)

The most common illnesses referred to public hospitals are hypertension, diabetes mellitus, coronary heart disease, stroke and kidney failure. The hospital that receives the most

referrals for this disease in Jambi City is Raden Mattaheer Regional Hospital, which consists of hypertension (15,200), diabetes mellitus (12,300), coronary heart disease (9,800), stroke (8,100) and kidney failure (6,800).

Advanced Level Health Facilities (FKTL) are health facilities that provide specialist services to patients, those providing these services are medical personnel consisting of doctors (general practitioners, specialist doctors) and dentists (dentists, specialist dentists). (Sarina et al., 2023)

Table 2. Number of medical personnel (specialist doctors and specialist dentists)

FKTL	Specialist Doctors	specialist dentists
RS Abdul Manap	45	6
RSJ Jambi	9	4
RSUD H. Abdurrahman Sayoeti	7	4
RS Royal Prima	19	1
RS Siloam Jambi	42	10
RS DKT Jambi	35	4
RSIA Annisa	11	-
RS Baiturrahim	30	2
RS Mitra	33	1
RS Bhayangkara	49	2
RS. ST. Theresia	40	8
RS Islam Arafah	40	5
RS Kambang	29	2
RSUD Raden Mattaheer	81	9
TOTAL	470	58

Data Source: Jambi City Health Service

Based on the data above, the number of specialist doctors and dentists at Advanced Health Facilities in Jambi City is 470 specialist doctors and 58 specialist dentists. Raden Mattaheer Regional Hospital is an Advanced Level Health Facility (FKTL) that has the most specialist doctors with 81 specialist doctors plus 9 specialist dentists.

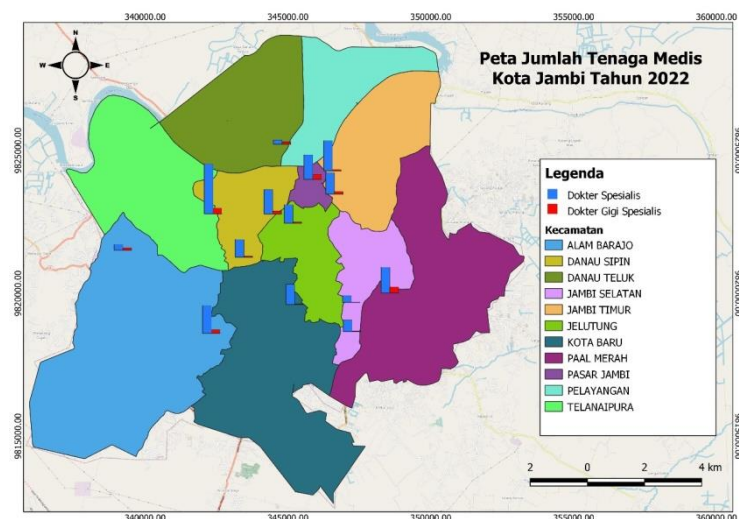


Figure 5. Map of the number of FKTL specialist doctors and dentists

Referral hospitals have an important role in providing specialist health services to patients. One factor that can influence the performance of referral hospitals is the availability of health workers (specialist doctors). (Jeremia, 2023) It can be seen that the diseases that receive many

referrals from FKTP in Jambi City are hypertension, diabetes mellitus, coronary heart disease, stroke and kidney failure. The hospital that receives the most referrals for this disease in Jambi City is Raden Mattaher Regional Hospital. This could also be due to the availability of specialist doctors at Raden Mattaher Regional Hospital which is the highest among hospitals in Jambi City, where there are 81 specialist doctors out of 470 specialist doctors.

This research is in line with research conducted by Septiani Eka Retnosari, et al (2024) regarding GIS distribution of health workers according to sub-districts in Malang City in 2019-2021 with the results that HRK equality has not yet completely occurred, health human resources are more abundant in big cities while in the cities others tend to be fewer. (Retnosari, 2024)

CONCLUSION

The distribution of Jambi City Hospitals is quite even and in a close pattern there are 3 sub-districts that do not yet have FKTL that partner with BPJS Health. The FKTL referral rate can be influenced by the distance or distribution of health centers close to the FKTL and the availability of medical personnel (specialist doctors) and health facilities capable of handling referred disease. So that the government can pay more attention to the distribution of Advanced Level Health Facilities in areas that do not yet have FKTL. The limitation of this research is that the data on the number of specialist doctors in each hospital does not provide an explanation of doctors working in more than one hospital. Maybe the next researcher can group the number of doctors more precisely and the next researcher can also add data on BPJS Health participants per sub-district to see the adequate distribution of FKTL in one area.

ACKNOWLEDGEMENTS

The researcher would like to thank the Faculty of Medicine and Health Sciences, Jambi University, supervisors and all BPJS Health Jambi, Jambi City Health Service and Jambi City Health Facilities who have given permission and helped participate during the research process. So this research runs smoothly.

References

- Ahkan, Z. A., & Muchlis, N. (2021). Implementasi Sistem Rujukan Terintegrasi (SISROUTE) Di RSUD Labuang Baji Kota Makassar. *Journal Of Muslim Community Health (JMCH)*, 2(2), 98-111.
- Amoah-Nuamah, J., Agyemang-Duah, W., & Prosper, G. (2023). Analysis Of Spatial Distribution Of Health Care Facilities And Its Effects On Access To Primary Healthcare In Rural Communities In Kpandai Public Health Analysis Of Spatial Distribution Of Health Care Facilities And Its Effects On Access To Primary Healthcare In Rural Communities In Kpandai. *Cogent Public Health*, 10(1). <https://doi.org/10.1080/27707571.2023.2183566>
- Arief, M. H., Afandi, K., Arifin, I. F., Laily, N. F., Kesehatan, G., & Kesehatan, A. F. (2023). Analisis Spasial Aksesibilitas Fasilitas Kesehatan Di Kabupaten Jember. 12(September), 1764-1771.
- Astuti, D., Listina, F., & Aziza, N. (2024). Permintaan Rujukan Pasien BPJS Di Puskesmas Tiuh Tohou Kecamatan Menggala Kabupaten Tulang Bawang Tahun 2023. 7(September 2023), 83-95.
- Betan, A., Sofiantin, N., Jenice, M., Syamsi, N., Primadewi, K., Muh, D. A., Kamaruddin, I., & Muthiyah, A. (2023). *Kebijakan Kesehatan Nasional*.
- Ekaputri, R. (2023). Gambaran Umum Masyarakat Dalam Pemanfaatan Jaminan Kesehatan Nasional Di Desa Rantau Jaya Kecamatan Simpang Raya Kabupaten Banggai. 02(September).
- Hikmah, N., Noerjodianto, D., & Wardiah, R. (N.D.). Analisis Spasial Sebaran Fasilitas Kesehatan Tingkat Pertama (FKTP) Di Kota Jambi Spatial Analysis Of Distribution Of First Level Health Facilities In Jambi. 7(2), 236-241.
- Jeremia, A. (2023). Transformasi Rumah Sakit Indonesia Menuju Era Masyarakat 5.0.
- Khotima, F. L., Nugraha, I. N. A., & Wardhana, Z. F. (2023). Analisis Alur Pelayanan Pasien Rawat Jalan Bpjs Kesehatan Di Rumah Sakit Mata Bali Mandara Analysis Of Outpatient Patient Service Flow Of BPJS Kesehatan

- At Bali Mandara Eye Hospital*. 10(1), 43-60.
- Lubis, A. S., Sabrina, D., Ginting, N. G. B., Hutajula, S. A., & Gurning, F. P. (2022). *Analisis Perkembangan Fasilitas Kesehatan Tingkat Pertama Dan Fasilitas Kesehatan Rujukan Tingkat Lanjutan Pada Tahun 2022*. 1(9), 1235-1248.
- M, A. N. R., & Sigit, A. A. (2022). *Analisis Spasial Pola Sebaran Dan Keterjangkauan Fasilitas Kesehatan Berbasis Sistem Informasi Geografis Di Kota Surakarta Tahun 2022*. 1-11.
- Nanda, M. B. (2021). *Faktor-Faktor Yang Mempengaruhi Permintaan Pelayanan Kesehatan Rumah Sakit Umum Daerah Depati Bahrin Kabupaten Bangka*. 09(01), 38-50.
- Ns, S. K., Kes, M., Mutrofin, A., Kurnia, D., Rachma, S., & Z, T. K. (2023). *Pelaksanaan Sosialisasi Sistem Rujukan Berjenjang Bagi Peserta Jaminan Kesehatan Nasional (JKN) - BPJS Kesehatan Dr. 01*, 2-5.
- Nurlinawati, I., Rosita, R., & Werni, S. (2019). *Gambaran Faktor Penyebab Rujukan Di Puskesmas Kota Depok*. Ejournal2.Litbang.Kemkes.Go.Id
- Prasetyo, E. I., Prasetyo, T., & Hulu, D. (2020). *Analisis Faktor-Faktor Yang Dapat Memprediksi Financial Distress Pada Badan Penyelenggara Jaminan Sosial (BPJS) Kesehatan Tahun 2014-2018*. 7(1).
- Puspitasari, D. (2024). *Pemetaan Persebaran Rumah Sakit Di Kabupaten Kendal Berbasis Aplikasi Sistem Informasi Geografis*. 4(1), 42-50.
- Ramadhani, S. N. (2020). *Analysis Of Factors Causing High Referral Rates At Primary Health Center In The JKN Era : A Literature Review*.
- Retnosari, S. E. (2024). *Sig Persebaran Tenaga Kesehatan Menurut Kecamatan Di Kota Malang Tahun 2019-2021*. 4(1), 59-65.
- Sarina, N., Amelia, A. R., & Hamzah, W. (2023). *Analisis Rujukan Penyakit Non Spesialistik Ke Fasilitas Kesehatan Tingkat Lanjut Pada Puskesmas Di Kabupaten Polewali Mandar*. 4(2), 84-98.
- Setiyadi, N. A., Darnoto, S., & Miftahul, A. (2021). *Sistem Informasi Geografis SIG Kesehatan*.
- Sholawati, A., Amin, D. A., Riswanti, N., Irsyad, A., Informasi, S., Teknik, F., & Mulawarman, U. (2023). *Aplikasi Sistem Informasi Geografis Dalam Pemetaan Rumah Sakit Saskatchewan, Kanada*. 1(1), 23-25.
- Subagiyono, & Febriani, H. (2023). *IDENTIFIKASI MASALAH KESEHATAN SELAMA PANDEMI COVID-19 DI PADUKUHAN BOGEM DESA TAMANMARTANI, KALASAN, SLEMAN*. 8(3), 120-128.
- Suriati, D., Hang, U., & Pekanbaru, T. (2023). *LITERATURE REVIEW: ANALISIS FAKTOR PENYEBAB TINGGINYA ANGKA RUJUKAN DI PUSKESMAS BANGUN PURBA*. 1(1), 79-85.
- Wijayanti, A., & Universitas. (N.D.). *DISTRIBUSI FASILITAS KESEHATAN BAGI PESERTA BPJS KESEHATAN KECAMATAN BOYOLALI*.
- Yamin, A., & Khadafie, M. (2024). *Analisis Penggunaan Aplikasi Sistem Rujukan Terintegrasi (SISRUTE)*. 7, 2105-2115.