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# Educational Infrastructure and Learning Equity in Indonesia: Insights from National Statistics

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**Abstract:** Educational infrastructure is a foundational determinant of equitable access to quality learning opportunities. This study examines the multidimensional condition of educational infrastructure and its implications for learning equity across Indonesia's formal schooling system using data from Education Statistics 2025 published by Statistics Indonesia (BPS) for the 2024/2025 academic year. Employing a descriptive comparative quantitative design, the analysis evaluates five core dimensions institutional availability, classroom physical quality, classroom capacity adequacy, basic sanitation facilities, and teacher workforce indicators across primary (SD), junior secondary (SMP), senior secondary (SMA), and vocational secondary (SMK) levels. The results show broad institutional coverage comprising 221,132 schools nationwide and adequate classroom quantity, with study-group-to-classroom ratios remaining below 1.00 across all tiers (0.85–0.98). However, severe qualitative deficits persist at the primary level, where only 39.68% of classrooms are in good condition, 10.81% are severely damaged, and 18.76% of schools lack student toilets. The study concludes that advancing learning equity requires shifting policy priorities from physical expansion toward targeted facility rehabilitation, basic sanitation provision, and level-specific resource allocation.

**Keywords:** Educational Infrastructure; Learning Equity; Classroom Quality; School Sanitation; Indonesia

## 1. Introduction

Educational infrastructure constitutes a foundational pillar of educational quality, instructional effectiveness, and inclusive learning equity [1], [2]. School buildings, safe classrooms, clean water, sanitation facilities, and qualified teaching staff collectively form the physical and human environment within which teaching and learning occur [1], [3]. When these foundational inputs are deteriorated or unequally distributed, students face heightened risks of absenteeism, health hazards, diminished concentration, and learning poverty [1], [4], [5]. Accordingly, contemporary educational management scholarship conceptualizes school infrastructure not merely as passive physical capital, but as a strategic governance instrument essential for operationalizing Sustainable Development Goal 4 (SDG 4) on inclusive and equitable quality education [6], [7].

In Indonesia, educational infrastructure development is central to the national human capital transformation agenda articulated in the Medium-Term National Development Plan (RPJMN 2025–2029) and the National Education System Law No. 20 of 2003 [8], [9]. Spanning an expansive archipelago of more than 17,000 islands with marked demographic and fiscal heterogeneity, Indonesia faces complex logistical and governance challenges in ensuring uniform facility standards across regions and schooling tiers [10], [11]. Disparities in regional fiscal capacity, public–private school composition, and maintenance budgeting directly shape the physical learning environments experienced by students across urban and rural jurisdictions [1], [12].

Expanding the physical number of schools represents a necessary first step toward reducing travel distances and broadening enrollment access [10], [13]–[16]. However, international evidence demonstrates that quantitative school expansion alone is insufficient to guarantee learning equity if classroom structural integrity, class-size adequacy, water and sanitation hygiene (WASH), and teacher deployment lag behind [1], [5], [7]. Evaluating educational infrastructure therefore requires a multidimensional diagnostic framework that

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integrates quantitative capacity metrics with qualitative facility and instructional support indicators [1], [3], [10].

Official national data compiled in Education Statistics 2025 (Statistik Pendidikan 2025) by Statistics Indonesia (Badan Pusat Statistik [BPS]) provide a comprehensive empirical basis for assessing Indonesia's schooling infrastructure for the 2024/2025 academic year [10]. While prior studies have examined school construction programs, regional enrollment gaps, or specific learning interventions [11], [12], [17], fewer studies offer an integrated cross-level synthesis contrasting institutional quantity against physical quality and sanitation deficits across all four formal schooling tiers. To address this gap, this study analyzes Indonesia's educational infrastructure across primary (SD), junior secondary (SMP), senior secondary (SMA), and vocational secondary (SMK) levels using 2024/2025 national statistics [10], [13]–[16]. Specifically, the study aims to: (1) evaluate school availability and public–private institutional provision; (2) assess classroom physical condition and capacity adequacy; (3) examine basic water and student sanitation coverage; and (4) analyze teacher availability and qualification to derive actionable policy recommendations for equitable resource allocation.

## 2. Methodology

### 2.1. Research Design

This study employed a descriptive comparative quantitative design utilizing official secondary statistical data to examine educational infrastructure conditions across Indonesia's formal education tiers [10], [18]. A descriptive comparative design is well suited for macro-level educational planning research aimed at diagnosing structural bottlenecks, benchmarking cross-level resource allocation, and identifying equity deficits across standardized administrative categories rather than estimating causal econometric parameters [2], [18].

The analytical scope encompasses all four core tiers of Indonesia's formal primary and secondary education system: primary school (Sekolah Dasar [SD], Grades 1–6), junior secondary school (Sekolah Menengah Pertama [SMP], Grades 7–9), senior secondary school (Sekolah Menengah Atas [SMA], Grades 10–12), and vocational secondary school (Sekolah Menengah Kejuruan [SMK], Grades 10–12) [9], [10]. Comparing infrastructure profiles across these sequential tiers illuminates how public and private capital investments translate into differential learning environments along the student educational pathway [13]–[16].

### 2.2. Data Source and Indicator Framework

Primary empirical data were extracted from Chapter 2 of Education Statistics 2025 (Statistik Pendidikan 2025) published by Statistics Indonesia (BPS), which consolidates verified national administrative records from the Ministry of Primary and Secondary Education (Kemendikdasmen) for the 2024/2025 academic year [10], [13]–[16]. Utilizing official, nationally audited statistical series ensures high measurement validity, institutional reliability, and cross-level comparability [10], [18].

To capture both quantitative access and qualitative learning environment dimensions, nine standardized indicators were organized into five analytical domains aligned with national facility standards [1], [3]: (1) institutional availability (number and percentage of public vs. private schools); (2) classroom physical condition (percentage of classrooms in good condition, lightly/moderately damaged, and severely damaged); (3) classroom capacity adequacy (mean students per study group and study-groups-to-classroom ratio); (4) basic sanitation and WASH facilities (proportion of schools with adequate water sources, no water sources, separate student toilets, and no student toilets); and (5) instructional human resource infrastructure (total teaching workforce, percentage of academically qualified teachers holding at least a bachelor's degree/D4, and student-to-teacher ratio) [10], [19].

### 2.3. Analytical Procedure

Data analysis followed a structured four-stage comparative protocol [2], [10]. First, raw statistical tables covering SD, SMP, SMA, and SMK for the 2024/2025 academic year were extracted, cross-checked against ministerial school statistics, and structured into standardized comparative matrices [10], [13]–[16]. Second, public–private ownership shares and cross-level distributions were computed to evaluate institutional provision patterns. Third, quantitative capacity indicators (study-groups-to-classroom ratios and class sizes) were juxtaposed against qualitative condition indicators (classroom damage rates and missing student toilets) to detect structural mismatches between physical quantity and facility quality [1], [3]. Fourth, empirical findings were synthesized through an educational equity framework to formulate targeted fiscal and governance interventions [2], [6], [8].

## 3. Results and Discussion

The analysis of national statistics for the 2024/2025 academic year reveals a pronounced structural divergence between quantitative infrastructure expansion and qualitative facility readiness across Indonesia's formal schooling tiers [10]. The empirical findings and their governance implications are examined across five core dimensions below.

### 3.1. Institutional Availability and Public–Private Provision

In the 2024/2025 academic year, Indonesia operated a vast schooling network totaling 221,132 formal primary and secondary institutions: 149,034 SD, 43,098 SMP, 14,675 SMA, and 14,325 SMK [10], [13]–[16]. Table 1 details the distribution of schools by ownership status across educational levels.

Table 1. Number and Ownership Distribution of Schools by Educational Level in Indonesia (2024/2025)

| Educational Level | Public Schools | Private Schools | Total Schools | Public Share (%) | Dominant Sector |
|---|---|---|---|---|---|
| Primary (SD) | 129,284 | 19,750 | 149,034 | 86.75% | Public |
| Junior Secondary (SMP) | 24,076 | 19,022 | 43,098 | 55.86% | Public |
| Senior Secondary (SMA) | 7,113 | 7,562 | 14,675 | 48.47% | Private |
| Vocational Secondary (SMK) | 3,775 | 10,550 | 14,325 | 26.35% | Private |
| Total (All Levels) | 164,248 | 56,884 | 221,132 | 74.28% | Public |

Table 1 demonstrates a clear structural transition in educational service delivery across schooling stages [10]. At the primary level, public institutions account for 86.75% of all schools (129,284 public vs. 19,750 private), reflecting state commitment to universal basic education access across dispersed rural and archipelagic communities [9], [13]. At the junior secondary level, public schools retain a narrower majority (55.86%), whereas at the upper secondary tier, non-state providers become predominant accounting for 51.53% of SMA and 73.65% of SMK institutions [15], [16]. From an equity governance standpoint, heavy reliance on private providers in secondary and vocational education requires robust regulatory oversight and targeted operational subsidies (Bantuan Operasional Sekolah [BOS]) so that students enrolled in under-resourced private schools do not experience inferior facility standards [2], [8].

### 3.2. Classroom Physical Quality and Rehabilitation Needs

While school availability is extensive, physical classroom conditions vary sharply across educational tiers [10]. Table 2 presents the distribution of classroom structural conditions in the 2024/2025 academic year.

Table 2. Classroom Physical Condition by Educational Level in Indonesia (2024/2025)

| Educational Level | Good Condition (%) | Light / Moderate Damage (%) | Severe Damage (%) | Total Damaged (%) |
|---|---|---|---|---|
| Primary (SD) | 39.68% | 49.51% | 10.81% | 60.32% |
| Junior Secondary (SMP) | 50.30% | 42.72% | 6.98% | 49.70% |
| Senior Secondary (SMA) | 60.27% | 33.56% | 6.17% | 39.73% |
| Vocational Secondary (SMK) | 62.85% | 33.41% | 3.74% | 37.15% |

The empirical pattern in Table 2 exposes a critical inverse relationship between institutional scale and physical facility quality [10]. Primary education (SD) which serves the largest student cohort and forms the cognitive foundation for literacy and numeracy exhibits the poorest classroom quality: only 39.68% of SD classrooms are in good condition, whereas 60.32% suffer structural deterioration (49.51% lightly/moderately damaged and 10.81% severely damaged) [10]. By contrast, classroom integrity improves progressively at higher tiers, reaching 50.30% good condition in SMP, 60.27% in SMA, and 62.85% in SMK (with only 3.74% severely damaged) [10]. Empirical evidence confirms that dilapidated classrooms undermine student safety, thermal comfort, instructional concentration, and foundational learning outcomes [1], [5], [20]. Consequently, primary school rehabilitation represents the single most urgent capital maintenance priority in Indonesia's education sector [3], [8].

### 3.3. Classroom Capacity Adequacy and Learning Space Utilization

To distinguish quantitative space shortages from qualitative deterioration, Table 3 evaluates classroom capacity adequacy using average students per study group (rombongan belajar) and study-groups-to-classroom ratios [10].

Table 3. Classroom Capacity and Study Group Adequacy Indicators (2024/2025)

| Educational Level | Students per Study Group | Study Groups per Classroom | Capacity Status |
|---|---|---|---|
| Primary (SD) | 21 | 0.98 | Adequate (Near Full Utilization) |
| Junior Secondary (SMP) | 28 | 0.85 | Adequate (Surplus Capacity) |
| Senior Secondary (SMA) | 32 | 0.93 | Adequate (Manageable) |
| Vocational Secondary (SMK) | 27 | 0.96 | Adequate (Near Full Utilization) |

As shown in Table 3, aggregate classroom capacity is quantitatively sufficient across all four schooling levels [10]. Mean class sizes range from 21 students per study group in SD to 32 students in SMA, remaining within national pedagogical standards [3], [10]. Moreover, the study-groups-to-classroom ratio stays below 1.00 across every tier from 0.85 in SMP to 0.98 in SD indicating that schools generally possess enough physical rooms to accommodate existing classes without widespread double-shift crowding [10]. However, juxtaposing Table 3 against Table 2 reveals a vital policy insight: Indonesia's primary classroom deficit is predominantly qualitative rather than quantitative. While rooms exist on paper, nearly three-fifths of SD classrooms require structural repair [1], [10].

### 3.4. School Sanitation and Water Hygiene (WASH) Facilities

Safe water access and gender-separated sanitation facilities are indispensable prerequisites for student health, dignity, and sustained school attendance [1], [6], [20]. Table 4 summarizes national school sanitation indicators across educational levels.

Table 4. School Water Supply and Student Sanitation Indicators (2024/2025)

| Educational Level | Adequate Water Source (%) | No Water Source (%) | Separate Student Toilets (%) | No Student Toilet (%) |
|---|---|---|---|---|
| Primary (SD) | 85.11% | 1.51% | 64.19% | 18.76% |
| Junior Secondary (SMP) | 84.87% | 1.60% | 76.17% | 13.93% |
| Senior Secondary (SMA) | 87.66% | 1.83% | 79.29% | 10.85% |
| Vocational Secondary (SMK) | 89.86% | 2.13% | 75.98% | 12.91% |

Table 4 indicates that while between 84.87% (SMP) and 89.86% (SMK) of schools report adequate water sources, critical sanitation gaps persist most acutely in primary education [10]. Specifically, 18.76% of primary schools (approximately 27,959 schools nationwide) lack dedicated student toilets, and only 64.19% provide gender-separated student toilets [10]. Even at secondary levels, between 10.85% (SMA) and 13.93% (SMP) of schools lack student toilets, while 1.51% to 2.13% lack any water source [10]. Consistent with UNICEF and World Bank evidence [1], [20], inadequate school sanitation disproportionately harms young children and adolescent girls, increasing hygiene-related illnesses and absenteeism. Achieving learning equity therefore requires integrating WASH compliance into minimum school infrastructure standards [3], [6].

### 3.5. Teacher Workforce Availability and Qualification

Physical facilities can only translate into equitable learning outcomes when paired with an adequately staffed and qualified teaching workforce [4], [19]. Table 5 and Figure 1 synthesize teacher workforce indicators alongside physical quality benchmarks across educational tiers.

Table 5. Teacher Workforce, Academic Qualification, and Student–Teacher Ratio (2024/2025)

| Educational Level | Total Teachers | Qualified Teachers (%) | Student–Teacher Ratio |
|---|---|---|---|
| Primary (SD) | 1,640,864 | 97.46% | 15 : 1 |

| Educational Level | Total Teachers | Qualified Teachers (%) | Student–Teacher Ratio |
|---|---|---|---|
| Junior Secondary (SMP) | 721,880 | 98.32% | 14 : 1 |
| Senior Secondary (SMA) | 360,010 | 98.88% | 20 : 1 |
| Vocational Secondary (SMK) | 337,306 | 97.21% | 15 : 1 |
| Total / National Range | 3,060,060 | 97.21% – 98.88% | 14 : 1 – 20 : 1 |

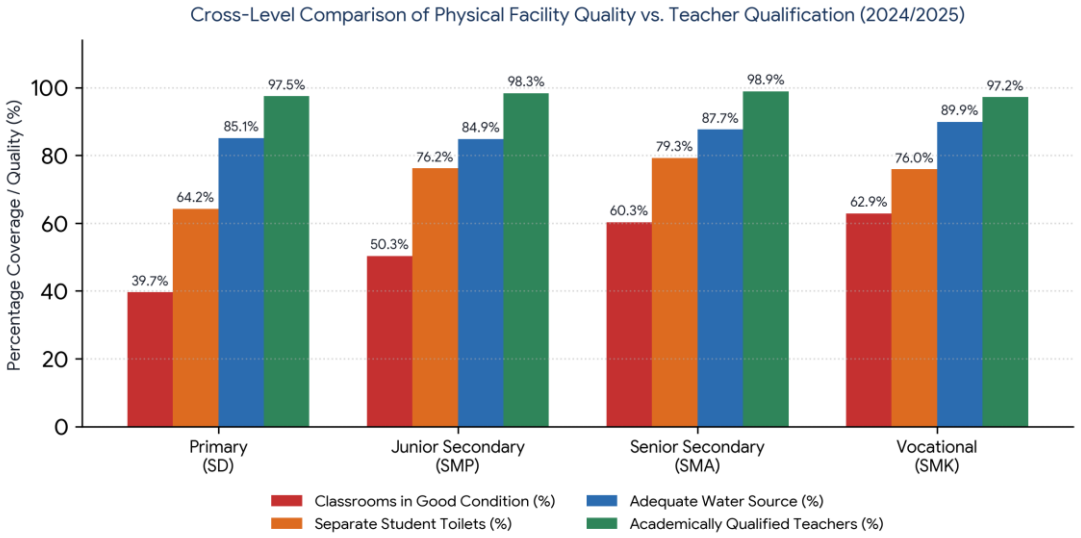


Figure 1. Cross-level contrast between physical facility readiness (classroom condition, sanitation, water) and teacher academic qualification in Indonesia, 2024/2025 (Source: Processed from BPS [10]).

As detailed in Table 5 and visually contrasted in Figure 1, Indonesia possesses a strong aggregate human resource foundation comprising 3,060,060 teachers, with academic qualification rates exceeding 97% across all schooling levels (from 97.21% in SMK to 98.88% in SMA) and favorable national student-to-teacher ratios (14:1 to 20:1) [10], [19]. However, Figure 1 highlights a striking structural asymmetry: while teacher qualification exceeds 97% at the primary level, only 39.68% of primary classrooms are in good physical condition and 64.19% possess separate student toilets [10]. Thus, qualified primary teachers frequently deliver instruction inside deteriorated physical environments a mismatch that blunts instructional effectiveness and reinforces early learning gaps [1], [5].

### 3.6. Governance Implications, Research Contributions, and Limitations

These empirical findings carry three concrete policy implications for educational management in Indonesia [2], [8]. First, infrastructure capital budgeting particularly the Special Allocation Fund for Education (Dana Alokasi Khusus [DAK] Fisik) must pivot from new school construction toward systematic rehabilitation of damaged primary school classrooms, prioritizing the 10.81% of SD classrooms classified as severely damaged [3], [8], [10]. Second, national WASH benchmarks must be enforced as non-negotiable minimum service standards by earmarking dedicated funding to eliminate the 18.76% student toilet deficit in primary schools [3], [6], [20]. Third, because private schools account for over half of SMA (51.53%) and nearly three-quarters of SMK (73.65%) institutions, equitable quality assurance requires extending targeted infrastructure matching grants to underserved private schools serving low-income communities [2], [15], [16].

Scholarly, this study contributes an integrated cross-level diagnostic framework demonstrating that educational infrastructure inequality in Indonesia operates along a quantity–quality divide rather than an aggregate capacity shortage [1], [10]. Nevertheless, two methodological limitations warrant attention: (1) national level averages obscure substantial inter-provincial and urban–rural disparities in teacher deployment and facility conditions [10], [11]; and (2) descriptive cross-sectional statistics do not estimate causal elasticities between facility upgrades and student learning outcomes [1], [4]. Future research should disaggregate 2024/2025 infrastructure indicators by province and district (kabupaten/kota) and link them with national assessment (Asesmen Nasional) scores to evaluate spatial equity impacts [2], [4], [10].

## 4. Conclusion

This study examined educational infrastructure and learning equity across Indonesia's formal schooling system using national statistical data for the 2024/2025 academic year [10]. While Indonesia has achieved broad institutional coverage (221,132 schools), adequate classroom capacity (study-group-to-classroom ratios of 0.85–0.98), and high teacher academic qualification (over 97%), severe qualitative infrastructure deficits persist most acutely at the primary education level, where 60.32% of classrooms suffer structural damage and 18.76% of schools lack student toilets.

Transforming physical access into genuine learning equity requires shifting national infrastructure governance from quantitative expansion to quality-oriented rehabilitation, universal WASH provision, and equity-weighted resource allocation across public and private schools [1], [6], [8]. Subsequent empirical studies incorporating sub-national spatial disaggregation and student learning assessments are recommended to guide targeted regional investments.

## References


[1] P. Barrett, A. Treves, T. Shmis, D. Ambasz, and M. Ustinova, *The Impact of School Infrastructure on Learning: A Synthesis of the Evidence*. Washington, DC, USA: World Bank Group, 2019, doi: https://doi.org/10.1596/978-1-4648-1378-8.

[2] UNESCO International Institute for Educational Planning, *Educational Planning and Management for Equity*. Paris, France: UNESCO-IIEP, 2023.

[3] Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia, *Peraturan Menteri Pendidikan, Kebudayaan, Riset, dan Teknologi Nomor 22 Tahun 2023 tentang Standar Sarana dan Prasarana pada Pendidikan Anak Usia Dini, Jenjang Pendidikan Dasar, dan Jenjang Pendidikan Menengah*. Jakarta, Indonesia: Kemendikbudristek, 2023.

[4] World Bank, *Learning Poverty and Education Recovery*. Washington, DC, USA: World Bank, 2024.

[5] World Bank, *World Development Report 2024: The Middle-Income Trap*. Washington, DC, USA: World Bank, 2024, doi: https://doi.org/10.1596/978-1-4648-2078-6.

[6] United Nations, *The Sustainable Development Goals Report 2024*. New York, NY, USA: United Nations, 2024, doi: https://doi.org/10.18356/9789213589779.

[7] UNESCO, *Global Education Monitoring Report 2024/5: Leadership in Education—Lead for Learning*. Paris, France: UNESCO Publishing, 2024, doi: https://doi.org/10.54676/EJKH2483.

[8] Ministry of National Development Planning/BAPPENAS, *Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2025–2029*. Jakarta, Indonesia: BAPPENAS, 2025.

[9] Pemerintah Republik Indonesia, *Undang-Undang Republik Indonesia Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional*. Jakarta, Indonesia: Sekretariat Negara, 2003.

[10] Badan Pusat Statistik, *Statistik Pendidikan 2025*. Jakarta, Indonesia: BPS, 2025.

[11] United Nations Development Programme, *Human Development Report 2023/2024: Breaking the Gridlock—Reimagining Cooperation in a Polarized World*. New York, NY, USA: UNDP, 2024.

[12] Asian Development Bank, *Asian Development Outlook April 2025*. Manila, Philippines: ADB, 2025, doi: https://doi.org/10.22617/FLS250134-3.

[13] Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, *Statistik Persekolahan Sekolah Dasar (SD) Tahun Ajaran 2024/2025*. Jakarta, Indonesia: Pusdatin Kemendikdasmen, 2025.

[14] Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, *Statistik Persekolahan Sekolah Menengah Pertama (SMP) Tahun Ajaran 2024/2025*. Jakarta, Indonesia: Pusdatin Kemendikdasmen, 2025.

[15] Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, *Statistik Persekolahan Sekolah Menengah Atas (SMA) Tahun Ajaran 2024/2025*. Jakarta, Indonesia: Pusdatin Kemendikdasmen, 2025.

[16] Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, *Statistik Persekolahan Sekolah Menengah Kejuruan (SMK) Tahun Ajaran 2024/2025*. Jakarta, Indonesia: Pusdatin Kemendikdasmen, 2025.

[17] UNESCO Institute for Statistics, *Education and ICT Indicators Database*. Montreal, Canada: UIS, 2024.

[18] OECD, *Education at a Glance 2024: OECD Indicators*. Paris, France: OECD Publishing, 2024, doi: https://doi.org/10.1787/c00cad36-en.

[19] Pemerintah Republik Indonesia, *Peraturan Pemerintah Republik Indonesia Nomor 74 Tahun 2008 tentang Guru*. Jakarta, Indonesia: Sekretariat Negara, 2008.

[20] UNICEF, *The State of the World's Children 2024: The Future of Childhood in a Changing World*. New York, NY, USA: UNICEF, 2024.