# Potential Analysis of New Hospital Locations in Tasikmalaya City Using Geographic Information Systems

Efri Triana Nur Arifin [a,1,*],

[a] Faculty of Social Science Education, Indonesia University of Education, Bandung, Indonesia
[1] efritriana27@gmail.com*
* Corresponding Author

**ABSTRACT**

Tasikmalaya is one of the cities in West Java Province with a total population of 716,155 people in 2020 with a growth rate of 12.70% compared to the population in 2010. Cihideung District is the area with the largest population density of 13,202 people/km$^2$ and Tamansari District is the area with the smallest population density of 2,083 people/km$^2$. Meanwhile, the population density of Tasikmalaya City is around 3,887 people/km$^2$. However, the number of existing hospitals has not increased significantly and is also unable to accommodate and reach this very large population. For this reason, it is necessary to add hospitals with strategic locations, one way to do that can be done with the help of a geographic information system. By using the descriptive-quantitative method, the existing data were analyzed using a correlation approach and depicted factually, systematically and accurately. Referring to the data from the overlay analysis, the determination of the new hospital land location should be placed in areas with high population density, these locations include the districts of Cibereum, Mangkubumi, Bungursari, and Purbaratu, as well as in the northern and southern areas of Tasikmalaya City.

## 1. Introduction

Hospital is a public facility that functions as a center for public health services including prevention and cure of disease, as well as maintenance, improvement and complete health recovery (Adji, 2019). Hospitals as health service providers need to improve health services. The increasing socio-economic conditions of the community, it also affects the mindset of the people who are increasingly critical of things that are very vital, especially in terms of health (Mongkaren, 2013). As for customer satisfaction, the hospital can fulfill one of them through its services (Supriyanto, 2012). Based on data from the Central Bureau of Statistics, Tasikmalaya City is one of the cities in West Java Province which has a population density of around 3,887 people/km$^2$. To support the welfare of the people in Tasikmalaya City, it is necessary to provide health services/hospitals. In carrying out its functions, hospitals have certain criteria so that health services can run effectively.

In the Decree of the Minister of Health No. 340 of 2010, it is said that the hospital is a health service institution that provides complete individual health services such as inpatient, outpatient and emergency services (Purnomo, 2017). Based on the Minister of Health Regulation No. 24 of 2016 concerning Technical Requirements for Hospital Buildings, geographical factors that must be considered in the construction of hospitals are land contours and environmental conditions. Soil contours affect the structural design, architecture, and mechanical or electrical of the hospital. In addition, the contours of the land also affect the planning of the drainage system, road conditions on the building footprint and others.

The function of use geographic information systems in the health sector is to provide attribute data and spatial data that describe the distribution or pattern of distribution of patients with a disease or a distribution model for the distribution of health care facility units including medical personnel and other health workers (Prahasta, 2009). In an effort to improve health services to become more optimal, it is necessary to increase the number of hospitals or the capacity of hospital beds. To help analyze the need for effectiveness, it can be assisted with a geographic information system (GIS). GIS can be used to select prospective locations for which a new hospital will be built in accordance with applicable criteria (Purnomo, 2017).

Based on data from the West Java Central Bureau of Statistics, Tasikmalaya City ranks eighth with the most populous population in West Java Province. According to the West Java Central Bureau of Statistics in 2020, the population of Tasikmalaya City is 716,155 thousand people. The distribution of the location of the existing hospital centered on the main arterial road causes the low reach of hospital services in the Tasikmalaya City, especially in areas far from the city center.

Based on the background, the objectives of this research are to identify the condition of the Existing Hospital in Tasikmalaya City, also analyzing the service range coverage of existing hospital in the Tasikmalaya City, then analyzing the needs of the population for hospitals in the Tasikmalaya City, and recommend an appropriate land location for the construction of a new hospital in the Tasikmalaya City.

## 2. Method

This research was conducted online with the research location in Tasikmalaya City. According to the Tasikmalaya City Central Bureau of Statistics in 2021, the area of Tasikmalaya City is 184.22 km² which is administratively divided into 10 districts, namely Kawalu, Tamansari, Cibereum, Purbaratu, Tawang, Cihideung, Mangkubumi, Indihiang, Bungursari, and Cipedes. The method used in this research is descriptive-quantitative. The data collected in a quantitative descriptive manner is used to provide an overview of the actual situation, as well as to answer questions related to the status object of the study (Isnawati et al, 2020).

Data analysis is a process to accommodate data, process it into patterns, classifications, and descriptions of a primary (Moelong, 2020). In collecting research data, the population and samples used are regional populations and regional samples (Natsir et al, 2021). That is covering the entire area of the Tasikmalaya City which is the location of research with data sources obtained through literature studies. Literature study is a study that is used to collect information and data with the help of various materials in the library such as documents, books, magazines, historical stories, and so on (Mardalis in Mirzaqon & Purwoko, 2018).

Data processing and data analysis techniques in this study using network analysis service area tools to describe the reach of existing hospitals. Starting by searching the data on the distribution of the hospital location in the form of coordinates in the Tasikmalaya City via internet. Network analysis also known as 'protocol analysis' is the art of listening in data communications and networks are usually done to ascertain how devices communicate and determine the health of the network (Stevany et al, 2016). In Network Analysis on ArcGIS software, service area is used to determine the area that includes all accessible roads (roads that lie within the specified impedance) (Rahmadhani et al, 2013). The service areas created by Network Analysis also help evaluate accessibility. The variables and indicators of this research are as follows :

Table 1. Research Variables and Indicators

| Variable | Problem Formulation | Indicator |
|---|---|---|
| New Hospital Location | Condition Distribution of Existing Hospital | 1. Hospital Service Range |
| | | 2. Accessibility |
| | Land Alternative For New Hospital | 1. Land Use |
| | | 2. Slope |

| | |
|---|---|
| 3. Road Network | |
| 4. Population density | |
| 5. Landslide Potential Area | |
| 6. Flood Potential Area | |

Source : Natsir et al, 2021

Then to determine the new hospital location, a base map was made as a parameter to produce a map of the new hospital location in Tasikmalaya City with the technical analysis is "overlay" using the Analytical Hierarchy Process (AHP) method. AHP is a method used to make the best decisions based on several criteria. The explanation regarding the technical analysis of the new hospital location mapping using the geographic information system is as follows:

### 1.    Distribution of Hospitals in Tasikmalaya City
(Prayoga in Adji, 2019), states that the opportunity to fulfill health services is influenced by the accessibility of health facilities. Based on the Regulation of the Minister of Health No. 24 states that accessibility for hospital transportation and communication lines, that the location of the hospital must be easily accessible by the community or close to the highway and available public transportation, pedestrian, and accessible routes for the disabled. Meanwhile, service coverage is the ability of a facility to serve the surrounding area. Service coverage can be measured in terms of distance, time, and cost. However, the government has determined the scale of health facility services according to certain criteria. The determined criteria are total population and population density.

### 2.    Determination of Land for the Location of the New Hospital in Tasikmalaya City
In determining the land for the location of the new hospital, several basic maps are needed as parameters for making the map of the new hospital location. The base maps include land use maps, slope maps, road network maps, population density maps, landslide potential maps, and flood potential maps. Furthermore, from each of the base maps, the criteria and sub-criteria were weighted using the AHP method. And lastly, an overlay is done using the intersect tool to analyze the location of the new hospital. Overlay technic is a technic that pasting a digital map on another digital map and its attributes to produces a combined map that has attribute information from both maps (Darmawan et al, 2017). The criteria for each base map and their weight are presented in the following table :

**Table 2.** Base Map Scoring Criteria

| Criteria | Sub Criteria | Score | Weight |
|---|---|---|---|
| Slope | 0-8 | 62,84 | 3,08 |
| | 8-15 | 25,40 | |
| | 15-25 | 4,08 | |
| | 25-45 | 3,87 | |
| | >45 | 3,79 | |
| Land Use | Agriculture | 4,73 | 48,49 |
| | Forest | 4,73 | |
| | Built-up Land | 23,50 | |
| | Empty Land | 62,13 | |
| | Waters | 4,88 | |
| Population density | Low | 13,02 | 8,65 |
| | Medium | 22,99 | |
| | High | 64,02 | |

| Landslide Potential Area | Low | 79,07 | 6,66 |
|---|---|---|---|
| | Medium | 14,61 | |
| | High | 6,32 | |
| Flood Potential Area | Low | 79,07 | 8,45 |
| | Medium | 14,61 | |
| | High | 6,32 | |

Source : Purnomo in Natsir et al, 2021

The next stage is the classification of score analysis by making 5 alternative classes of new hospital locations. The calculation process involves the formula for determining class intervals, namely :

$$\frac{Highest\ Score - Lowest\ Score}{Classification\ Total}$$

Or it could be like the following table:

**Table 3.** Class Interval Calculation

| Minimum Total Score | Maximum Total Score | Delta (Max-Min Value) | Range (Delta/ Number of Classes) |
|---|---|---|---|
| 449,6293 | 4955,0679 | 4955,0679-449,6293= 4.505,4386 | 4.505,4386/5= 901,08772 |

Source : Calculation Results, 2021

The results of these calculations will produce a classification with the following final weights :

**Table 4.** Hospital Score Classification

| Classification | Final Score |
|---|---|
| Very Inappropriate | 449,6293 - 1.350,71702 |
| Inappropriate | 1.350,71702 - 2.251,80474 |
| Slightly Appropriate | 2.251,80474 - 3.152,89246 |
| Appropriate | 3.152,89246 - 4.053,98018 |
| Very Appropriate | 4.053,98018- 4.955,0679 |

Source : Calculation Results, 2021

## 3. Result and Discussion

### 3.1. Existing Hospital Service Coverage in Tasikmalaya City

Currently there are around 16 hospitals spread across the City of Tasikmalaya. However, based on the results of the analysis using the Network Analysis Service Area, the existing hospitals cannot reach all areas in the City of Tasikmalaya. The affordability of the majority of existing hospitals covers only a small part of each sub-district. More details are in the table below.

**Table 5.** Percentage of Hospital Service Range Coverage in Tasikmalaya City

| District Name | District Area (ha) | Coverage (ha) | Percentage (%) | |
| --- | --- | --- | --- | --- |
| | | | Served | Unserved |
| Bungursari District | 1740.156995 | 26.68978885 | 1.533757524 | 98.46624248 |
| Cibeureum District | 1833.944294 | 31.20560367 | 1.70155679 | 98.29844321 |
| Cihideung District | 539.1455365 | 492.5810371 | 91.36327833 | 8.636721667 |
| Cipedes District | 897.8235385 | 328.0802798 | 36.54173295 | 63.45826705 |
| Indihiang District | 1102.868373 | 204.8740557 | 18.57647392 | 81.42352608 |
| Kawalu District | 4290.399613 | 131.8206826 | 3.072456986 | 96.92754301 |
| Mangkubumi District | 2455.318376 | 121.2644637 | 4.938848863 | 95.06115114 |
| Purbaratu District | 1210.960088 | 123.8688265 | 10.2289768 | 89.7710232 |
| Tamansari District | 3788.162205 | 129.7570897 | 3.425330877 | 96.57466912 |
| Tawang District | 721.9297154 | 616.4498636 | 85.38917993 | 14.61082007 |

Source : Calculation Results, 2021

Based on the table, Cihideung Sub-district is the sub-district with a high percentage of the area covered by health services, which is 91.3%. Followed by Tawang District with a percentage of 85.3%, then Cipedes District with 36.5%. While the rest only have a percentage of area under 20%.
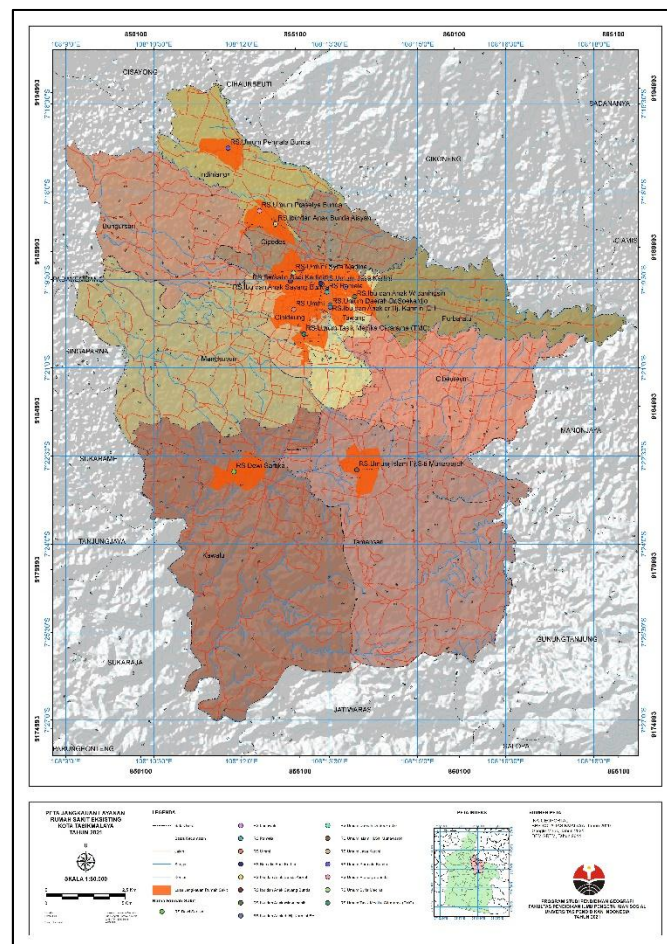


**Fig. 1.** Map of Existing Hospital Affordability in Tasikmalaya City.

It can be seen in the picture above that there are still areas that difficult to reach hospitals because the majority of hospitals are concentrated in the city center. A total of 11 hospitals are located in the city center and can only be reached by six sub-districts including Syifa Medina General Hospital, Sayang Bunda Maternal and Child Hospital, Budi Kartini Maternity Hospital,

Jasa Kartini General Hospital, Lunawati Hospital, Pamela Hospital, Ummi Hospital, dr.Hj. Karmini EH Maternal and Child Hospital, Dr. Soekardjo Regional General Hospital, Widaningsih Maternal and Child Hospital, Tasik Medika Citrarama General Hospital, which covers the Cipedes District, Purbaratu District, Cihideung District Tawang District, Mangkubumi District and Cibeureum District. A total of two hospitals, namely the Bunda Aisyah Maternal and Child Hospital and the Prasetya Bunda General Hospital, can be reached by Cipedes District, Indihiang District and Bungursari District. One hospital, Permata Bunda General Hospital, is located in Indihiang District, Dewi Sartika Hospital in Kawalu District and Hj.Siti Munawaroh Islamic General Hospital in Tamansari District.

### 3.2. Accessibility of Existing Hospitals in Tasikmalaya City

Accessibility is the effort of physical movement of a person to get services or carry out activities (Cullinane et al, 2008). The size of the effort in achieving this health facility is called the level of accessibility (Hadi et al, 2013). One parameter that has high urgency is the road network. The road network is a determining parameter in terms of accessibility to the hospital to be built. This is supported by the statement of (Gatrell & Elliott in Kara & Egresi, 2013) that the level of accessibility of health care institutions is one of the most significant indicators to measure the efficiency of the health care system, and this is supported by the transportation system and road network. In addition, according to (Jones et al, 1998) the farther a person to a health care facility, the higher risk of death to that person.

The analysis was carried out by dividing the road based on the classification of SNI 03-6981-2004 on the procedures for planning a simple housing environment without layers in urban areas. Road data was obtained through the official page of the Indonesian geoportal (ina-geoportal) from Geospatial Information Agency which was then processed using the ArcGIS application to be exported to each road class and clip to the administration of the City of Tasikmalaya. As a result, there are four classes of roads in Tasikmalaya City, namely arterial roads, collector roads, local roads, and other roads. Then the four road classes are buffered to determine the width of the road as shown in table 2.

Table 6. Class and Road Width

| Road Class | Road width |
|---|---|
| Arterial Road | 20 Meters |
| Collector Road | 15 Meters |
| Local Road | 10 Meters |
| Other Road | 4 Meters |

Source : SNI 03-6981-2004, 2004

From the results of the road network mapping analysis of hospitals in the city of Tasikmalaya, there is one hospital located on an arterial road, namely the Bunda Aisyah Maternal and Child Hospital in Cipedes District. Then there are 3 hospitals located on collector road, namely Prasetya Bunda General Hospital in Indihiang District, Widaningsih Maternal and Child Hospital in Tawang District, and Tasik Medika Citrarama General Hospital in Cihideung District. Then there are 11 hospitals located on local roads, namely Permata Bunda General Hospital in Indihiang District, Dewi Sartika Hospital in Kawalu District, Hj. Siti Munawaroh Islamic General Hospital in Tamansari District, Ummi Hospital in Cihideung District, Sayang Bunda Maternal and Child Hospital in Cihideung District, Syifa Medina General Hospital in Cihideung District, Budi Kartini Maternity Hospital in Tawang District, Pamela Hospital in Tawang District, Dr. Soekardjo General Hospital in Tawang District, dr. Hj. Karmini Maternal and Child Hospital in Tawang District, Lunawati Hospital in Tawang District, and Jasa Kartini General Hospital in Tawang District.
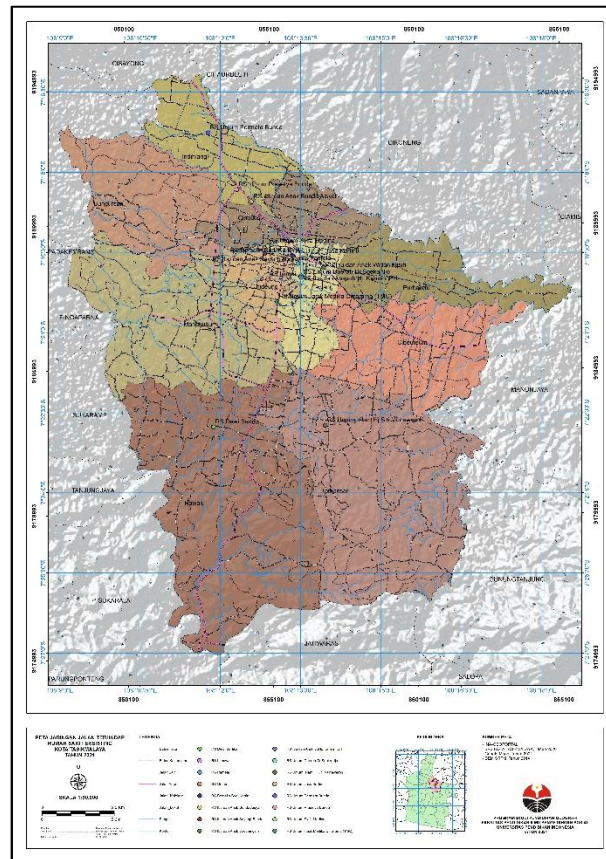
**Fig. 2.** Road Network Map of Existing Hospitals in Tasikmalaya City.

### 3.3. Residents Need for Hospitals in Tasikmalaya City

Indonesia in general is targeting an increase in health facility services. As stated in the 2019 national health insurance roadmap. In the fourth point of the national health insurance roadmap, it is stated that in 2019, all residents can meet their medical needs with the condition of adequate number and distribution of health care facilities (Thabrany, 2021). From 2015 to 2019, the number of health facilities in the form of hospitals in Indonesia has continued to increase. The number of hospitals in Indonesia in 2015 was 2,488 which increased by 13.52% to 2877 hospitals in 2019 (Ministry of Health, 2020).

Although it continues to increase nationally, West Java Province apparently still has problems related to the number of healthcare facilities, especially hospitals. In 2019, the ratio of hospital beds to the total population in Indonesia has met WHO standards. However, there are 8 provinces that are still below the WHO standard of 1.0 point. West Java Province is one of the provinces that has a ratio between beds and population which is still below the WHO standard with the point just 0.87 (Ministry of Health, 2020).
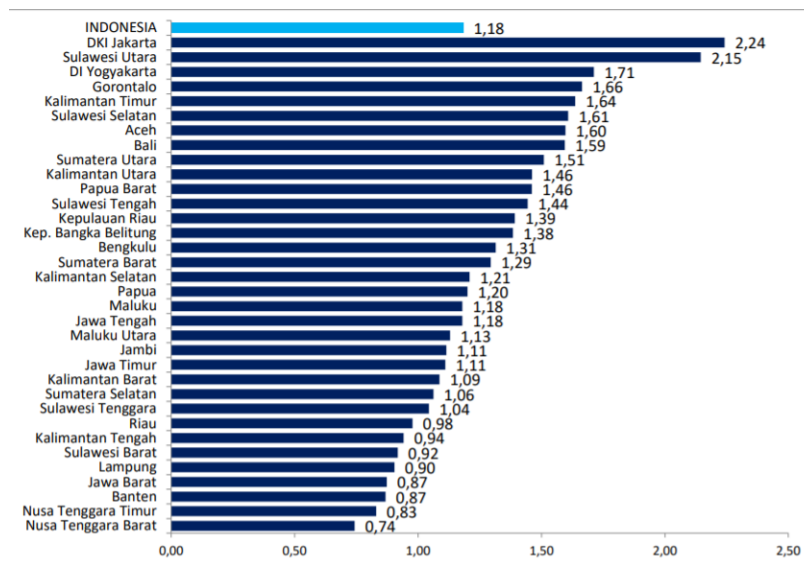
**Fig. 3.** Ratio of Hospital Bed Availability to Total Population.

In general, Tasikmalaya City has 16 hospitals consisting of a general hospital, a maternal and child hospital, and a Covid-19 emergency hospital. With around 1576 beds, the city of Tasikmalaya with a population of 719,882 people (Tasikmalaya City Central Bureau of Statistics, 2020), has a bed-to-population ratio of 0.456777919. This number is still below the WHO standard which states that the minimum ratio between hospital beds and population is 1:1000, or has a ratio of 1.0 (OECD, 2020).

**Table 7.** Hospital in Tasikmalaya City

| Hospital Name | Class | Number of Beds |
|---|---|---|
| Dr. Soekarjo Hospital | B | 480 |
| Hj.Siti Munawaroh Islamic General Hospital | D | 50 |
| Jasa Kartini General Hospital | C | 181 |
| Prasetya Bunda General Hospital | D | 50 |
| Tasik Medika Citrarama General Hospital | C | 100 |
| Permata Bunda General Hospital | D | 50 |
| Ummi Maternity Hospital | C | 50 |
| Syifa Medina General Hospital | D | 50 |
| Budi Kartini Maternity Hospital | Undefined | 15 |
| Bunda Aisyah Maternal and Child Hospital | C | 100 |
| Sayang Bunda Maternal and Child Hospital | C | 50 |
| Widaningsih Maternal and Child Hospital | C | 50 |
| dr.Hj. Karmini EH Maternal and Child Hospital | C | 50 |
| Lunawati Maternity Hospital | C | 50 |
| Pamela Maternity Hospital | C | 50 |
| Dewi Sartika Covid-19 Emergency Hospital | Undefined | 200 |
| Total | | 1576 |

Source : Analysis Result, 2021

Based on these data, the city of Tasikmalaya still needs additional hospitals to be able to meet the hospital service standards recommended by WHO. At least about 5500 additional beds are needed to meet these needs.

### 3.4. Potential Analysis of the New Hospital Land Location in the Tasikmalaya City

Determining the ideal new hospital location cannot be done arbitrarily. At least it is necessary to do a detailed analysis of what factors influence the determination of the hospital location so that it can be in accordance with its designation and needs. In this study, several basic maps were used as parameters or criteria to determine the location of a new hospital. These parameters include land use, slope, road network, population density, landslide potential area, and flood potensial area. Each parameter has its own sub-criteria as presented in table 2.

Land use will have a positive impact on facilitating the process of preparation and development on land. Unplanned land use will cause land and environmental damage (Nugraha et al, 2014). Based on Minister of Health Regulation number 24 of 2016 the development process must pay attention to the slope aspect. According to (Apianto, 2007), build a infrastructure on a hilltop, around a slope, or in a mountain valley will have its own risks of danger. In addition, (Lashari, 2011) adds that the slope is feasible for the construction of a building starting at 9% and below.

The population density parameter affects the determination of the new hospital location based on the level of demand and the level of population illness. According to (Jones et al. 1998) The further a person to a health care facility, the higher the risk of death to that people. The next parameter is the threat of flooding. Determining the location of the hospital must be safe from flood-prone locations so as not to change its function, so that the hospital is ready to accommodate flood victims in the area. And the last parameter is the threat of landslides. Landslide potential areas will increase the possibility of danger so that there is a risk of building destruction due to ground movement. The construction of hospitals in landslide-prone locations will increase the pressure of slope loads, especially on steep slopes, so that the slopes are not strong enough to withstand the load and are at risk of landslides and destroying buildings (Masithah et al, 2018).

After conducting a parameter analysis to determine the location of the new hospital. The data that has been collected is then processed using ArcGIS software. Before the overlay is performed, the score and weight calculation for each parameter map is carried out using the AHP method. Then merging or overlaying using tools intersect from all criteria so as to produce new data. Furthermore, the new data intersect results are reprocessed by calculating the total score of each parameter and divided into 5 interval classes as the land suitability level of the new hospital. From the results of data processing for the new hospital in Tasikmalaya City, it produces land area information based on a predetermined classification as shown in the following table :

**Table 8.** New Hospital Land Area Suitability Classification

| Classification | Area (Ha) |
|---|---|
| Very Inappropriate | 6530,394418 |
| Inappropriate | 10923,576303 |
| Slightly Appropriate | 878,00274 |
| Appropriate | 418,121379 |
| Very Appropriate | 115,785696 |

Source : Calculation Results, 2021

Based on the table above, the classification that is Inappropriate is the classification with the highest area, while the classification that is Very Appropriate is the classification with the lowest area. The following is the result of the Potential Alternative Land Locations Map of the New Tasikmalaya Hospital.

**Fig. 4.** Map of Potential Alternative Land Locations for Hospitals in Tasikmalaya.

### 3.5. Recommended New Hospital Location

Based on coordinate data obtained through Google Maps in 2021, the number of hospitals in Tasikmalaya City is 16 hospitals. Most of the number of hospitals are concentrated in the center of Tasikmalaya City, especially in Cihideung and Tawang sub-districts. However, the distribution of the number of hospitals in Tasikmalaya City is not evenly distributed in each sub-district. It is recorded that 4 sub-districts in Tasikmalaya City do not yet have a hospital to provide health services to the community. The sub-districts include the districts of Cibereum, Mangkubumi, Bungursari, and Purbaratu.

The unequal distribution of hospital locations is enough to affect the range of hospital services in an area. An area is said to have a qualified hospital capacity if it is evenly distributed so that it is easy to reach the local population and all parts of the area can be served (Rahmini et al in Natsir et al, 2021). Referring to the data from overlay process, the location of new hospital must be located in an area with a high population density so that it can be reached by health services. These locations include the districts of Cibereum, Mangkubumi, Bungursari, and Purbaratu, as well as in the northern and southern regions of Tasikmalaya City.

Determining the location of a new hospital needs to be studied as thoroughly as possible with the aim of providing convenience to the community in accessing health facilities in accordance with Law Number 44 of 2009 concerning Hospitals. An in-depth analysis of the location, surrounding conditions, and strong regulations is needed so that development has a legal status. In this case the government through the relevant agencies has an important role to ensure essential public health services.

### 4. Conclusion

Based on the results of the analysis conducted using the Network Analysis Service Area tool, there are three sub-districts with a fairly wide percentage of hospital coverage, namely Cihideung District (91.3%), Tawang District (85.3%), and Cipedes District (36.5%). Meanwhile, other sub-districts only have a percentage of hospital coverage area below 20%. In addition, the condition of hospital accessibility in Tasikmalaya City is also relatively low. Of the 16 hospitals, only one has very good accessibility, which is located near an arterial road which has a road width of 20 m, while the other 3 are on collector roads and the rest are on local roads. This means that there are still areas that do not or have lack health services in the City of Tasikmalaya.

The quantity and quality of health facilities in the City of Tasikmalaya is not sufficient. For example, the availability of beds in the Tasikmalaya City hospital is still below the standard given by the World Health Organization. So that the community's need for health services has not been met. This of course needs to be seriously followed up by the local government to add hospital beds or increase the number of hospitals with strategic locations that are able to reach the community and also have a good level of accessibility.

The results of the analysis of potential locations for hospitals show that most areas are dominated by highly inappropriate and inappropriate classes. However, there are several locations that are appropriate for building hospitals with very appropriate, appropriate and slightly appropriate categories. Most of the slightly appropriate classes are in Indihiang and Mangkubumi sub-districts. While the appropriate and very appropriate classes are spread in Indihiang District, Mangkubumi District, Cipedes District, Purbaratu District, Tamansari District and Kawalu District.

### References

Adji, J.U. (2019). "Distribution Pattern and Accessibility of Hospitals in Bandung City with Geospatial Information System (GIS) Applications". Indonesian Computer University, Bandung.

Darmawan, K., Hani'ah., Suprayogi, A. (2017). "Analysis of Flood Vulnerability in Sampang Regency using the Overlay Method with Scoring Based on Geographic Information Systems". *Undip Geodetic Journal*, 6 (1) : 31-40.

Hadi, P., Joewono, T., Santosa, W. (2013). "Accessibility to Health Facilities in Bandung". *Transportation Journal*, 13 (3) : 213-222. https://doi.org/10.26593/jtrans.v13i3.1347.%25p

Indonesia Minister of Health. (2020). Indonesia Health Profile 2019. Jakarta : Indonesia Minister of Health

Isnawati, Jalinus, N., Risfendra. (2020). "Pedagogical Ability Analysis of Vocational High School Teachers who are Taking Teacher Professional Education with Quantitative Descriptive Methods and Qualitative Methods". *INVOTEK: Journal of Vocational and Technological Innovation*, 20 (1), 37-44. https://doi.org/10.24036/invotek.v20i1.652

Mirzaqon, A., Purwoko, B. (2018). "Literature Study on The Theory and Practice of Expressive Writing Counseling". *BK UNESA Journal*, 8 (1) : 1-8.

Moleong, L. (2002). Qualitative Research Methods. Bandung : Remaja Rosdakarya.

Mongkaren, S. (2013). "Facilities and Service Quality Influence on User Satisfaction at Manado Adventist Hospital". *EMBA Journal*, 1 (4), 493–503.

Natsir, A.W.P., Setiawan, I., Somantri, L. (2021). "Analysis of Determining the Location of a New Type C Hospital Using the Analytical Hierarchy Process (AHP) Method in Sumedang Regency". LOSARI : *Journal of Urban and Settlement Architecture*, 6 (1), 55–71. https://doi.org/10.33096/losari.v6i1.268

Nugraha, Y., Nugraha, A., Wjiaya, A. (2014). "Utilization of GIS to Determine Potential Locations for Development of Housing and Settlement Areas (Case Study of Boyolali Regency)". *Undip Geodetic Journal*, 3 (4) 50-59.

OECD (2020). Hospital Beds Indicator. Accessed on 30 Mei 2021, From : https://data.oecd.org/healtheqt/hospital-beds.htm.

Prahasta, E. (2009). Geographic Information Systems: Basic Concepts of Geodesy & Geomatics Perspective. Bandung : Bandung Informatika

Purnomo, S., Subiyanto, S., & Nugraha, A. L. (2017). "Analysis of the Potential for Hospital Land Use Assessed from the Physical Aspects and Population Needs with Geographic Information Systems in the City of Semarang". *Undip Geodetic Journal*, 6 (4), 226-235.

Radliya, R.N., Hadiana, A., Afrianto, I. (2017). "Hospital Management Information System Audit (Case Study at Tasikmalaya City Hospital)". *Journal of Governance and Information Technology Framework,* 4 (1), 114-226. https://doi.org/10.34010/jtk3ti.v1i2.295

Rahmadhani, N., Suprayogi, A., Sabri. (2013). "Analysis of the Accessibility of Tsunami Evacuation Shelters in Padang City Based on Geographic Information Systems". *Undip Geodetic Journal*, 2 (1) : 1-11.

Stevany, D., Suprayogi, A., Sukmono, A. (2016). "Mapping the Evacuation Path of Mount Raung's Eruption with Network Analysis Method". *Undip Geodetic Journal*, 5 (4), 91-100.

Supriyanto, Y. (2012). "Analysis of the Effect of Service Quality, Price, and Facilities on Outpatient Satisfaction at Kariadi Hospital Semarang". *Diponegoro Journal of Management*, 1 (4), 472-480.

Tasikmalaya City Central Bureau of Statistics, (2020). Tasikmalaya Regency in 2020 Figures. Tasikmalaya : Tasikmalaya City Central Bureau of Statistics.

Thabrany, H. (2021). Roadmap Towards National Health Insurance 2012-2019. Jakarta : National Social Security Council.