

Descriptive Statistical Analysis of Population Density by District in Padang City in 2025

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Abstract: Population density is an important demographic indicator in regional development planning because it reflects the level of population concentration in an area and serves as the basis for providing infrastructure and public services. Differences in population density between sub-districts can indicate the existence of unequal population distribution that needs to be studied quantitatively. This study aims to analyze the characteristics of population density by sub-district in Padang City in 2025 using a descriptive statistical approach. This research is a descriptive quantitative study utilizing secondary data sourced from the publication "Padang City in Figures 2026" published by the Padang City Central Statistics Agency. The analysis unit consists of 11 sub-districts in Padang City. Data analysis was performed using Microsoft Excel through the calculation of measures of central tendency which include the mean and median, measures of dispersion consisting of minimum, maximum, range, variance, standard deviation, and coefficient of variation, then the results are presented in the form of tables, bar charts, and boxplots. The results of the study indicate that population density in Padang City has high variations between sub-districts with an average of 4,349 people/km², a median of 4,281 people/km², a standard deviation of approximately 3,320 people/km², and a coefficient of variation of 76.34%, which indicates that the distribution of population density is heterogeneous. Padang Timur Sub-district has the highest population density, while Bungus Teluk Kabung has the lowest density. These findings indicate that the distribution of population in Padang City is still concentrated in the city center area so that information regarding population density characteristics can be the basis for regional development planning, equal distribution of public services, and more targeted policy making.

Keywords: Demographics; descriptive statistics; population density; Padang city.

1. Introduction

Population density is a demographic indicator widely used to describe the level of population concentration in a region and serves as the basis for development planning, the provision of public facilities, and the equitable distribution of public services. Differences in population density between regions can impact the need for infrastructure, education, health, transportation, and spatial planning,

making analysis of population density distribution crucial for local governments in determining development priorities. In mathematics and statistics, descriptive statistical analysis is the most fundamental approach to describing data characteristics through measures of central tendency, dispersion, and data visualization, allowing for objective understanding of distribution patterns (Walpole et al., 2018). Various studies have utilized descriptive statistics to analyze population data at the regional level because this method can provide an initial overview of data characteristics before more complex analyses are conducted (Ramadhani & Wibowo, 2022; Sari & Handayani, 2023). However, most studies focus on population growth or population projections, while studies specifically describing variations in population density between sub-districts using descriptive statistical measures are still relatively limited, particularly in the Padang City area.

Padang City, the capital of West Sumatra Province, has highly diverse regional characteristics, both in terms of area and population distribution. Data from Padang City in Figures 2026 shows that population density varies significantly between sub-districts, ranging from low-density districts to very high-density districts. These differences indicate heterogeneity in population distribution, which requires quantitative analysis to provide more comprehensive information on the characteristics of population density in each sub-district. Descriptive statistical analysis is important because it provides information on the mean, median, standard deviation, variance, range, and coefficient of variation, which can be used to more objectively describe the level of population density diversity (Purwanto et al., 2021; Nugraha et al., 2022). This information can serve as a baseline for local governments and researchers in understanding population distribution patterns and inform regional development policy formulation.

Based on these issues, this study aims to analyze the characteristics of population density by sub-district in Padang City in 2025 using a descriptive statistical approach. The analysis was conducted by calculating measures of central tendency (mean and median), measures of dispersion (range, variance, standard deviation, and coefficient of variation), and presenting graphs to illustrate the distribution pattern of population density between sub-districts. The results of this study are expected to provide a quantitative picture of the level of variation in population density in Padang City and serve as supporting information in the formulation of regional development policies and further research related to population analysis.

2. Methods

This research is quantitative with a descriptive approach. Descriptive research aims to describe the characteristics of a phenomenon based on numerical data without manipulating the research variables or testing causal relationships. The quantitative approach was chosen because all analyzed data is in numerical form and can therefore be processed using descriptive statistical techniques to obtain an overview of the characteristics of population density across sub-districts in Padang City (Sugiyono, 2023; Purwanto et al., 2021).

The research was conducted in the administrative area of Padang City, West Sumatra Province. The research analysis unit covered all 11 sub-districts within Padang City: Bungus Teluk Kabung, Lubuk

Kilangan, Lubuk Begalung, South Padang, East Padang, West Padang, North Padang, Nanggalo, Kuranji, Pauh, and Koto Tangah. All sub-districts were selected as research objects, therefore, the

sampling technique used was total sampling or census. Padang City was selected based on the significant variation in population density between sub-districts, making it suitable for use as a descriptive statistical analysis object. Population density data were obtained from the official publication "Padang City in Figures 2026" published by the Padang City Central Statistics Agency (BPS).

The study used secondary data sourced from the publication "Padang City in Figures 2026." The primary variable analyzed was population density (people/km²) in each sub-district in 2025. Supporting data, including population and land area, were used to interpret variations in population density. Because the study used official data published by the Central Statistics Agency (BPS), the data has undergone verification, validation, and standardization processes in accordance with national statistical procedures, thus maintaining a high level of reliability as a research data source (BPS Padang City, 2026).

The research instrument was a worksheet developed by the researcher using Microsoft Excel 2021. The worksheet was used for data tabulation, descriptive statistical calculations, and graphical presentation. Variables entered into the worksheet included sub-district names, population, area, and population density.

Furthermore, the Descriptive Statistics feature in Microsoft Excel's Analysis ToolPak was utilized to automatically obtain measures of central tendency and dispersion. Excel was chosen because it can produce accurate and efficient descriptive statistical analysis on small to medium-sized data (Rahman et al., 2022).

Data Collection Techniques

1. Identify the publication "Padang City in Figures 2026" as the research data source.
2. Collect data on population, area, and population density
3. Enter all data into a Microsoft Excel spreadsheet in order of sub-districts.
4. Cross-check the tabulated data with the tables in the BPS publication to ensure there are no data copying errors.
5. Compile a final database ready for analysis using descriptive statistics.

These steps ensure the analyzed data accurately aligns with the official data published by the Central Statistics Agency (BPS).

Data Analysis Techniques

Data analysis was conducted using descriptive statistics with the aid of Microsoft Excel 2021. Population density data for each sub-district was entered into Microsoft Excel to form the research database. This stage aimed to ensure all data was systematically arranged according to the sub-district's order.

Measures of central tendency were then calculated, consisting of the mean and median, as well as measures of dispersion, including the minimum value, maximum value, range, variance, standard

deviation, and coefficient of variation. These statistics were used to describe the general characteristics of population density in Padang City (Purwanto et al., 2021; Nugraha et al., 2022). The coefficient of variation was calculated using the equation

$$CV = \frac{s}{\bar{x}} \times 100\% \quad (1)$$

where s represents the standard deviation and $\bar{x}$ represents the average population density. The coefficient of variation value is used to determine the relative level of diversity in the data. The higher the coefficient of variation, the higher the level of population density variation between sub-districts. The results of the statistical analysis are then presented in tables, bar charts, histograms, and boxplots. Bar charts are used to compare population density between sub-districts, while boxplots are used to observe data distribution, extreme values, and the possibility of outliers.

The final stage involves interpreting the descriptive statistics based on measures of central tendency and measures of dispersion. The sub-districts with the highest and lowest population densities are identified and then analyzed based on their regional characteristics. Furthermore, the level of population density diversity in Padang City is explained based on the standard deviation and coefficient of variation values, thus obtaining a comprehensive picture of the distribution of population density between sub-districts.

3. Results and Discussion

Population density is an indicator that shows the number of people per square kilometer of land. The higher the density, the higher the concentration of people in that area. Based on data from Padang City in Figures 2026, population density in Padang City in 2025 showed significant variation between sub-districts.

Table 1. Population Density by District in Padang City in 2025

District	Area (km ²)	Population (Thousand People)	Density (Life/km ²)
Bungus Teluk Kabung	100,78	29,70	295
Lubuk Kilangan	85,99	62,70	729
Lubuk Begalung	30,91	132,32	4.281
Padang Selatan	10,03	63,15	6.296
Padang Timur	8,15	78,73	9.660
Padang Barat	7,00	43,30	6.186
Padang Utara	8,08	55,61	6.883
Nanggalo	8,07	59,63	7.389
Kuranji	57,41	157,78	2.748

District	Area (km ²)	Population (Thousand People)	Density (Life/km ²)
Pauh	146,29	64,25	439
Koto Tengah	232,25	217,87	938

Source: BPS Padang City (2026)

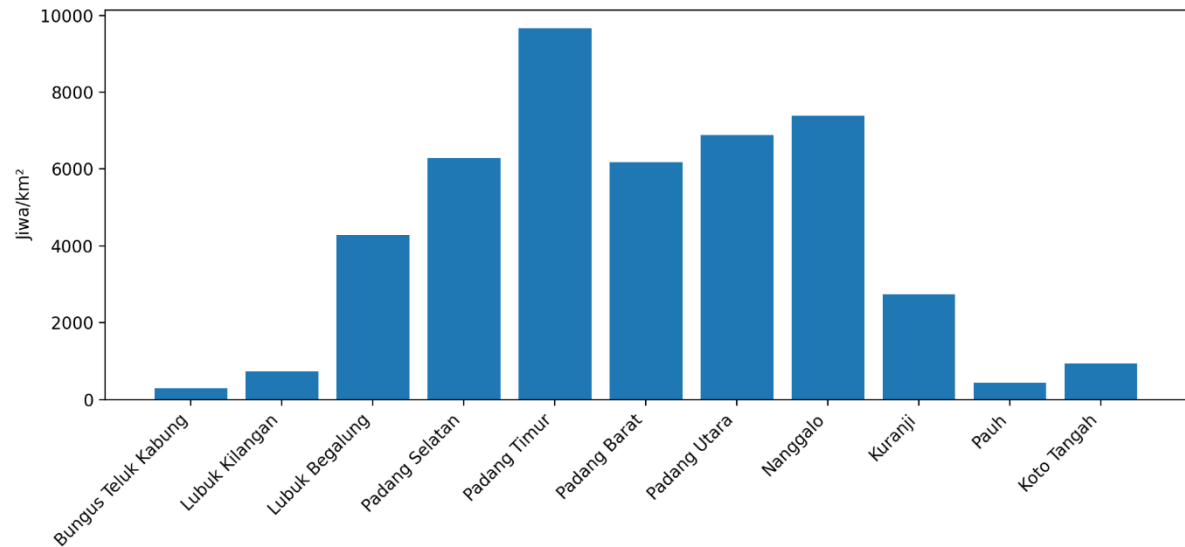


Figure 1. Bar chart of population density of Padang City in 2025

Table 1 shows that population density varies significantly between sub-districts. Padang Timur Sub-district has the highest population density, at 9,660 people/km², while Bungus Teluk Kabung Sub-district has only 295 people/km². This difference indicates that population distribution in Padang City is uneven. Sub-districts located in the city center tend to have higher densities than those with larger administrative areas.

Based on the data in Table 1, the following descriptive statistics were obtained.

Table 2. Descriptive Statistics for Population Density in Padang City

Statistics	Value
Number of subdistrict	11
Minimum	295
Maximum	9.660
Mean	4.349
Median	4.281
Range	9.365
Standard Deviations	3.320
Variance	11.024.000
Coefficient of Variation	76,34 %

The analysis shows that the average population density of Padang City is approximately 4,349 people/km², while the median is 4,281 people/km². The closeness of the mean and median values indicates that the center of distribution of the data has not shifted significantly, although there are several subdistricts with very high and very low densities.

The minimum value of 295 people/km² and the maximum of 9,660 people/km² yield a data range of 9,365 people/km², indicating a population density gap between sub-districts. Furthermore, the standard deviation of 3,320 people/km² indicates a relatively large deviation from the mean.

The coefficient of variation of 76.34% indicates a high level of diversity. According to Purwanto *et al.* (2021), a coefficient of variation value above 30% indicates high heterogeneity in the data. Therefore, population density in Padang City is not evenly distributed across all sub-districts.

Data visualization using a bar chart shows a cluster of sub-districts with very high densities: East Padang, Nanggalo, North Padang, South Padang, and West Padang. Conversely, Bungus Teluk Kabung, Pauh, Lubuk Kilangan, and Koto Tengah have relatively low densities.

4. Conclusion

The analysis results show that population density in Padang City has a high variation between sub-districts, as indicated by a very wide range of density values, a relatively large standard deviation, and a coefficient of variation of 76.34%. Therefore, the distribution of population density can be categorized as heterogeneous. Padang Timur Sub-district is the area with the highest population density, while Bungus Teluk Kabung has the lowest density. This difference indicates that the distribution of population in Padang City is still concentrated in the city center area, while sub-districts with larger areas tend to have lower densities. Thus, the research objective of providing a quantitative description of the characteristics of population density between sub-districts has been achieved through the presentation of measures of centralization, measures of dispersion, and data visualization that are able to explain the distribution pattern of population density comprehensively. The results of this study provide implications that information on the characteristics of population density can be the basis for formulating policies for equitable development, spatial planning, and the provision of infrastructure and public services that are more proportional to the characteristics of each sub-district.

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