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POPULATION DISTRIBUTION AND DENSITY CHANGING PATTERN IN SUMATERA UTARA

Nilasari Siagian
Program Studi Hukum Keluarga, Fakultas Syariah, IAIDU
Jl. Mahoni, Mekar Baru, Kisaran Barat, Asahan, Sumatera Utara, 21264, Indonesia
e-mail: nilasari@gmail.com

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Abstrak

Tujuan penelitian ini adalah untuk mengetahui distribusi kepadatan penduduk deskripsi dan pola perubahan di Sumatera Utara. Jenis penelitian ini adalah penelitian kepustakaan. Tehnik pengumpulan data dilakukan dengan memanfaatkan fasilitas yang ada di perpustakaan, seperti buku, majalah, dokumen, catatan data sekunder, data statistik atau penelitian kepustakaan murni yang terkait dengan obyek penelitian. Metode analisis deskriptif memberikan gambaran dan keterangan yang secara jelas, objektif, sistematis, analitis dan kritis mengenai distribusi dan kepadatan penduduk deskripsi: karakteristik spasial dan pola perubahan di Sumatera Utara. Langkah awal yang ditempuh dengan mengumpulkan data-data yang dibutuhkan, melakukan klasifikasi, deskripsi kemudian dianalisis. Hasil penelitian ini menjelaskan bahwa pola distribusi dan kepadatan penduduk yang terjadi disebabkan oleh karakteristik spasial dan perubahan-perubahan geologi. Jika dilihat dari aspek kepadatan penduduk. Tingginya kepadatan penduduk di Sumatera Utara menyebabkan masalah-masalah sosial seperti pengangguran, kemacetan, kemiskinan, rendahnya pelayanan kesehatan, meningkatnya angka kriminalitas, pemukiman kumuh, lingkungan tempat tinggal yang tidak sehat, dan lainnya. Pola distribusi penduduk yang terjadi adalah secara geografis. Penyebaran penduduk terbesar masih terkonsentrasi pada wilayah Pantai Timur, yaitu dimana pada wilayah tersebut terdapat sejumlah kabupaten yang berpenghuni terbesar (di atas 5 % dari seluruh penduduk provinsi).

Kata kunci: *Penduduk, Distribusi, Kepadatan, Spasial*

Abstract

The purpose of this study was to determine the distribution of population density descriptions and patterns of change in North Sumatra. This type of research is library research. Data collection techniques are carried out by utilizing existing facilities in the library, such as books, magazines, documents, secondary data records, statistical data, or pure library research related to the object of research. The analytical method provides a clear, objective, systematic, analytical, and critical description and description of the distribution and population density description: characteristics and patterns of change in North Sumatra. The initial step is achieved by collecting the required data, classifying it, describing it, and then analyzing it. The results of this study explain that the distribution pattern and population density that occur are caused by spatial characteristics and geological changes. When viewed from the aspect of population density. The high population density in North Sumatra causes social problems such as congestion, poverty, health services, crime rates, settlements, unhealthy living environments, and others. The pattern of population distribution that occurs is geographical. The largest distribution is still throughout the East Coast region, wherein that region there are the largest number of districts (above 5% of the province's population).

Keywords: *Population, Distribution, Density, Spatial*

INTRODUCTION

The demographic aspect greatly determines the composition of human beings in a region. In addition, residential modes, urban and rural population trends, components of population change (including studies of mortality, fertility, and migration as effects of changes in distribution and density), and interrelationships between and between population characteristics and distribution and density are included (Başkan et al., 2017).

The population distribution factor is important to consider zoning. Population studies often focus on a portrait of the distribution of the population and the factors that influence population distribution (L. Chen et al., 2012). Population distribution is the composition of the population in a certain area according to the conditions and needs of the community (Kumar, 2015).

The main factors that determine population distribution are climate, landscape, topography, soil, energy and mineral resources, accessibility such as distance from the sea coast, natural ports, navigable rivers or canals, cultural factors, political boundaries, migration and trade controls, government policies, types of economic activity, technology including types of agriculture and means of transportation, social organization and last but not least, demographic factors such as changes in natural growth and migration. Poor physical conditions and lack of sufficient opportunities for livelihoods have been mainly responsible for deterring occupants in certain areas (Ribeiro et al., 2021).

Climatic conditions are perhaps the most important of all geographic influences on population distribution (Syazili & Bakti, 2020). In addition to physical factors, there are also other factors such as social, demographic, economic, political, and historical factors that affect the distribution of the population. Changes in population within a country have various implications (Putri et al., 2020). For example, different geographic, demographic, and Econo-social factors seem to contribute to the migration decisions made by individual residents. Demography, particularly population change, has been the target of intensive research because of its economic and social implications (Malik & Dewancker, 2018). A key factor shaping demographic dynamics is migration.

Migration decisions by residents are influenced by various factors including employment opportunities, cost of living, and climatic conditions (Aljoufie, 2021). Deriving estimates of the population at risk as a basis for policy evaluation (Balk et al., 2006).

In fact, humans may regard a particular area, which may differ from administrative units and have a certain finite but unknown size, as the spatial unit on which migration decisions are based (Romdhoni, 2020). If so, individuals can make decisions by considering their current living environment and/or migration destinations to a certain distance, resulting in overcrowding (Başkan et al., 2017).

Trends in population distribution are one of the most dynamic and policy-relevant dimensions of the contemporary demographic situation (R. Chen et al., 2020). Distribution of the population between states, then the balance shifts between metropolitan and nonmetropolitan (Purnama et al., 2020). Trends in areas classified by degree of remoteness (Hugo, 2002).

Several large cities in Indonesia are classified as very dense compared to their area(Pavlic et al., 2013). This high population density causes social problems such as unemployment, congestion, poverty, low health services, increasing crime rates, slum settlements, unhealthy living environments, and so on (Pavlic et al., 2013). Besides social problems, it also causes spatial problems such as reduced agricultural land, vacant land, and an increase in the number of settlements (Başkan, A. H., Zorba, E., & Bayrakdar, 2017).

This phenomenon also occurs in several regions in Indonesia, such as in North Sumatra Province. The problem of distribution and population density has become one of the regional development planning agendas as outlined in the Provincial RPJMD and RKPD. Seeing the current development and distribution pattern of the population reflects the existence of population and regional problems that must be addressed immediately. If we refer to the data released by the Central Statistics Agency of North Sumatra Province in 2020, the population of North Sumatra is 15,136,522 people, with a population density of 207.40 people/km2. The geographical location of North Sumatra consists of 1°-4° north latitude 98°-100° east longitude.

The province of North Sumatra stretches across the island of Sumatra between the Indian Ocean and the Malacca Strait. It is bordered by the province of Aceh in the northwest and the provinces of Riau and West Sumatra in the southeast. These conditions certainly have an influence on development, the increase in the number of settlements, and changes in the composition of the population.

The geographical characteristics of the North Sumatra region consist of coastal areas, lowlands, and highlands as well as the Bukit Barisan mountains that stretch in the middle from North to South. Regionally, North Sumatra Province is located in a strategic international shipping lane in the Malacca Strait which is close to Singapore, Malaysia, and Thailand. North Sumatra Province has a coastline of 1,300 km. The length of the east coastline is 545 km, the length of the west coastline is 375 km and the length of the coastline of Nias island is 380 km. There are 419 islands, with 237 islands that already have names, with 6 islands in the East Coast region including Berhala Island as the outermost island bordering the Malacca Strait and the remaining 182 islands in the West Coast region with Wonga Island and Simuk Island as the outermost islands in the Coastal area West.

The relationship between demographic characteristics such as population density and distribution in the North Sumatra region has an impact on the economic and social activities of the community. Responding to these problems and phenomena, the researcher considers it important to review how the pattern of change and distribution of population density in North Sumatra is.

RESEARCH METHOD

In this study, the author uses a type of library research, which is a series of activities related to library data collection methods. According to (Moelong, 2008). Library research is research that uses methods to obtain information data by placing existing facilities in the library, such as books, magazines, documents, secondary data records, statistical data, or pure library research related to the object of research.

Furthermore, descriptive analysis was carried out. The descriptive analysis method provides a clear, objective, systematic, analytical, and critical description and description of the distribution pattern and population density description in North Sumatra. The first step is to collect the required data, classify it, and then analyze it.

RESULTS AND DISUSSION

Population Distribution in Sumatera Utara

Population distribution means the pattern of where people live and is uneven (Linard et al., 2012). Population distribution data obtained through means such as household registration do not reflect the actual distribution and people's behavior such data only reflect the geographic spatial distribution of the population. Conversely, data such as street demographic data can truly reflect the overall distribution of the population over a long period of time. The population distribution is also uneven in a country.

Locations with favorable conditions are generally more densely populated than locations in more

challenging environments (Hummel, 2020). North Sumatra Province is the fourth most populous province in Indonesia and the most populous province outside Java Island. Based on the projection results of the 2010 Population Census, the average population growth for 2010-2020 is 1.28%. The population of North Sumatra Provins in 2020 reached 14,799,361 people.

Table 1. Total Population by Regency / City and Gender in 2020

Regency/City	Sex		Amount	Sex Ratio
	Male	Female		
Nias	64.685	68.175	132.860	94,88
Mandailing Natal	201.686	209.245	410.931	96,39
Tapanuli Selatan	133.140	134.955	268.095	98,66
Tapanuli Tengah	160.012	158.896	318.908	100,70
Tapanuli Utara	140.238	143.633	283.871	97,64
Toba Samosir	86.932	87.933	174.865	98,86
Labuhanbatu	214.452	210.192	424.644	102,03
A s a h a n	340.302	337.574	677.876	100,81
Simalungun	413.871	417.115	830.986	99,22
Dairi	136.483	136.911	273.394	99,69
Karo	178.073	180.750	358.823	98,52
Deli Serdang	928.434	917.181	1.845.615	101,23
Langkat	492.424	484.461	976.885	101,64
Nias Selatan	145.948	148.121	294.069	98,53
Humbang Hasundutan	86.769	87.996	174.765	98,61
Pakpak Bharat	20.938	20.554	41.492	101,87
Samosir	60.384	61.210	121.594	98,65
Serdang Bedagai	303.039	300.987	604.026	100,68
Batu Bara	191.652	189.371	381.023	101,20
Padang Lawas Utara	114.979	114.085	229.064	100,78
Padang Lawas	116.289	115.877	232.166	100,36
Labuhanbatu Selatan	145.214	139.595	284.809	104,03
Labuhanbatu Utara	169.327	166.132	335.459	101,92
Nias Utara	63.678	64.855	128.533	98,19
Nias Barat	39.597	43.104	82.701	91,86
Sibolga	43.036	42.816	85.852	100,51
Tanjungbalai	79.202	77.973	157.175	101,58
Pematangsiantar	115.488	121.459	236.947	95,08
Tebing Tinggi	73.036	74.735	147.771	97,73
Meda n	1.047.875	1.074.929	2.122.804	97,48
Binjai	124.869	125.383	250.252	99,59
Padangsidimpuan	96.841	101.968	198.809	94,97
Gunungsitoli	62.793	65.544	128.337	95,80
Sumatera Utara	6.591.686	6.623.715	13.215.401	99,52

Source: Badan Pusat Statistik Provinsi Sumatera Utara, 2020.

The sex ratio of the population of North Sumatra Province is 99.52, which means that the male population is less than the female population. The largest sex ratio is in South Labuhanbatu Regency, which is 104.03 and the smallest is in West Nias Regency, which is 91.86. From the data from the Population Census, the population growth rate of North Sumatra in 1990-2000 was 1.20% and in the period 2000-2010, it

increased to 1.22%, which is the lowest population growth rate in Sumatra, or the 5th position of growth rate. the lowest population nationally (below the population growth rate of Central Java (0.37%), East Java (0.76%), West Kalimantan (0.91%), and DI Jogyakarta (1.02%).

Geographically, the largest population distribution is still concentrated in the East Coast region, where there are several districts with the largest population (above 5% of the entire province's population) and the highest density (above 200 people/km2), such as Labuhan Batu, Asahan, Deli Serdang, Langkat and Serdang Bedagai. In this eastern region there are also many large cities with the largest distribution and population density, namely the cities of Medan, Sibolga, Tanjung Balai, Pematang Siantar, Tebing Tinggi, Medan, Binjai and Padang Sidempuan.

From the results of the 2010 Population Census, the distribution of the population of North Sumatra by district/city is below 5% on average, and only five districts/cities have a distribution above 5%. In general, the gross density in North Sumatra Province is still low because most of the area is an undeveloped area, namely forest and plantation areas. Except for cities in North Sumatra, the density is relatively moderate as an urban area. Medan City, Deli Serdang Regency, and Langkat Regency are the three regencies/cities with the highest order having the largest population of 2,122,804 people (16.06%), 1,845,615 people (13.97%), and 976,885 people (7.39%). Meanwhile, Pakpak Bharat Regency is the district with the least population of 41,492 people (0.31%).

Density Population in North Sumatera

Population density is a measure of the number of people in an area. This is an average number (Hummel, 2020). Population density is calculated by dividing the number of people by the area (Ratih, et al 2020) Population density is usually shown as the number of people per square kilometer. Of course, not everyone in a country is evenly distributed. Cities have a greater population density than rural areas (Yi Shi, Junyan Yang, and Peiyu Shen, 2020).

Density can also be used to refer to the number of plants or animals in each area. Sometimes, the population of animals or plants is too dense. This leads to overpopulation (Pequeno P, Mendel B, Rosa C, Bosholn M, Souza JL, Baccaro F, Barbosa R, Magnusson W, 2020). With an area of about 71,680.68 square kilometers of North Sumatra Province inhabited by 13,215,401 people, the average population density of North Sumatra Province is 184 people per square kilometer.

According to the latest population data in 2012, the regency/city with the highest population density level is Medan City, which is 8,008 people per square kilometer, while the lowest is Pakpak Bharat Regency with 34 people per square kilometer.

The second city with the highest density is Sibolga City at 7971 per square kilometer. With the limited land carrying capacity of Sibolga City while the population continues to grow, Sibolga City needs to control its population growth. For more details, see the following table:

Table. 2. Total Population, Density, and Population Distribution of Sumatera Utara by Kabupaten/Kota in 2020

Regency/City	Amount	Population Density/km^2	Population Distribution (%)
Nias	132,860	136	1,01
Mandailing Natal	410,931	62	3,11
Tapanuli Selatan	268,095	62	2,03

Tapanuli Tengah	318,908	148	2,41
Tapanuli Utara	283,871	75	2,15
Toba Samosir	174,865	74	1,32
Labuhanbatu	424,644	166	3,21
Asahan	677,876	184	5,13
Simalungun	830,986	190	6,29
D a i r i	273,394	142	2,07
K a r o	358,823	169	2,72
Deli Serdang	1,845,615	742	13,97
Langkat	976,885	156	7,39
Nias Selatan	294,069	181	2,23
Humbang Hasundutan	174,765	76	1,32
Pakpak Bharat	41,492	34	0,31
Samosir	121,594	50	0,92
Serdang Bedagai	604,026	316	4,57
Batu Bara	381,023	421	2,88
Padang Lawas Utara	229,064	58	1,73
Padang Lawas	232,166	60	1,76
Labuhanbatu Selatan	284,809	91	2,16
Labuhanbatu Utara	335,459	95	2,54
Nias Utara	128,533	86	0,97
Nias Barat	82,701	152	0,63
Sibolga	85,852	7.971	0,65
Tanjungbalai	157,175	2.555	1,19
Pematangsiantar	236,947	2.963	1,79
Tebing Tinggi	147,771	3.844	1,12
Medan	2,122,804	8.008	16,06
Binjai	250,252	2.773	1,89
Padangsidimpuan	198,809	1.734	1,50
Gunungsitoli	128,337	273	0,97
Sumatera Utara	13,215,401	184	100,00

Source**:** Badan Pusat Statistik Provinsi Sumatera Utara, 2020.

The development of Medan City, which is located in the eastern region, has an impact on adjacent districts, giving rise to increasingly dominant urban population growth, such as the districts of Deli Serdang and Serdang Bedagai, followed by Asahan, Batubara, Simalungun, Karo and Langkat districts. On the other hand, districts far from Medan have populations that are predominantly rural, such as the districts of South Nias, Nias, Humbang Hasundutan and South Tapanuli.

The population in the East Coast region is greater than the population living in the West Coast and Highlands areas, of course this has the effect of the shrinking agricultural land in the east coast which results in food security, environmental problems, employment and settlements (Mohammed Hamud et al., 2019). From the graph, the trend of population growth in the West Coast Region has begun to keep pace with population growth in the Highlands. This imbalance in population growth is also the result of uneven development throughout the Province of North Sumatra. This will certainly be a priority for North Sumatra Province to control the distribution of the population so that it is evenly distributed throughout the Province of North Sumatra through equitable infrastructure development.

Spatial Characteristics and Changing Pattern in Sumatera Utara

Geologically, the North Sumatra Province has complex structures and rocks and has experienced several collisions from tectonic processes because of its position at the confluence of the Eurasian plate in the east and the Australian plate in the west. This causes the formation of a series of fault lines, fractures, and folding accompanied by volcanic activity. The fault line passes through the North Sumatra route starting from the Alas-Karo segment and is approximately 390 km long and is a source of geological natural disasters in the form of earthquake centers on land, tsunamis, and triggers for volcanic eruptions and landslides. The fault line (subduction) on the West Coast along approximately 250 km is the epicenter of the earthquake on the seabed.

Figure 1. Administrative Map of Sumatera Utara

The condition of the complex geological structure which is characterized by the shape of the hilly landscape, folded with faults, apart from being an earthquake pathway, also has the potential to cause landslides in about 40-50% of the total area of North Sumatra Province which includes 18 districts and 1 city (according to the 2005 state of affairs), is an area that is prone to landslides. However, coastal areas are relatively in demand by the community for residence on the grounds that they can stimulate the economy. The coastal area is the boundary area between land and sea. The livelihoods of residents of coastal areas generally depend on marine exploitation, such as fishing, fishpond business, or making salt. Coastal community settlement areas generally follow an elongated pattern or a linear pattern along the coast (Gutiérrez Chacón et al., 2020).

Almost not much different from the settlement conditions of other coastal fishing communities, namely elongated or linear patterns along the coast. Residents in coastal areas have a relatively low economic level, wherein the west season, some fishermen do not go to sea and most of them only depend on fish in the sea. By looking at the above, it is necessary to make efforts to develop alternative livelihoods as one way that must be prioritized so that coastal residents are not concentrated in their places of residence during the west season.

Based on Figure 1 above, it can be explained that the North Sumatra region consists of coastal areas, lowlands and highlands as well as the Bukit Barisan mountains that stretch in the middle from North to South. The slope of the land is between 0 – 12% covering an area of 65.51%, between 12 – 40% covering an area of 8.64 %, and above 40% covering an area of 24.28 %, while the area of Lake Toba is 112,920 hectares or 1.57%. The altitude of the land in North Sumatra Province varies from 0 – 2,200 m above sea level. It is divided into 3 (three) parts, namely the eastern part which is relatively flat, the middle part is wavy to hilly and the western part is undulating plain.

The East Coast region which is a lowland area of 24,921.99 Km 2 or 34.77% of the total area of North Sumatra is a fertile area, high humidity with relatively high rainfall as well. Floods also often hit the area due to reduced forest conservation, erosion and river silting. In the dry season, there is also a shortage of water supply due to the critical condition of the forest. The highlands and the West Coast area of 46,758.69 km2 or 65.23% of the total area of North Sumatra, are mostly mountainous, have variations in soil fertility, climate, topography, and contours as well as areas with unstable soil structure. Several lakes, rivers, waterfalls, and volcanoes are found in this area and some areas are recorded as areas of tectonic and volcanic earthquakes.

CONCLUSION

North Sumatra Province ranks fourth with the largest population outside Java Island. The distribution patterns and population density that occur are caused by spatial characteristics and geological changes. When viewed from the aspect of population density. The high population density in North Sumatra causes social problems such as unemployment, congestion, poverty, low health services, increasing crime rates, slum settlements, unhealthy living environments, and others. The pattern of population distribution that occurs is geographically, the largest population distribution is still concentrated in the East Coast region, which is where there are a number of districts with the largest population (above 5% of the total population of the province). The spatial characteristics and patterns of change in the North Sumatra region consist of the coastal areas, lowlands and highlands as well as the Bukit Barisan mountains which stretch in the middle from North to South, so that these spatial characteristics determine the distribution of the population's residence.

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