



Availability of Physical Education Facilities and Infrastructure for Students with Disabilities: A Census Survey of Special Schools in Pekanbaru, Indonesia

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ABSTRACT

Purpose of the study: Access to safe, accessible, and disability-responsive physical education (PE) environments is part of educational inclusion, yet school-level evidence on PE facilities for students with disabilities remains limited in many low- and middle-income settings. This study mapped PE and health-related facilities across all Special Schools (SLB) operating in Pekanbaru, Indonesia, and identified priority deficits.

Materials and methods: A descriptive cross-sectional census survey was conducted in all five officially operating SLBs in Pekanbaru during May–June 2026. Seventeen PE teachers assisted as key informants. Data were collected through direct observation, photographic documentation, and a 12-indicator structured checklist covering spaces, equipment, accessibility, safety, and sanitation. Availability was calculated as observed provision relative to the target standard, capped at 100%. School-level scores were summarized using means and standard deviations; a descriptive 95% confidence interval was calculated for the city-wide mean. No inferential hypothesis testing was performed because the five eligible schools constituted the complete accessible population.

Results: Mean availability was 78.81% (SD 14.19; descriptive 95% CI 61.19–96.43), classified as Complete under the study's five-category scale. Scores ranged from 66.67% to 100.00%. Motor-coordination equipment, adaptive game equipment, access paths/wheelchair ramps, and disability-friendly toilets reached 100% across schools. The lowest indicator scores were mats (37.14%), whistles/stopwatches (40.00%), and sports fields (60.00%).

Conclusions: The census shows that aggregate completeness can coexist with substantial deficits in safety-critical and instructional resources. Internationally, the study contributes context-specific evidence to the ecological view that school physical environments form part of the opportunity structure for physical activity and inclusive PE. The findings support targeted infrastructure planning, while the small census frame and non-validated checklist limit generalization and causal interpretation.

Keywords

physical education and training; children with disabilities; schools; physical activity; accessibility; school environment.

INTRODUCTION

Global and Theoretical Context

Disability is a global equity issue rather than a niche educational concern. The World Health Organization estimates that approximately 1.3 billion people, or 16% of the global population, experience significant disability, while UNICEF estimates almost 240 million children worldwide live with disabilities (Organization, 2023, 2021). These populations experience persistent inequities in health, participation, and education, and environmental barriers can amplify functional limitations. The United Nations Convention on the Rights of Persons with Disabilities frames education as a right to be realized without discrimination and requires reasonable accommodation and support for effective participation (Nations, 2009). (Hollenweger, 2011, p. 3; True-Frost, 2018, p. 95) Within this rights-based context, physical education (PE) is a curricular setting for physical competence, health-related behavior, social participation, and movement opportunities.

Physical activity participation among children and adolescents with disabilities is shaped by interacting determinants. Recent evidence identifies school time structure, PE characteristics, the physical environment, the social

environment, and organizational factors as relevant domains (Deng et al., 2024, 2025). A parallel qualitative meta-synthesis identified facilities, adapted equipment, activity space, social support, and opportunities for participation as interconnected school-based influences. These findings are consistent with an ecological perspective in which behavior emerges through interactions between individual characteristics and multiple environmental levels. Thus, school facilities are not a neutral backdrop: their availability, accessibility, safety, and usability can expand or constrain opportunities for movement (Flôres et al., 2021, p. 497; Leatherdale et al., 2010, p. 7).

The ecological model is particularly useful for interpreting facility audits because it does not predict that infrastructure alone determines physical activity or that every item has equal effects. Environmental resources form part of an opportunity structure that interacts with teachers, peers, time allocation, curriculum adaptation, student preferences, and organizational support (Daly-Smith et al., 2020, p. 19; Sallis et al., 2005). A ramp may remove a mobility barrier without guaranteeing participation; an adapted ball may create an instructional opportunity without guaranteeing competent teaching; and a sports field may remain

underused if staffing or scheduling is inadequate. This distinction matters because the present outcome is facility availability, not student physical activity or PE learning quality. The theoretical contribution is therefore environmental description rather than causal testing.

Critical Review of Existing Evidence

Existing quantitative evidence suggests that the school environment matters, but the evidence base is heterogeneous. [Deng et al. \(2025\)](#) synthesized 24 quantitative studies of children and adolescents with disabilities and classified school factors into time structure, PE characteristics, physical environment, social environment, and organizational factors. The review found more consistent associations for structured school time than for the physical environment as a whole, indicating that facility presence should not be treated as a sufficient explanation for participation. In broader adolescent research, school environmental findings are not uniformly equivalent to disability-specific evidence; the contrast suggests that environmental resources may operate differently according to functional needs, adaptation, and instructional context ([Anaby et al., 2018](#); [Benjamin et al., 2016](#), p. 88).

Earlier disability-focused reviews reinforce this complexity. [Bloemen et al. \(2014\)](#) synthesized 18 studies and identified equipment and local facilities among factors associated with physical activity in children and adolescents with physical disabilities. [Shields et al. \(2011\)](#), based on 14 studies, identified inadequate facilities as a barrier and accessible facilities as a facilitator alongside personal, social, programmatic, and policy factors. More recent synthesis shows that the physical environment remains one part of a broader system. This evidence cautions against interpreting a facility percentage as a proxy for inclusion itself.

Methodological variation also limits direct comparison. International evidence includes cross-sectional surveys, observational association studies, qualitative and mixed-methods research, and intervention trials. Samples range from small disability-specific groups to large population surveys, while measures vary from self-reported physical activity and perceived barriers to objective activity measures and environmental inventories. Intervention studies also differ in frequency, duration, adaptation, supervision, and fidelity. A recent meta-analysis of 33 school-based intervention studies involving 1,454 children and adolescents with disabilities found effects on cognitive ($g = 0.42$) and mental-health outcomes ($g = 0.57$), but not academic outcomes; intervention length and disability classification moderated effects ([Leahy et al., 2025](#)). Such findings show why an infrastructure census should not be evaluated as an intervention-effectiveness study.

The Indonesian literature is more descriptive and geographically fragmented. The source study's prior review identified facility surveys in Kediri and Karawang and PE

implementation research in Pekanbaru, but disability-specific facility data remain sparse. A recent Pekanbaru study reported strong implementation of PE for students with visual impairment, yet it did not provide a systematic physical-environment audit ([Abdillah & Sari, 2024](#); [Liu et al., 2025](#), p. 1496639). Indonesian facility surveys commonly use descriptive percentages and local classification schemes. Comparability is constrained by different instruments, school types, indicator definitions, and thresholds; formal psychometric validation, inter-rater reliability, uncertainty estimates, and explicit distinction between availability and functionality are rarely reported ([Alves-Wold et al., 2023](#), p. 37; [Keleş et al., 2025](#), p. 29).

Research Gap, Novelty, and International Contribution

Although previous studies show that school environments, adapted equipment, and accessible facilities are relevant to physical-activity participation among children and adolescents with disabilities, it remains unclear what the complete facility profile looks like across an entire urban special-school system in an Indonesian provincial capital when every eligible school is assessed rather than a convenience sample. The unresolved issue is whether aggregate availability masks specific safety, instructional, and accessibility deficits within a complete local system.

The novelty is threefold. First, the study uses a census design covering all five officially operating SLBs in Pekanbaru. Second, it combines direct observation, photographic documentation, and teacher-assisted verification across 12 facility domains, distinguishing overall completeness from indicator-specific deficits. Third, it interprets the profile through an ecological and disability-inclusion lens, separating environmental availability from downstream outcomes that were not measured. The study therefore extends international evidence with a transparent baseline from a Southeast Asian special-school system and identifies priority resource categories rather than treating one composite percentage as the complete story.

Objectives and Hypotheses

The primary objective was to quantify the availability of PE facilities and infrastructure across all SLBs in Pekanbaru City and to identify facility indicators with the greatest shortfalls. A secondary objective was to describe variation in availability among schools. Because this was a complete census with no experimental allocation and no inferential comparison, formal null and alternative hypotheses were not prespecified; hypothesis testing would imply a sampled population and an inferential comparison that the design did not undertake. The descriptive expectation was that availability would be heterogeneous across facility indicators and schools, which was examined through school-level and indicator-level percentages rather than p values.

MATERIALS AND METHODS

Reporting guideline. The manuscript was structured with reference to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidance for cross-sectional studies. STROBE improves transparency in reporting observational designs but does not convert a descriptive census into an inferential study ([Elm et al., 2007](#)).

Setting and Participants

This study employed a cross-sectional descriptive census design and was conducted in all five Special Schools (Sekolah Luar Biasa, SLBs) officially operating in Pekanbaru City, Riau

Province, Indonesia: SLB Negeri Pembina Pekanbaru, SLB Panam Mulia Pekanbaru, SLB Pelita Nusa Pekanbaru, SLB Sri Munijab Pekanbaru, and SLB Kasih Ibu Pekanbaru. Data collection was conducted through on-site facility inspections between May and June 2026. The study population comprised all five eligible SLBs within the defined geographical setting, and a total-population census approach was used; therefore, no eligible school was excluded from the sampling frame. Seventeen physical education (PE) teachers from the five participating schools assisted the researcher during on-site

verification and served as key informants regarding the presence and condition of recorded facilities. The distribution of teacher informants was four from SLB Kasih Ibu, two from SLB Sri Munijab, six from SLB Negeri Pembina, two from SLB Panam Mulia, and three from SLB Pelita Nusa. The unit of analysis was the school rather than the individual teacher or student.

Study Design and Reporting Guideline

This was a descriptive quantitative, cross-sectional census survey of institutional facility availability. Inclusion criteria were: (1) an SLB officially operating within Pekanbaru City during May–June 2026 and (2) willingness of the school administration to permit on-site facility observation. No eligible school was excluded. The unit of analysis was the school, while PE teachers acted as informants rather than independent statistical units. Students were not recruited, measured, or individually identified. Baseline individual characteristics, withdrawal, and participant attrition were therefore not applicable. Institutional permission was obtained before observation.

Sample Size and Rigor Justification

No a priori power analysis was conducted because the study was designed as a census of the entire accessible population of five eligible SLBs rather than as a sample intended to estimate a larger population through hypothesis testing. The minimum and recruited sample were therefore both five schools. A post hoc power calculation would not be informative for this design. Rigor was pursued through complete enumeration of eligible schools, direct observation, photographic documentation, use of a structured checklist, and teacher-assisted verification. Because only five school-level observations were available, inferential modelling, subgroup analysis, and effect-size estimation for between-school differences were not justified.

Intervention, Exposure, or Research Procedures

No intervention or exposure manipulation was performed. Before data collection, the researcher prepared the checklist and arranged access with each school. During the site visit, the researcher and resident PE teacher(s) inspected and enumerated PE-related facilities and infrastructure. Photographs were collected as documentary evidence. Observed counts were compared with the target quantities or availability requirements specified by the checklist. The 12 domains were: sports field; physical activity area; large/small balls; basic gymnastics equipment; mats; motor-coordination equipment; adaptive game equipment; whistle and stopwatch; visual instruction board; access path/wheelchair ramp; sports-equipment storage; and disability-friendly toilet.

The checklist used historical facility ratios derived from Permendiknas No. 33 of 2008 and incorporated accessibility principles associated with later regulatory frameworks. Importantly, which was in force during data collection, repealed Permendiknas No. 33 of 2008. Therefore, the 2008 regulation is treated in this article as the historical source from which the original checklist ratios were derived, not as a currently operative legal standard. Current Indonesian policy additionally emphasizes reasonable accommodation and disability-responsive facilities under (*Peraturan Menteri Pendidikan, Kebudayaan, Riset, Dan Teknologi Republik Indonesia Nomor 48 Tahun 2023 Tentang Akomodasi Yang Layak Untuk Peserta Didik Penyandang Disabilitas Pada Satuan Pendidikan Anak Usia Dini Formal, Pendidikan Dasar, Pendidikan Menengah, Dan Pendidikan Tinggi*, 2023). No intervention dose, adherence, fidelity, adverse-event monitoring, or safety monitoring protocol was applicable because the study was observational.

Measures and Instruments

The primary outcome was school-level PE facility availability, operationalized as the percentage of the target provision observed during the site audit. The structured checklist comprised 12 indicator domains: sports field, physical activity area, large/small balls, basic gymnastics equipment, mats, motor-coordination equipment, adaptive game equipment, whistle and stopwatch, visual instruction board, access path/wheelchair ramp, sports-equipment storage, and disability-friendly toilet. The checklist was developed by the researchers based on facility domains identified in the Indonesian regulatory framework used during the development of the instrument and adapted to the operational characteristics of Special Schools. Direct observation was used to record the quantity of facilities physically present at each school, while photographic documentation provided supporting evidence. PE teachers at each participating school assisted with field verification and clarification of facility use and condition. For each indicator, the observed quantity was divided by the target quantity specified by the checklist and multiplied by 100. Values exceeding 100% were capped at 100% so that surplus equipment did not disproportionately increase the composite availability score. The school-level availability score was calculated as the arithmetic mean of the 12 indicator percentages, and the overall city-level score was calculated as the arithmetic mean of the five school-level scores. The checklist provided content coverage based on the facility framework from which the instrument was developed and was adapted to the Special School context. However, the study did not establish a formal psychometric validation, expert-content validity index, pilot-study coefficient, inter-rater reliability coefficient, or test-retest reliability. These limitations are explicitly acknowledged when interpreting the measurement precision and transferability of the resulting availability index. No cultural translation was required because the checklist was developed for use in the Indonesian institutional context. No copyrighted instrument was used; therefore, permission for use of a proprietary measurement instrument was not applicable.

Statistical or Analytical Procedures

Data cleaning consisted of checking school names, indicator entries, target quantities, and calculation consistency against field records. Missing-data procedures were not required because all five schools had complete indicator profiles in the final dataset. No outlier was removed; percentages above 100% were capped according to the prespecified scoring rule. Descriptive statistics included school-level percentages, indicator means, the overall mean, standard deviation, median, and range. A descriptive 95% confidence interval for the city-wide mean was calculated from the five school-level scores using the t distribution; this interval is presented as uncertainty around the observed census mean and should not be interpreted as a population-inference claim. No regression model, covariate adjustment, multiplicity correction, subgroup analysis, mediation, moderation, or sensitivity analysis was performed because the dataset contained only five school-level observations and no inferential research question. No p values are reported. Statistical significance was therefore not an endpoint of this study.

Ethical Approval and Informed Consent

Formal research permission was obtained from the Faculty of Teacher Training and Education, Universitas Islam Riau, and from the heads/principals of participating SLBs before field observation. PE teachers participated voluntarily as informants and provided verbal informed consent according to the source

manuscript. No individual student data, names, images, or identifiable student information were collected. Only institution-level facility information was recorded. The source manuscript does not provide a formal research ethics committee name,

approval number, approval date, or registration identifier. Accordingly: Ethics committee FKIP-Physical Education; approval number UIR-FKIP/2026/01-1171; approval date 09-03-2026.

RESULTS

Participant Flow and Baseline Characteristics

All five officially operating SLBs identified in the census frame were assessed and included; none was excluded. Seventeen PE teachers assisted as school-level informants. Because the unit of analysis was the institution rather than individual students or teachers, individual baseline characteristics and attrition are not applicable. The resulting analytic dataset comprised five complete school-level facility profiles, each containing 12 indicator scores.

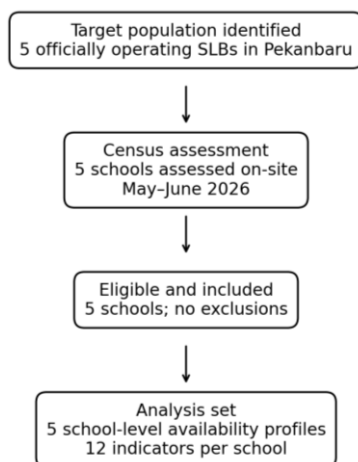


Figure 1. Census flow of participating Special Schools (SLBs).

Table 1. School-level PE facility availability and teacher informants.

School	PE teacher informants (n)	Availability (%)	Category
SLB Negeri Pembina Pekanbaru	6	85.71	Very Complete
SLB Panam Mulia Pekanbaru	2	75.00	Complete
SLB Pelita Nusa Pekanbaru	3	66.67	Complete
SLB Sri Munijab Pekanbaru	2	100.00	Very Complete
SLB Kasih Ibu Pekanbaru	4	66.67	Complete
City-wide mean	17	78.81	Complete

Primary Outcome

The city-wide mean availability was 78.81% (SD 14.19), with a descriptive 95% confidence interval of 61.19%–96.43% based on the five school-level scores. The observed school-level range was 66.67%–100.00%. Two schools (40%) were classified as Very Complete and three schools (60%) as Complete according to the study's five-category classification.

SLB Sri Munijab had the highest observed availability (100.00%), followed by SLB Negeri Pembina (85.71%). SLB Panam Mulia recorded 75.00%, while SLB Pelita Nusa and SLB Kasih Ibu each recorded 66.67%. Because the study used a census and did not define an inferential comparison, no between-school effect estimate, adjusted estimate, p value, or hypothesis test was calculated.

Secondary Outcomes

Table 2. Availability (%) of PE facility indicators across the five SLBs.

Indicator	Pembina	P. Mulia	P. Nusa	S. Munijab	K. Ibu	Mean (%)
Sports field	100	0	100	100	0	60.00
Physical activity area	100	100	0	100	100	80.00
Balls (large/small)	43	100	100	100	100	88.57
Basic gymnastics equipment	0	100	100	100	100	80.00
Mats	86	0	0	100	0	37.14
Motor-coordination equipment	100	100	100	100	100	100.00
Adaptive game equipment	100	100	100	100	100	100.00
Whistle & stopwatch	100	0	0	100	0	40.00
Visual instruction board	100	100	0	100	100	80.00
Access path (ramp/wheelchair)	100	100	100	100	100	100.00
Sports-equipment storage	100	100	100	100	0	80.00
Disability-friendly toilet	100	100	100	100	100	100.00
Overall mean	—	—	—	—	—	78.81

Four indicators—motor-coordination equipment, adaptive game equipment, access paths/wheelchair ramps, and disability-friendly toilets—were available at 100% across all five schools. The lowest mean availability was observed for mats (37.14%), followed by whistles/stopwatches (40.00%) and sports fields (60.00%). Physical activity areas, basic gymnastics equipment, visual instruction boards, and sports-equipment storage each averaged 80.00%, while large/small balls averaged 88.57%.

Additional, Subgroup, Sensitivity, or Qualitative Findings

No prespecified subgroup, mediation, moderation, per-protocol, or sensitivity analysis was conducted. No adverse events were relevant to the observational procedure. The photographic documentation and teacher-assisted verification served as corroborative field evidence but were not subjected to a formal qualitative coding procedure or inter-rater agreement analysis. These observations should therefore be considered documentation rather than an independent qualitative outcome.

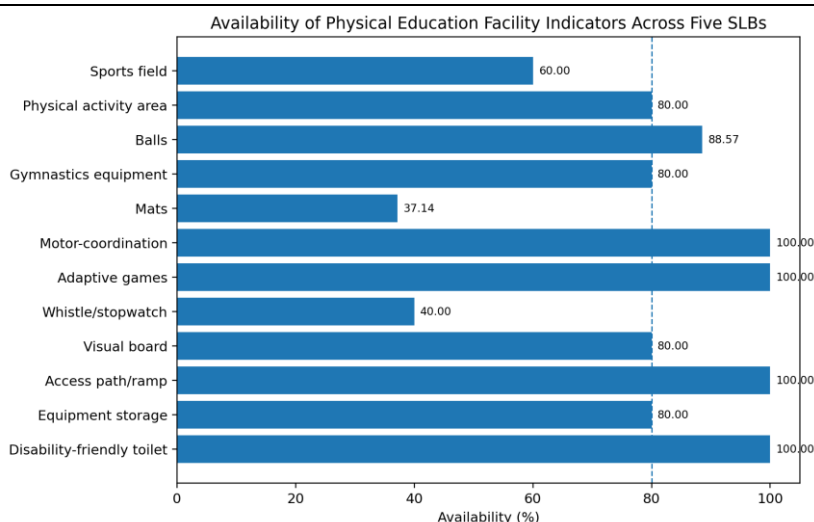


Figure 2. Indicator-level availability of PE facilities and infrastructure. The dashed line marks 80%, the lower boundary used in this article's descriptive interpretation of higher availability; it is not a regulatory pass/fail threshold.

DISCUSSION

Principal Findings

This census study found that the five SLBs in Pekanbaru had an overall observed PE facility availability of 78.81%, with substantial variation between schools and between facility categories. The principal finding is therefore twofold: the aggregate profile was relatively complete according to the study's descriptive classification, but the composite score concealed pronounced deficits in specific resources, particularly mats, whistles/stopwatches, and sports fields. The descriptive expectation of heterogeneous availability was supported. No causal or inferential hypothesis was tested, so the results should be interpreted as an institutional baseline rather than evidence that facilities cause better PE participation or learning.

The distinction between availability and adequacy is essential. A facility can be physically present yet unusable, damaged, poorly located, inaccessible to a particular disability group, or insufficient in quantity during simultaneous classes. The source field procedure primarily measured presence relative to target quantity. It did not independently establish functionality, condition, usability, teacher competence, frequency of use, or student experience. Consequently, 78.81% should be read as a facility-availability index, not as an overall measure of inclusive PE quality.

Comparison with International Evidence

The findings broadly align with international evidence showing that the school environment forms part of the opportunity structure for physical activity among students with disabilities. Deng et al., (2024,2025) synthesized 24 quantitative studies and identified school physical environment among five major school-factor domains, although structured school time showed more consistent positive associations with physical activity than the physical environment as a whole. This distinction is important for interpreting Pekanbaru: a high facility score cannot substitute for adequate PE time, teacher preparation, activity adaptation, peer support, or organizational commitment. The present study adds the complementary perspective of an environmental audit, identifying what is physically available before asking whether those resources are used effectively.

The results also resonate with Deng et al. (2024) qualitative meta-synthesis of 16 studies, which identified physical environment, social environment, opportunities for physical activity, and characteristics of activities as interrelated themes.

The low availability of mats and sports fields in Pekanbaru is therefore relevant not because these items independently determine participation, but because they may narrow the range of activities that can be delivered safely and adaptively. The 2021 mixed-methods review by McKenzie et al. (2021) similarly concluded that social and physical environments are important to participation among people with childhood-onset physical disability. These studies reinforce an ecological interpretation in which environmental resources interact with capability, motivation, social relationships, and institutional conditions (King et al., 2009, p. 330).

At the same time, the Pekanbaru pattern differs from the assumptions that might be drawn from general-population school-environment studies. A 2025 meta-analysis of 18 studies with 340,749 adolescents found a positive association between school environment and physical activity and identified the number of physical-activity facilities as a significant physical-environment correlate. The much smaller disability-specific evidence base, however, indicates that environmental effects may depend on adaptation and accessibility. A conventional sports field, for example, may be available but not equivalent to an accessible activity area for a student using a wheelchair. Thus, facility counts should be interpreted through functional fit rather than generic school standards.

The current results also complement the broader evidence that children with disabilities experience environmental barriers to physical activity. Shields et al. (2011) identified inadequate facilities as a recurring barrier, while Bloemen et al. (2014) reported equipment and local facilities among factors associated with physical activity in children and adolescents with physical disabilities. The present census extends this evidence by showing that environmental deficits can coexist with strong performance on other accessibility-related indicators. In Pekanbaru, access paths, adaptive game equipment, and disability-friendly toilets were universally available, while safety and instructional-management items remained less complete. This pattern suggests that policy compliance may progress unevenly across facility domains.

The Indonesian context is also consistent with this uneven pattern. The local literature cited in the source manuscript has documented facility variability across school types, while Guswandi & Sari (2023) reported a relatively strong

implementation profile for PE for students with visual impairment in Pekanbaru. The present findings suggest that implementation quality should not be inferred from facility availability alone. Instead, local PE research would benefit from linking facility audits with teacher competency, lesson observation, student activity time, and disability-specific outcomes.

Theoretical, Methodological, and Practical Implications

Theoretically, the study supports a cautious ecological interpretation of inclusive PE. Environmental provision is one level of influence within a multilevel system, not a stand-alone determinant. The results refine the ecological model by demonstrating why facility audits should distinguish generic availability from disability-responsive functionality. A universal ramp score of 100% does not tell us whether a blind student can navigate the PE environment, whether a student with hearing impairment can access visual instructions, or whether a student with physical impairment can use the available equipment safely (Lieberman et al., 2024; Lubans et al., 2017, p. 30). Future ecological studies should therefore measure physical environment alongside social, organizational, and instructional variables.

Methodologically, the census design is a strength for local system mapping because no eligible school was sampled out. The use of direct observation plus photographic documentation reduces exclusive reliance on teacher self-report. At the same time, the checklist's lack of formal psychometric validation limits measurement precision (Edlund et al., 2023, p. 10; Odom et al., 2023, p. 8). Future work should establish content validity with multidisciplinary experts, define functionality and condition criteria, train at least two independent observers, and report inter-rater agreement. A standardized instrument would improve comparability across Indonesian cities and facilitate international benchmarking.

Practically, resource allocation should be priority-based rather than driven solely by the composite score. Mats are the clearest immediate deficit because their mean availability was only 37.14%. Whistles/stopwatches and sports fields were also below the study's higher-availability benchmark. These items may be relatively inexpensive compared with major construction projects, making them plausible targets for rapid improvement. For schools without adequate outdoor space, shared-use agreements, scheduled access to community facilities, or adaptable indoor activity areas could be considered where legally and operationally feasible. Such solutions should be designed with disability-specific safety and accessibility criteria rather than simply increasing the number of generic sports resources.

At policy level, the findings are consistent with the current Indonesian framework that requires education facilities to accommodate learner characteristics and disability-related reasonable accommodation. (Peraturan Menteri Pendidikan, Kebudayaan, Riset, Dan Teknologi Republik Indonesia Nomor 22 Tahun 2023 Tentang Standar Sarana Dan Prasarana Pada Pendidikan Anak Usia Dini, Jenjang Pendidikan Dasar, Dan Jenjang Pendidikan Menengah, 2023) establishes standards for educational facilities and infrastructure and specifically recognizes facilities and infrastructure for learners with disabilities, while (Peraturan Menteri Pendidikan, Kebudayaan, Riset, Dan Teknologi Republik Indonesia Nomor 48 Tahun 2023 Tentang Akomodasi Yang Layak Untuk Peserta Didik Penyandang Disabilitas Pada Satuan Pendidikan Anak Usia Dini

Formal, Pendidikan Dasar, Pendidikan Menengah, Dan Pendidikan Tinggi, 2023) addresses reasonable accommodation. The international contribution is not to propose a new standard, but to show how a facility audit can operationalize a disability-responsive school-environment baseline and reveal where aggregate compliance may conceal functional gaps (Organization, 2025).

Strengths and Limitations

Several strengths should be considered. First, the study assessed all five eligible SLBs in the city, avoiding sampling selection within the accessible school system. Second, the field audit combined direct observation, documentation, and teacher verification. Third, the analysis preserved indicator-level information instead of reporting only a single composite score. Fourth, the manuscript explicitly separates descriptive availability from causal claims and reports uncertainty around the observed city-wide mean.

The limitations are substantial. The five-school frame is small and geographically restricted to one Indonesian city, limiting transferability to rural areas, other provinces, private or unregistered providers, or countries with different education and financing systems. The cross-sectional design captures one period and cannot assess changes after annual procurement cycles. The checklist was researcher-adapted and lacks reported psychometric validation and inter-rater reliability. Observer presence and teacher participation could introduce measurement or social-desirability bias, although photographic documentation provides some corroboration. The audit measured availability rather than condition, usability, utilization, or student-level outcomes. No individual student characteristics were collected, so disability-specific needs could not be stratified. No inferential modelling was appropriate, meaning that the descriptive confidence interval should not be interpreted as evidence of statistical generalizability. Finally, because the instrument's historical ratio source predates the current regulatory framework, future studies should revalidate every target against the current Indonesian technical guidance before using the index for compliance assessment.

Future Research

Future research should move from mapping to explanation and evaluation. First, multicity studies across Indonesian provinces should use a standardized, validated facility instrument and include urban, peri-urban, and rural SLBs. Second, studies should assess functionality, condition, accessibility by disability type, utilization frequency, and student active time rather than presence alone. Third, prospective longitudinal designs should repeat audits across at least one to three annual budget cycles to examine whether facility improvements are sustained. Fourth, multilevel studies should combine facility indicators with teacher competence, PE lesson quality, scheduling, class size, student physical activity, motor competence, participation, and safety outcomes. Mediation or moderation models could test whether teacher adaptation or organizational support changes the association between facility availability and student participation. Fifth, implementation studies should examine shared-resource models, low-cost equipment packages, and targeted infrastructure upgrades, including cost-effectiveness and equity analyses. Finally, replication in other Southeast Asian education systems would help determine which components of disability-responsive PE infrastructure are culturally and institutionally transferable.

CONCLUSION

The census of five Special Schools in Pekanbaru identified an overall PE facility availability of 78.81%, with school-level scores ranging from 66.67% to 100.00%. Although the aggregate profile fell within the study's Complete category, the indicator-level analysis revealed substantial deficits in mats, whistles/stopwatches, and sports fields. The primary contribution is therefore a transparent environmental baseline showing that overall completeness can coexist with specific resource gaps that may matter for safe and disability-responsive PE.

DECLARATIONS

Ethical Approval

This study received ethical approval from the Ethics Committee of FKIP–Physical Education, Universitas Islam Riau (UIR). The approval was granted under approval number UIR-FKIP/2026/01-1171 on 9 March 2026. All study procedures were conducted in accordance with the ethical requirements and procedures approved by the committee.

Consent to Participate

Participation of the physical education teachers who served as informants in the field verification process was voluntary. Verbal informed consent was obtained from the participating teachers before data collection. No individual student data were collected, and no students were directly involved as research participants. Participants were informed that the information collected would be used solely for academic research purposes.

Consent for Publication

No identifiable individual participant information, photographs, videos, or case-specific personal data are included in this manuscript. The study reports only school-level information concerning the availability of physical education facilities and infrastructure. Therefore, consent for publication of identifiable individual information was not required.

Author Contributions (CRediT)

Regina Eka Pratiwi: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing—original draft, Visualization, Project administration.

Merlina Sari: Conceptualization, Methodology, Validation, Investigation, Resources, Writing—review and editing, Supervision, Project administration.

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Internationally, the study extends the school-environment evidence base by providing a complete urban census from Indonesia and by distinguishing facility availability from functionality, utilization, and student outcomes. The findings support targeted infrastructure planning but should not be generalized causally beyond the five surveyed schools. Broader conclusions require validated measures, multicity samples, longitudinal monitoring, and linkage with student-level participation and learning outcomes.

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Conflict of Interest

The source manuscript states that the authors declare no conflict of interest related to the research, authorship, or publication.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Access to the data is subject to the permission of the participating Special Schools and applicable ethical and institutional requirements. The dataset does not contain individually identifiable student information.

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