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## Aligning School Zoning with Educational Equity: Administrative and Leadership Challenges in Indonesia

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### Abstract

This article examines whether Indonesia's school zoning policy promotes educational equality and equity, and what its implementation reveals about educational administration and leadership. Focusing on Bangka Belitung Province, an archipelagic region with marked rural-urban variation, the study employed a mixed-methods design combining 25 focus group discussions with school principals, teachers, and administrative staff, as well as a survey of 300 parents and guardians across urban and rural districts. Quantitative analysis included t-tests, one-way ANOVA, linear regression, and multilevel models to capture individual- and school-level factors, while qualitative data were analysed thematically. The findings showed that zoning may support equality of access by distributing students more evenly across schools. However, equity gaps persist where rural-urban resource disparities, uneven teacher capacity, and limited support systems constrain school quality. Perceptions of fairness also varied across stakeholder groups, with mothers, younger parents, and families in private schools reporting lower perceived equity. Multilevel results suggest that school-level structural factors exert only a modest influence on perceptions, highlighting the importance of school leadership and administrative practices. For educational administrators, the findings indicate that admission policies alone cannot ensure equitable outcomes, particularly in geographically dispersed islands settings where uneven service access shapes schooling opportunities. The article contributes evidence from an under-researched archipelagic context and offers practical insights for school leaders seeking to align zoning with educational justice. Beyond Indonesia, the findings may be relevant to education systems using proximity-based admissions under decentralised governance, especially in rural areas or resource-constrained settings.

**Keywords:** *school zoning; educational equity; educational administration; policy implementation; Indonesia; rural education*

### Introduction

Quality education is enshrined in Indonesia's constitution, and recent reforms seek to translate this commitment into broader access and improved outcomes. One of the most consequential reforms is admissions zoning—*Penerimaan Peserta Didik Baru (PPDB "zonasi")*—designed to reduce test-based selection, prioritise proximity, and distribute students more evenly across schools, particularly where supply and access conditions differ between urban and rural districts. Updated

guidance for the 2024/2025 admissions cycle is set out in the Ministry's Secretary-General's Decision No. 47/M/2023 and implemented through provincial technical regulations (*Juknis*) issued by the *Dinas Pendidikan of Bangka Belitung Province* (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2023; Dinas Pendidikan Provinsi Kepulauan Bangka Belitung, 2024).

Curriculum reform has also been consolidated through the Ministry of Education, Culture, Research, and Technology (MoECRT) Regulation No. 12/2024, which formalises Kurikulum Merdeka as the national framework across early childhood education (Pendidikan Anak Usia Dini, PAUD), primary, and secondary levels. The curriculum emphasises foundational learning, diagnostic assessment, and differentiated instruction—capacities that become increasingly important as zoning policies expand the diversity of student intakes (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2024).

Despite expanded access, monitoring and independent reviews suggest that equity remains uneven (Organisation for Economic Co-operation and Development [OECD], 2018). Persistent disparities in school quality, teacher capacity, infrastructure—including digital infrastructure—and resourcing continue to constrain opportunities, particularly in rural and low-income areas (OECD, 2015). Post-pandemic analyses further document learning losses and uneven recovery, reinforcing the need to complement access reforms with targeted support and data-driven monitoring (World Bank, 2024). These patterns highlight a central paradox: admissions rules can redistribute students, but equitable outcomes depend on resource equalisation, teacher development aligned with *Kurikulum Merdeka*, and effective compliance mechanisms (OECD, 2024c; World Bank, 2024).

Implementation challenges are evident at both national and sub-national levels. During the 2024 PPDB cycle, oversight bodies reported numerous public complaints and instances of maladministration, including procedural deviations, discriminatory practices, competence gaps, and service delays, alongside weaknesses in local capacity mapping and zonal planning (Ombudsman Republik Indonesia, 2024a, 2024b). Large-scale assessment evidence likewise indicates that inclusion has improved in some respects, while overall performance remains modest, underscoring the limits of access-oriented reforms when instructional improvement and school-level support remain uneven (OECD, 2023a).

Against this backdrop, school zoning seeks to reduce differences between 'favourite' and 'non-favourite' schools and broaden access. However, concerns persist regarding addressing manipulation, uneven implementation capacity, and resource disparities. International and national reviews highlight similar challenges in education systems attempting to balance expanded access with equitable outcomes (OECD, 2015, 2019). Policy debates often focus on procedural design rather than on the institutional conditions under which access reform translates into equitable learning environments.

This study, therefore, examines whether PPDB *zonasi* advances educational equality—uniform access to opportunities—and educational equity—fairness responsive to students' needs in Bangka Belitung Province. This archipelagic context is characterised by geographic dispersion, uneven school distribution, and socioeconomic heterogeneity that create distinctive implementation challenges. In such settings, distance-based rules and domicile verification interact with school distribution and digital access conditions, shaping both families' admission experiences and the administrative demands placed on school leaders and local authorities (Barrett et al., 2019; United Nations Educational, Scientific and Cultural Organization [UNESCO], 2023).

Internationally, zoning and catchment policies remain contested as instruments for balancing access and fairness. Research from the United States, the United Kingdom, Australia, and East Asia suggest that proximity-based admissions can broaden participation but may also reproduce inequality through residential segregation and uneven school quality (Allen et al., 2014; Black & Machin, 2011; Butler & Hamnett, 2007; Byun et al., 2012; Chung, 2015; Ogawa et al., 2024). Catchment rules, therefore, interact with housing markets, family resources, and administrative direction, shaping school composition and perceptions of fairness. Most comparative work, however, focuses on advanced economies with relatively stable governance and population distributions, leaving emerging and archipelagic contexts underexplored—particularly where decentralisation, geographic fragmentation, and resource disparities influence implementation and perceived fairness.

Addressing this gap, this article situates Indonesia's PPDB policy within global debates while foregrounding the administrative and leadership conditions through which admission reforms are enacted. Using a mixed-methods design in Bangka Belitung Province, the study triangulated perspectives from school leaders, teachers, and administrative staff with survey evidence from parents and guardians, and model both individual- and school-level influences.

To clarify the analysis perspective, this article interprets educational equity through a spatial justice lens. Equity is understood not simply as equal formal access to schools, but as fairness shaped by the geographic distribution of educational opportunities. In archipelagic and rural contexts, distance, transport constraints, uneven school availability, and administrative capacity influence how admission rules operate in practice. School zoning, therefore, functions as a spatial allocation policy whose outcomes depend on place-based conditions rather than uniform implementation. This perspective provides the analytical basis for interpreting the empirical findings.

This article addresses the following questions:

**Research Question 1:** To what extent does school zoning promote equality of access and equity in educational opportunities in Bangka Belitung Province?

**Research Question 2:** How do socioeconomic, demographic, and school-level characteristics shape stakeholders' perceptions of equality and equity under the zoning system?

**Research Question 3:** What administrative and leadership actions are most important for translating access gains into equitable learning conditions?

By centring administrative practice and leadership, this article contributes to educational administration scholarship on how policy design interacts with school-level governance capacity. It also contributes to rural education research by providing evidence from an archipelagic province where place-based constraints shape how reforms are implemented and experienced. More broadly, the article reframes school zoning not as an end in itself, but as part of Indonesia's wider pursuit of educational justice.

### Positionality

The study was conducted by a collaborative research team combining local and comparative perspectives. The first author is a lecturer based in Bangka Belitung Province and conducted the research within her own regional and institutional context, bringing familiarity with local administrative practices, schooling conditions, and community dynamics. The first author (IW)

played a central role in the fieldwork and in identifying and analysing secondary sources published in Bahasa Indonesia.

The second author (PK) supervised the doctoral research and contributed a broader perspective on Southeast Asian public administration, enabling a comparative interpretation of policy implementation beyond a single national context. The third author (PR) provided project coordination and operational support throughout the research process, contributing to the effective management of data collection activities and overall project implementation. The fourth author (JC) contributed statistical and methodological expertise in the quantitative analysis.

The combination of insider contextual knowledge and external analytical distance informed the interpretation of the findings and helped balance contextual sensitivity with analytical generalisability.

## Literature Review

School zoning literature highlights a central distinction between equality of access and equity of outcomes. In rural and geographically dispersed systems, this distinction becomes particularly salient because proximity rules interact with long travel distances, limited school choice, uneven school supply, and varying administrative capacity. Equality refers to uniform entry opportunities through admissions rules, whereas equity concerns the differentiated resources and supports required to ensure fair learning conditions for students facing structural disadvantage (UNESCO, 2020; Unterhalter, 2009). Rural education research further shows that geographic isolation affects not only access to schooling but also the capacity of schools to provide comparable learning environments, as staffing stability, curriculum breadth, and service provision vary across space (Halsey, 2018; Schafft & Jackson, 2010).

Research on catchment-based admissions shows that residence-based allocation mechanisms often interact with housing patterns and local socioeconomic stratification, producing socially differentiated school composition even when admission rules are formally uniform (Burgess et al., 2015; Taylor & Gorard, 2001). Consequently, equal access does not necessarily translate into equal learning conditions. From an equality-of-conditions perspective, attention must, therefore, be directed to the structures—resources, recognition, care, and learning environments—that shape what students can realistically achieve after admission (Baker et al., 2006). Critics further note that in systems influenced by quasi-market logics, advantaged households are better positioned to convert nominal access into educational advantage, weakening the equity effects of access-oriented reforms (Gewirtz et al., 1995; Lynch, 2006). In geographically fragmented settings, these dynamics intensify because families' capacity to exercise choice is constrained by distance, transport, and institutional distribution (Halsey, 2018; Schafft & Jackson, 2010).

International scholarship reflects similar dynamics. Evidence from the United States, England, Australia, and South Korea indicates that proximity-based admissions can reduce overt selection but may also reproduce inequality through residential segregation and uneven school quality (Allen et al., 2014; Black & Machin, 2011; Butler & Hamnett, 2007; Byun et al., 2012; Chung, 2015; Ogawa, Okazawa, & Sano, 2024; OECD, 2024a). By contrast, countries such as Finland and Japan mitigated these effects through strong public investment, teacher deployment policies, and equalisation mechanisms (OECD, 2024a). Comparative studies suggest that zoning's equity effects depend less on admission design than on the extent to which it is accompanied by sustained resource redistribution and accountability systems.

Rural education scholarship further emphasises the importance of place conditions. Distance, staffing configurations, multi-grade teaching, and digital infrastructure shape both access and learning organisation in rural and remote schools (Echazarra & Radinger, 2019). At the same time, rural contexts also offer distinctive educational assets, including closer community relationships, contextualised learning, and place-responsive pedagogies that support engagement and belonging (Corbett, 2007; Gruenewald, 2003; Reid et al., 2010). Rural–urban differences should, therefore, be understood not as deficits but as variations in spatial and institutional conditions requiring different administrative and instructional responses. Evidence from Indonesia similarly shows that teacher deployment, supervision capacity, and infrastructure influence schools' ability to convert expanded access into equitable learning opportunities (World Bank, 2008, 2020a).

Since its introduction in 2017, the *Penerimaan Peserta Didik Baru* (PPDB) framework has undergone several adjustments to clarify procedures and address implementation gaps. The Ministry's Secretary-General's Decision No. 47/M/2023 governs the 2024/2025 intake across four channels—zoning (zonasi), affirmative action (afirmasi), parental job transfer (perpindahan tugas atau mutasi), and academic achievement (prestasi)—and requires subnational governments to specify distance criteria and domicile verification through technical guidelines (Juknis) (*Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi*, 2023). In parallel, MoECRT Regulation No. 12/2024 formalises *Kurikulum Merdeka* as the national curriculum, emphasising diagnostic assessment and differentiated instruction (*Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi*, 2024). Together, admissions and curriculum reforms form the institutional backdrop for assessing equity outcomes.

At the provincial level, implementation in Bangka Belitung illustrates the interaction between reform ambition and local capacity. Monitoring by the *Balai Penjaminan Mutu Pendidikan* (BPMP) reports efforts to maintain objectivity and transparency in PPDB alongside uneven adoption of *Kurikulum Merdeka*, particularly in remote districts with limited infrastructure and staffing (BPMP Babel, 2024, 2025). Provincial data indicate that more than 900 schools have yet to fully implement the curriculum, reflecting broader rural and archipelagic patterns where reform uptake depends on available resources (Detik Edu, 2023).

Empirical studies across Indonesian districts report mixed effects of zoning. Research from Yogyakarta City, Surabaya, and Langkat Regency document expanded access and more diverse student intakes but persistent disparities in school quality and teacher capacity (Hajaroh et al., 2021; Setiawan & Rahaju, 2021; Wijaya et al., 2020). Recent studies likewise confirm the continuing influence of "high-demand" and "lower-demand" school reputations, despite formal access reforms (Sulistiyosari et al., 2023; Susanto et al., 2024). National policy reviews similarly conclude that zoning redistributes students but requires parallel investment in staffing, infrastructure, and financing to advance equity (Pusat Standar dan Kebijakan Pendidikan, 2024).

A second strand of research links zoning's outcomes to classroom and leadership capacity. Although *Kurikulum Merdeka* aims to equip schools to manage student diversity, independent reviews highlight uneven implementation and limited professional support outside urban centres (IDinsight & PSKP, 2024; OECD, 2024b). International evidence similarly indicates that access-oriented reforms succeed only when accompanied by sustained investment in teacher development, leadership, and infrastructure.

Post-pandemic research further identifies digital access as a major equity constraint. Studies in Indonesia show that learning recovery varies sharply by location and household resources, indicating that proximity-based admission alone cannot ensure equitable learning conditions where

connectivity and digital literacy remain uneven (World Bank, 2024). Global evidence similarly warns that digitally mediated schooling and administrative processes can reproduce inequality without targeted support for low-connectivity communities (International Telecommunication Union, 2023; United Nations International Children's Emergency Fund [UNICEF], 2020; UNICEF, 2021).

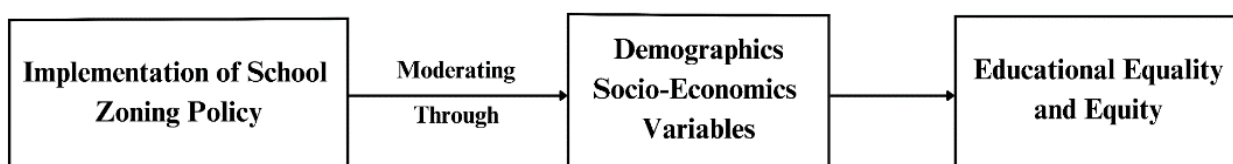
Finally, implementation research highlights the role of governance and administrative discretion. Drawing on street-level bureaucracy theory, scholars emphasise that policy outcomes depend on how local actors interpret and enact rules under constraint (Honig, 2006; Lipsky, 2010). In school zoning, perceived fairness, therefore, depends not only on policy design but also on communication, enforcement, and administrative capacity. Oversight findings from the 2024 PPDB cycles, which document recurring procedural deviations, further underscore the importance of leadership and monitoring in mediating zoning's equity effects (Ombudsman Republik Indonesia, 2024a, 2024b).

### Analytical Framework

This article is guided by a conceptual framework that integrates theories of educational equality and equity with Indonesia's regulatory and institutional context. It conceptualises *Penerimaan Peserta Didik Baru (PPDB)* or 'school zoning' (*zonasi*) as both a mechanism of educational redistribution and an instrument of governance reform. By limiting admission based on examination scores and private advantage, zoning makes proximity the principal determinant of school placement (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2023). In principle, this aligns with Rawlsian fairness, which emphasises impartial rules in allocating opportunities (Rawls, 1971). However, education systems often operate within capitalocentric logics that advantage affluent families and urban schools (Lynch, 2006), reflecting broader debates on how proximity-based admissions interact with structural inequality and social mobility (OECD, 2023a; Reardon, 2011).

The framework, therefore, conceptualises school zoning as a mediating structure between national reform goals and the experiences of parents, teachers, and administrators. It distinguishes between expanded access (equality) and the institutional and material conditions required to secure comparable learning opportunities (equity). Operationally, the framework recognises that zoning outcomes depend on leadership and institutional capacity at the provincial and school levels. School principals, teachers, and administrators act as key intermediaries whose discretionary decisions shape how policy intent is implemented. Drawing on street-level bureaucracy theory, the framework highlights how frontline actors interpret and apply technical rules, sometimes reproducing inequities and at other times enabling more inclusive responses (Lipsky, 2010).

**Figure 1. Conceptual Framework for Analysing the Implementation of School Zoning Policy in Relation to Demographic and Socioeconomic Variables and Educational Equality and Equity**



## Methodology

Building on the conceptual relationships outlined in Figure 1, this study employed a convergent-parallel mixed-methods design to examine the implementation of Indonesia's school zoning policy and its implications for educational equality and equity. Following Creswell and Plano Clark (2018), quantitative and qualitative data were collected concurrently, analysed separately, and integrated during interpretation. The study was conducted in Bangka Belitung Province, an archipelagic region characterised by pronounced urban-rural disparities in school access and capacity.

Data were collected through a structured survey administered to 300 parents across 25 junior high schools, complemented by 25 focus group discussions involving school principals, administrators, and teachers. The sampling strategy ensured representation across rural and urban districts within Bangka Belitung Province. Ethical approval was obtained from the Research Ethics Committee at Khon Kaen University, and informed consent was obtained from all participants prior to data collection.

### ***Quantitative Component***

The quantitative strand draws on a survey of 300 parents or guardians associated with students from 25 sampled junior high schools across urban and rural districts in Bangka Belitung. Of these schools, 10 were in rural areas and 15 in urban areas. From the rural schools, 92 respondents were randomly selected, while 208 respondents were drawn from the urban schools. Each respondent represented the household perspective of one student participating in the admission process.

Although PPDB zoning formally applies to public schools, both public and private schools were included to allow comparative analysis of perceived equality and equity across institutional settings. Respondents were selected using school-level cluster sampling to ensure proportional representation.

The questionnaire measured perceptions of admission fairness, satisfaction with school placement, and assessments of equality and equity in access and provision. Independent variables included gender, age, ethnicity, educational attainment, occupation, household income, school location, zone status, distance from home to school, and school type (public or private).

Two composite indices served as the dependent variable. The equality index comprised 17 dichotomous items capturing procedural fairness, transparency, facilities, impartial treatment, and satisfaction with access. The equity index included four items assessing whether students' needs were addressed through differentiated support and inclusive provision. Item responses were dichotomised and summed, producing scores ranging from 0–17 for equality, with higher scores indicating stronger perceptions. Internal consistency was assessed using Cronbach's alpha (equivalent to KR-20 for dichotomous items).

Statistical techniques included independent-sample t-tests, one-way ANOVA, multiple linear regression, and multilevel modelling to account for clustering at the school level (Raudenbush & Bryk, 2002).

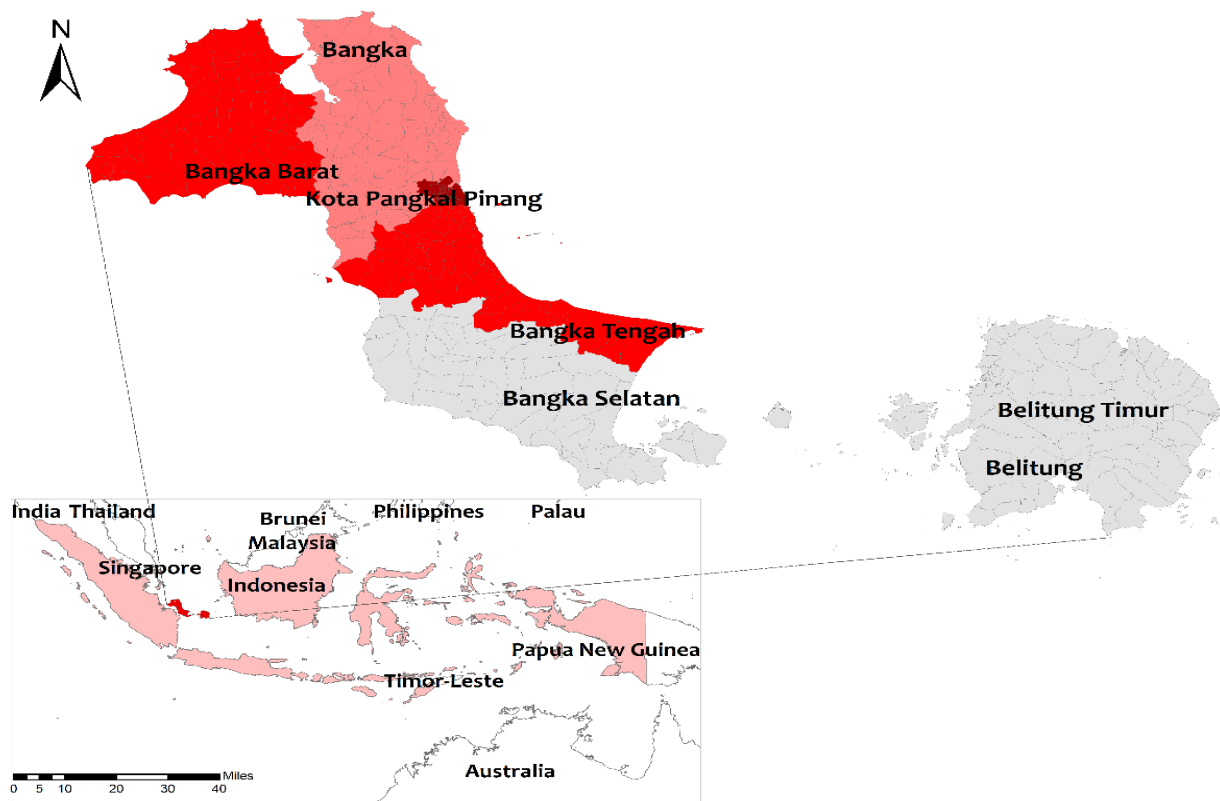
### ***Qualitative Component***

The qualitative component consisted of 25 focus group discussions (FGDs) conducted with school-level stakeholders across Bangka Belitung Province. Study sites were located in four districts—West

Bangka, Bangka, Central Bangka, and Pangkalpinang City—representing both rural and urban administrative context (see Figure 2).

Each group comprised eight participants—the school principal, an administrative assistant or deputy principal, and six teachers—yielding a total of 200 participants. Female teachers were included in each group to ensure gender representation. Parents and guardians were not included in the focus groups because their perspectives were captured through the survey component; the FGDs were designed to obtain complementary insights from school actors responsible for implementing PPDB zoning.

**Figure 2: Study Area and Sampled Districts in Bangka Belitung Province, Indonesia**



Source: Adapted by the authors from Indonesian administrative boundary data (Badan Informasi Geospasial [BIG], n.d.). The highlighted districts indicate the four research sites included in the study: West Bangka, Bangka, Central Bangka, and Pangkalpinang City. The locator map shows the position of Bangka Belitung Province within Indonesia.

Participants were recruited with support from district education offices and the Balai Penjaminan Mutu Pendidikan (BPMP) to ensure variation across school types and locations. Discussions explored experiences of zoning implementation, challenges in aligning policy requirements with school realities, and whether expanded access translated into equitable learning conditions.

All discussions were audio-recorded, transcribed, and analysed thematically using NVivo software (QSR International, 2020). Coding focused on themes of access, resource distribution, leadership discretion, and parental engagement, reflecting the institutional and leadership dimensions specified in Figure 1.

## **Integration**

Consistent with the convergent-parallel design, integration occurred at the interpretation stage. Quantitative results identified patterns in perceived equality and equity across demographic and institutional factors, while qualitative findings illuminated the mechanisms underlying these patterns. Triangulation across data sources strengthened interpretative credibility by comparing convergent and divergent evidence.

## **Findings**

Building on the mixed-methods design, this section presents findings in response to the three research questions. Quantitative analyses from the parent and guardian survey are complemented by qualitative insights from focus group discussions (FGDs) with principals, teachers, and administrative staff, together with contextual evidence on digital access and its implications for PPDB registration. Findings are organised by research question.

### **Equality and Equity Outcomes of the School Zoning Policy**

Survey results indicated broadly positive perceptions of equality and equity under the PPDB system. As shown in Table 1, the average equality score was 14.83 out of 17 (87.2%), while the average equity score was 3.86 out of 4 (96.5%), suggesting that respondents generally viewed zoning as supporting wider access and fairness in school admission.

Regression analysis (Table 2) supports these patterns. After controlling for school location, zoning status, distance, and school type, perceptions of equality remained consistently high. Gender was the only significant predictor, with male respondents reporting slightly higher equality perceptions than female respondents ( $p < .01$ ). This suggests that while access was widely recognised as fair, mothers and female guardians may be more cautious about whether access translates into comparable educational experiences.

Qualitative evidence both confirms and qualifies these patterns. Principals from suburban schools reported reduced overcrowding in previously high-demand schools and greater diversity in student intake. In contrast, principals and teachers in rural and under-resourced schools noted that increased enrolments have not been matched by additional staffing, facilities, or learning materials, constraining their capacity to sustain educational quality. As one suburban principal explained: *"Now we receive students from a broader range of backgrounds, creating a more diverse school community that is more conducive to learning."* A rural principal observed: *"Student numbers have risen, but staffing, facilities, and learning materials have not kept pace."*

Teachers echoed these concerns, noting that more heterogeneous classrooms have increased instructional demands, while disparities in teacher preparedness, facilities, and support for students with special educational needs persisted. These findings align with international evidence showing that access-oriented reforms often redistribute students without addressing underlying inequalities in provision (OECD, 2019a; World Bank, 2020b). Overall, zoning has improved equality of access, while equity in provision remains uneven.

**Table 1: Effect of School Zoning Policy on Educational Equality and Equity as Perceived by Parents/Guardians of Different Characteristics**

Parents' Characteristics	Number of Cases	Equality Score	Equity Score
Gender: Male	126	15.15**	3.90
Gender: Female	174	14.59	3.82
Age: 18-35 years	49	14.85	3.71*
Age: 36-40 years	80	15.06	3.85
Age: More than 40 years	171	14.71	3.90
Ethnicity: Native Bangka Belitung	157	14.82	3.82
Ethnicity: Non-Bangka Belitung	143	14.83	3.88
Education: Primary School	36	14.52	3.72
Education: Senior high school or lower	193	14.84	3.86
Education: Bachelor's degree or higher	71	14.94	3.91
Occupation: Government employee	83	14.84	3.92**
Occupation: Private/Self-employed	111	14.90	3.86
Occupation: Agriculture	43	14.95	3.97
Occupation: Housewife/Unemployed	63	14.60	3.66
Income: < 1,600,000	125	14.56	3.79**
Income: ≥ 1,600,000	175	15.02	3.90
School Location: Urban area	208	14.80	3.83
School Location: Rural area	92	14.90	3.90
Child Age: 17 years	250	14.83	3.86
Child Age: 16, 18, or 19 years	50	14.82	3.80
School Zone: Inside	250	14.70	3.90
School Zone: Outside	50	14.86	3.84
Distance: ≥ 4 km	146	14.96	3.84
Distance: ≤ 3 km	154	14.71	3.87
Type of school attended by child: Public	257	14.90	3.88
Type of school attended by child: Private	43	14.44	3.72
Total	300	14.83	3.86

Note: Values marked with asterisks indicate statistically significant differences between groups: \* $p < .05$ , \*\* $p < .01$ . Equality = perceived equality score; Equity = perceived equity score

### ***Determinants of Stakeholder Perceptions of Equality and Equity***

The second research question examined how demographic, socioeconomic, and school-level characteristics shaped perceptions of fairness under the zoning system. Bivariate analysis revealed

that male respondents reported higher equality perceptions than female respondents ( $p < .01$ ), while younger parents (ages 18-35) reported lower equity perceptions than older parents ( $p < .05$ ). Equity perceptions also varied by occupation, with government employees reporting higher perceived fairness than housewives or unemployed parents ( $p < .01$ ). No significant differences were observed by ethnicity, income, or school location (Table 1).

Regression results confirmed that gender was the most consistent predictor of equality perceptions (Table 2). For equity outcomes (Table 3), age, school type, and zoning status were significant. Older parents reported more positive perceptions, while parents of children in private schools rated the system less favourably than those in public schools. Students assigned within zoning boundaries reported slightly lower perceived fairness than those outside the boundaries, though effect sizes were modest (see Table 3).

**Table 2: Linear Regression and Multilevel Regression Analysis of Educational Equality (Dependent Variable); Adjusted Mean Scores and 95% Confidence Intervals (CI)**

	<b>Model 1: Linear Regression (Mean Score, 95% CI)</b>	<b>Model 2: Multilevel Regression (Mean Score, 95% CI)</b>
<b>Number of students</b>	300	300
<b>Number of schools</b>	25	25
<b>Level 1</b>		
<b>Intercept</b>	14.60 (14.34, 14.86)	14.83 (14.14, 15.54)
<b>Gender: Male</b>	0.56 (0.16, 0.96)	0.53 (0.12, 0.94)
<b>Female (Ref.)</b>	—	—
<b>Level 2</b>		
<b>School location: Rural area</b>	—	-0.01 (-0.45, 0.43)
<b>Urban area (Ref.)</b>	—	—
<b>School zone: Inside zone</b>	—	-0.07 (-0.67, 0.53)
<b>Outside zone (Ref.)</b>	—	—
<b>Distance: <math>\geq 4</math> km</b>	—	-0.21 (-0.66, 0.23)
<b><math>\leq 3</math> km (Ref.)</b>	—	—
<b>Private school</b>	—	-0.42 (-1.00, 0.16)
<b>Public school (Ref.)</b>	—	—

Note: CI = confidence interval. Ref. = reference category.

**Table 3. Linear Regression and Multilevel Regression Analysis of Educational Equity (Dependent Variable); Adjusted Mean Scores and 95% Confidence Intervals (CI)**

	<b>Model 1: Linear Regression (Mean Score, 95% CI)</b>	<b>Model 2: Multilevel Regression (Mean Score, 95% CI)</b>
<b>Number of students</b>	300	300
<b>Number of schools</b>	25	25
<b>Level 1</b>		
<b>Intercept</b>	3.65 (3.52, 3.79)	3.72 (3.51, 3.93)
<b>Age: &gt; 35 years</b>	0.16 (0.03, 0.30)	0.17 (0.04, 0.30)
<b>≤ 35 years (Ref.)</b>	—	—
<b>Occupation: Government</b>	0.04 (-0.08, 0.16)	0.04 (-0.08, 0.16)
<b>Non-government (Ref.)</b>	—	—
<b>Income: ≥ 1,600,000</b>	0.09 (-0.02, 0.20)	0.09 (-0.03, 0.20)
<b>&lt; 1,600,000 (Ref.)</b>	—	—
<b>Level 2</b>		
<b>School location: Rural area</b>	—	0.05 (-0.07, 0.16)
<b>Urban area (Ref.)</b>	—	—
<b>School zone: Inside zone</b>	—	-0.08 (-0.22, 0.07)
<b>Outside zone (Ref.)</b>	—	—
<b>Distance: ≥ 4 km</b>	—	0.01 (-0.10, 0.12)
<b>≤ 3 km (Ref.)</b>	—	—
<b>Type of school: Private</b>	—	-0.14 (-0.29, 0.01)
<b>Public school (Ref.)</b>	—	—

Note: CI = confidence interval. Ref. = reference category.

School-level structural variables—including location, distance, and zoning status—were not statistically significant after controlling for individual-level factors. This does not imply that place-based conditions are irrelevant. Rather, it suggests that within-category variation exceeds between-category differences, particularly in an archipelagic context where rural schools vary widely in resources and capacity. Parental assessments appear calibrated to local reference points, emphasising procedural consistency rather than national disparities in staffing or infrastructure. This interpretation is reinforced by the construction of the equality and equity indices, which primarily measure perceptions of admission integrity rather than instructional quality.

Qualitative findings support this interpretation. While teachers and principals consistently noted structural inequalities across schools, parental experiences varied by digital literacy and administrative support. Parents with higher digital competence—often urban and formally employed—navigated the online system more easily, whereas rural and digitally marginalised

families relied heavily on school operators. These differences shaped both experiences and perceptions of fairness.

### ***Leadership Responses and Adaptive Practices***

Focus group discussions also revealed adaptive leadership and administrative practices aimed at mitigating equity risks. One recurring issue involved address verification and policy compliance. Principals reported pressure from families attempting to manipulate domicile information, prompting closer coordination with district officials and neighbourhood authorities to reinforce transparency and procedural fairness.

Participants also noted that rural contexts sometimes provided administrative advantages, including closer community relationships and more direct communication among schools, local authorities, and families. In some cases, these relationships strengthened monitoring and collective support for equitable implementation.

Leadership responses were also evident in efforts to address teacher capacity constraints. Principals in schools experiencing rapid enrolment growth reported reallocating teaching loads, pairing junior and senior staff, and relying on informal peer mentoring to manage more diverse classrooms. Although these measures cannot substitute for formal professional development, they represented pragmatic adaptations in the absence of additional resources.

A third area of adaptation involved supporting families facing digital barriers during PPDB registration. In districts with lower household connectivity, schools established help desks, extended office hours, and designated staff to assist parents with online forms and document uploads. In rural districts such as West Bangka, school administrators frequently acted as intermediaries between families and the digital system.

Across these cases, leaders emphasised communication and expectation management. Meetings with parents were used to clarify zoning rules, admission criteria, and capacity constraints, thereby reducing conflict and aligning expectations. These practices illustrate that leadership under zoning extends beyond rule enforcement to ongoing mediation between policy mandates, resource constraints, and community expectations.

### ***Challenges and Opportunities for Advancing Educational Equality and Equity***

Despite improvements in access, challenges remain in resource allocation, teacher capacity, and support systems. Digital access emerged as a continuing constraint (Table 4). While urban households typically completed online registration independently, rural families often relied on schools or public facilities due to unstable connectivity and limited digital literacy, undermining equal access to admissions processes.

Taken together, these findings show that Indonesia's school zoning policy in Bangka Belitung has largely achieved equality of access, but equity outcomes remain contingent on leadership capacity, resource redistribution, and institutional support. Leadership and administrative practice, therefore, play a central mediating role in determining whether access gains translate into equitable educational experiences.

**Table 4: Internet Access and PPDB Implications by District**

District/City (Regency)	Estimated Household Internet Access*	Technological Characteristics	Implications for PPDB Enrolment
<b>Pangkalpinang (urban)</b>	~88-90%	Stable internet; higher computer/smartphone ownership	Parents generally complete online registration independently
<b>Central Bangka (semi-rural)</b>	~75-80%	Connectivity reliant on mobile networks; limited computers	Requires school operator assistance; higher risk of late registration
<b>Bangka (mixed rural-urban)</b>	~72-76%	Predominantly smartphone access; uneven coverage	Higher data costs; delays in document upload
<b>West Bangka (rural)</b>	~70-74%	Mobile-based internet; lower parental digital literacy	Dependence on schools or public facilities for online registration

Note: Estimates derived from Badan Pusat Statistik (2024) provincial data disaggregated by urban and rural classification.

### **Synthesis**

Across the three research questions, a consistent pattern emerged: Indonesia's school zoning policy in Bangka Belitung has improved access equality, while equity of provision remains uneven. Survey data indicated broad approval of the policy's intent and procedures, whereas qualitative evidence highlighted continuing disparities in school resources, teacher preparedness, and families' capacity to navigate digital systems. Leadership and administrative practices shaped how these constraints were managed, reinforcing the need to complement equality of access with systemic capacity-building to achieve equitable outcomes (OECD, 2019, 2023b).

### **Discussion**

The findings from Bangka Belitung Province suggest that Indonesia's school zoning policy has advanced equality of access, while equity of provision remains uneven. Interpreted through the lens of spatial justice, these results indicate that proximity-based admission rules can redistribute access to schooling but cannot by themselves overcome structural inequalities arising from uneven school distribution and geographic dispersion in rural and archipelagic settings. This outcome should not be interpreted as evidence that zoning is inherently incapable of promoting equity. Rather, the results reveal interacting mechanisms through which access gains fail to translate into equitable learning conditions when administrative capacity, resources, and support systems are unevenly distributed.

Quantitative results indicate high overall perceptions of equality and equity, suggesting broad approval of the policy's intent and procedures. However, qualitative evidence shows that expanded access reshapes classroom composition and organisational demands, particularly in schools with limited capacity. Principals and teachers in rural and under-resourced schools consistently reported

a mismatch between increased enrolment and stagnant staffing, infrastructure, and professional support. Zoning, therefore, redistributes students without a corresponding redistribution of instructional capacity, producing formal equity in admission but uneven provision in practice.

These dynamics operate across multiple institutional levels. At the classroom level, teachers confront more heterogeneous learning needs without sufficient preparation in differentiated instruction. At the school level, principals must manage larger and more diverse cohorts within fixed budgets and limited staffing authority. At the district level, uneven resource allocation and weak monitoring constrain local administrators' capacity to offset disparities created by geographic dispersion. In this sense, zoning functions primarily as an access equaliser, while its equity effects depend on complementary investments in capacity and governance.

This helps explain why equality gains are widely recognised by parents and guardians, whereas equity perceptions remain more fragile. The policy reallocates opportunities at the point of entry, but its effects on lived educational experience depend on institutional conditions beyond admission rules. Equity, therefore, emerges not directly from zoning design but from how zoning interacts with resources, capacity, and governance across fragmented educational systems.

The non-significance of school-level structural predictors in the multilevel models further highlights the mediating role of administrative and leadership practices. Geographic location, distance, and school type shape constraints, but do not directly determine perceptions of fairness. Instead, perceptions are filtered through everyday administrative encounters—how rules are communicated, how exceptions are handled, and how schools assist families in navigating technical requirements. This pattern aligns with street-level bureaucracy theory, which emphasises that policy outcomes emerge through discretionary practice under conditions of constraint (Lipsky, 2010).

Lower equity perceptions among parents and guardians of students in private schools also require careful interpretation. Unlike public-school households, private-school families often evaluate zoning from a comparative perspective, judging its fairness relative to expectations of choice, transparency, and procedural clarity. Their responses may, therefore, reflect dissatisfaction with how zoning reshapes the broader education landscape rather than direct disadvantage in access.

These findings further highlight the importance of spatial context in rural and archipelagic systems. Proximity-based admissions interact with dispersed settlements, uneven school distribution, and variations in institutional capacity. Research on geographically dispersed education systems similarly shows that policy outcomes often depend less on location itself than on how local governance, leadership capacity, and resource distribution shape implementation (Halsey, 2018; Schaff & Jackson, 2010). Under such conditions, within-category variation may exceed rural–urban average because school quality and administrative capacity vary widely across locations (Reid et al., 2010; Roberts & Cuervo, 2015).

Digitalisation adds another layer to these dynamics. Digital infrastructure influences both learning access and administrative processes such as registration and communication. Where connectivity and digital literacy are uneven, admissions procedures can reproduce inequities unless schools provide hybrid online-offline support and clear public communication. Similar dynamics have been documented in other geographically dispersed and archipelagic systems, including eastern Indonesia and the Pacific Island context (Echazarra & Radinger, 2019; World Bank, 2019).

Although this analysis focuses on Bangka Belitung Province, the findings highlight implementation mechanisms likely to appear in other territorially fragmented systems where proximity-based admissions operate under decentralised governance. These mechanisms include variations in school leadership capacity, uneven distribution of institutional resources, and administrative pressures affecting school operations. In such contexts, the explanatory claim concerns mechanism transferability rather than statistical generalisation. Some rural schools may benefit from stronger leadership or local partnerships, while some urban schools experience congestion, staffing shortages, or administrative overload. Structural indicators may therefore appear weak predictors not because place is irrelevant, but because spatial effects operate through these more specific governance and capacity-related pathways.

The findings also suggest that procedural fairness becomes a dominant reference point for parents and guardians where national disparities in resources are distant or normalised locally. Families often judge equity through the integrity and consistency of admissions procedures rather than through direct comparisons of school quality. This helps explain why high average equity perceptions can coexist with qualitative evidence of uneven provision.

More broadly, Indonesia's experience illustrates a common policy challenge. Although zoning has widened access, deeper equity constraints remain. Near-universal participation can mask persistent disparities in learning conditions, teacher quality, and institutional support. Similar tensions appear in other decentralised systems where national policy frameworks depend on subnational implementation capacity (OECD, 2024c; World Bank, 2020b).

Street-level actors illustrate both the promise and the limits of zoning. Teachers and principals largely support the policy and work to uphold it, yet their discretion is constrained by limited resources and institutional support. As Lipsky (2010) argues, policy is enacted through everyday administrative practice, but local commitment alone cannot substitute for sustained backing.

Taken together, the findings suggest that improving equity under zoning requires complementing access rules with targeted institutional supports. Hybrid enrolment assistance, clear public communication, equitable teacher deployment, and capacity-building at the school and district levels are particularly important in rural and small-island contexts. Without sustained national coordination and investment, zoning risks remaining effective in redistributing access while falling short of delivering equitable learning opportunities. Indonesia's experience, therefore, highlights a broader lesson: achieving equity requires not only fair admissions but also governance capacity, professional support, and long-term policy commitment.

### **Limitations**

Several limitations should be considered when interpreting these findings. First, the study relies on cross-sectional survey data and focus group discussions conducted within a single province. While Bangka Belitung provides an analytically valuable and archipelagic context, the results are not statistically generalisable to all regions of Indonesia. Instead, they offer context-sensitive insights into how school zoning operates under conditions of geographic dispersion and uneven administrative capacity.

Second, the analysis focuses on stakeholder perceptions of equality and equity rather than direct measures of learning outcomes or material adequacy. Perceptual indicators are important for understanding policy legitimacy and experienced fairness, but they cannot fully capture disparities

in instructional quality, facilities, or long-term educational achievement. Future research could, therefore, combine perception-based analysis with school performance indicators or longitudinal designs to examine how access reforms translate into learning outcomes over time. Findings should also be interpreted in light of Indonesia's substantial regional diversity, as experiences in wealthier provinces such as Jakarta or West Java may differ from those in more disadvantaged regions including Nusa Tenggara Timur or Papua (World Bank, 2020a, 2020b).

Third, the qualitative findings must be understood within the institutional context in which the focus group discussions were conducted. Because FGDs were supported by local educational authorities, participants may have moderated their responses when discussing implementation challenges or leadership practices. To reduce this risk, discussions emphasised confidentiality and open reflection, and qualitative insights were triangulated with survey data and documentary evidence. Nevertheless, participation dynamics and social desirability may have limited the expression of dissenting views.

Finally, although the multilevel analysis accounts for clustering at the school level, the number of schools in the sample remains relatively small. This may reduce the statistical power to detect modest school-level effects and partly explains the absence of significant structural predictors. Despite this constraint, the integration of quantitative and qualitative evidence provides a robust basis for interpreting how gains in access do or do not translate into equity in educational provision.

### **Conclusion and Policy Implications**

This study examined whether Indonesia's school zoning policy has advanced educational equality and equity in a rural archipelagic context. The findings show that zoning has expanded and equalised access to schooling by redistributing students more evenly across schools. However, translating access into equitable learning conditions remains uneven. Rather than demonstrating that zoning cannot promote equity, the results indicate that equity emerges conditionally through interactions among admission rules, administrative capacity, resource distribution, teacher constraints, and spatial context.

The study, therefore, advances a mechanism-based understanding of how access-oriented reforms operate in decentralised and geographically fragmented education systems. Admission rules alone do not produce equity; outcomes depend on how reforms interact with institutional capacity across classroom, school, and district levels. Teachers face more heterogeneous learning needs without corresponding professional support, principals manage rising enrolment within fixed staffing and budget constraints, and district authorities often lack the resources or monitoring capacity to offset disparities associated with geographic dispersion. Under these conditions, zoning functions primarily as an access equaliser while equity outcomes remain uneven.

The Bangka Belitung case further demonstrates how geographic fragmentation reshapes policy implementation. In settings characterised by dispersed settlements, long travel distances, and uneven administrative reach, place-based admissions interact with spatial constraints and infrastructure gaps. Zoning, therefore, operates within spatially uneven educational systems rather than on a neutral geographic canvas.

The findings also highlight the role of street-level actors in mediating policy implementation. Teachers and principals largely support zoning and work to uphold its objectives, yet their discretion is exercised under conditions of limited resources and institutional support. Consistent

with street-level bureaucracy theory, policy outcomes emerge through everyday administrative practice under constraint. In rural and island settings, this discretion is further shaped by spatial and organisational conditions that influence how schools manage pressures and study diversity. Empirically, the study also helps explain variation in perceptive equity across stakeholder groups. Differences associated with school type, zoning status, and family background reflect uneven exposure to the institutional constraints identified in the qualitative analysis. While families widely recognise gains in access, perceptions of equity remain more fragile where schools face staffing shortages, limited infrastructure, or weak district-level support. Equity is, therefore, experienced not at the point of admission, but through the quality and consistency of educational provision over time.

The policy implications are clear. Improving equity under zoning regimes requires complementing admissions rules with targeted implementation supports, particularly in rural and archipelagic communities. Priority measures include more equitable teacher deployment, incentives for qualified teachers to work in underserved areas, targeted infrastructure investment, and hybrid enrolment and communication systems that accommodate uneven digital connectivity. Strengthening district-level administrative capacity and aligning decentralised responsibilities with adequate fiscal and technical support are equally important. Without such measures, zoning reforms risk redistributing students without redistributing the conditions necessary for equitable learning.

Indonesia's experience also offers lessons of broader relevance. Proximity-based admissions systems are widely used internationally, but their equity effects depend on governance capacity, spatial context, and sustained investment. Achieving educational equity, therefore, requires more than fair admissions rules: it requires the administrative and professional capacity necessary to convert access gains into durable improvements in learning conditions.

Finally, the conclusions should be interpreted with appropriate caution. Drawing on evidence from a single archipelagic province, the study identifies implementation mechanisms rather than universal generalisations. Future research could examine whether these mechanisms operate similarly across provinces with differing levels of rurality and geographic dispersion and assess how targeted implementation supports influence equity outcomes over time.

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## Appendix 1

### **Survey Questionnaire**

The following questionnaire was administered to parents or guardians of junior high school students during the 2024/2025 PPDB admissions cycle in Bangka Belitung Province, Indonesia.

### **“EVALUATING THE IMPACT OF SCHOOL ZONING POLICY ON EDUCATION EQUALITY AND EQUITY IN BANGKA BELITUNG PROVINCE, INDONESIA”**

The ID for each questionnaire. 001-999

Name of the school of your child.

Age of your child.

Class or level of your child.

How many children do you have?

Is your child attending school in the zone or outside of the zone?

If outside of the school zoning, why do you choose this school for your child?

In terms of distance, how far is your child's school from your home?

In terms of time, how long does it take for your child to get to school?

**Fill your identity with actual circumstances:**

#### **Section One: Respondent Characteristics**

1. Name of school

2. Age:

18 – 24 years

25 – 29 years

30 – 35 years

36- 40t years

> 41 years

3. Gender:

Male

Female

4. Ethnic:
  - Origin / Native Bangka Belitung
  - Chinese
  - Malay
  - Others
5. Highest Level of education:
  - Junior High School or equivalent
  - Senior High School or equivalent
  - Bachelor's Degree
  - Master's Degree
  - Doctoral Degree
  - Others
6. Occupation:
  - Teacher or Government Officer
  - Self-employed/self-owned business
  - Private business employee
  - Agriculture/fisherman/husbandry
  - Health profession/engineer/computer or digital technology/lawyer
  - Labor worker/ Factory worker/wage earner/mining
  - Housewife/ unemployed
7. Income (monthly):
  - < Rp. 500.000,00
  - Rp. 500.000,00 – Rp. 1.500.000,00
  - Rp. 1.600.000,00 – Rp. 3.000.000,00
  - Rp. 3.100.000,00 – Rp. 5.000.000,00
  - > Rp. 5.000.000,00

## **Section Two: Education Equality**

### **Resources Equality:**

1. Does your child have equal access to resources, such as sufficient financing, qualified instructors, and cutting-edge facilities like other students?  
Yes/No
2. Does the zoning system allow your child equal educational opportunities as other children?  
Yes/No

3. Do you believe that despite the implementation of the school zoning policy, schools still compete to attract academically talented and competent students from both within and outside their zones, thereby undermining educational equality for all children?

Yes/No

**Respect and Recognition Equality:**

4. Is your child assigned to classes based on perceived academic competence or entrance examination scores?

Yes/No

5. Do you feel the school's zoning policy has created a supportive environment that promotes inclusivity and enhances your child's emotional well-being?

Yes/No

6. Are your child's academic achievements frequently disregarded or underappreciated by the school?"

Yes/No

7. Does your child receive equal or similar encouragement and support from teachers and staff?

Yes/No

8. Does the curriculum at your child's school adequately represent the history and contributions of your culture and the uniqueness of your ethnic group?

Yes/No

**Love, Care, and Solidarity Equality:**

9. Does your child have difficulty talking to instructors or school counselors about personal struggles or academic concerns?

Yes/No

10. Does your child's school prioritize emotional intelligence to foster a more just and peaceful learning environment for all students?

Yes/No

**Power Equality:**

11. Do all children in your area have equal opportunities for school admission regardless of their social and economic backgrounds?

Yes/No

12. Does your child have the same opportunities to participate in leadership development and extracurricular activities as other children?

Yes/No

13. Does the curriculum development process at your child's school consider the diverse needs and perspectives of all students?

Yes/No

14. Is the administration at your child's school making a concerted effort to ensure that all students benefit equally from the school zoning policies?

Yes/No

### **Work and Learning Equality:**

15. Is the responsibility for emotional labor, such as supporting others' emotional well-being, evenly distributed among students at your child's school?

Yes/No

16. Do you feel that your child's school prepares your child well to integrate into Indonesian society and thus foster social cohesion?

Yes/No

17. Does your child's school provide opportunities for your child to engage in work or activities that are meaningful, fulfilling, and valued by society?

Yes/No

### **Section Three: Education Equity**

18. Does your child's school offer assistance and resources to help your child explore and pursue their passions and interests for future careers?

Yes/No

19. Do you need help from the school to assist your child in learning?

Yes/No

20. (If yes), What are the kinds of help your child needs

Did not receive any help at all

Financial aid

Remedial teaching or tutorial class

Learning equipment/books or materials

Answer no in question 19

21. (If yes,) did you receive the help you indicated in question 20?

Yes/No

22. Does your child's school strive to create a level playing field, ensuring every student has an equal chance to succeed, irrespective of their background?

Yes/No

23. Does your child's school have a system or strategy for continuously assessing, adapting, and enhancing policies and practices to meet the needs of students and communities?

Yes/No

24. Does your child's school prioritize emotional intelligence to foster a more just and peaceful learning environment for all students?

## Appendix 2

Equality Index (17 items, five domains, range 0-17)

Domain 1: Fairness in Admission Procedure

1. All students in my district have an equal chance of admission regardless of family background. (+)
2. Admission procedures are transparent to all parents. (+)
3. Some families use special connections to bypass the rules. (-)

Domain 2: Transparency of Placement

4. The placement of students in schools is based on clear and fair criteria. (+)
5. Students are sometimes placed unfairly due to address manipulation. (-)
6. Parents can easily verify the admission decision. (+)

Domain 3: Adequacy of School Facilities.

7. Facilities in my child's school are adequate compared to those in other schools. (+)
8. Some schools in my area lack basic learning facilities. (-)
9. My child's school provides access to extracurricular programmes similar to those of other schools. (+)

Domain 4: Impartial Treatment of Students

10. All students in my child's school are treated equally by teachers. (+)
11. Teachers sometimes favour students from wealthy families. (-)
12. Students from outside the local zone are treated differently. (-)

Domain 5: Parental Satisfaction with Access

13. I am satisfied with my child's school placement. (+)
14. My child's school is reasonably close to our residence. (+)
15. We had to spend extra resources to secure school placement. (-)
16. The school is accessible by safe and reliable transport. (+)
17. Overall, the PPDB zoning system ensures fairness of access. (+)

Equity Index (4 items, range 0-4)

1. Students with lower academic backgrounds receive sufficient support in my child's school. (+)
2. Schools offer additional support for disadvantaged families. (+)
3. Special-needs students are supported with inclusive programmes. (+)
4. Resources are allocated fairly to schools with greater needs. (+)

Note. (+) indicates positively worded items scored as 1 for "yes" and 0 for "no"; (-) indicates negatively worded items that were reverse-coded. All items were reviewed by education policy experts and piloted with parents prior to inclusion, ensuring content and face validity of the equality and equity indices.



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