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SPATIAL INEQUALITY AND ACCESSIBILITY OF SENIOR HIGH SCHOOL EDUCATION IN BONEBOLANGO REGENCY

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Abstract

This study aims to analyze the spatial dynamics of upper secondary education services, distribution patterns, and the reach of high school services in Bonebolango Regency. The research method used in the study was spatial descriptive, with data sources from schools and the Central Statistics Agency. The data analysis techniques used are meeting needs, school occupancy levels, and utilizing the Geographic Information System (GIS) through the analysis of the nearest neighbors, buffers, and overlays. The results of this study show that the availability of high school facilities in Bonebolango Regency has not met the needs of the upper school-age community, because it has not been able to accommodate 80% of the high school age population in each sub-district. The occupancy rate is also uneven, with four high schools having an occupancy rate above 80% of the temporary capacity and 11 high schools having an occupancy rate of less than 50% of their capacity Based on the analysis of the nearest neighbors, the distribution pattern of high schools in Bonebolango Regency is relatively random, with a value of 0.975337 and a z-score of -0.030915. Based on the analysis of the service coverage of high school facilities using the buffer method according to SNI 03-1733-2004, it is known that high school facilities in Bonebolango Regency are very uneven and tend to overlap in several sub-districts and do not cover all settlements.

Keywords Spatial Inequality, Accessibility of Senior High School Education.

INTRODUCTION

Education is a basic right of every citizen and is the main foundation for the development of a nation. In the context of national development, education has a strategic role in producing a generation that is intelligent, competitive, and has noble character. Therefore, the equitable distribution of education services is an important agenda in an effort to realize social justice and the progress of the nation as a whole.

One of the important indicators in the equitable distribution of education is the affordability of educational services, especially at the upper secondary level, which is a bridge between primary education and higher education. In various regions in Indonesia, especially in rural areas and areas with complex topography, the affordability of upper secondary education is still a major challenge. Unequal access to education services, both in terms of location, infrastructure, and the number of educators, has the potential to cause gaps in educational attainment and the quality of human resources between regions.

In the regional context, Gorontalo Province shows a strong commitment to improving the quality and equitable access to education, in line with national programs to reduce regional disparities. However, the realization of education development at the district/city level still shows inequality, one of which is in Bone Bolango Regency. The district has complex geographical characteristics, encompassing hilly, coastal, and remote areas that are difficult to reach. This condition has a significant impact on the distribution of educational institutions, especially at the upper secondary level, which tends to be concentrated in the center of districts or areas that are more accessible. This inequality is also exacerbated by the limited transportation infrastructure and the number of qualified educators in remote areas. In response to these problems, the Bone Bolango Regency Government has prepared an education roadmap, strengthened collaboration with universities, distributed scholarships, and expanded inclusive education services. These efforts show the seriousness of local governments in overcoming spatial inequality in education services and expanding the reach of secondary education in a fair and sustainable manner.

Based on data released by BPS in 2024, Gorontalo Province is among the areas with the lowest access to high school education in Indonesia. Access to secondary education in Gorontalo is around 46.19%, this figure makes Gorontalo ranked 3rd as the region with the lowest access to secondary education after East Nusa Tenggara (NTT), which is at 43.46% and Papua Province at 39.5%. (bps.go.id, 2024)(gopos.id, 2024)

This fact indicates that the management of education is less effective because it cannot be accessed by some of the population. The government has actually launched the implementation of a zoning system for equal distribution of services and quality of education to overcome this. But it seems that this cannot be a solution, what happens in the field is precisely with the existence of this system, as if to limit the opportunity for prospective students to be able to access good quality educational facilities, so that this secondary education is difficult to access by the community.

This problem must, of course, be seen as a multi-sector problem that is closely related to the conditions of each region, because basically, each school has different environmental characteristics. In the context of Bonebolango district in Gorontalo Province, schools are growing along with the development of their area, which is concentrated in a small number of sub-districts, therefore in the context of the implementation of the zoning system, on the one hand there are areas that have not been reached by schools, but on the other hand there are also areas that experience overlap in school services. The school's location and the long distance add to the transportation burden for both the city and the school residents. This will certainly affect the teaching and learning process; the differences in this process will encourage the results obtained, which in turn produce disparities in the quality of education between regions from the results of the process.

Several relevant previous studies that have been conducted, such as research (Widyana & Hriday, 2024), show that community-based school models significantly increase the affordability of quality education among the urban poor through contextual and participatory curricula. Furthermore, Irawan et al. (2024) found that SDGs-based continuing education policies are able to reduce access-quality disparities, even though systemic and legal barriers still attract attention. Research (Harahap et al., 2024) reveals that the pattern of unequal distribution of school infrastructure, with priority areas determined through spatial autocorrelation analysis to direct development interventions. Research (Ihsan, 2022) highlights that the implementation of the PPDB zoning system in high schools, although running procedurally, still creates new inequalities due to the old paradigm and the limitations of the new paradigm. Meanwhile, research (Hasanah, 2025) confirms that remote areas often face limitations in teaching staff, infrastructure, and educational facilities, which causes inequality in the quality of education compared to urban areas.

Based on this, this research is important to be carried out so that the inequality that has been occurring can be overcome and become part of the ideal solution, this is in line with the statement that with a geographic information system we can find out the location of schools in each region,

both at the elementary, first, and high school levels. So that GIS can be used to determine served and unserved zones, and at the same time, this system helps people who have difficulty finding the location of schools (Nur Qolis, 2010), (Ramadhana, A. N., & Prakoso, 2018), (Munawaroh et al., 2020), (Ristanti, Z., Trisnaningsih, T., & Halengkara, 2022), (Sari et al., 2023).

Thus, this study is different and has novelty because it specifically analyzes the spatial inequality and affordability of upper secondary education in Bone Bolango Regency with a measured geographical and spatial approach, so as to provide a visual and analytical picture of the relationship between geographical conditions, distribution of educational institutions, and student accessibility factually. This distinction is expected to enrich the spatial education literature in Indonesia, as well as become the basis for more contextual region-based policy interventions, so that the results of this research are expected to be a reference for the development of high school education services in Bonebolango Regency.

METHOD

This study uses a descriptive spatial approach to map and analyze the spatial dynamics of the quality of secondary education services in Bonebolango Regency, which is associated with spatial dynamics in this case seen from several aspects, namely; the fulfillment of regional needs for secondary education services, the occupancy or level of efficiency of secondary education institutions in terms of meeting the needs of their population, the scope of secondary education services, the pattern of their distribution, and the direction of the development of educational services.

The data sources used in this study include: the number of school-age population of Bonebolango Regency obtained from the Central Statistics Agency, school capacity, and the number of high school students or equivalent in Bonebolango Regency, which was obtained directly from the school; School location coordinates extracted from *Google Earth*. Furthermore, the data are processed with a descriptive spatial approach to identify the extent to which high schools in Bonebolango Regency can serve the needs of the school-age population in their area, which is analyzed based on the following aspects:

1. Needs Fulfillment Analysis

The needs fulfillment analysis aims to determine whether the available school facilities have met the needs of the school-age population in an area. This method uses certain calculations

assuming that the active participation rate (APK) for the school-age population is 100% (Uang et al., 2017). This analysis uses the following formula:

$$Pk = \frac{Dt}{Pus} \; X \; 100$$

Information:

PK = Percentage of meeting needs in each sub-district

Dt = High School Capacity in each sub-district (the number of classes per sub-district multiplied by the maximum number of students per class in accordance with the High School Service Standards based on Government Regulation No. 24 of 2007, which is 36 students).

Pus = Number of population aged 16-18 years (SMA) in each sub-district. Parameters of Fulfillment of Education Service Needs:

Table 1. Fulfillment of Needs

Classification	Criterion
Good/Efficient	PK = 80-110%
Enough	PK= >110
Less	PK = <80%

Source: (Rosaliani, 2017)

2. Service Occupancy Analysis

This analysis is used to see the optimality of school management on school tapping power using the formula.

$$Tk = \frac{Pd}{Dt} \; X \; 100$$

Information:

Tk = Occupancy Rate

Pd= Student

Dt = High school capacity

Table 2. Occupancy Rate

Classification	**Criteria**
Good/Efficient	Tk= 80-100%
Enough	Tk= >100
Less	Tk= <80%

Source: (Rosaliani, 2017)

3. Buffer Analysis

The buffer analysis method is a GIS analysis technique to see the service coverage radius of a point. In this study, it is to analyze the service coverage radius of high schools (Rumengan, M. R. C., Kindangen, J. I., & Takumansang, 2019).

4. Nearest *Neighbour* Analysis

It is one of the spatial statistical tools used to determine the distribution pattern of certain locations. In this study, it is used to analyze the distribution pattern of high school facilities by paying attention to the distance, number of students, and area (Mukhlis, M., & Musyawarah, 2019). There are three types of distribution variations, namely clustered, random, and dispersed (Arisca, W. D., & Agustini, 2020).

5. Overlay Analysis

This analysis is used to determine the direction of educational development through variable weighting and map overlays based on the scale of first, second, and third development priorities. For more details, see the following table:

Table 3. Overlay Analysis

No	Variable	Priority 1 (Weight 3)	Priority 2 (weight 2)	Priority 3 (weight 1)
1.	Total population High school age (15-19) years	Tall	Keep	Low
2.	School Participation Rate	Low	Keep	Tall
3.	Percentage of Land Use for Settlement	Tall	Keep	Low
4.	School Accreditation in each District	C	B	A
5.	Sub-districts with School Percentages based on substandard class and student ratios	Tall	Keep	Low
6.	Sub-districts with School Percentages based on the ratio of teachers to students below the standard	Tall	Keep	Low
7.	Sub-districts with School Percentages based on the completeness of infrastructure facilities	Low	Keep	Tall

FINDINGS AND DISCUSSION

Findings

Availability of Secondary Education Facilities in Bonebolango Regency

Analysis of the availability of educational facilities can be seen from the availability of educational facilities on the number of students, capacity to accommodate, analysis of meeting needs, and service occupancy. In 2023, high school education facilities in Bonebolango Regency consist of 15 schools spread across 11 sub-districts out of a total of 18 sub-districts in Bonebolango

Regency; in this case, the other seven sub-districts do not have secondary education service facilities. Based on the results of the analysis of the fulfillment of education services, there are only six sub-districts that can be categorized well in terms of the fulfillment of their services, namely Suwawa, Kabila, Tapa, Botupingge, Boneraya, and North Bulango sub-districts.

Table 4. Analysis of Fulfillment of Secondary Education Services

No	District	PUS	DT	%	Category
1.	Suwawa	777	2268	292	Good
2.	Kabila	1346	1620	120	Good
3.	Tapa	419	864	206	Good
4.	Bone Pantai	713	116	16	Less
5.	Tilongkabila	1219	0	0	Less
6.	Botupingge	356	756	212	Good
7.	Kabila Bone	743	0	0	Less
8.	Bone Raya	446	612	137	Good
9.	Bone	692	432	62	Less
10.	Bulango Utara	445	684	154	Good
11.	Suwawa Tengah	343	0	0	Less
12.	Suwawa Selatan	346	0	0	Less
13.	Suwawa Timur	340	252	74	Less
14.	Bulango Selatan	677	360	53	Less
15.	Bulango Timur	291	0	0	Less
16.	Bulango Ulu	297	252	85	Less
17.	Bulawa	379	0	0	Less
18.	Pinogu	132	108	82	Less

Analysis Results: 2024

Based on the data from this analysis, it can be seen that there is an inequality in secondary education services in Bonebolango Regency, where only 33% of the area meets with secondary education needs of the school-age population. While the remaining 67% of areas still have to travel farther away from their places of residence to meet the needs for secondary education services, there are still six sub-districts that do not even have secondary education services, namely Tilongkabila District, Kabila Bone District, Central Suwawa District, South Suwawa, East Bulango, and Bulawa District.

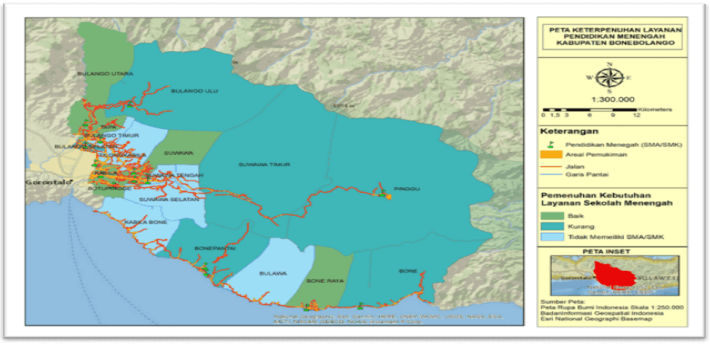

Figure 1. Map of Fulfillment of Secondary Education Services in Bonebolango Regency

Filling of Educational Services

Furthermore, to see how areas that are still low or do not have secondary education services meet the needs of their population based on the level of availability of upper secondary education services in Bonebolango district, it can be seen from the results of the analysis of the Occupancy of school services, where the area will tend to compete for quotas in schools whose occupancy levels are less efficient in their services, namely schools with much greater capacity compared to the number of students. Based on this analysis, if juxtaposed with the zoning system, schools with good accreditation tend to be favorites and will immediately be filled with school-age residents within their zoning radius, because new students are no longer test-based but based on priority zoning distance. The following are the results of data analysis on the level of occupancy of secondary education services in Bonebolango Regency.

Table 5. Secondary Education Service Occupancy Analysis Table

No	District	School	PD	DT	Kindergarten	Kat
1.	Suwawa	SMAN 1 Suwawa	623	648	96,1	Good
2.		SMA Wira Bhakti	249	612	40,7	Less
3.		SMK N 1 Suwawa	544	1008	54,0	Less
4.	Kabila	SMA N 1 Kabila	1256	1260	99,7	Good
5.		SMK S Bina Mandiri	136	360	37,8	Less
6.	Tapa	SMA N 1 Tapa	503	864	58,2	Less
7.	Bone Pantai	SMA N 1 Bonepantai	513	684	75,0	Less
8.		SMK N 1 Bonepantai	161	432	37,3	Less
9.	Tilongkabila		0	0		Less
10.	Botupingge	SMK N Model Gorontalo	208	756	27,5	Less
11.	Kabila Bone		0	0		Less
12.	Bone Raya	SMK N 1 Bone Raya	353	612	57,7	Less
13.	Bone	SMA N 1 Bone	406	432	94,0	Good
14.	Bulango Utara	SMK N 1 Bulango North	242	684	35,4	Less
15.	Suwawa Tengah					Less
16.	Suwawa Selatan					Less
17.	Suwawa Timur					Less
18.	Bulango Selatan	SMK N 1 Bulango Selatan	316	360	87,8	Good
19.	Bulango Timur	0				Less

20.	Bulango Ulu	SMA N 1 Bulango Ulu	81	252	32,1	Less
21.	Bulawa					
22.	Pinogu	SMA N 1 Pinogu	47	108	43,5	Less

Analysis Results 2024

Based on the results of the analysis in the table above, it can be seen that there are only four schools with efficient service levels, where more than 90% of the school's capacity is met by students in their area while the other 14 schools tend to be inefficient in absorbing students, the available capacity only absorbs no more than 50% of their capacity.

This indicates that secondary education services in Bonbolango Regency are not evenly distributed and tend to be inefficient, where certain schools compete for students in the same service area while being singled out. This is because the spatial pattern of high schools in Bone Bolango Regency tends to be grouped; this can be seen in the results of the analysis of the nearest neighbors, where the p-value is 0.975337 or below 0.1 and the z-score is -0.030915 or <-1.65, which indicates that the distribution pattern tends to be *random* or random.

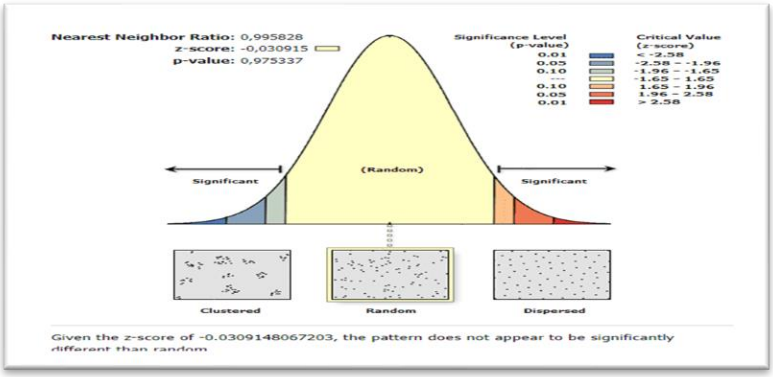

Figure 2. Nearest Neighbor Analysis Chart

Based on the results of the analysis of the nearest neighbors, it indicates that the spatial dynamics of education services in Bonebolango Regency tend to be unequal, where there are areas whose service areas overlap with each other on one side, of many areas that are not covered. For more details, the spatial dynamics can be seen in the map of the buffer analysis of the radius buffer of high school services in each settlement based on the Indonesian National Standard (SNI) 03-1733-2004, where the effective coverage distance of high school education facilities is as far as 3000 meters, as follows:

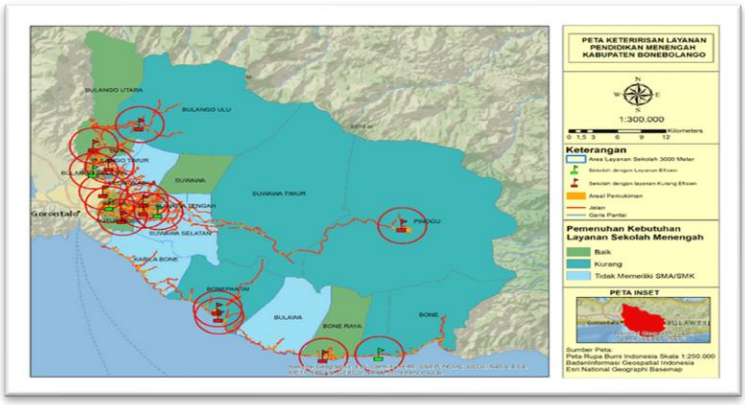

Figure 3. Map of Secondary Education Services in Bonebolango Regency

Based on the results of the buffer analysis in Figure 3, it can be seen that the range of 3000 meters of high school education facility services currently in Bonebolango Regency has not been able to cover all existing residential areas. This is illustrated in the map, where settlements that are within the buffer radius and those that are outside the coverage of the service are clearly visible. In this case, there have been overlapping services in several sub-districts, such as Suwawa, South Bulango, Botungpingge, East Bulango, Tilongkabila, and Tapa, while most residential areas in several other sub-districts are not effectively reached. This fact is certainly ineffective and efficient.

Furthermore, although not all sub-districts in Bonebolango Regency have high schools, some villages in several sub-districts have been served by high schools in other sub-districts. This is due to the distance between adjacent high schools, such as Tilongkabila and Suwawa sub-districts in the south and east, all residential areas have been covered by high school services from the adjacent sub-districts.

Direction of Development of Education Services

The direction of education service development is an area that should be prioritized in reducing disparities in the high school/equivalent education sector This directive is analyzed based on the weighting of the variables studied, the higher the weight of all variables, the more important the priority level to determine the priority level.

In determining the direction of the development of this service, it is determined from several variables, namely external variables in the form of the number of high school age population (15-19 years), school participation rates, residential land use, and also determined from the internal conditions in each school unit in the sub-district, namely the school accreditation ranking, the Class and Student Ratio, the ratio of Student Teachers, as well as the completeness of facilities and infrastructure and the graduation rate of students of each high school. This is the result of variable weighting for the direction of the development of educational services in the Bonebolango district.

Table 6. Overlay Analysis Results Table

District	PUS	APS	Wil Pem	School Accreditation	Class-Student Ratio	Teacher-to-Student Ratio	Sarpras	Total Weight
Bone Raya	1	1	1	2	1	2	2	10
Bulawa	1	3	1	3	3	3	3	17
Bone	2	2	1	2	3	2	3	15
Bone Pantai	2	1	1	2	2	2	2	12
Kabila Bone	2	2	1	3	1	1	3	13
Botupingge	1	1	1	1	1	1	3	9
Suwawa Selatan	1	3	1	3	1	1	3	14
Kabila	3	1	3	2	3	2	1	15
Bulango Selatan	2	2	3	3	3	1	3	17
Suwawa Tengah	1	3	1	3	1	1	3	13
Suwawa	3	1	1	2	3	2	2	14
Tilongkabila	3	1	1	3	1	1	1	11
Bulango Timur	1	3	2	3	1	2	3	15
Tapa	1	1	1	2	2	1	1	9
Pinogu	1	3	1	3	1	3	3	15
Suwawa Timur	1	2	1	2	1	1	3	11
Bolango Ulu	1	2	1	3	1	1	2	11
Bulango Utara	2	2	1	2	1	1	2	11

Based on the results of data processing, the weights of variables in each sub-district were obtained, ranging from 9-17. Thus, it is classified into three priority areas, namely the main priority with a weight of more than 15-21, the second priority with a weight of 11-14, and the third priority with a weight of 7-10, as depicted in the map in Figure 4 below.

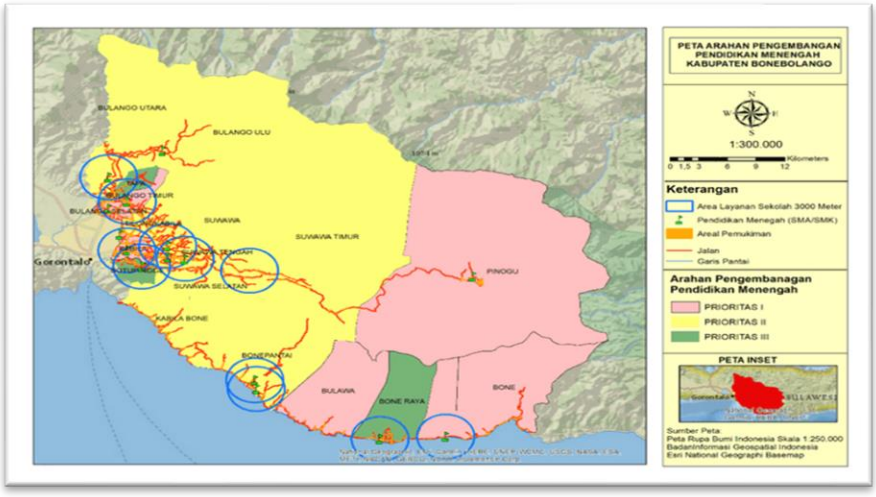

Figure 4. Map of Directions for the Development of Upper Secondary Education Services in Bonebolango Regency

From the results of the analysis, it can be seen that Pinogu, Bone, Bulawa, Kabila, South Bulango, and East Bulango Districts are designated as the first priority areas for the development of upper secondary education services in Bone Bolango Regency. Tilongkabila, Bonepantai, Kabila Bone, Suwawa, South Suwawa, Central Suwawa, East Suwawa, Bulango Ulu, and North Bulango Districts are included in the second priority. Meanwhile, Boneraya, Botupingge, and Tapa Districts are included in the third priority for the development of high school/equivalent education, based on an analysis of seven weighting variables.

In the context of the five sub-districts that are the main priorities for the development of high school/equivalent education, each sub-district has different characteristics in the priority aspect of development. Kabila District, as the most populous sub-district in Bone Bolango Regency, has a high residential land use and a large school-age population. Although this area is quite developed, the population density causes the available educational facilities to be unbalanced with the number of school-age population. Similar conditions occurred in the South Bulango District, which borders Gorontalo City and is a transitional area between villages and cities. Its high population density causes an imbalance between the number of educational facilities and the ratio of the school-age population.

Meanwhile, the other three sub-districts, namely Pinogu, Bulawa, and Bone, are classified as areas that are still lagging behind other sub-districts and are quite far from the center of Bone Bolango Regency. Bulawa District is the only sub-district that until now does not have junior high or high school education facilities.

Discussion

The finding that the distribution of high schools in Bonebolango Regency shows a random pattern with an NNI value of 0.975337 and a z-score of -0.030915 reflects the absence of spatial principles in school location planning. This is strengthened by the results of a study (Taufiq et al., 2023), which shows that although the distribution pattern of State High Schools is random, spatial zoning designed integratively with models such as Voronoi, Breaking Point, and Location-Allocation is able to improve service coverage down to the smallest residential units. In Bonebolango, the unaffordable access to upper secondary education, especially in suburban and hilly areas, is evidence that there is no optimal GIS-based affirmative policy. In comparison, the distribution of schools in the study, although random, is supported by a fairly mature spatial zoning system, while in Bonebolango, the distribution is not only random but also uneven in terms of reach

and fulfillment of capacity.

In particular, the results of the analysis of the occupancy rate showed that only four schools were able to accommodate more than 80% of students, while 11 other schools were below 50%, confirming the existence of inequality not only in terms of spatiality but also in terms of quality and public perception of schools. This phenomenon is also strengthened by research findings (Hamka et al., 2022), which show that the unevenness of educational facilities is the result of weak distribution planning that does not consider the characteristics of settlements and accessibility. In other words, low occupancy in Bonebolango can be attributed to the lack of quality of educational services and poor perception of schools in the suburbs, exacerbating the disparity between the center and the peripherals.

When examined from the aspect of facility needs, the study (Fatih, M. Z. A., Haref, A. E., Lumbantobing, R. N., Try, D., & Marbun, 2025) found that the lack of high school units has a direct impact on the potential for school dropouts and the low affordability for students from poor families. This situation is very parallel to the reality in Bonebolango, which shows that the majority of sub-districts are not able to accommodate 80% of the high school age population. This means that there is a real need for the construction of new high schools in areas with significant population growth and remote access. Fatih's research also highlights the dominance of private schools as a barrier to access to inclusive education, something that could be a risk in Bonebolango if the government does not immediately implement spatial-based and affirmative interventions.

Spatial inequality is also inseparable from the affordability aspect of services. (Awana et al., 2024) In his research shows that even though the coverage of high school services administratively has reached 100%, the affordability in terms of distance still reaches 5–6 km, far from the ideal radius of 3 km based on SNI 03-1733-2004. This is similar to the findings in Bonebolango, where buffer analysis revealed overlap in some sub-districts and service vacancies in others. This indicates that the equity approach based on the number of schools alone is not enough. The range of services and the distribution of settlements must be integrated into spatial planning to ensure the principle of equitable *educational opportunity*.

Finally, it is important to emphasize that the quality of facilities and infrastructure is also the main determinant. A study by Al Kahfi, M., & Widiyastuti (2017) found that out of a total of 53 high school units, only one sub-district meets the standards of educational facilities, and the spatial coverage only reaches 63.09% of residential areas. A similar situation occurs in Bonebolango, where

quantitative inequality is exacerbated by qualitative inequalities such as incomplete facilities and limited professional teachers. Therefore, an approach that only increases the number of school units will not be effective without management quality reform, human resource improvement, and distribution of facilities based on spatial data and local needs.

Thus, it can be understood that spatial inequality in the provision of upper secondary education services in Bonebolango Regency is the result of weak integration between education development policies and data-based spatial approaches. Without strategic interventions that combine the use of GIS, demographic projections, and the principles of spatial justice, areas with difficult geographical conditions will continue to lag behind in education services. Therefore, education planning is no longer enough to rely solely on administrative data, but must be accompanied by in-depth spatial analysis and cross-sector collaboration to create an inclusive, adaptive, and equitable zoning system. By strengthening spatial analytics capacity and rearranging the distribution of facilities based on the real needs of the community, local governments can lay a strong foundation for achieving equitable access and quality of upper secondary education in a sustainable manner.

Finally, the spatial dynamics of upper secondary education services in Bonebolango Regency cannot be separated from efforts to distribute them as a whole, both in terms of quantity, quality, and distribution of services. This study provides empirical evidence that rearranging the distribution pattern of high schools with a GIS-based spatial approach is very necessary. The development of educational facilities that are responsive to the spatial context will not only increase access to education but also support the achievement of the goal of fair, equitable, and quality national education.

CONCLUSION

The availability of educational facilities in Bonebolango Regency has not been able to meet the needs of the entire community. Based on the needs analysis, there is an inequality of secondary education services in Bonebolango Regency, where only 33% of the area meets with secondary education needs of the school-age population. While the remaining 67% of areas still have to travel farther from their places of residence to meet the needs for their secondary education services, there are still six sub-districts that do not even have secondary education services, namely Tilongkabibila sub-district, Kabila Bone sub-district, Central Suwawa sub-district, South Suwawa, East Bulango, and Bulawa sub-district. In terms of occupancy rate, the distribution of high schools in Bonebolango

Regency is still very uneven; out of a total of 15 schools, there are four schools that are quite efficient in their services in meeting the capacity of their schools. Meanwhile, the other 11 schools only serve below 50% of their capacity on average. Some of the factors that affect this condition include the distance and the low gross participation rate of the high school age population in Bonebolango Regency. The distribution pattern of high school education facilities in Bonebolango Regency was analyzed using the Nearest Neighbour Analysis method. The results of the analysis showed a *p-value* of 0.975337 or below 0.1 and a z-score of -0.030915 or <-1.65, which indicates that the distribution pattern tends to be *random* or random. This pattern indicates that the spatial dynamics of education services in Bonebolango Regency tend to be unequal where there are areas where the service area overlaps with each other, on the one hand many areas are not covered, this can be seen from the range of services of high school education facilities in Bonebolango Regency analyzed using the buffer method based on the Indonesian National Standard (SNI) 03-1733-2004, which is as far as 3000 meters. The results of this analysis show that the current service coverage of high school education facilities in Bonebolango Regency has not been able to cover all existing settlements.

REFERENCES

Al Kahfi, M., & Widiyastuti, D. (2017). Kajian Ketersediaan dan Pola Distribusi Fasilitas Pendidikan Sekolah Menengah Atas/ Sederajat di Kabupaten Karanganyar. *Jurnal Bumi Indonesia*, *6*(2), 1–8.

Arisca, W. D., & Agustini, E. P. (2020). Pola Persebaran Sekolah SMA dan SMK di Kabupaten Ogan Komerin Ulu, Ogan Ilir, Penukal Abab Lematang Ilir, dan Prabumulih Menggunakan Metode Avarage Nearst Neighbour. *Jurnal Bina Komputer*, *2*(2), 99–121.

Awana, A. A., Agussaini, H., & Aulia, F. (2024). Analisis Spasial Zonasi Sekolah Menengah Atas Negeri terhadap Permukiman di Kota Banda Aceh. *Jurnal Ilmiah Mahasiswa Arsitektur dan Perencanaan*, *8*(3), 53–62. https://doi.org/10.24815/jimap.v8i3.26209

Amirul Azis, A., & Sigit, A. A. (2018). Analisis Pemenuhan Fasilitas Pendidikan Sekolah Menengah Pertama (Smp) Menggunakan Sistem Informasi Geografis (Sig) Di Kabupaten Rembang (Doctoral Dissertation, Universitas Muhammadiyah Surakarta).

AM, Masyhuri ,2004, UN dan Politisasi Standar Mutu, Sekretaris Majelis Pertimbangan dan Pemberdayaan Pendididkan Agama Islam, http: // www.pendis. kemenag.go.id /index.php? a = artikel&id 2 = unpolitisasistandarmutu

Alfandi, W., 2001. Epistemologi Geografi. Gajah Mada University Press,Yogyakarta.

Bramasta, D. (2017). Pemetaan Digital Berbasis Sistem Informasi Geografis dalam Analisis Keruangan Sertifikasi Guru Sekolah Dasar. Jssh (Jurnal Sains Sosial dan Humaniora), 1(2), 111-123.

Chen, B., Zhang, H., Wong, C. U. I., Chen, X., Li, F., Wei, X., & Shen, J. (2024). Research on the Spatial Distribution Characteristics and Influencing Factors of Educational Facilities Based on POI Data: A Case Study of the Guangdong–Hong Kong–Macao Greater Bay Area. *ISPRS International* Journal *of Geo-Information*, *13*(7), 225. https://doi.org/10.3390/ijgi13070225

Choirunnisa, I; Harjanti, IM. 2021. Penggunaan Sistem Informasi Geografis dalam Penentuan

Kesesuaian Lokasi Sarana Pendidikan Menengah di Kecamatan Mijen. Jurnal Riptek. Vol. 15 (2): 46-59.

Departemen Pendidikan Nasional (2005), *Rencana Strategis Departemen Pendidikan Nasional tahun 2005*-2009. Jakarta.

Departemen Pendidikan Nasional (2005), *Peraturan Pemerintah Republik Indonesia no.19 tahun 2005* Tentang *Standar Nasional Pendidikan.* Jakarta.

Departemen Pendidikan Nasional, (2006), *Peraturan Menteri Pendidikan No. 23 tahun 2006 tentang* Standar Kompetensi *Lulusan untuk Satuan Pendidikan Dasar dan Menengah.* Jakarta.

Departemen Pendidikan Nasional, (2007) *Peraturan Menteri Pendidikan Nasional Nomor 24 Tahun 2007* tentang *Standar Sarana dan Prasarana untuk SD, SMP, SMA atau sederajat.* Jakarta.

Departemen Pekerjaan Umum (1986), *Tata Cara Perencanaan Lingkungan Perumahan Sederhana Tidak* Bersusun *di Daerah Perkotaan Penyempurnaan terhadap standar Perencanaan Kebutuhan Sarana Pendidikan* Cipta Karya. Jakarta.

Fatih, M. Z. A., Haref, A. E., Lumbantobing, R. N., Try, D., & Marbun, S. F. (2025). Analisis Kebutuhan Jumlah Sekolah di Kecamatan Percut Sei Tuan. *Jurnal Intelek Insan Cendikia, 2*(5), 9823–9829.

https://gopos.id/parah-indeks-akses-pendidikan-di-gorontalo-masuk-3-besar-terendah-di-indonesia/

Hamka, H., Misilia, M., & Malik, R. (2022). Analisis Distribusi Fasilitas Pelayanan Pendidikan Sekolah Menegah Atas (SMA). *Madani Jurnal Politik dan Sosial Kemasyarakatan*, *14*(03), 484–492. https://doi.org/10.52166/madani.v14i03.3737

Harahap, M. H., Siregar, H., Rustiadi, E., & Pravitasari, A. E. (2024). Analysis of the Spatial Distribution Patterns of Education Infrastructure Development (A case study of 33 regencies/cities in North Sumatra Province). *Journal of Infrastructure, Policy and Development*, *8*(11), 8624. https://doi.org/10.24294/jipd.v8i11.8624

Hasanah, R. (2025). Ketimpangan Akses Pendidikan di Daerah Terpencil: Isu HAM dan Kebijakan Hukum di Indonesia. *Wicarana*, *3*(1), 1–9. https://doi.org/10.57123/wicarana.v3i1.97

Ihsan, F. (2022). Equality of Educational Opportunity Through the Zoning System in Senior High Schools. *Jurnal Komunikasi Pendidikan*, *6*(1), 38. https://doi.org/10.32585/jkp.v6i1.1807

Irawan, B., Simon, J. C., Alif, M. Z., Saliman, A. R., Fatmawati, E., & Judijanto, L. (2024). Addressing Educational Inequality Through Sustainable Policies: an Evaluation from the Education Policy and Sdgs Perspective in Indonesia. *Journal of Law and Sustainable Development*, *12*(1), e3152. https://doi.org/10.55908/sdgs.v12i1.3152

Kavroudakis, D., Ballas, D., & Birkin, M. (2012). *SimEducation: A Dynamic Spatial Microsimulation* Model *for Understanding Educational Inequalities* (pp. 209–222). Springer, Dordrecht. https://doi.org/10.1007/978-94-007-4623-7_13

Koestoer, R. H. (1996), Penduduk dan Aksesibilitas Kota: Perspektif ataruang Lingkungan Ujung Pandang, UI *Press*, Jakarta.

Mukhlis, M., & Musyawarah, R. (2019). Analisis Pola Persebaran dan Keterjangkauan Lokasi Sekolah Terhadap Pemukiman di Kecamatan Batauga Kabupaten Buton Selatan. *Journal Environmental Science*, *2*(1), 77–86.

Munawaroh, L., Hikmah, N. 'Izzatul, & Pramulatsih, G. P. (2020). Evaluasi Kecukupan Spasial dan Proyeksi Kebutuhan Sarana Pendidikan Sekolah Menengah Pertama. *Seminar Nasional Official Statistics*, *2019*(1), 631–639. https://doi.org/10.34123/semnasoffstat.v2019i1.218

Mahdi, H. F., & Al-Rawe, M. K. (2023). Spatial distribution of educational services in the city of Faw. *IOP Conference Series*, *1129*(1), 012017. https://doi.org/10.1088/1755-1315/1129/1/012017.

Nur Qolis, A. F. (2010). Pemetaan dan Analisa Sebaran Sekolah untuk Peningkatan Layanan

Pendidikan Di Kabupaten Kediri Dengan GIS. *EEPIS Final Project*.

Pitaloka, D., & *Prakoso*, B. S. (2017). Pola Spasial Persebaran Pasar Modern dan Implikasinya *Terhadap* Penataan Ruang Kawasan Strategis Ekonomi Kota Jambi. Jurnal Bumi Indonesia, *6*(3).

Pradono, K. A., Manurung, P., & Wibowo, A. (2024). Analisis Distribusi Fasilitas Sekolah Menengah Pertama melalui Pemodelan Spasial Studi Kasus di Kota Malang. Geodika: Jurnal Kajian Ilmu dan Pendidikan Geografi, 8(2), 100-110.

Ramadhana, A. N., & Prakoso, B. S. E. (2018). Analisis Ketersediaan dan Keterjangkauan Fasilitas Pendidikan Jenjang Sekolah Dasar (SD) dan Sekolah Menengah Pertama (SMP) di Kota Metro. *Jurnal Bumi Indonesia*, *7*(3).

Ristanti, Z., Trisnaningsih, T., & Halengkara, L. (2022). Pemanfaatan Sistem Informasi Geografi (Sig) untuk Pemetaan Sebaran dan Zonasi Sekolah dalam Sistem Penerimaan Peserta Didik Baru (Ppdb) SMA Negeri di Kota Bandar Lampung. *Jurnal Penelitian Geografi (JPG)*, *10*(1).

Rosaliani, R. (2017). Pemetaan Fasilitas Pendidikan Sekolah Menengah Atas di Kota Dumai dengan Memanfaatkan Sistem Informasi Geografis. *Universitas Pendidikan Indonesia*.

Rumengan, M. R. C., Kindangen, J. I., & Takumansang, E. D. (2019). Analisis Ketersediaan dan Kebutuhan Fasilitas Sosial di Kota Kotamobagu. *Jurnal Spasia*, *6*(2), 375-387. https://doi.org/https://doi.org/10.35793/sp.v6i2.25320

Sari, F. D. A. A. F., & Sigitta, R. C. (2023). Penyusunan Basis Data Spasial Sekolah Menengah Atas Atau Sederajat untuk Mengetahui Backlog Pemenuhan Kebutuhan Sarana Pendidikan di Kabupaten Brebes. *Jurnal Informatika dan Riset*, *1*(1), 15–23. https://doi.org/10.36308/iris.v1i1.472

Shirokorad, I. I. (2022). Territorial Organisation of Educational Services A Factor of the Sustainable Spatial Development. *European Proceedings of Social and Behavioral Sciences*. https://doi.org/10.15405/epsbs.2022.02.3

SNI 03-1733-2004 Tentang Tata Cara Perencanaan Lingkungan Perumahan di Perkotaan Undang-Undang Nomor 20 Tahun 2003.

Surat Keputusan Bersama Menteri dalam Negri, Menteri Pekerjaan Umum, dan Menteri Negara Perumahan Rakyat No 648-384 thn 1992, N0 739/KPTS/1992, No 09/KPTS/1992, Tentang Pedoman Perumahan dan Permukiman Berimbang. Jakarta.

Taufiq, M., Manaf, M., & Alimuddin, I. (2023). Zonasi Sekolah dalam Upaya Pemerataan Akses Pendidikan : Analisis Keruangan pada Sebaran Sekolah Menengah Atas di Kota Parepare. *Urban and Regional Studies Journal*, *6*(1), 94–107. https://doi.org/10.35965/ursj.v6i1.3810

UN dan Politisasi Standar Mutu, Sekretaris Majelis Pertimbangan dan Pemberdayaan Pendididkan Agama Islam, 2004, http://www.pendis.kemenag.go.id/index.php? a = artikel&id 2 = unpolitisasistandarmutu

Widyana, R., & Hriday, B. A. (2024). Overcoming Educational Inequity for the Urban Poor Through Community-Based Schools: a Case Study of Gajahwong School in Yogyakarta. *Jurnal Konseling dan Pendidikan*, *12*(4), 38–52. https://doi.org/10.29210/1119000