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ANALYSIS OF PRIMARY SCHOOL NEEDS IN BANTEN BASED ON EDUCATIONAL AND FISCAL INDICATORS

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Abstract: This study develops an Urgency Index for Primary School Needs to assess disparities in basic education provision across districts and cities in Banten Province, Indonesia. The index integrates indicators of educational access, infrastructure availability, teacher adequacy, demographic pressure, and local fiscal capacity. Using a quantitative descriptive approach with composite index modeling, the study identifies regions that require priority intervention under the national Sekolah Rakyat initiative. The analysis shows substantial inequalities in school capacity and access across Banten. Tangerang Regency, Tangerang City, and Serang City occupy the top three priorities for primary school development. Tangerang Regency has the first priority because it has the highest number of out-of-school children in the Banten region, proportional to the number of children aged 5-14 years, plus the highest student/teacher ratio, and is supported by high fiscal capacity. Tangerang City has the second priority because it has a large number of children aged 5-14 years, has a relatively high number of out-of-school children, and is supported by high fiscal capacity. Serang City has the third priority because it has a relatively low literacy index, with a relatively low School Participation Rate, and a relatively high student/teacher ratio.

Keywords: *Primary Education, Fiscal Capacity, Composite Index, Banten Province, Primary Education.*

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1. Introduction

Primary education is widely recognized as the cornerstone of human capital formation and long-term socio-economic development. Numerous global studies affirm that investments in basic education generate substantial social returns by enhancing literacy, cognitive skills, productivity, and intergenerational mobility (Hanushek & Woessmann, 2020; UNESCO, 2021). In developing countries, ensuring equitable access to quality primary schooling is pivotal for reducing poverty and narrowing regional disparities. For Indonesia, the mandate of nine years of compulsory education, that reinforced by the Sustainable Development Goals (SDG 4), illustrates the country's commitment to expanding educational participation and reducing learning poverty (The World Bank et al., 2022).

Despite national progress, structural challenges persist. Indonesia faces uneven distribution of school infrastructure, teacher shortages, and disparities in educational participation across districts, particularly between urban and rural regions (Muttaqin, 2018). These challenges are amplified by the country's fiscal decentralization system, wherein local

government capacity to finance education varies widely. Districts with lower fiscal capacity often struggle to expand school facilities, hire qualified teachers, and deliver effective educational services (Bird & Zolt, 2015). As a result, disparities in primary education remain a pressing issue requiring targeted interventions.

In response, the Government of Indonesia has introduced the *Sekolah Rakyat* initiative under the directive of President Prabowo Subianto to broaden access to foundational education, especially in underserved areas. This initiative aims to support regions facing shortages of primary schools, high student-teacher ratios, limited literacy environments, and high numbers of out-of-school children. Similar community-based educational models have been successfully implemented in other Southeast Asian countries to reach remote and marginalized populations (Poluan, 2024).

Banten Province provides a clear example of these disparities. While northern urban districts such as Tangerang, Tangerang City, and South Tangerang have experienced rapid economic growth and relatively strong fiscal capacity, southern districts such as Pandeglang and Lebak continue to face significant educational challenges (Badan Pusat Statistik Banten, 2023). These include limited availability of primary schools, uneven distribution of teachers, lower literacy indicators, and higher percentages of school-age children who are not enrolled in school.

Moreover, several districts exhibit capacity strain due to demographic pressure, where the number of children aged 7–12 years surpasses the capacity of existing primary schools. This creates overcapacity in some schools and forces children in remote areas to travel long distances or remain unenrolled. The issue of out-of-school children remains persistent, further highlighting the need for strategic interventions through both formal and community-based schooling models.

Fiscal constraints exacerbate these challenges. Under Indonesia's decentralized system, local revenues—particularly Original Local Government Revenue (*PAD*)—and national transfers such as General Allocation Fund (*DAU*), Special Allocation Fund (DAK), and Revenue Sharing Fund (*DBH*) shape a district's ability to invest in education. Research indicates that fiscal inequality translates into unequal educational opportunities (Blanden et al., 2022). Regions with weaker fiscal capacity struggle to maintain or expand school infrastructure, directly affecting educational access and quality.

Previous studies in Indonesia and comparable developing contexts have extensively examined school access disparities, teacher allocation inequalities, and the effects of fiscal decentralization on education outcomes (Setiawan et al., 2022; Suryadarma & Jones, 2013; World Bank Group, 2018). Other strands of literature have focused on literacy development, school participation rates, and infrastructure gaps, often highlighting the disadvantages faced by rural or remote areas (UNESCO, 2023; UNICEF, 2021). While these studies provide valuable insights, they tend to analyze educational challenges in a fragmented manner, addressing individual dimensions of access or quality without integrating them into a unified analytical framework. More importantly, existing research has not sufficiently addressed how multiple dimensions of educational need interact with local fiscal capacity to shape actionable priorities for school development. Most empirical studies implicitly assume that areas with the highest educational deprivation should automatically receive priority. However, in decentralized systems such as Indonesia's, the ability of local governments to respond to educational needs is also constrained by fiscal capacity, administrative readiness, and budgetary flexibility. As a result, regions with high need but low fiscal capacity often face

implementation delays, while fiscally strong regions experiencing rapid urbanization and population growth remain underexamined in terms of urgency.

This gap is particularly evident in rapidly urbanizing provinces such as Banten, where peri-urban expansion, migration, and housing density have generated new forms of educational vulnerability. Contrary to conventional assumptions that rural areas are the most educationally disadvantaged, emerging evidence suggests that urban and peri-urban districts face severe overcrowding, high student–teacher ratios, and increasing numbers of out-of-school children. However, no existing study has systematically quantified these multidimensional pressures while simultaneously incorporating fiscal feasibility into a single analytical index.

To address this gap, this study develops an Urgency Index for Primary School Needs (UIPSN), an integrative measure designed to capture the full spectrum of factors influencing the adequacy and readiness of primary education services. The index incorporates several critical dimensions, namely the availability and distribution of school infrastructure, the adequacy of teacher resources, school participation rates among children aged 7–12, demographic pressure reflected in the size and density of the school-age population, the broader literacy environment shaping learning readiness, and the fiscal capacity of local governments to finance educational expansion. By combining these dimensions into one composite index, the study provides a structured, evidence-based tool to guide policymakers in prioritizing regions most in need of immediate educational intervention.

The specific objectives of this study are threefold. First, it aims to measure and compare the level of urgency for primary school development across districts in Banten Province using a multidimensional composite index. Second, it seeks to identify spatial and structural patterns of educational vulnerability, particularly the emerging challenges in urban and peri-urban areas. Third, the study evaluates the role of fiscal capacity in shaping feasible and effective education interventions under Indonesia's decentralized governance framework.

The main contribution of this study lies in its integrated analytical approach, which bridges the gap between educational inequality research and fiscal policy analysis. By explicitly incorporating fiscal capacity into the measurement of school development urgency, this research provides a more actionable framework for policymakers, enabling better alignment between educational needs, budgetary capacity, and targeted public investment.

2. Literature Review

2.1. Educational Access and Primary School Infrastructure

Access to primary education has long been recognized as a fundamental determinant of human capital formation and long-term economic development. Empirical studies consistently show that inadequate access to primary schools—measured through limited school availability, long travel distances, and overcrowded classrooms—significantly increases the probability of dropout and delayed enrollment (World Bank Group, 2018).

In the Indonesian context, disparities in primary school infrastructure remain pronounced across regions. Suryadarma & Jones (2013) highlight that while national enrollment rates have improved, subnational inequalities persist due to uneven distribution of schools and teachers. Rural and peri-urban areas often face infrastructure deficits, resulting in capacity constraints that undermine compulsory education objectives. However, recent evidence suggests that infrastructure gaps are no longer confined to remote regions, but increasingly affect rapidly urbanizing districts where population growth outpaces public service expansion (The World Bank et al., 2022).

2.2. School Participation, Out-of-School Children, and Educational Exclusion

The School Participation Rate (SPR) and the prevalence of out-of-school children (OOSC) are widely used indicators of educational inclusion. UNICEF (2021) identifies poverty, distance to school, teacher shortages, and household vulnerability as key drivers of non-participation at the primary level. In developing countries, OOSC patterns often reflect structural barriers rather than individual preferences, emphasizing the role of public policy in addressing educational exclusion.

In Indonesia, persistent gaps in APS (Angka Partisipasi Sekolah) reveal that universal access remains an unfinished agenda. Studies show that APS is strongly correlated with local education expenditure, household income, and school availability (Cerdan-Infantes & Filmer, 2015). Importantly, recent research suggests that urban poverty and informal labor dynamics have emerged as new sources of educational exclusion, particularly in metropolitan peripheries (The World Bank et al., 2022). These findings underscore the need to reassess traditional assumptions that rural children are the most vulnerable.

2.3. Teacher Allocation and Instructional Capacity

Teacher availability is a critical input in the education production function. Hanushek & Woessmann (2020) argue that while infrastructure provides access, instructional quality—proxied by teacher availability and student–teacher ratios—largely determines learning outcomes. High student–teacher ratios are associated with reduced instructional effectiveness, weaker student engagement, and increased teacher burnout (OECD, 2019).

In Indonesia, teacher distribution remains structurally imbalanced. Despite sufficient aggregate numbers of teachers nationally, shortages persist in high-growth urban districts due to rigid allocation systems and uneven incentives (Kemendikdasmen, 2024). Empirical studies find that regions with rapid population inflows experience sustained overcapacity in schools, even when fiscal resources are relatively strong (World Bank Group, 2018). These findings suggest that school construction alone is insufficient without parallel investments in human resource planning.

2.4. Literacy Environment and Foundational Learning

Beyond formal schooling, the literacy environment at the household and community levels plays a crucial role in shaping educational outcomes. (UNESCO, 2023) emphasizes that early exposure to reading materials, access to libraries, and community-based literacy programs significantly influence school readiness and learning progression. Children in low-literacy environments are more likely to experience learning delays, even when school access is formally available.

Empirical evidence shows that weak literacy ecosystems exacerbate educational vulnerability, particularly among children from disadvantaged households (UNICEF, 2021). Districts with limited literacy infrastructure often face compounding challenges, including low parental engagement, poor foundational skills, and reduced demand for schooling. These insights support the inclusion of literacy indicators as a core dimension in assessing primary school needs, rather than treating them as auxiliary social outcomes.

2.5. Demographic Pressure and Urbanization

Demographic pressure—measured through the ratio of school-age children to available school facilities—has become increasingly relevant in rapidly urbanizing regions. Guo (2025) document that peri-urban areas frequently experience infrastructure lag as population growth

outpaces service provision. This results in overcrowded schools, double-shift systems, and declining education quality.

In Indonesia, urban expansion has altered the spatial distribution of educational needs. The (The World Bank et al., 2022) notes that urban poverty is now closely linked to service exclusion, including education, due to congestion, informal settlements, and fragmented planning. These dynamics necessitate analytical frameworks that capture both demographic intensity and infrastructure capacity.

2.6. Fiscal Capacity and Education under Decentralization

Fiscal decentralization assigns local governments a central role in education service delivery. Bird and Zolt (2015) argue that fiscal capacity determines not only the scale of public investment but also the sustainability of service provision. In Indonesia, local education financing depends heavily on a combination of own-source revenue (PAD) and intergovernmental transfers (DAU, DAK, DBH).

While several studies find that higher fiscal capacity is associated with improved education outcomes (Setiawan et al., 2022), others highlight that fiscal strength does not automatically translate into adequate infrastructure if demographic pressures are high. This creates a policy paradox in which fiscally strong regions may still face severe service deficits. Existing literature, however, rarely integrates fiscal capacity directly into measures of educational urgency, leaving a gap between fiscal analysis and education planning.

2.7. Composite Indices in Public Policy Analysis

Composite indices are widely used to synthesize complex, multidimensional phenomena into actionable policy tools. Well-known examples include the Human Development Index (HDI) and the Multidimensional Poverty Index (UNDP, 2025). Greco et al. (2019) argue that composite indices are particularly effective for prioritization and spatial comparison, provided that indicator selection and normalization are theoretically justified.

In the education sector, most composite indices focus on outcomes or quality but do not explicitly integrate fiscal feasibility. This study extends the literature by constructing a composite index that simultaneously captures **educational need and implementation capacity**, offering a more policy-relevant approach to school development prioritization.

2.8. Research Gap and Positioning

Despite extensive research on educational access, teacher allocation, literacy, and fiscal decentralization, existing studies remain fragmented. No prior research has systematically integrated educational access, infrastructure capacity, demographic pressure, literacy environment, and local fiscal capacity into a single composite index to assess primary school development urgency at the district level. This study fills that gap by proposing an integrated, spatially sensitive framework that aligns educational need assessment with fiscal and administrative feasibility.

3. Research Method

This study employs a quantitative descriptive research design supported by a composite index construction method. The purpose is to develop an Urgency Index for Primary School Needs (UIPSN) for all districts and cities in Banten Province. The quantitative approach is appropriate because the study relies on measurable educational and fiscal indicators, enabling systematic comparison and prioritization across regions.

The research is structured through four major analytical stages that collectively ensure the systematic construction of the UIPSN. It begins with the careful selection of indicators and the theoretical justification for their inclusion, ensuring that each component reflects a critical dimension of primary education needs. This is followed by a process of data standardization and normalization, which allows indicators with different units, scales, and directions of interpretation to be compared meaningfully. The third stage involves developing the composite index itself, integrating all normalized indicators into a unified measure that captures the multidimensional nature of educational urgency. Finally, the study undertakes a district-level ranking and interpretation of the results, enabling policymakers to identify regions with the highest need for immediate intervention. This multi-stage approach aligns with widely accepted methodologies for constructing multidimensional indices in public sector research, ensuring rigor, transparency, and comparability across regions (Amaddeo et al., 2024).

To enhance methodological robustness, this study acknowledges the existence of alternative weighting schemes commonly used in composite index construction. In the literature, weighting approaches generally fall into three categories: equal weighting, expert-based weighting, and data-driven weighting methods such as Principal Component Analysis (PCA) or factor analysis (Greco et al., 2019).

Expert-based weighting assigns differential importance to indicators based on expert judgment or policy preferences. While this approach can reflect institutional priorities, it is inherently subjective and may introduce bias, particularly when expert consensus is limited or when policy objectives vary across regions. Given the diversity of educational challenges and fiscal conditions across districts in Banten, applying expert-based weights could disproportionately emphasize certain dimensions without sufficient empirical justification.

Data-driven weighting methods, such as PCA, derive weights statistically based on variance maximization. Although frequently used in socio-economic index construction, these methods also have notable limitations. PCA-based weights tend to prioritize indicators with higher statistical variance rather than normative or policy relevance, potentially obscuring critical dimensions such as literacy or school participation that exhibit lower variance but high policy importance. Moreover, PCA weights are sample-dependent, which reduces comparability across time and limits interpretability for policy audiences.

Considering these limitations, this study adopts an equal-weighting approach, consistent with widely applied frameworks such as the Human Development Index, the Multidimensional Poverty Index (UNDP, 2025a), and the Education Development Index (UNDP, 2025b). Equal weighting minimizes subjective bias, ensures transparency, and facilitates interpretability for policymakers. Importantly, it reflects the analytical assumption that all selected dimensions—educational access, infrastructure availability, teacher adequacy, demographic pressure, literacy environment, and fiscal capacity—are equally essential in determining primary school development urgency. The academic literature consistently highlights that such indices function as powerful tools for prioritizing public sector investments, identifying geographical or sectoral disparities, and supporting evidence-based decision-making processes. The index comprises seven indicators across three dimensions. Three indicators are chosen to capture access barriers and teaching capacity, two indicators are related with infrastructure and school availability, and other two indicators are related to demographic pressure & fiscal capacity. Those indicators are chosen based on theoretical justification and data availability.

To further ensure robustness, sensitivity checks were conducted by comparing index rankings under alternative normalization and aggregation specifications. The results show that

district-level urgency rankings remain broadly consistent, indicating that the findings are not driven by a specific weighting choice but reflect underlying structural conditions.

Indicator	Definition	Rationale
1. School Participation Rate (SPR 7–12)	Percentage of children aged 7–12 enrolled in school	Lower APS indicates higher educational exclusion (UNICEF, 2021).
2. Student–Teacher Ratio (STR)	Number of students per teacher	High ratios indicate overcapacity and teacher shortages (World Bank Group, 2018).
3. Literacy Index	District-level literacy scores	Reflects foundational learning environment (UNESCO, 2023)
4. Number of Existing Primary schools	Total primary schools in the district	Fewer schools indicate limited accessibility.
5. Availability of primary schools in Villages (Village SD Index)	Percentage of villages with at least one primary school	Lower percentage indicates higher need for primary school development
6. Number of Children Age 7–12 (per primary school)	Ratio of child population to primary school	Higher ratios show insufficient capacity .
7. Fiscal Capacity Index	Composite of *PAD, DAU, DAK, DBH*	Fiscal capacity determines ability to invest in education (Bird & Zolt, 2015).

The indicators differ in units, scales, and direction of interpretation; therefore, it must be standardized before constructing the index. For indicators where higher values represent higher urgency (e.g., child-to-school ratio, STR), the formula above is used, this study applies the min–max method:

$$Normalized_i = \frac{X_i - \min(X)}{\max(X) - \min(X)}$$

Whereas, for indicators where higher values represent lower urgency (e.g., APS, fiscal capacity), this study applies:

$$Normalized_i = \frac{\max(X) - X_i}{\max(X) - \min(X)}$$

This ensures that in all cases, higher normalized scores indicate higher urgency. The method is standard in constructing composite indices (Greco et al., 2019; UNDP, 2025a).

Given the absence of prior weighting consensus and to avoid bias, all indicators are assigned equal weight, consistent with OECD and UNDP composite index methodologies (OECD, 2019; UNDP, 2020). If there are k indicators, then:

$$\text{UIPSN}_j = \frac{1}{k}\sum_{i=1}^{k} Normalized_{ij}$$

where:

- i = indicator
- j = regency/city

Thus, UIPSN is a bounded index from 0 to 1, where:

- 0 = lowest urgency
- 1 = highest urgency

4. Results and Discussion

4.1. Results

The analysis of primary school needs in Banten Province reveals substantial variation in educational access, infrastructure adequacy, and fiscal capacity across districts and cities. Using a composite index constructed from seven standardized indicators—literacy development, village primary school availability, school participation rate, demographic pressure per school, student–teacher ratio, fiscal capacity, and out-of-school magnitude—the study identifies the level of urgency for primary school development in each region.

To strengthen the robustness of the Urgency Index for Primary School Needs (UIPSN), this study briefly examines the sensitivity of district rankings to alternative indicator inclusion and weighting assumptions. Sensitivity checks were conducted by recalculating the index under alternative specifications, including the exclusion of single indicators (one-at-a-time omission) and the application of alternative normalization schemes. The results indicate that district-level urgency rankings remain largely stable, with only marginal positional changes among middle-ranked districts, while high- and low-urgency clusters remain consistent.

These findings suggest that the UIPSN is not overly sensitive to the inclusion or exclusion of any single indicator, nor is it driven by a particular weighting assumption. Instead, the index captures structural and multidimensional patterns of educational need, where multiple factors—such as demographic pressure, teacher availability, literacy environment, and school access—jointly determine urgency levels. This robustness reinforces the validity of the index as a reliable policy tool for prioritizing primary school development.

The results demonstrate that districts with high demographic pressure, high out-of-school counts, and inadequate teacher availability exhibit the highest urgency scores. Conversely, regions with stronger literacy performance, adequate school distribution, and lower student–teacher ratios placed lower in the urgency ranking.

Analysis of Each Composite Indicator

The Community Literacy Development Index (CLDI) varies widely across Banten. Regions such as Lebak and Serang score relatively lower, indicating limited local investments in reading culture, library infrastructure, and community literacy programs. Low CLDI correlates with reduced early learning readiness, thereby increasing the urgency for strengthening primary education. This aligns with the notion that foundational literacy shapes learning progression (UNESCO, 2023).

Areas characterized by dispersed rural settlements, especially in the southern and western Banten regions, exhibit low percentages of villages equipped with primary school facilities. Such conditions create geographical barriers for young learners and correspond with elevated out-of-school numbers. This reflects patterns observed in national Village Potential *(PODES)* data, where geographic access is a persistent determinant of basic education participation.

School Participation Rate (SPR) values show strong spatial disparities. Districts with urban-rural transition areas (such as Tangerang, Serang, and Lebak) experience lower SPR due to socio-economic constraints, overcrowded schools, and mobility limitations. In regions with low SPR, many children who complete primary school do not continue to higher levels or drop out early, underscoring systemic barriers.

Number of Children Aged 5-14 in Each Primary school (CAEPS) indicator demonstrates the demographic burden placed upon existing school infrastructure. Districts with large child populations relative to the number of Primary school units (most prominently Tangerang and Tangerang City) face classroom shortages. This aligns with evidence that school crowding is

strongly correlated with learning loss and reduced teacher effectiveness (World Bank Group, 2018).

The student–Teacher Ratio (STR) provides a direct measure of instructional load. High STR values in Tangerang, Serang, and Tangerang City imply limited teacher availability, increased teacher workload, and reduced learning support. These findings are consistent with national trends linking STR greater than 30 to diminished literacy and numeracy outcomes.

Contrary to expectations, higher fiscal capacity increases the priority score, because it indicates the region's ability to finance the construction of new schools. In this study, fiscal capacity is not treated as an indicator of deprivation; rather, it represents intervention feasibility. Consequently, districts with strong fiscal capacity may receive higher urgency scores when high educational needs coexist with the ability to finance and sustain school development initiatives. Regions such as Tangerang, Tangerang City, and Tangerang Selatan have high APBD and transfer revenues, enabling them to address the need more effectively. This criterion aligns with the equity principle used in PMK 84/2023 fiscal capacity mapping.

Based on the uploaded results, the number of children aged 7–12 who are not attending school is highest in Tangerang Regency with 2,407 children, Lebak Regency with 1,184 children, and Tangerang City with 1,178 children. The high concentration of the number of children aged 7–12 who are not attending schoo in urban and peri-urban areas contradicts the traditional assumption that exclusion is primarily rural, revealing complex socio-economic dynamics.

Composite Priority Ranking of Districts and Cities

Using normalized indicator values and equal weights, the study produces a final priority ranking:

Rank	Region	Key Drivers of High/Low Priority
1	Tangerang Regency	Highest out-of-school children, highest STR, large demographic pressure, strong fiscal capacity
2	Tangerang City	Large child population, high out-of-school children, strong fiscal capacity
3	Serang City	Low literacy index, low APS, high STR
4	Tangerang Selatan City	Moderate out-of-school children, large child population, high fiscal capacity
5	Serang Regency	Low literacy index, high STR, moderate demographic pressure
6	Lebak Regency	Low literacy index, high out-of-school children, but lower demographic pressure
7	Pandeglang Regency	Low indicators across all dimensions; moderately low urgency
8	Cilegon City	Lowest out-of-school children, relatively favorable indicators; lowest urgency

4.2. Discussion

The empirical results from the Urgency Index for Primary School Needs (UIPSN) reveal multidimensional disparities in education access, infrastructure distribution, and fiscal capability across districts in Banten Province. This section interprets these findings in relation to the theoretical foundations reviewed in the literature and explores their implications for local and national education policy.

Interpreting Regional Variations in Educational Access and Infrastructure

The analysis reveals significant regional variations in educational access and infrastructure across districts in Banten Province, offering insights into the multidimensional nature of school urgency. Tangerang Regency, Tangerang City, and Serang City emerge as the regions with the highest urgency scores. This heightened urgency is driven by the convergence of several structural conditions, including intense demographic pressure, elevated numbers of out-of-school children, and limited teacher availability relative to student populations. These factors combine to form a complex educational landscape in which existing facilities are increasingly unable to meet rising demand. The patterns observed are consistent with the broader literature emphasizing that educational access is influenced not only by the availability of schools but also by the quality of educational services and the socio-demographic composition of the population served (Suryadarma & Jones, 2013; UNESCO, 2023).

A key insight that emerges from the findings is the persistence of what can be termed a capacity–demand gap. In rapidly urbanizing districts such as Tangerang, population growth—driven by migration, urban expansion, and economic concentration—has outpaced the expansion of school infrastructure. This mismatch results in overcrowded classrooms, high student–teacher ratios, and increased barriers to enrollment. These dynamics parallel earlier studies showing that peri-urban areas, which lie at the intersection of rural and urban systems, are particularly vulnerable to infrastructure lag and service congestion (Chang et al., 2013). Such areas tend to absorb population overflow from major cities without receiving proportional investments in public services, including education.

In contrast, districts such as Pandeglang Regency and Cilegon City register relatively lower urgency levels. These regions benefit from lower numbers of children aged 7–12 who are not currently attending school, as well as more favorable student–teacher ratios, suggesting that existing educational infrastructure is more closely aligned with demographic realities.

The findings of this study resonate strongly with international evidence on the growing vulnerability of urban and peri-urban education systems. While traditional education policy discourse has long emphasized rural disadvantage, recent comparative studies demonstrate that rapid urbanization has generated new forms of educational exclusion in cities across developing and middle-income countries. The World Bank et al., (2022) documents that urban poverty is increasingly associated with overcrowded schools, teacher shortages, and limited access to affordable public education, particularly in metropolitan peripheries experiencing high population inflows.

Similar patterns have been observed in other rapidly urbanizing regions in Asia and Africa. Chang et al., (2013) show that peri-urban areas often suffer from infrastructure lag, as population growth outpaces public investment in schools and teachers. OECD (2019) further highlights that urban education systems face structural pressures related to migration, housing density, and administrative fragmentation, which reduce the effectiveness of education service delivery despite relatively strong fiscal resources. These comparative insights align closely with the conditions observed in Tangerang Regency and Tangerang City, where demographic pressure and overcrowding coexist with comparatively high fiscal capacity.

By situating the results within this broader international literature, the study demonstrates that the challenges identified in Banten are not isolated anomalies but reflect a wider global trend in urban education systems. This comparative perspective strengthens the analytical contribution of the study and underscores the relevance of the Urgency Index framework for other rapidly urbanizing regions beyond Indonesia.

The Role of Literacy in Determining School Needs

The analysis underscores the critical role of literacy development as a determinant of educational need across districts in Banten Province. In particular, the districts of Lebak and Serang exhibit notably low levels of community literacy development, which substantially elevates their urgency scores in the composite index. These findings align with a growing body of empirical research demonstrating that literacy gaps—both at the household and community levels—are strongly associated with increased educational vulnerability among primary school–age children (Hanushek & Woessmann, 2020; UNICEF, 2021). Children living in environments with limited exposure to reading materials, low parental literacy, or weak community literacy ecosystems are more likely to experience delays in enrollment, poor learning readiness, and lower progression rates.

The study further shows that literacy infrastructure, including public libraries, reading corners, mobile library units, and community-based literacy initiatives plays an influential role in shaping children's school participation patterns. Districts with inadequate literacy support systems tend to struggle with not only foundational learning outcomes but also broader indicators such as school participation, retention, and the ability to meet curriculum standards. These dynamics reinforce the notion that literacy development is not merely a supplementary activity but an essential component of the educational ecosystem that determines whether children can effectively engage in and benefit from formal schooling.

Moreover, the observed relationship between literacy levels and school urgency highlights the interdependence between community learning environments and formal education systems. Areas with weak literacy cultures often face compounding challenges: lower household engagement in education, reduced early childhood learning opportunities, and weaker demand for schooling. These conditions disproportionately affect children from socioeconomically disadvantaged households, amplifying inequities and widening the participation gap. As such, interventions aimed solely at increasing the number of schools or teachers may have limited impact if they do not simultaneously strengthen literacy environments and learning readiness.

The findings emphasize that literacy development must be treated as a foundational policy lever within regional education planning. Prioritizing literacy infrastructure can generate significant multiplier effects, improving children's preparedness for school, enhancing their ability to absorb instructional content, and fostering long-term educational attainment. Integrating literacy development with school infrastructure planning, particularly in districts like Lebak and Serang, offers a strategic pathway for reducing educational disparities and ensuring that investments in primary school expansion lead to meaningful improvements in learning outcomes.

Teacher Allocation and Its Structural Implications

Teacher allocation emerges as one of the most persistent structural challenges affecting educational equity in Banten Province. The analysis shows that the student–teacher ratio (STR) is disproportionately high in several densely populated districts, particularly within the Tangerang Raya metropolitan area, indicating that rapid population growth has not been matched by proportional increases in teacher recruitment and deployment. This pattern mirrors broader national trends highlighted in *Kemendikdasmen (2024)*, which reports that teacher shortages are most acute in rapidly urbanizing regions where fiscal resources may be sufficient, but administrative capacity and allocation mechanisms lag behind demographic realities.

The high STR values observed in South Tangerang, and Tangerang City illustrate the structural imbalance between educational demand and human resource supply. Urban districts

often attract large inflows of migrant families seeking employment, resulting in accelerated growth of the school-age population. However, teacher assignment systems—governed through a mixture of certification pathways, civil servant placement rules, and contractual hiring limitations—tend to respond slowly to such changes. As a result, schools face overcrowded classrooms, reduced instructional quality, and a greater risk of teacher burnout.

The findings reinforce the argument that infrastructure development cannot be viewed in isolation. While constructing new schools is essential for expanding access, the effectiveness of such investments depends heavily on whether adequate teaching personnel can be deployed to staff these facilities. This conclusion aligns with international research from the OECD (2019) and the World Bank Group (2018), both of which emphasize that improvements in school infrastructure must be paired with strategic workforce planning to ensure that learning environments are pedagogically viable. Without sufficient teachers, new school buildings may remain underutilized or fail to deliver the intended improvements in learning quality.

Moreover, the structural nature of teacher allocation challenges suggests that addressing them requires systemic policy responses rather than ad hoc solutions. For example, the concentration of certified teachers in urban centers—combined with limited incentives for deployment to peri-urban or underserved areas—contributes to persistent disparities between districts. Additionally, rigidities in the civil service system, including slow recruitment cycles and uneven distribution of subject-specialized teachers, exacerbate these disparities.

The Paradoxical Role of Fiscal Capacity

One of the more intriguing findings of the study concerns the unexpectedly high urgency scores assigned to districts with strong fiscal capacity, particularly Tangerang Regency and Tangerang City. At first glance, this result appears paradoxical. Conventional public finance theory suggests that regions with greater fiscal capacity—measured through higher own-source revenue (*PAD*), larger transfers (*DAU, DAK, and DBH*), and wider fiscal space—tend to demonstrate better service delivery outcomes, including in the education sector (Setiawan et al., 2022). Regions with more substantial budgets are generally expected to outperform fiscally constrained districts in terms of school availability, teacher recruitment, and literacy support infrastructure.

However, the structure of the Urgency Index for Primary School Needs (UIPSN) intentionally incorporates fiscal capacity not as an indicator of deprivation, but as a measure of intervention feasibility. This means that districts exhibiting both (1) high levels of educational need, and (2) strong ability to co-finance school development projects, are identified as the most strategically actionable locations for immediate expansion. In other words, fiscal capacity functions as an enabling condition that increases the likelihood that proposed interventions can be implemented efficiently, sustainably, and at scale.

This logic is consistent with Indonesia's broader fiscal decentralization framework. The targeting mechanism used in the Special Allocation Fund (*DAK*) education formula—particularly the *DAK* for school rehabilitation and classroom construction—prioritizes regions where existing needs intersect with fiscal readiness and administrative capacity. Similarly, the calculation of the fiscal gap in the General Allocation Fund (*DAU*) explicitly integrates fiscal capacity as a component for assessing whether regions are able to support new service delivery mandates. These national formulas reflect the policy principle that development interventions should be directed not only to areas of greatest need but also to areas with the administrative and fiscal capability to deliver measurable results.

The findings from this study reinforce that same principle. The high urgency ranking for Tangerang and South Tangerang, therefore, does not signal failure in fiscal management; rather, it reflects a structural dynamic where rapid urban growth generates substantial educational demand that even strong fiscal capacity has not been able to fully absorb. Schools in these fast-growing districts remain overcrowded, teacher–student ratios remain high, and demographic pressure continues to outpace infrastructure expansion. As such, fiscal capacity becomes a crucial determinant of which districts are best positioned to respond quickly and effectively to these pressures.

Overcrowding and Urban Educational Vulnerability

A major contribution of this study lies in documenting the rise of urban educational vulnerability, a trend that challenges long-standing assumptions in Indonesian education policy. Traditional narratives have positioned rural children as the most disadvantaged due to geographic isolation, limited school availability, and inadequate infrastructure. However, the findings from Banten Province reveal an emerging pattern: educational exclusion is increasingly concentrated in urban and peri-urban district**s**, particularly in Tangerang Regency and Tangerang City. These districts show some of the highest concentrations of out-of-school children, signaling a shift in the geography of educational inequality.

The data highlight several interconnected structural factors driving this urban vulnerability. First, mobility constraints among migrant families—many of whom relocate to Tangerang for informal or low-wage employment—reduce children's ability to enroll consistently in school. Families living in rental barracks, temporary housing, or industrial peripheries often lack the stability needed for consistent school attendance. Second, rapid housing density increases and slum expansion place significant pressure on existing public services, including schools. As neighborhoods grow faster than government infrastructure investments, many children are left without accessible or affordable school options.

Third, pressures from informal labor markets further shape educational decisions. In low-income urban households, children often contribute to household income through informal work or caregiving responsibilities, increasing the risk of delayed enrollment or early dropout. This mirrors international findings indicating that urban children in poor households face different—but equally severe—barriers to education compared to their rural counterparts.

Finally, the study identifies a shortage of affordable educational facilities in rapidly developing urban peripheries, where population growth is most intense. These peri-urban zones frequently fall between administrative jurisdictions, resulting in planning gaps and fragmented service provision. Schools in these areas are often overcrowded, operating with limited classrooms and insufficient teachers.

These dynamics are consistent with emerging global evidence from the (The World Bank et al., 2022), which argues that urban poverty is becoming increasingly linked to educational exclusion, particularly in cities where population growth dramatically outpaces public service expansion. Urbanization, once associated with improved access to education, is now generating new forms of vulnerability shaped by congestion, migration patterns, land-use pressures, and administrative fragmentation.

The findings from Banten therefore highlight a critical policy implication: urban educational vulnerability must be recognized as a priority concern, not an anomaly. Addressing overcrowding and exclusion in these fast-growing districts will require integrated interventions that combine school construction, improved teacher deployment, targeted support for migrant

communities, and proactive urban planning. Without such measures, educational disparities in urban areas may widen further, deepening inequalities within the province.

The composite index reveals Four dominant structural determinants of school need. First, Regions with rapidly growing school-age populations face acute classroom shortages, reinforcing arguments by UNESCO (2023) that demographic transition must guide school planning. Second, High STR values show that teacher allocation remains a systemic bottleneck, confirming global evidence that teacher density is correlated with both enrollment and learning outcomes (OECD, 2019). Third, Low primary school availability in certain villages signals persistent geographical barriers. The last, regions with high fiscal resources demonstrate greater feasibility to launch new SD units and absorb operational costs, consistent with Bird & Zolt (2015). Together, these components explain why urgency levels differ significantly across Banten.

5. Conclusion

This study developed and applied the Urgency Index for Primary School Needs (UIPSN) to assess the relative priority of primary education development across districts and cities in Banten Province. Using seven indicators from three dimensions—educational access and quality, infrastructure availability, demographic pressure, and fiscal capacity—the analysis reveals significant disparities in school needs across the region.

First, the Urgency Index for Primary School Needs provides a data-driven framework for prioritizing primary school development across districts. By integrating educational access, infrastructure capacity, demographic pressure, literacy environment, and fiscal feasibility, the index enables policymakers to move beyond ad hoc or purely needs-based allocations toward more strategic and implementable investment decisions. This approach is particularly relevant for guiding the allocation of education-related Special Allocation Funds (DAK Pendidikan) and supporting evidence-based spatial planning.

Second, the findings highlight the necessity of integrating teacher allocation and literacy development into school infrastructure planning. High student–teacher ratios and weak literacy environments significantly exacerbate educational vulnerability, especially in urban districts. Policy interventions should therefore combine school construction with targeted teacher deployment strategies and investments in community literacy infrastructure, such as libraries and reading centers, to ensure that expanded access translates into improved learning outcomes.

Third, the study underscores the importance of aligning educational investment with local fiscal capacity under Indonesia's decentralized governance framework. Districts with both high educational needs and strong fiscal capacity represent the most actionable targets for immediate intervention, where investments are likely to be implemented efficiently and sustained over time. Recognizing this interaction between need and capacity can help national and provincial governments design more effective intergovernmental transfer mechanisms and reduce delays in service delivery.

The results show that Tangerang Regency, Tangerang City, and Serang City exhibit the highest urgency for primary school intervention. These areas face a combination of substantial population pressure, elevated out-of-school children's numbers, insufficient school capacity, and high student–teacher ratios. The analysis also highlights literacy gaps in specific districts such as Lebak and Serang, suggesting broader barriers to foundational learning development.

One of the most important insights from this study is the emergence of urban educational vulnerability, where urbanized and peri-urban regions demonstrate higher exclusion rates and

more severe school capacity deficits compared to rural areas. These finding challenges traditional assumptions that rural regions face the greatest educational barriers.

Furthermore, the inclusion of fiscal capacity in the index provides a strategic perspective: regions with both high urgency and strong financial capability are the most feasible locations for immediate school development. Thus, the UIPSN serves as a practical and policy-relevant instrument for supporting the implementation of the national Sekolah Rakyat initiative and guiding more equitable educational planning in Banten Province.

Overall, this study contributes theoretically by integrating demographic, literacy, infrastructure, and fiscal dimensions into a unified school-need assessment model; empirically by providing district-level urgency rankings; and practically by offering local governments a strategic decision-support tool to allocate education resources more effectively.

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