ANALYSIS OF EFFECTIVENESS OF HEALTH FACILITIES SERVICES IN MAGELANG REGENCY, INDONESIA

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Abstract

One of the priorities for health development in Magelang Regency is improving the quality of health services. In fact, it was found that the health facilities in Magelang Regency are adequate. However, it is imperative to figure out if they function well. Therefore, the purpose of this study was to assess the level of effectiveness of existing health facilities in this regency. The data used in this study are the number and coordinate points of the hospital and community health centres. The data analysis uses multi-ring buffer analysis. The results show that the level of effectiveness of hospital health services in the category of very high effectiveness, 0.94% of the total area. The effectiveness of the distribution of hospitals is in the low category can serve 12.16% of the total area. The effectiveness of the distribution of community health centres facilities is in the very high category,0.43% of the district area, and the very low category covers 36.48% of the area of Magelang Regency.

Keywords: effectiveness, reach, health facilities

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INTRODUCTION

The consequence of the city's development is the increasing population activity, which increases the need for facilities to support the population's activities. Health facilities are one of the public facilities that residents need (Istiqomah & Ritohardoyo, 2006). The distribution of health facilities in urban areas is essential for health services in big cities (Mansour, 2016). Thus, analysis of the spatial relationship between the location of health facilities and accessibility to activity centres is an essential factor in decision-making, planning, and healthcare systems (Higgs et al., 2019; Perry & Gesler, 2000)

Health facilities provide health services to the community and play a strategic role in accelerating the improvement of public health status and controlling population growth (Kruk et al., 2018). The provision of health facilities is calculated based on the number of people served by these facilities (Mahendradhata et al., 2017). The placement of the provision of health facilities considers the range of radius that must be met to serve specific areas (Sadali et al., 2021). Indonesian National Standard No. 03-1733-2004 concerning Procedures for Environmental Planning states that a city/regency area has a standard for calculating health facilities based on the type of facility with the criteria of supporting population, the radius of achievement, and location qualifications.

The 2019-2024 Regional Medium-Term Development Plan for Magelang Regency contains strategic issues, including the quality of human resources, regional competitiveness, and clean and accountable governance. Magelang Regency Regional Medium-Term Development Plan is achieved through various sectors, including the health sector. This achievement is manifested through priority development programs in the health sector, namely improving health services that is getting better and more affordable.

Health is a development priority to improve human resources quality (Sadali et al., 2021). One of the priorities for health development in Magelang Regency is improving the quality of health services, which indicates the quality of public services. Good quality of health services will improve public health status (Yusyanti, 2021). The existing condition of health facilities in Magelang Regency is sufficient which covers 29 community health centres and five hospitals (BPS Kabupaten Magelang, 2021). Based on the Indonesian National Standard No. 03-1733-2004 calculation, the need for health facilities in Magelang Regency is five units of hospitals and 11 units of community health centres. It shows that the existing condition of health facilities in Magelang Regency has exceeded the standard requirement. Magelang Regency's position which is surrounded by Magelang City also influences the availability of health facility services. Magelang City, in 2021, had six units of general hospitals, two exceptional hospitals, and five community health centres. The availability of health facilities in Magelang City attracts community users from Magelang

Regency. The close distance causes; the quality of health services to be more comfortable and complete.

The large number of health facilities in Magelang Regency needs to be reviewed on the level of reach and effectiveness. Therefore, this study analyzes the reach and effectiveness of the distribution of health facilities in Magelang Regency. The results of this evaluation can be used as a basis for formulating a strategy for optimizing health facilities in Magelang Regency so that priority programs for development in the health sector can be achieved.

LITERATURE REVIEW
Provision of Health Facilities
Public health concerns threat to the general health of the community based on the analysis of population health (Maidin, 2008). Health facilities provide health services to the community, play a strategic role in accelerating the increase in public health status, and control population growth (Atmanti & Naylah, 2019). The basis for providing health facilities is based on the number of people these facilities serve. The basis for providing health facilities also considers the spatial requirements design approach. At the same time, the placement of the location for the provision of health facilities considers the range of service area radius that must be met. Law Number 36 of 2009 concerning Health states that Regional Governments can determine the number and type of health service facilities and grant operational permits based on area size, health needs, disease patterns, utilization, social functions, ability to use technology, and population size and distribution.

Public health services at the primary level in Indonesia are community health centres. Community health centres are health service facility organizing community and individual health efforts by prioritizing promoted and preventive efforts to achieve the highest degree of public health (Regulation of the Minister of Health Number 75 of 2014 Concerning Community Health Centres). The role of the community health centres in health development aims to create a society that has healthy behavior including awareness, willingness, and ability to live healthily, able to reach quality health services, live in a healthy environment, and have optimal health status; not only individuals, families, groups, but also communities. The community health centres are the government's foundation in providing health services to the public at the sub-district and sub-district levels. Hence, community health centres are one of the frontlines in the development of public health (Luthfia & Alkhajar, 2019).

Spatial distribution patterns can be used in making decisions on strategies and policies applied to project the density or abundance of a population (Krebs, 2014). According to Dewantara & Urufi (2021), health facilities' uneven distribution patterns and reach can be a particular spatial planning problem. This condition can be seen from various indicators: population density, spatial

distribution index of health facilities, radius/reach of health facilities, affordability, and travel time to the nearest health facility.

Effectiveness of Distribution of Health Facilities
Access to health facilities shows information about how easy it is for residents to access various kinds of health facilities (Paez et al., 2010). The health facility indicator is applied primarily to the poor and vulnerable individuals in accessing health facilities that are important for their lives. The ease of accessing these health facilities is measured using the distance from the village to the location where the facility is located. Health services can be measured from the convenience of the health insurance program and the geographical range of services, accessibility related to transportation, distance, and travel time. Regional accessibility to health facilities focuses on radius/reach, affordability, and travel time (Ramadan et al., 2021).

Effectiveness is defined as something that has an effect (consequences, influence), can bring influence, and can also mean coming into effect (regarding regulations). The effectiveness of health facility service coverage is measured through affordability. The affordability indicator can be seen from the ease of accessibility based on the distance to health facilities. Assessment of the effectiveness of health facility services is based on research conducted by (Ramadan et al., 2021) using GIS modeling (network analysis). Network analysis is considered as the area of the service area or the affordability of a service point in the form of a health facility based on distance and time. The results of the service area calculation based on distance and time are used as affordability parameters through data overlay techniques—the overlay results in the percentage of areas the nearest health facility covers.

RESEARCH METHODOLOGY
This research is held in Magelang Regency, which has an area of 1.086 Ha, consisting of 21 sub-districts with five hospitals and 29 community health centres. The data needed in research are in the form of primary data and secondary data. This study uses secondary data in the form of spatial planning regulations and policies, population per district, a list of hospitals and health centres, references to journals, and literature reviews. The data were obtained from various agencies, namely the Public Works and Spatial Planning Office of Magelang Regency, Magelang Regency Regional Development Planning Agency and Litbangda, Magelang Regency Health Office, and the Central Bureau of Statistics of Magelang Regency. This study also uses primary data from field observations, namely the coordinate point data for hospitals and health centres. The data analysis, in general, use descriptive analysis with a spatial approach. The spatial approach uses the multi-ring buffer analysis method to analyze the range of health facility services. In assessing the effectiveness of the distribution

of health facilities, affordability analysis was used with a weighting formula seen from the distance to the hospital and community health centre.

The Reach of Health Facilities in Magelang Regency
The technique for reach analysis of health facilities uses buffer analysis. Buffer or Proximity Analysis is an analytical technique used to identify the relationship between a point and the surrounding area, a proximity factor analysis. Proximity Analysis can be used as a marketing strategy analysis to determine sites/business land/trade (Aqli, 2010). According to (Prahasta, 2002), Buffer Analysis is a form of a zone that leads out from a mapping object which can be a point, a line, or an area (polygon). Zones can be used to identify the spatial proximity of an object on the map to the surrounding objects. The result is of buffering analysis can provide information regarding the optimal range of health facilities.

The buffering technique is based on providing health facility service reach in SNI 03-1733-2004. However, the standard still needs to regulate the range/radius of health facilities in serving the city/district scale. Therefore, to calculate the reach of health facilities uses the distance radius category. Referring to several studies, the service radius of health facilities generally used for community health centres is divided into four distance categories. It is 1 kilometre, 2 kilometres, 3 kilometres and 4 kilometres radius (Istiqomah & Ritohardoyo, 2006; Mamonto et, al., 2022; Mansour, 2016; Ramadan et al., 2021; Xu, Yan, Hu, & Pu, 2022). Based on the Guidelines for Determining Minimum Service Standards in the Field of Spatial Planning, Housing and Settlements and Public Works, Decree of the Minister of Settlement and Regional Infrastructure No. 534/KPTS/M/2001, that the minimum service standard for a hospital is twice that of community health centres. With the radius approach, the distance between hospital services is twice the distance between community health centres services. The service radius for health facilities in the form of hospitals uses the distance categories of 2 kilometres, 4 kilometres, 6 kilometres, and 8 kilometres. The analysis was carried out by multiple ring buffer analysis for each type of health facility, hospital, and health centre in the four categories of buffer distances. This analysis was carried out using the multiple-ring buffer technique for each type of health facility—multiple ring buffer analysis using the ArcGIS software application. Multiple ring buffer analysis was carried out to obtain the extent of service coverage in each analysed radius. The next step is to intersect the district area so that the service area of the hospital and community health centres in each district is obtained.

The Level of Effectiveness of the Distribution of Health Facilities in Magelang Regency
The analysis of the effectiveness of the distribution of health facilities focuses on the ability of health facilities to serve affordably, indicating ease of access in

terms of distance. Identifying the effectiveness of the distribution of health facilities uses weighting based on the area served. In line with the research conducted (Dewantara & Urufi, 2021), the weighting formula is based on the area served (L) / health facilities with the following assumptions (Table 1).

Table 1: Value of Area Served of Health Facilities.

Area Served	Radius of Hospital (km)	Radius of Community Health Centers (km)	Value
L5	0 – 2	0 – 1	5
L4	2,1 – 4	1,1 – 2	4
L3	4,1 – 6	2,1 – 3	3
L2	6,1 – 8	3,1 – 4	2
L1	> 8	> 4	1

Weighting 1 to 5 is determined based on the parameters of the optimum service location of a network so that it can minimize the multiplication results between the shortest distances with the weights of all nodes originating from that network node (Rushton, 1979). Furthermore, this weight value is multiplied by the area based on the served radius with the following formula:

$$K = \frac{((L5 \; x \; 5) + (L4 \; x \; 4) + (L3 \; x \; 3) + (L2 \; x \; 2) + (L1 \; x \; 1))}{(\Sigma L \; x \; 5)} \; x \; 100\%$$

The result of this calculation is the percentage value of affordability or effectiveness for each district which is categorized as follows:

▪ Very High if the affordability effectiveness is 75.01% - 100%
▪ High if the affordability effectiveness is 50.01% - 75%
▪ Medium if the effectiveness of the affordability is 25.01% - 50%
▪ Low if the effectiveness of the affordability is 0% - 25%
▪ Very Low if there is no health service coverage

ANALYSIS AND DISCUSSION
Health Facility Coverage in Magelang Regency
The placement of health facilities must consider accessibility so that it has implications for the optimal utilization of health services (Arif et al., 2018). This optimization is carried out by reducing the distance travelled to obtain basic needs and facility services based on the centre's service hierarchy (Sarwasih, 2020). Optimizing the reach of health services can improve community welfare, efficiency and cost-effectiveness (Arif et al., 2018). Health facilities have an essential role in improving the quality of health in the community, therefore; easy access to health service locations is one of the essential things to pay attention to

improve health services (Putri, 2018). The service level of health facilities is calculated by analysing the range of services. The analysis of the service reach of health facilities is classified into two: the analysis of the service reach of hospitals and the analysis of the service reach of community health centres.

Reach of Hospital
The analysis of the reach of hospital, health facility, is divided into four distance categories (Figure 1). The results of multiple ring buffer analysis show that the reach of the hospitals in a 2-kilometre kilometre radius covering an area of 5,161 Ha, 4-kilometre kilometre radius area of 11,032 Ha, radius of 6 kilometres covering an area of 12,520 Ha, radius of 8 kilometres covering an area of 15,370 Ha.
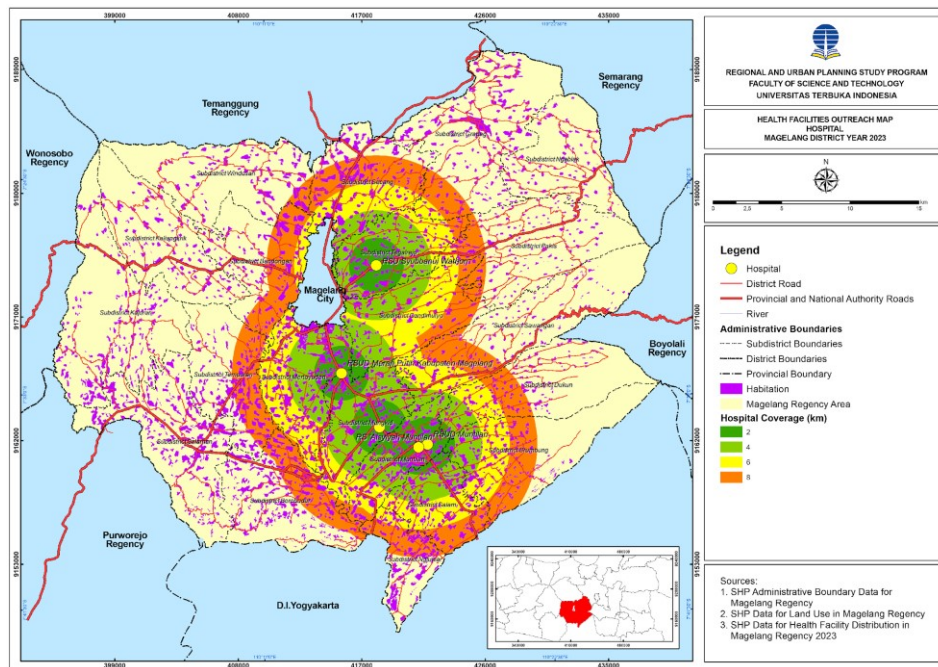

Figure 1: Multiple ring buffers at five hospitals.

The analysis of the reach of hospital in the Magelang Regency area shows that not all areas in Magelang Regency are covered by hospital health facilities. Several districts within a maximum radius of 8 kilometres are unable to reach the nearest hospital health facilities. The five hospitals in Magelang Regency that have reached health facilities are Kajoran, Kaliangkrik, Salaman and Ngablak District. The service coverage of hospital with a radius of more than 8 kilometres occupies 60.96% of the total area of Magelang Regency. Almost all

districts in Magelang Regency have reached health facilities yet in the form of hospitals optimally.

The percentage of hospital health facility coverage with a 75% -100% reaches only Candimulyo, Mertoyudan, Mungkid, Muntilan, Salam and Tegalrejo District. Affordability values between 50% -75% are Secang District and Srumbung District, and Hospital affordability with a percentage value of 25% -50% includes Bandongan, Borobudur, Dukun, Ngluwar, Sawangan and Tempuran District. The affordability of hospital around the district with a value of 0-25% includes Grabag, Pakis, Windusari, Kajoran, Kaliangkrik, Ngablak and Salaman District.

The highest range of hospital health facilities is in Ngluwar District at 98.19% and Muntilan District at 77.49%. It could be since several hospital locations are in the Muntilan District, which is adjacent to the Ngluwar District. Meanwhile, the district with a low affordability percentage value is located adjacent to Magelang City, where the number of hospitals in Magelang City has larger quantity with a narrower area. Districts with a low reach of hospital facilities can be served with health facilities at a level below the hospital (Heywood & Harahap, 2009). Health facilities can be reached, including health centres, auxiliary health centres, medical clinics, doctor's practices, and other health facilities (Haruna et al., 2019).

Reach of Community Health Centres
Magelang Regency has 29 community health centres spread evenly in each district. The classification of community health centres is divided into inpatient and non-inpatient classes. The health centres include in the hospitalization were Grabag I, Pakis, Sawangan 2, Borobudur, Salaman 1, Kaliangkrik, and Bandongan Health Center. While the other community health centres belong to in the non-inpatient classThe analysis of the coverage of community health centre facilities is divided into four categories (Figure 2).

The reach of community health centres within a 1-kilometre radius covers 8.06% of an area of 9,103 Ha. Community health centres within a 2-kilometre radius cover 22.37% of an area of 25,259 Ha. Community health centres within a 3-kilometre radius cover 27.58% of an area of 31,149 Ha. A 4 km radius within reach of the community health centres occupies 19.38% covering an area of 21,881 Ha. The reach of community health centres with a radius of more than 4 kilometres occupies 22.61% of the area of Magelang Regency covering an area of 25,532 Ha.
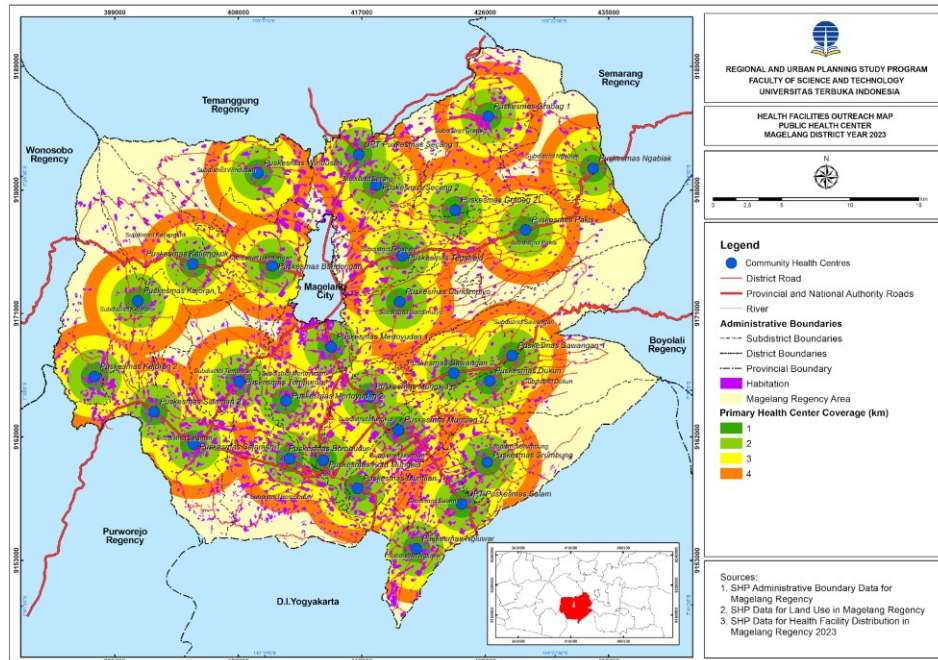
Figure 2: Multiple ring buffers at community health centres

The affordability of community health centres in the district area is obtained in the value category of 75-100% and 50-75%. Affordability value categories between 25-50% and 0-25% are not found. These results can be assumed that the affordability of health facilities in the form of health centres in Magelang Regency is in almost all areas served. The affordability category of community health centres with a value of 75-100% includes Bandongan, Candimulyo, Grabag, Mertoyudan, Mungkid, Muntilan, Ngluwar, Salam, Salaman, Secang, Tegalrejo, and Tempuran District. The percentage of reach of community health centres with a value of 50-75% includes Borobudur, Dukun, Kajoran, Kaliangkrik, Ngablak, Pakis, Sawangan, Srumbung and Windusari District.

The highest coverage percentage of health facilities at the health center in Magelang district includes Mungkid, Muntilan, and Salam districts. The districts cover 100% of the entire area of each district. Meanwhile, the five districts with the lowest coverage are Windusari, Srumbung, Sawangan, Dukun, and Kaliangkrik District. The district with the lowest coverage has implications for problems with accessibility to health facility services. Communities must travel longer distances to receive care and treatment services at the Puskesmas (Zainol & Pettit, 2016).

The Effectiveness Level of the Distribution of Health Facilities in Magelang Regency

The Level of Effectiveness of the Distribution of Hospital

The distribution of health facilities in the form of hospitals in Magelang Regency is expected to reach the entire community. The results of multiple ring buffer analysis at five hospitals were scored through weighting to get the level of effectiveness. The resulting categories are very high, high, medium, low, and very low effectiveness (Figure 3). A very high level of effectiveness can reach Muntilan and Mungkid Districts. The effective reach of hospitals in Muntilan District reaches 21.86% of the total area of the district. Mungkid district can be served with a very high level of hospital effectiveness, 9.78% of the district area.

The medium level of effectiveness covers Candimulyo, Mungkid, Sawangan, Mertoyudan, Muntilan, Dukun, Salam, Srumbung and Ngluwar Districts. The effectiveness of the distribution of hospitals in Salam District covers 34.62% of its area. Muntilan Hospital and Aisyiyah Hospital effectively distribute hospitals in the Salam District. Mungkid District can be served by a hospital distribution of 29.65% of its area. Hospitals that can serve Mungkid district are the Merah Putih Hospital, Gemilang N-21 Hospital, Muntilan Hospital and Aisyiyah Hospital.
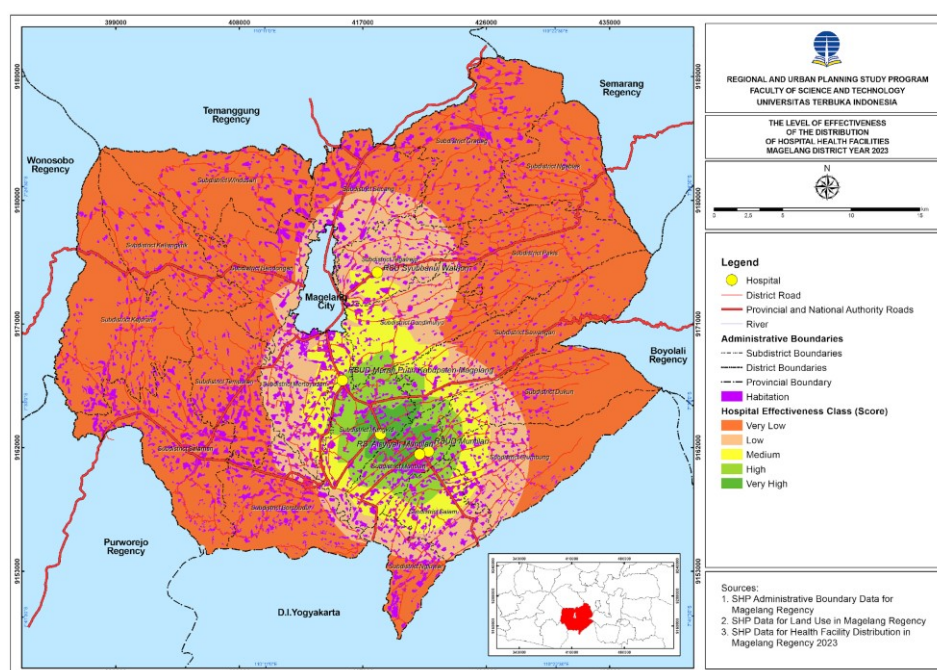

Figure 3: The Effectiveness of the Distribution of Hospital Health Facilitie**s**

The districts with very low effectiveness with a value of 100% are Grabag, Kajoran, Kaliangkrik, Ngablak, Pakis, Salaman and Windusari District. Other districts that are almost unreachable by hospital facilities with a range of percentage values of the sub-district area between 50-99% are Bandongan, Borobudur, Tempuran, Secang, Dukun, Ngluwar, Sawangan and Srumbung Districts. The level of effectiveness needs to be improved in almost all districts in the Magelang Regency.

Overall, the level of effectiveness is very high for the spread of hospital, reaching 0.94% of the total area of Magelang Regency. A very high level of effectiveness reaches the Muntilan and Mungkid Districts. The effectiveness of the distribution of hospitals at a high level reaches 3.63% of the total area. The area covered by the hospital at a medium effectiveness level is 5.90% of the total. Hospitals' low effectiveness level can serve 12.16% of the total area. The level of very low effectiveness covers almost all areas, with a total area of 77.37%. Although the effectiveness level in terms of hospital reach is low, lower-level health facilities, community health centres, can serve these areas.

Health service facilities' availability, distribution, and effectiveness in terms of location coverage, quantity, and quality are closely related to improving health facility services (Sadali et al., 2021). One of the indicators of community welfare in the health aspect is the increase in health facility services that are adequate and affordable for the community (Sadali et al., 2022). Improving the health and welfare of the population will produce reliable human resources. The strategy for improving the quality of human capital resources, the principle of efficiency, needs to be considered in planning the government's budget. If the efficiency level is high, government spending can decrease (Atmanti & Naylah, 2019).

The Level of Effectiveness of the Distribution of Community Health Center
The results of the analysis of the effectiveness of community health centres outreach can be divided into five levels (Figure 4). Results of the analysis of the effectiveness of the distribution of community health centres in Magelang Regency can be a percentage of the area of the district. The very low category covers 36.48% (41,195.85 Ha) of the district area. The districts with the highest scores in the very low effectiveness category were Windusari, Ngablak, Kaliangkrik, Dukun, Sawangan and Srumbung Districts. Meanwhile, the lowest scores were in the very low effectiveness category, namely Mungkid and Muntilan Districts. However, the community health facilities have served the area more optimally. The low category covers 37.97% (42,879.84 Ha). The medium effectiveness category occupies 20.99% (23,699.79 Ha) of the district's area. The effectiveness level of high distribution covers 4.14% (4,669.92 Ha) of the district area. The very high effectiveness category covers 0.43% (481 Ha) of the district

area. The very high level of effectiveness covers parts of Sawangan, Dukun, Mungkid, Mertoyudan and Borobudur Districts.
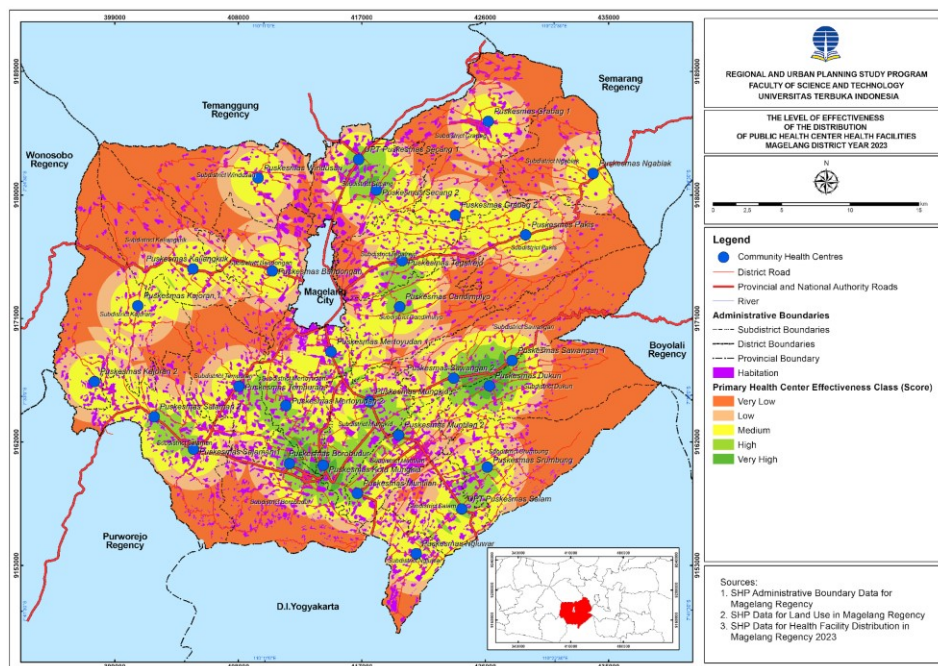

Figure 4: The Effectiveness of the Distribution of Community Health Centres

Most areas in Magelang Regency which are not served by health facilities in hospitals and community health centres are in high topography and belong to conservation areas. These inaccessible areas are in the Mount Merapi and Merbabu National Parks, and the Mount Sumbing and Menoreh Hills Areas. These areas are not covered by health facilities, such as hospitals and community health centres, and can be served by health facilities at the lower hierarchical level. Health facilities at the hierarchical level below hospitals and community health centres can be in the form of local health centres in every village, clinics/polyclinics, doctors' offices, etc. Minimum service standards at each level of a particular health facility, it will be possible to carry out an analysis regarding the level of fulfilment of service capacity or the effectiveness of service capacity of each health facility. Comparing the number of health facilities and the total population served are the parameter of the ideal number of health (Sadali et al., 2022).

CONCLUSION

The results of the analysis show that not all areas in Magelang Regency have access to hospital health facilities. The districts that have reached the health facilities of the five hospitals in Magelang Regency are Kajoran, Kaliangkrik, Salaman and Ngablak District. The affordability of health facilities in the form of community health centers in Magelang Regency shows that they can serve all districts which are out of the hospital covering radius. The outher areas like Kaliangkrik, Dukun, Sawangan and Srumbung Districts got limited access to health centers. It infers that the effectiveness of hospital distribution in Magelang Regency is concentrated in the southern part, especially on Jogjakarta-Semarang National Road. In general, the effectiveness of the distribution of community health centers is, however; evenly distributed and can cover almost all sub-districts. Overall, the Magelang Regency Government needs to e enhance the quality of health facility services by enabling health centres that do not provide inpatient facilities to have inpatient services, particularly health centers in districts where people have not been able to reach hospital yet. The Magelang Regency Government is also recommended to improve accessibility to hospital to make the travel time can become more affordable. Since this research focuses on the range of services and the effectiveness of existing health facilities in Magelang Regency, a more in-depth study is needed to measure the accessibility of health facilities from settlements. Thus, it is highly recommended for future researchers to carry out more comprehensive research combining the reach of health facilities with economic and social aspects.

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