

Descriptive Statistical Analysis of Trends and Disparities in School Enrollment Rates for Students Aged 16–18 by Province in Indonesia, 2014–2023

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ABSTRACT

Expanding access to secondary education is essential for human capital development, yet national improvements in participation may coexist with persistent regional disparities. This study examines trends and interprovincial disparities in the School Participation Rate (SPR) among individuals aged 16–18 years across Indonesian provinces during 2014–2023. Using secondary data from Statistics Indonesia (Badan Pusat Statistik/BPS), the study applies descriptive statistical analysis to provincial year-level observations. The analysis includes the mean, median, minimum, maximum, standard deviation, coefficient of variation, inter-period changes, and provincial comparisons. The findings show that the average SPR increased from 72.74% in 2014 to 75.50% in 2023. However, substantial regional disparities remained. In 2023, SPR ranged from 64.15% in Papua to 91.17% in the Special Region of Yogyakarta, representing a gap of 27.02 percentage points. The coefficient of variation declined modestly from 8.48% to 8.05%, indicating only a limited reduction in relative dispersion. These findings demonstrate that increased educational participation has not fully eliminated interprovincial disparities. Policy efforts should therefore combine national expansion strategies with geographically targeted interventions addressing educational accessibility, infrastructure, financial barriers, and regional socioeconomic conditions.

INTRODUCTION

Education is a fundamental investment in human capital, contributing to individual productivity, economic mobility, and socioeconomic development. Human Capital Theory emphasizes that education develops knowledge, skills, and capabilities that generate long-term economic and social returns (Becker, 1993; Leoni, 2023; Rothomi & Rafid, 2023). However, national expansion in educational access does not necessarily ensure equal opportunities across regions, as socioeconomic, geographical, infrastructural, and institutional differences may create disparities in educational participation.

Educational equity is also central to Sustainable Development Goal 4 (SDG 4), which promotes inclusive and equitable quality education for all (United Nations, 2015; UNESCO, 2024). Achieving this goal requires not only improving national participation but also ensuring that progress is distributed across regions. In developing countries, economic disadvantage, geographical barriers, limited infrastructure, and unequal educational provision may constrain participation. Therefore, regional analysis is essential to assess whether improvements in educational access are accompanied by greater educational equity (OECD, 2024; UNESCO, 2024; World Bank, 2023).

In Indonesia, educational access has expanded through programs such as Indonesia Pintar Program (PIP), School Operational Assistance (BOS), infrastructure development, and improvements in teacher distribution (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2024; BPS, 2024). However, Indonesia's archipelagic geography and regional differences in economic development, infrastructure, and educational services may create substantial disparities in educational opportunities across provinces (Liyana, 2023).

The School Participation Rate (SPR), or Angka Partisipasi Sekolah (APS), measures the proportion of individuals in a specific age group participating in formal or non-formal education (BPS, 2024). The 16–18 age group is particularly important because it corresponds to upper secondary education, a stage where students may face economic, social, geographical, and accessibility barriers that increase the risk of leaving education (OECD, 2024; UNESCO, 2024).

Although national educational participation has improved, national averages may conceal substantial provincial disparities. Previous Indonesian studies have mainly examined the determinants of participation or classified regions using clustering and spatial approaches (Windarto & Herawan, 2021; Nisa & Anisa, 2025; Sari et al., 2025; Misbahuddin & Basir, 2026). However, longitudinal evidence examining the development and distribution of SPR among individuals aged 16–18 across Indonesian provinces remains limited. This study addresses this gap by assessing changes in school participation and interprovincial disparities over time.

This study addresses this gap by examining the development and regional distribution of the School Participation Rate among individuals aged 16–18 years across Indonesian provinces during the 2014–2023 period. Rather than focusing on causal determinants, the study provides a systematic longitudinal descriptive assessment of the extent and direction of changes in educational participation

across provinces. The analysis considers national and provincial trends, measures of central tendency and dispersion, interprovincial differences, changes in provincial performance between 2014 and 2023, and the distribution of provinces according to their participation levels. This approach makes it possible to distinguish between overall national progress and the extent to which such progress has been accompanied by changes in regional inequality.

The study contributes to the literature in three ways. First, it provides a decade-long provincial-level mapping of school participation among individuals aged 16–18 years, thereby offering a more specific assessment of upper-secondary educational access than analyses based on aggregate national indicators. Second, it shifts attention from national improvement alone toward the distribution and persistence of regional differences, highlighting the importance of evaluating educational progress in terms of both expansion and equity. Third, the findings provide an empirical basis for geographically differentiated education policies by identifying provinces with relatively high, moderate, and low participation levels as well as differences in the pace of improvement over time. In this way, the study contributes to the broader discussion of equitable human capital development by demonstrating that improvements in aggregate educational participation should be interpreted alongside their regional distribution.

Accordingly, this study addresses four research questions:

1. How has the School Participation Rate among individuals aged 16–18 years evolved across Indonesian provinces during the 2014–2023 period?
2. How large are the interprovincial differences in the School Participation Rate, and how have these differences changed over the study period?
3. Which provinces recorded the highest and lowest School Participation Rates, and which provinces experienced the largest and smallest changes between 2014 and 2023?
4. To what extent does the development of provincial School Participation Rates indicate persistent regional inequality in access to secondary education?

By addressing these questions, the study seeks to provide a clearer empirical understanding of the relationship between the expansion of educational participation and regional equity in Indonesia. The findings are expected to support evidence-based policy formulation aimed not only at increasing overall participation but also at reducing persistent disparities in access to secondary education across provinces.

LITERATURE REVIEW

Human Capital Theory and School Participation

Human Capital Theory views education as an investment that develops knowledge, skills, and productivity, generating long-term economic and social benefits (Schultz, 1961; Becker, 1993). Continued participation in education, particularly at the secondary level, supports human capital accumulation and future socioeconomic opportunities (Hanushek & Woessmann, 2021; OECD, 2024). Therefore, differences in school participation across provinces may

indicate unequal opportunities for continued human capital development. In this study, Human Capital Theory provides a conceptual basis for understanding the importance of educational participation rather than explaining its causal determinants.

The School Participation Rate (SPR), or Angka Partisipasi Sekolah (APS), measures the proportion of individuals within a specific age group participating in formal or non-formal education (BPS, 2024). Unlike the Net Enrollment Rate, SPR provides a broader measure of continued educational participation (Windarto & Herawan, 2021).

Regional Educational Disparities

Educational participation may vary across regions because of differences in economic conditions, geographical accessibility, infrastructure, and institutional capacity (Todaro & Smith, 2020). Consequently, improvements in national participation do not necessarily indicate greater educational equity. Examining SPR across provinces is therefore necessary to assess its distribution and regional disparities.

Analytical Dimensions of the Study

This study examines SPR among individuals aged 16–18 through three descriptive dimensions: (1) temporal development, examining changes in participation during 2014–2023; (2) provincial distribution, assessing differences across provinces using measures of central tendency and dispersion; and (3) interprovincial change, comparing provincial SPR between 2014 and 2023.

Together, these dimensions distinguish overall changes in educational participation from changes in its regional distribution. The framework is descriptive rather than causal and focuses on documenting patterns and disparities without estimating their determinants.

Previous Studies

Previous research highlights education as a key driver of human capital development and economic growth (Hanushek & Woessmann, 2021). However, access to secondary education remains constrained by economic, geographical, and social barriers, particularly in developing countries (UNESCO, 2024). School participation is also influenced by household conditions, socioeconomic factors, and geographical accessibility (Mnyawami et al., 2022; Ebabu et al., 2024).

Recent studies emphasize the territorial dimension of educational inequality, showing that national progress may coexist with substantial disparities across regions (Nikolai et al., 2022; Schnabel, 2025). Therefore, a longitudinal regional perspective is important for distinguishing overall improvements in school participation from changes in regional disparities.

In Indonesia, previous studies have applied clustering and spatial approaches to identify patterns of educational participation across provinces (Windarto & Herawan, 2021; Nisa & Anisa, 2025; Sari et al., 2025; Misbahuddin & Basir, 2026). However, a longitudinal descriptive assessment of the School Participation Rate (SPR) among individuals aged 16–18 across Indonesian

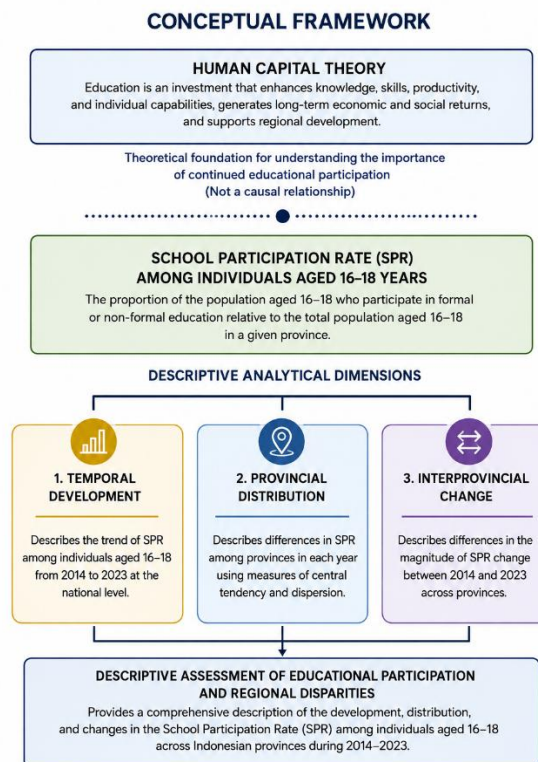
provinces remains limited. This study addresses this gap by examining changes in SPR and its distribution across provinces over a decade.

Conceptual Framework

The conceptual framework of this study is designed to reflect its descriptive, non-causal research design. Human Capital Theory provides the theoretical basis for understanding the importance of continued educational participation as part of human capital formation. The School Participation Rate among individuals aged 16–18 years is then examined descriptively through three analytical dimensions: temporal development, provincial distribution, and interprovincial change.

The temporal development dimension examines changes in SPR during 2014–2023. The provincial distribution dimension examines differences in SPR across provinces using descriptive measures of central tendency and dispersion. The interprovincial change dimension compares SPR values between 2014 and 2023 to identify differences in the magnitude of change among provinces.

These dimensions are presented as complementary descriptive perspectives, rather than as causal pathways. Accordingly, the framework does not propose that Human Capital Theory, socioeconomic conditions, or any other factor causes differences in SPR. Instead, it provides an analytical structure for describing patterns of educational participation and regional disparities. The conceptual relationship underlying the study can therefore be summarized as follows:



This framework does not assume a causal relationship between specific socioeconomic factors and SPR because such determinants are not directly

estimated in the present study. Instead, it provides a theoretical basis for interpreting observed differences and changes in provincial school participation.

Research Gap and Research Contribution

Existing studies highlight the importance of education for human capital development and examine socioeconomic factors, clustering, and spatial patterns of school participation. However, longitudinal evidence focusing specifically on individuals aged 16–18 and regional disparities across Indonesian provinces remains limited.

This study addresses this empirical and descriptive gap through a decade-long provincial analysis of School Participation Rate (SPR). It examines national trends, provincial distribution, dispersion, and changes between 2014 and 2023 without estimating causal determinants. The study contributes to the discussion of educational equity by assessing whether improvements in school participation have occurred broadly across provinces or whether substantial regional disparities persist.

METHODOLOGY

Research Design

This study employed a quantitative descriptive research design to examine the development and interprovincial disparities in the School Participation Rate (SPR) among individuals aged 16–18 years in Indonesia during the 2014–2023 period. A descriptive approach was selected because the primary purpose of the study is to identify and describe patterns, distributions, differences, and changes in SPR across provinces rather than to estimate causal relationships between educational participation and its potential determinants. The quantitative approach enables the systematic analysis of numerical observations and facilitates comparisons across provinces and years (Creswell & Creswell, 2023; Neuman, 2020).

The study adopts a longitudinal provincial perspective by examining annual SPR observations across Indonesian provinces over a ten-year period. This design makes it possible to distinguish between changes in the overall level of educational participation and differences in provincial performance over time. Accordingly, the analysis focuses on three related dimensions: temporal development, interprovincial distribution, and changes in provincial SPR between the beginning and end of the observation period.

Data Source and Data Coverage

The study used secondary data on the School Participation Rate (SPR) among individuals aged 16–18 years obtained from Statistics Indonesia (Badan Pusat Statistik/BPS). The data originate from the National Socioeconomic Survey (Survei Sosial Ekonomi Nasional—Susenas) and are reported at the provincial level (BPS, 2024).

The observation period covers 2014–2023, representing ten annual periods. The dataset includes 38 Indonesian provinces, resulting in 380 potential province-year observations (38 provinces $\times$ 10 years). However, the 2014 SPR observation for North Kalimantan is unavailable because the province had only

recently been established. Consequently, the final analytical dataset contains 379 province-year observations, consisting of 37 provinces with ten annual observations each and North Kalimantan with nine observations.

The missing 2014 observation for North Kalimantan was retained as missing rather than treated as a zero value or estimated from other observations. This approach preserves the integrity of the official BPS data and avoids introducing an artificially constructed observation into the analysis.

Unit of Analysis

The unit of analysis is the province-year observation of the School Participation Rate (SPR) among individuals aged 16–18 years. The provincial level was selected to examine interprovincial differences and changes over time. The dataset covers 38 Indonesian provinces from 2014–2023. A balanced dataset would contain 380 observations; however, the 2014 SPR data for North Kalimantan are unavailable. Therefore, the final dataset contains 379 province-year observations, with 37 provinces having ten observations and North Kalimantan having nine. The missing observation was retained as missing and was neither treated as zero nor imputed, ensuring that the analysis relies exclusively on available official BPS data.

Research Variable

The study uses one principal research variable, namely the School Participation Rate (SPR) among individuals aged 16–18 years. According to Statistics Indonesia (2024), SPR is the percentage of individuals within a specified age group who are participating in formal or non-formal education relative to the total population of the same age group.

SPR is expressed as a percentage (%). A higher value indicates that a greater proportion of individuals aged 16–18 years are participating in education, whereas a lower value indicates a smaller proportion of the relevant population participating in education.

Because the study is descriptive, SPR is not modeled as a dependent variable explained by other independent variables. Instead, it is examined directly across provinces and years to identify patterns of educational participation and regional differences.

Data Analysis

The data were analyzed using descriptive statistical techniques to examine the level, distribution, variability, and changes in School Participation Rate (SPR) across Indonesian provinces during 2014–2023 (Triola, 2022). Data processing was conducted using spreadsheet and statistical software.

The analysis consisted of five stages: (1) national trend analysis to examine changes in the annual mean SPR; (2) distribution analysis using the mean, median, minimum, maximum, standard deviation, and coefficient of variation; (3) inter-period analysis comparing provincial SPR in 2014 and 2023 to identify absolute changes; (4) interprovincial disparity analysis based on the range, standard deviation, and coefficient of variation; and (5) provincial classification

and comparative presentation to identify differences in SPR levels across provinces in 2023.

The coefficient of variation, expressed as a percentage of the standard deviation relative to the mean, was used to assess relative dispersion, with lower values indicating smaller disparities among provinces.

Measurement of Provincial Change

To assess the development of educational participation at the provincial level, the study compares SPR values at the beginning and end of the observation period. The absolute change is defined as:

$$\text{Absolute Change} = \text{SPR}_{(2023)} - \text{SPR}_{(2014)}$$

A positive value indicates an increase in SPR between 2014 and 2023, whereas a negative value would indicate a decline. The analysis uses this measure to identify differences in the magnitude of provincial improvement over the study period. The percentage change may also be used to provide a relative interpretation of provincial improvement where appropriate. However, because SPR is itself expressed as a percentage, the primary interpretation of changes in this study emphasizes percentage-point differences rather than treating the change as a conventional growth rate.

Interpretation of Regional Disparities

Regional disparities are interpreted from the perspective of differences in the distribution of SPR across provinces rather than as evidence of causal relationships. A large difference between the highest and lowest provincial SPR indicates substantial variation in educational participation at a particular point in time. Changes in the coefficient of variation over time provide an additional indication of whether the relative dispersion of provincial participation rates has increased or decreased.

The interpretation therefore distinguishes between national improvement and regional equity. An increase in the average SPR indicates an expansion of educational participation, whereas a persistent or only modestly declining dispersion indicates that improvements may not have eliminated differences between provinces. This distinction is central to assessing whether educational development has occurred uniformly across regions.

Research Procedure

The research procedure consisted of seven sequential stages. First, the research problem and focus on regional differences in school participation were identified. Second, official SPR data were collected from Statistics Indonesia. Third, the data were verified, organized, and tabulated according to province and year. Fourth, descriptive statistical measures were calculated to summarize the distribution of SPR. Fifth, national trends, provincial differences, inter-period changes, and regional disparities were examined. Sixth, the findings were interpreted in relation to Human Capital Theory and relevant previous studies.

Finally, conclusions and policy implications were formulated based on the empirical findings.

The analytical procedure was designed to maintain consistency between the research objectives and the statistical methods employed. Because the study uses a descriptive design and a single principal indicator, the findings are interpreted as evidence of patterns and differences in educational participation rather than as evidence of causal effects.

RESEARCH RESULT

Development of the School Participation Rate Among Individuals Aged 16–18 Years in Indonesia

The development of the School Participation Rate (SPR) among individuals aged 16–18 years is examined to identify changes in the overall level of educational participation and the distribution of provincial SPR during the 2014–2023 period. The descriptive statistics presented in Table 4.1 provide information on the mean, median, minimum, maximum, and standard deviation of provincial SPR values for each year.

Table 4.1. Descriptive Statistics of the School Participation Rate (SPR) among Individuals Aged 16–18 Years by Province, 2014–2023

Year	Mean (%)	Median (%)	Minimum (%)	Maximum (%)	Standard Deviation
2014	72.74	71.98	61.63	86.44	6.17
2015	73.08	72.32	61.96	86.78	6.08
2016	73.33	72.62	62.07	87.20	6.10
2017	73.88	72.99	63.35	87.61	6.01
2018	74.34	73.57	63.48	88.39	6.01
2019	74.71	74.04	63.50	88.97	6.05
2020	74.97	74.31	64.83	88.95	5.95
2021	75.22	74.58	63.98	89.63	6.00
2022	75.14	74.43	65.93	89.95	5.85
2023	75.50	74.57	64.15	91.17	6.08

Source: Statistics Indonesia (BPS), processed by the authors.

Table 4.1 shows an overall upward movement in the average SPR among Indonesian provinces during the observation period. The mean increased from 72.74% in 2014 to 75.50% in 2023, representing an increase of 2.76 percentage points. The increase indicates that, on average, a larger proportion of individuals aged 16–18 years participated in education in 2023 than in 2014.

The median SPR also increased from 71.98% in 2014 to 74.57% in 2023. The simultaneous increase in the mean and median indicates that the general distribution of provincial SPR shifted upward over the observation period. The increase in the median is particularly relevant because it indicates that the observed improvement was not confined exclusively to provinces at the upper end of the distribution.

The minimum SPR increased from 61.63% in 2014 to 64.15% in 2023, although the annual values were not strictly increasing. The maximum SPR also increased from 86.44% in 2014 to 91.17% in 2023. Thus, both ends of the provincial distribution recorded higher participation levels at the end of the observation period than at the beginning.

The standard deviation remained relatively stable throughout the period, ranging from 5.85 to 6.17 percentage points. The lowest standard deviation was recorded in 2022 at 5.85, whereas the highest was recorded in 2014 at 6.17. The relatively stable standard deviation suggests that the dispersion of provincial SPR values did not change dramatically during the study period.

The pattern in Table 4.1 therefore indicates two simultaneous developments. First, the overall level of school participation increased during 2014–2023. Second, the relatively stable standard deviation indicates that the increase in the average SPR was not accompanied by a dramatic change in the absolute dispersion of provincial participation rates. Consequently, national improvement in SPR should not be interpreted automatically as evidence that regional disparities have been eliminated.

The annual pattern also shows that the mean SPR increased continuously from 2014 through 2021, followed by a small decline in 2022 before increasing again in 2023. The mean increased from 74.97% in 2020 to 75.22% in 2021, declined slightly to 75.14% in 2022, and subsequently reached 75.50% in 2023. This variation suggests that improvements in educational participation were not perfectly linear over the entire observation period.

Overall, the descriptive evidence demonstrates an improvement in provincial school participation among individuals aged 16–18 years over the 2014–2023 period. However, the persistence of variation between provinces indicates that the expansion of participation at the aggregate level has occurred alongside continuing differences in educational participation across regions.

Provincial Ranking of the School Participation Rate in 2023

Examining provincial rankings in 2023 provides a cross-sectional overview of the distribution of school participation among individuals aged 16–18 years at the end of the observation period. The ranking identifies provinces with relatively high and low participation levels and provides an initial indication of the extent of interprovincial variation.

Table 4.2. Top Five Provinces by School Participation Rate, 2023

Rank	Province	SPR (%)
1	Special Region of Yogyakarta	91.17
2	Riau Islands	84.97
3	Bali	84.73
4	West Sumatra	84.33
5	Aceh	83.41

Source: Statistics Indonesia (BPS), processed by the authors.

The Special Region of Yogyakarta recorded the highest SPR in 2023 at 91.17%, meaning that more than nine out of ten individuals in the 16–18 age group were participating in education. The Riau Islands, Bali, West Sumatra, and Aceh followed with SPR values of 84.97%, 84.73%, 84.33%, and 83.41%, respectively.

The concentration of relatively high SPR values among these provinces indicates substantial variation in educational participation across Indonesia. However, the descriptive ranking alone does not establish why these provinces achieved higher participation rates. Differences may be associated with regional socioeconomic, geographical, institutional, and educational conditions, but these factors are not directly estimated in the present study.

Table 4.3. Bottom Five Provinces by School Participation Rate, 2023

Rank	Province	SPR (%)
34	Bangka Belitung Islands	69.53
35	West Kalimantan	69.25
36	West Java	68.58
37	Central Kalimantan	66.32
38	Papua	64.15

Source: Statistics Indonesia (BPS), processed by the authors.

Papua recorded the lowest SPR in 2023 at 64.15%, followed by Central Kalimantan at 66.32%, West Java at 68.58%, West Kalimantan at 69.25%, and the Bangka Belitung Islands at 69.53%. These figures indicate that substantial differences remained between provinces at the end of the study period.

The difference between the highest and lowest provincial SPR was 27.02 percentage points in 2023, calculated as the difference between the SPR of the Special Region of Yogyakarta (91.17%) and Papua (64.15%). This gap indicates substantial variation in school participation across provinces despite the overall increase in the national provincial mean.

The provincial ranking should therefore be interpreted as evidence of the unequal distribution of educational participation rather than as evidence of the causes of such inequality. The findings identify provinces that warrant closer examination and provide a basis for subsequent analyses of the socioeconomic, geographical, and institutional factors that may explain these differences.

Changes in the School Participation Rate by Province, 2014–2023

The comparison of provincial School Participation Rates (SPR) between 2014 and 2023 provides an additional perspective on the development of educational participation. While the previous analysis describes the distribution of SPR in individual years, the analysis of inter-period change identifies differences in the magnitude of improvement across provinces. The change is measured as the difference between the SPR recorded in 2023 and the corresponding value in 2014.

Overall, the available provincial data indicate an increase in SPR between the beginning and the end of the observation period, although the magnitude of change varies considerably across provinces. This variation indicates that provinces did not experience identical rates of improvement in educational participation during the decade.

Table 4.4. Top Five Provinces with the Largest Increase in SPR, 2014–2023

Rank	Province	Change (Percentage Points)
1	Special Region of Yogyakarta	4.73
2	West Sulawesi	4.60
3	South Sumatra	3.87
4	East Java	3.82
5	Bangka Belitung Islands	3.75

Source: Statistics Indonesia (BPS), processed by the authors.

The Special Region of Yogyakarta recorded the largest increase in SPR during the observation period, with an improvement of 4.73 percentage points. West Sulawesi recorded the second-largest increase at 4.60 percentage points, followed by South Sumatra, East Java, and the Bangka Belitung Islands, with increases of 3.87, 3.82, and 3.75 percentage points, respectively.

The magnitude of these changes indicates that the provinces with the largest improvements were not necessarily identical to the provinces with the highest SPR in 2023. This distinction is important because the level of participation at a particular point in time and the pace of improvement over time represent different dimensions of educational development. A province may have a relatively high participation rate while experiencing only modest subsequent improvement, whereas another province may record a larger increase from a lower initial level.

West Sulawesi provides an important example of this distinction. Its SPR increased by 4.60 percentage points between 2014 and 2023, placing it second among the provinces with the largest observed increases. This result indicates substantial improvement in participation over the study period. However, the increase alone should not be interpreted as evidence of convergence because convergence requires an assessment of whether initially lower-performing provinces systematically narrowed their participation gap relative to higher-performing provinces.

Table 4.5. Top Five Provinces with the Smallest Increase in SPR, 2014–2023

Rank	Province	Change (Percentage Points)
1	Central Kalimantan	0.48
2	West Papua	0.71
3	East Kalimantan	1.00

Rank	Province	Change (Percentage Points)
4	South Sulawesi	1.62
5	Bengkulu	1.65

Source: Statistics Indonesia (BPS), processed by the authors.

In contrast, Central Kalimantan recorded the smallest increase in SPR, with an improvement of only 0.48 percentage points between 2014 and 2023. West Papua and East Kalimantan followed with increases of 0.71 and 1.00 percentage points, respectively, while South Sulawesi and Bengkulu recorded increases of 1.62 and 1.65 percentage points. The differences between the largest and smallest provincial changes demonstrate that improvements in school participation were uneven in magnitude. While some provinces experienced relatively substantial increases, others recorded only limited changes over the same period. These differences indicate that national improvement in educational participation was accompanied by heterogeneous provincial trajectories.

The variation in provincial changes may reflect differences in regional contexts, including geographical conditions, population distribution, educational service availability, and socioeconomic characteristics. However, because these factors are not directly measured in the present study, the observed provincial differences should be interpreted as descriptive patterns rather than evidence of causal effects (UNESCO, 2024). Taken together, the results demonstrate that examining only the national or cross-sectional level of SPR can obscure important differences in provincial trajectories. The comparison between 2014 and 2023 shows that provinces differed substantially in the magnitude of their improvement. Therefore, the assessment of educational development should consider both the level of participation and the direction and magnitude of change over time.

Regional Disparities in the School Participation Rate

The regional distribution of the School Participation Rate (SPR) was further examined using the coefficient of variation (CV) to assess relative dispersion among provincial participation rates. The CV complements the standard deviation reported in the previous analysis because it expresses dispersion relative to the mean level of SPR. A lower CV indicates lower relative dispersion among provinces, whereas a higher CV indicates greater relative dispersion.

Table 4.6. Coefficient of Variation of the School Participation Rate among Individuals Aged 16-18 Years

Year	Coefficient of Variation (%)
2014	8.48
2015	8.32
2016	8.32
2017	8.13

Year	Coefficient of Variation (%)
2018	8.08
2019	8.10
2020	7.94
2021	7.98
2022	7.78
2023	8.05

Source: Statistics Indonesia (BPS), processed by the authors.

Table 4.6 shows that the coefficient of variation declined from 8.48% in 2014 to 8.05% in 2023. The overall decline of 0.43 percentage points indicates a modest reduction in the relative dispersion of provincial SPR over the study period. However, the decline was not linear. The CV decreased from 2014 through 2018, increased slightly in 2019, declined again until reaching its lowest value of 7.78% in 2022, and then increased to 8.05% in 2023.

The pattern suggests that relative interprovincial dispersion was somewhat lower at the end of the study period than at the beginning, but the change was limited. The increase in the CV between 2022 and 2023 is particularly relevant because it indicates that the reduction in relative dispersion observed in previous years was not sustained continuously.

The CV should therefore be interpreted together with the other measures of dispersion. The standard deviation remained relatively stable during the study period, while the CV declined only modestly. Taken together, these indicators suggest that the overall increase in SPR was accompanied by a relatively stable distribution of provincial participation rates rather than a substantial elimination of regional differences.

The persistence of regional variation is also evident from the 2023 gap between the highest and lowest provincial SPR. The Special Region of Yogyakarta recorded an SPR of 91.17%, whereas Papua recorded 64.15%, resulting in a difference of 27.02 percentage points. Thus, although the relative dispersion measured by the CV was slightly lower in 2023 than in 2014, substantial differences in educational participation remained across provinces.

These findings indicate that improvements in aggregate school participation should be distinguished from improvements in regional equity. The increase in the mean SPR demonstrates progress in overall participation, whereas the relatively modest decline in the CV and the substantial maximum–minimum gap indicate that regional differences remain an important feature of the Indonesian educational landscape.

Provincial Classification Based on the School Participation Rate

To provide an additional descriptive interpretation of the provincial distribution, the 2023 SPR values were grouped into four categories: Very High ($\geq 85\%$), High (80.00–84.99%), Moderate (70.00–79.99%), and Low ($< 70\%$). These categories are used as descriptive classifications to facilitate comparison among

provinces rather than as an externally established national or international standard.

The Special Region of Yogyakarta was the only province classified as Very High, with an SPR of 91.17%. The High category included the Riau Islands, Bali, West Sumatra, and Aceh, whose SPR values ranged from 83.41% to 84.97%. These provinces therefore recorded relatively high levels of educational participation among individuals aged 16–18 years in 2023.

Most provinces were classified in the Moderate category, indicating that their SPR values were between 70.00% and 79.99%. The concentration of provinces within this category suggests that the national provincial distribution was characterized primarily by intermediate levels of participation rather than by uniformly high participation.

The Low category consisted of Papua, Central Kalimantan, West Java, West Kalimantan, and the Bangka Belitung Islands. Their SPR values were below 70%, with Papua recording the lowest value at 64.15%. The presence of several provinces below the 70% threshold demonstrates that a considerable difference remained between the highest-performing provinces and regions with substantially lower participation levels.

The classification provides a useful descriptive overview of the geographical distribution of SPR in 2023. However, the categories should not be interpreted as evidence of differences in the causes or quality of provincial education systems. Rather, they identify the relative position of provinces in terms of observed school participation and can serve as a basis for more detailed socioeconomic or spatial analyses in future research.

Overall, the classification reinforces the central finding of the study: although school participation among individuals aged 16–18 years has improved over time, the distribution of participation across Indonesian provinces remains heterogeneous.

DISCUSSION

This study does not formulate or test statistical hypotheses because it employs a descriptive quantitative longitudinal design. Instead, the findings are organized and interpreted in relation to the four research questions concerning the development, distribution, interprovincial differences, and changes in the School Participation Rate (SPR) among individuals aged 16–18 years during 2014–2023. Human Capital Theory and relevant previous studies are used to provide theoretical and empirical context for interpreting the observed patterns. They are not used to establish causal relationships or statistical effects.

The findings indicate that school participation among individuals aged 16–18 years improved during the 2014–2023 period. The provincial mean SPR increased from 72.74% in 2014 to 75.50% in 2023, while the median increased from 71.98% to 74.57%. This upward trend is consistent with Human Capital Theory, which views education as an investment that enhances knowledge, skills, productivity, and long-term socioeconomic opportunities (Becker, 1993; Hanushek & Woessmann, 2021). Increased participation therefore represents

progress in the opportunity for continued human capital formation among young people.

However, the improvement in participation was not accompanied by the elimination of regional inequality. In 2023, the SPR ranged from 64.15% in Papua to 91.17% in the Special Region of Yogyakarta, producing a gap of 27.02 percentage points. The coefficient of variation declined only modestly, from 8.48% in 2014 to 8.05% in 2023. These findings suggest that national progress in educational participation has coexisted with persistent differences among provinces. This pattern is consistent with the broader literature emphasizing the role of geographical, socioeconomic, infrastructural, and institutional differences in shaping educational opportunities (Todaro & Smith, 2021; UNESCO, 2024).

Differences in provincial trajectories indicate that educational progress has not occurred uniformly. The Special Region of Yogyakarta recorded the largest increase in SPR, followed by West Sulawesi, while Central Kalimantan showed the smallest increase. However, differences in improvement cannot be interpreted as evidence of convergence because such conclusions require specific analytical testing beyond this study's descriptive design.

The persistence of interprovincial differences is consistent with international evidence that educational inequality has a territorial dimension (Nikolai et al., 2022; Schnabel, 2025). This study extends this perspective by documenting provincial differences in school participation among individuals aged 16–18 in Indonesia over a ten-year period.

The findings highlight that human capital development depends not only on increasing educational participation but also on ensuring equitable access across regions. Therefore, national efforts to expand secondary education should be complemented by geographically targeted interventions addressing barriers related to accessibility, economic conditions, infrastructure, and educational service availability (Mnyawami et al., 2022; Ebabu et al., 2024; UNESCO, 2024; World Bank, 2023).

Overall, Indonesia experienced increased school participation during 2014–2023, but substantial interprovincial differences remained. This distinction between educational expansion and educational equity underscores the importance of assessing both national progress and its regional distribution.

CONCLUSIONS AND RECOMMENDATIONS

This study examined the development and interprovincial distribution of the School Participation Rate (SPR) among individuals aged 16–18 years in Indonesia during the 2014–2023 period. Using a descriptive longitudinal analysis of provincial SPR data, the study focused on changes in the overall level of participation, differences among provinces, and changes in provincial participation over time.

The findings provide three main conclusions. First, school participation among individuals aged 16–18 years increased during the study period. The provincial mean SPR increased from 72.74% in 2014 to 75.50% in 2023, representing an increase of 2.76 percentage points. The median also increased from 71.98% to 74.57%, indicating an overall upward shift in the distribution of

provincial participation. This finding demonstrates progress in the expansion of educational participation at the upper-secondary age level.

Second, the increase in participation was accompanied by persistent interprovincial differences. In 2023, the Special Region of Yogyakarta recorded the highest SPR at 91.17%, whereas Papua recorded the lowest at 64.15%, resulting in a difference of 27.02 percentage points. The coefficient of variation declined modestly from 8.48% in 2014 to 8.05% in 2023. This indicates that relative dispersion was slightly lower at the end of the observation period, but the reduction was limited and substantial differences among provinces remained.

Third, provincial trajectories differed considerably during the study period. The Special Region of Yogyakarta recorded the largest increase in SPR at 4.73 percentage points, followed by West Sulawesi at 4.60 percentage points. In contrast, Central Kalimantan recorded the smallest increase at 0.48 percentage points. These differences demonstrate that provinces did not experience identical levels of improvement in educational participation. Importantly, differences in the magnitude of provincial change should not automatically be interpreted as evidence of convergence because convergence requires a specific analytical test that is beyond the descriptive design of this study.

Overall, the findings indicate that the expansion of school participation and the achievement of educational equity are related but distinct dimensions of educational development. Indonesia has experienced an increase in participation among individuals aged 16–18 years, but this progress has not eliminated substantial differences among provinces. From a Human Capital Theory perspective, this finding suggests that expanding participation provides an important foundation for human capital formation, while unequal participation may indicate that opportunities for human capital accumulation remain unevenly distributed across regions.

RECOMMENDATIONS

Several policy recommendations can be derived from these findings. First, national efforts to expand secondary education participation should be maintained and strengthened, particularly in provinces with relatively low SPR. Educational assistance, infrastructure development, teacher support, and improvements in educational services remain relevant policy instruments for expanding participation (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2024).

Second, educational policy should incorporate a stronger regional dimension. The substantial differences between provinces indicate that a uniform policy approach may not adequately address differences in local educational conditions. Provincial SPR should therefore be used as one of the indicators for identifying areas requiring greater policy attention and for supporting geographically differentiated interventions.

Third, policy evaluation should consider both changes in the national average and the distribution of participation across provinces. An increase in the national or provincial average should not be considered sufficient evidence of

educational equity. Monitoring the maximum–minimum gap, coefficient of variation, and provincial trajectories can provide additional information about whether improvements are being distributed broadly across regions.

Fourth, provinces that demonstrate relatively substantial improvements in SPR may provide useful cases for further investigation. Comparative studies of provinces with different trajectories could identify institutional, socioeconomic, and geographical conditions associated with faster or slower improvements in educational participation. Such investigations would complement the descriptive evidence provided by the present study.

Finally, efforts to improve educational participation should be integrated with broader strategies for reducing socioeconomic and geographical barriers to education. Greater coordination among central governments, local governments, schools, communities, and relevant stakeholders is necessary to ensure that improvements in educational participation translate into more equitable opportunities for young people across Indonesia.

LIMITATIONS AND FUTURE RESEARCH

This study has several limitations. First, its descriptive design identifies patterns and changes in school participation but does not examine causal relationships. Therefore, the effects of socioeconomic, institutional, and regional factors on SPR cannot be determined.

Second, the analysis focuses exclusively on SPR among individuals aged 16–18 years and does not capture other dimensions of educational development, such as enrollment, dropout, educational attainment, and learning outcomes. Third, the use of aggregated provincial data may conceal variations within provinces, including differences across districts, urban and rural areas, and household groups. The study also depends on the availability and consistency of official data, including the absence of North Kalimantan data in 2014.

Future research could apply panel-data and spatial approaches to examine the determinants and geographical patterns of school participation. Studies may also investigate whether provinces with lower initial participation experience faster improvement, indicating convergence in educational participation. Finally, district- and household-level analyses could provide a deeper understanding of how socioeconomic conditions, geographical accessibility, and educational infrastructure influence school participation among individuals aged 16–18 years.

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