

## Analysis of Disparities in Household Access to Adequate Sanitation Across Regions in Indonesia in 2024

Isah Fitriani<sup>1\*</sup>, Risnaida Ratri Andini<sup>2</sup>

<sup>1</sup>Faculty of Public Health, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

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### ABSTRACT

Access to adequate sanitation is an important indicator of public health development and forms part of the targets of the Sustainable Development Goals (SDGs) 2030. Although the coverage of adequate sanitation in Indonesia has continued to improve, disparities in access across regions remain a significant challenge. This study aimed to analyze regional disparities in household access to adequate sanitation in Indonesia in 2024. A descriptive quantitative method was employed. The data were obtained from the *Indonesia Health Profile 2024* published by the Ministry of Health of the Republic of Indonesia and were analyzed descriptively based on provincial and area-type classifications. The results showed that substantial disparities in access to adequate sanitation still exist among provinces in Indonesia. The provinces with the highest access to adequate sanitation were Bali (96.83%), followed by the Special Region of Yogyakarta (96.71%) and DKI Jakarta (94.01%), while the lowest access was found in Highland Papua (12.61%), Central Papua (48.34%), and South Papua (57.13%). The gap between the highest- and lowest-performing provinces reached 84.22 percentage points. Based on area type, access to adequate sanitation in urban areas (84.06%) remained higher than in rural areas (82.93%). These disparities may increase the risk of health problems, widen welfare inequalities, and hinder the achievement of equitable health development. Therefore, efforts to promote equitable sanitation infrastructure development and improve access to sanitation services, particularly in low-performing regions, are needed to support improvements in public health status and the achievement of the SDGs targets.

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### Corresponding Author:

Isah Fitriani

Faculty of Public Health

Universitas Ahmad Dahlan

Professor Doctor Soepomo Street, S.H., Janturan, Yogyakarta City, Special Region of Yogyakarta, Indonesia

Email: [isahftrn@gmail.com](mailto:isahftrn@gmail.com)

## 1. INTRODUCTION

Access to adequate sanitation is a key component of public health development and community well-being. Adequate sanitation plays a role in preventing environmental contamination from human waste, breaking the chain of transmission of environment-borne diseases, and supporting improvements in the quality of life for communities. The availability of adequate sanitation facilities also contributes to creating a healthy, safe, and productive environment for communities. Various studies indicate that poor sanitation conditions are associated with an increased risk of infectious diseases, such as diarrhea and gastrointestinal infections, and contribute to chronic nutritional problems such as stunting in children (Puteri & Fitria, 2025). Therefore, improving access to adequate sanitation is a key effort in achieving optimal public health.

Inadequate sanitation can have serious consequences for public health, particularly in developing countries. Various reports indicate that diseases linked to poor sanitation remain a leading cause of illness and death among vulnerable groups, especially children. In addition to increasing the risk of environment-related diseases such as diarrhea and gastrointestinal infections, poor sanitation can also contribute to malnutrition due to impaired nutrient absorption caused by recurrent infections. These conditions demonstrate that improving access to adequate sanitation is not only crucial for maintaining environmental quality but also plays a role in reducing the disease burden and enhancing human capital (Hendriarianti et al., 2024).

The importance of sanitation is also reflected in the 2030 Agenda for Sustainable Development adopted by the United Nations (UN) in 2015. Through the Sustainable Development Goals (SDGs), particularly Goal 6, all countries are committed to ensuring the availability and sustainable management of clean water and sanitation for all by 2030. However, global challenges in the field of sanitation remain significant. In 2017, approximately 55% of the world's population lacked access to safely managed sanitation, and about two billion people still lacked access to basic sanitation services. In addition to impacting public health, inadequate sanitation also causes significant economic losses due to increased disease burden, healthcare costs, and lost productivity (Parikh et al., 2021). This situation indicates that sanitation remains a development issue that requires serious attention in many countries, including Indonesia.

Indonesia has made progress in the development of the sanitation sector over the past few years. Nevertheless, ensuring equitable access to sanitation remains a challenge that requires attention. Research conducted by Irianti & Puguh Prasetyoputra (2021) shows that some households in Indonesia still lack access to adequate sanitation, with a significant disparity between urban and rural areas. Households in rural areas are less likely to have access to adequate sanitation than those in urban areas. These findings indicate that the development of basic infrastructure and sanitation services has not yet been fully equitable across all regions of Indonesia.

According to data from the 2024 Indonesia Health Profile, approximately 83.60% of households in Indonesia have access to adequate sanitation, which is the highest achievement in the past decade. Nevertheless, there are still about 16% of households that do not have access to adequate sanitation (Kementerian Kesehatan RI, 2025). These national achievements indicate progress in environmental health development, but they do not fully reflect the equitable distribution of sanitation access across all regions of Indonesia. Therefore, it is important to conduct an analysis that focuses not only on national coverage rates but also on the distribution of access across regions.

Disparities in access to adequate sanitation across regions in Indonesia remain quite striking. In 2024, the provinces with the highest percentages of access to adequate sanitation were Bali (96.83%), Yogyakarta Special Region (96.71%), and Jakarta Special Capital Region (94.01%). Conversely, the provinces with the lowest rates are predominantly in eastern Indonesia, such as Papua Pegunungan, which reached only 12.61%, and Central Papua, which remains below 50%. The vast disparity between the provinces with the highest and lowest rates indicates that sanitation development has not been evenly distributed. This disparity reflects the existence of varying social,

economic, geographical, and infrastructure barriers in each region regarding the provision of adequate sanitation services (Kurniati et al., 2024)

In addition to geographical factors, various studies indicate that access to adequate sanitation is also influenced by socioeconomic characteristics and household environmental conditions. Numerous studies have identified that sociodemographic factors, housing conditions, and environmental factors have a significant relationship with access to and utilization of household sanitation facilities. The age and gender of the head of household, educational level, economic status, the presence of infants in the household, household size, access to electricity, water sources, number of rooms, housing conditions, and characteristics of the residential area are factors that influence the ownership and use of adequate sanitation facilities. These findings indicate that disparities in sanitation access are a multidimensional issue influenced not only by the availability of infrastructure but also by the social and economic conditions of the community (Yitageasu et al., 2025).

Various studies show that disparities in access to sanitation are influenced by a range of socioeconomic and demographic factors, as well as regional characteristics. Households with low levels of education and economic status, those living in rural areas, and those with limited access to basic infrastructure tend to have poorer access to sanitation compared to more affluent groups. These disparities not only increase the risk of environment-related diseases, such as diarrhea, parasitic infections, and malnutrition, but can also increase healthcare costs, reduce community productivity, and widen the welfare gap between socioeconomic groups. This situation demonstrates that access to sanitation is not merely an environmental health issue but is also closely linked to sustainable social and economic development (Keleb et al., 2024; Kumar et al., 2024; Prakash et al., 2022). Although various studies on sanitation have been conducted in Indonesia, studies that specifically map disparities in access to adequate sanitation across provinces using the latest data remain relatively limited. Therefore, this study aims to analyze disparities in household access to adequate sanitation across regions in Indonesia based on data from the 2024 Indonesia Health Profile as a foundation for supporting the formulation of policies to promote equitable sanitation.

## **2. METHOD**

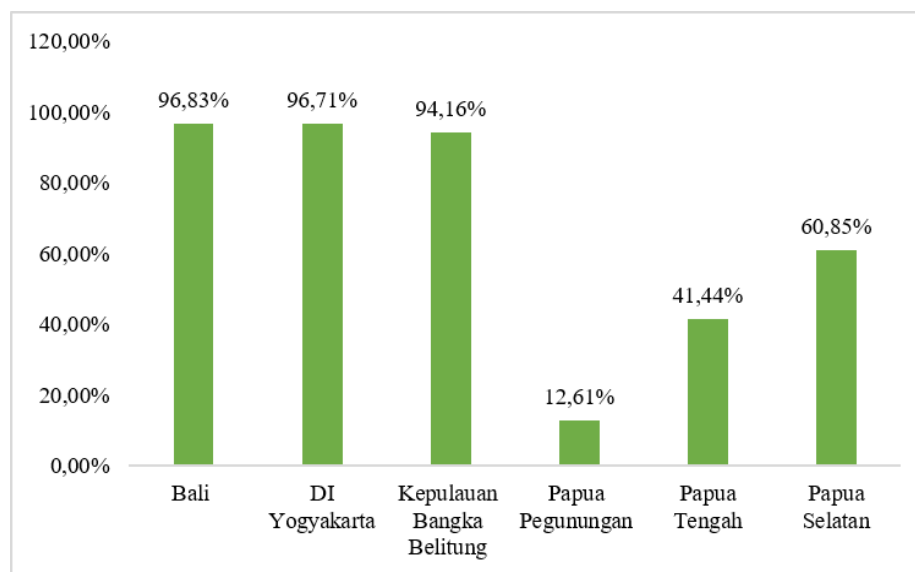
This study employs a descriptive quantitative method to describe and analyze disparities in access to adequate sanitation in Indonesia based on data from the 2024 Indonesia Health Profile. The data used in this study are drawn from the 2024 Indonesia Health Profile published by the Ministry of Health of the Republic of Indonesia. The data analyzed consists of indicators of the percentage of access to adequate sanitation in Indonesia, both at the national level and across regions (provinces). The variable in this study is access to adequate sanitation, expressed as a percentage of coverage. This variable is used to identify differences or disparities in sanitation access across regions in Indonesia. The data analysis technique used is descriptive analysis, which involves presenting data in the form of graphs and narratives to illustrate the distribution of access to adequate sanitation. The analysis was conducted by comparing coverage rates across regions to identify regions with the highest and lowest coverage and to examine the existence of disparities in sanitation access in Indonesia.

## **3. RESULTS AND DISCUSSION**

Sanitation refers to efforts made to maintain the physical environment required by the community, which has a direct impact on the environment and human health. Sanitation also includes the maintenance and provision of facilities and services related to the disposal of feces and urine. Poor sanitation conditions can have various negative impacts, particularly on the health of the community in that environment (Miskiyah et al., 2023). Access to adequate sanitation is a fundamental component of maintaining public health. Inadequate sanitation not only leads to a decline in health, but can also hinder public well-being and impede a country's social and economic

development (Aprilia et al., 2024). Therefore, improving access to adequate sanitation is a key priority in health development.

This is in line with Goal 6 of the 2030 Sustainable Development Goals (SDGs), which emphasizes providing access to clean water and sustainable sanitation for all (Badan Perencanaan Pembangunan Nasional, 2023). Under Target 6.2, the government aims to achieve adequate and equitable access to sanitation and hygiene for all citizens, as well as the elimination of open defecation. However, in Indonesia, sanitation remains a serious issue that requires cross-sectoral attention. Given these conditions, an analysis of access to adequate sanitation in Indonesia is crucial to assess the extent of health development achievements, particularly regarding equity across regions. Differences in geographical conditions, regional development levels, and access to basic infrastructure are believed to be factors influencing disparities in sanitation access across various provinces in Indonesia. To provide a clearer picture of this situation, the following data presents the provinces with the highest and lowest percentages of households having access to adequate sanitation in Indonesia in 2024.



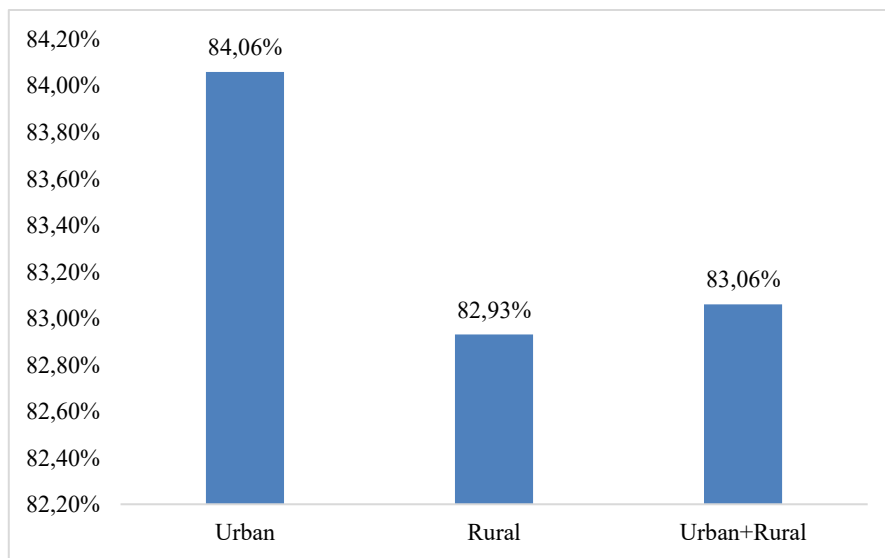
**Figure 1. Comparative Analysis Chart of Households with Access to Adequate Sanitation by Province: Highest and Lowest Rates in Indonesia in 2024**

Based on the graph, there is a disparity in access to adequate sanitation among provinces in Indonesia in 2024. The provinces with the highest coverage rates are Bali (96.83%), Yogyakarta Special Region (96.71%), and Jakarta Special Capital Region (94.01%), while the lowest rates are found in Papua Pegunungan (12.61%) and Central Papua, which remain below 50%. When compared, there is a difference of 84.22 percentage points between the provinces with the highest and lowest rates. This significant gap indicates that access to adequate sanitation in Indonesia is not yet evenly distributed across regions. Provinces with high rates are generally areas with relatively more advanced levels of development and are supported by better infrastructure availability. Conversely, provinces with low coverage still face various challenges, such as difficult-to-reach geographical conditions, limited basic infrastructure, and relatively higher poverty rates. This disparity also highlights differences in development capacity across regions. Eastern Indonesia, particularly mountainous and remote areas, tends to face greater obstacles in providing sanitation facilities compared to more developed regions. Difficult geographical conditions, limited transportation access, and great distances from service centers make the construction and maintenance of sanitation infrastructure more complex and costly.

The findings of this study are consistent with a study Yumanda & Vidriza (2022) that classified Indonesian provinces based on indicators of safe drinking water, adequate sanitation,

water quality, and poverty. That study showed that provinces with better socioeconomic conditions and development tend to have higher sanitation access, whereas regions with high poverty rates generally have lower sanitation access. These findings indicate that disparities in sanitation access are not only influenced by geographical factors but are also closely linked to the socioeconomic conditions and development capacity of each region. Various studies show that mountainous areas and remote regions tend to have lower sanitation access due to challenges in infrastructure development and the distribution of basic services (Biswas et al., 2024; Putirama, 2021). In the Indonesian context, this situation is evident in several provinces in the eastern region, particularly Papua, which has more complex geographical characteristics than Java and Bali, potentially hindering equitable access to sanitation. Therefore, efforts to improve access to sanitation cannot be carried out using a one-size-fits-all approach across all regions. Sanitation policies and programs must be tailored to the specific geographic, social, and economic conditions of each region, with a priority on underdeveloped, mountainous, and remote areas through the strengthening of basic infrastructure, financial support, and community-based empowerment (Kanyangarara et al., 2021).

In addition to being analyzed by province, access to adequate sanitation can also be analyzed by type of area, namely urban and rural areas. According to the Central Statistics Agency (2025), households are categorized as having access to adequate sanitation if they use sanitation facilities that meet health requirements, such as flush toilets with final disposal of fecal matter into a septic tank or a Wastewater Treatment Plant (WWTP). Analysis by area type is important because differences in regional characteristics—particularly regarding the availability of basic infrastructure, access to public services, population density, and the socioeconomic conditions of the community—can influence the level of household access to adequate sanitation facilities (Kementerian Kesehatan RI, 2025). A comparison between urban and rural areas can also provide insight into the level of equity in sanitation development in Indonesia. Therefore, an analysis of sanitation access by region type is necessary to identify potential disparities that still exist. The details are presented in Figure 2.



**Figure 2. Percentage of Households with Access to Adequate Sanitation by Region Type, 2024**

According to Figure 2, the percentage of households with access to adequate sanitation in urban areas in 2024 was 84.06%, while in rural areas it was 82.93%. These results indicate that access to adequate sanitation in urban areas remains slightly higher than in rural areas, with a difference of 1.13 percentage points. Although the difference is relatively small, this finding indicates that disparities in sanitation access between the two areas persist. Similar conditions are

also found in various countries, where households in rural areas tend to have lower sanitation access compared to those in urban areas. Various studies show that these differences are influenced by socioeconomic factors, education levels, the availability of basic infrastructure, and the characteristics of the residential area. Households with better economic conditions and higher education levels generally have a greater chance of having adequate sanitation facilities. Conversely, limited water networks, sanitation facilities, and certain geographical conditions in rural areas can be barriers to the provision and use of adequate sanitation facilities (Azeez et al., 2023; Keleb et al., 2024; Mengistie et al., 2025).

Inequalities in access to sanitation are not only related to the availability of basic facilities but also have an impact on public health. Various studies show that poor sanitation can increase the risk of diarrhea, parasitic infections, and other environment-related diseases. In addition, repeated exposure to infections due to inadequate sanitation can interfere with nutrient absorption and contribute to malnutrition and stunting in children (Chirgwin et al., 2021; Olin & Paun, 2022; Wolf et al., 2023). In Indonesia, a study Aryo & Efendi (2024) shows that households with inadequate access to sanitation face a higher risk of stunting compared to households with adequate access to sanitation. These findings indicate that improving access to sanitation is not only important for preventing disease but also plays a role in supporting children's growth and development and enhancing the quality of human resources.

The availability of adequate sanitation facilities is a crucial foundation in efforts to prevent the spread of disease. A well-managed waste management system plays a key role in preventing the contamination of clean water sources, thereby reducing the risk of transmission of various diseases related to sanitation and environmental quality. In addition, effective waste and garbage management can also reduce the breeding of disease vectors, such as flies and rats, which contribute to the spread of various infectious diseases. Good sanitation conditions not only contribute to a reduction in morbidity rates from environment-based diseases but also support the creation of a healthy and safe environment for the community. Thus, the provision of adequate sanitation facilities serves not only as a basic household necessity but also as a vital component in public health protection efforts and the overall improvement of quality of life (Hendriarianti et al., 2024).

On the other hand, inequities in access to sanitation can also have social and economic consequences. Inadequate sanitation can increase medical costs, reduce labor productivity, and lower the quality of life for communities. This burden is generally felt more acutely by low-income households, potentially reinforcing the cycle of poverty and inequality in well-being. Repeated exposure to disease from an early age can also affect cognitive development and educational attainment, which ultimately impacts an individual's future productivity and income (Jaika et al., 2025; Okesanya et al., 2024). Therefore, efforts to improve access to sanitation must not only focus on expanding service coverage but also address equity across regions and social groups. An approach that combines the construction of sanitation facilities, health education, community empowerment, and the reduction of economic barriers is considered more effective in improving access to sanitation in a sustainable manner. This strategy aligns with the "leave no one behind" principle in the Sustainable Development Goals (SDGs), which emphasizes the importance of equitable access to sanitation for all members of society without exception (Abdulhadi et al., 2024; Chirgwin et al., 2021).

#### **4. CONCLUSION**

Access to adequate sanitation is a key indicator of public health development and reflects the level of equitable development across regions. Research findings indicate that disparities in access to adequate sanitation still exist in Indonesia in 2024. The provinces of Bali, the Special Region of Yogyakarta, and Jakarta have the highest rates of access to adequate sanitation, while Mountainous Papua, Central Papua, and South Papua have the lowest rates. The gap between the provinces with the highest and lowest rates of access to adequate sanitation reached 84.22

percentage points. Additionally, access to adequate sanitation in urban areas remains higher than in rural areas, although the difference is relatively small.

Equitable access to sanitation remains a challenge in health development in Indonesia. Differences in socioeconomic conditions, regional development levels, availability of basic infrastructure, and geographical characteristics are believed to contribute to disparities in sanitation access across regions. Therefore, more targeted efforts are needed through improvements in sanitation infrastructure, strengthening of health education, and the development of sanitation programs tailored to the characteristics and needs of each region. These efforts are expected to improve equitable access to adequate sanitation, reduce disparities between regions, and support the achievement of health development and sustainable development targets in Indonesia.

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