

Public Transportation Accesibility Disparities in Indonesia Medium Size Cities : Perspectives from Urban Centers and Peripheral Communities

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ABSTRACT: Public transport accessibility is essential for sustainable urban mobility, yet disparities between urban centers and peripheral areas persist in many Indonesian medium-sized cities. This study examines how residents, operators, and local governments in Malang, Mataram, and Palu perceive these disparities and identifies factors shaping accessibility inequality and its implications for equitable transport planning. A qualitative comparative multiple-case study design was used, involving thirteen purposively selected informants—urban and peripheral residents, vulnerable groups, operators, and planners—through semi-structured interviews, field observations, and policy document analysis. Data were analyzed using the Miles, Huberman, and Saldaña thematic analysis framework via open, axial, and selective coding. Findings show significant disparities: central residents enjoy shorter access distances, higher frequency, better connectivity, and reliability, while peripheral communities face longer distances, weak first/last-mile connections, limited hours, higher costs, and reliance on informal transport. Barriers are especially severe for persons with disabilities, older adults, women, students, and low-income residents, linking transport disadvantage to social exclusion. Institutional constraints—limited budgets, uneven investment, declining ridership, and urban-centered planning—sustain these inequalities. Residents adopt adaptive strategies (motorcycle taxis, ride-sharing, schedule adjustments) that shift the burden onto individuals rather than resolving structural issues. The study concludes that accessibility disparities are multidimensional, requiring integrated feeder services, inclusive infrastructure, equitable investment, and stronger transport–land-use coordination, informed by Accessibility Theory, Transport Equity, and Center–Periphery perspectives.

Keywords: Public Transport Accessibility, Transport Equity, Transport-Related Social Exclusion, Medium-Sized Cities, Center–Periphery, Qualitative Comparative Case Study, Indonesia



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INTRODUCTION

Public transport accessibility has become a central concern in contemporary urban planning because it determines people's ability to reach employment, education, healthcare, and other essential urban opportunities. Accessibility is no longer viewed merely as the availability of transport infrastructure, but as the extent to which transport systems enable individuals to participate fully in economic and social life. As cities continue to expand spatially, ensuring

equitable accessibility has become increasingly important for achieving sustainable urban mobility and reducing spatial inequalities. This issue is particularly relevant in developing countries, where rapid urban growth frequently exceeds the capacity of transport systems to provide adequate and equitable services. Consequently, accessibility has emerged as a key indicator of both transport performance and social justice.

Across Southeast Asia, rapid urbanization has transformed the spatial structure of cities while simultaneously increasing pressure on transport infrastructure and public services. Much of this growth has occurred in an unplanned or fragmented manner, resulting in expanding peripheral settlements that often remain inadequately connected to urban transport networks. As urban expansion outpaces investment in public transport, disparities between central and peripheral areas become increasingly pronounced, limiting mobility opportunities for residents living outside traditional urban cores (Arfanuzzaman & Dahiya, 2019; Padawangi, 2022). Regional policy initiatives have recognized transport connectivity as a strategic instrument for reducing development disparities by strengthening links between urban cores and peripheral regions. Nevertheless, the effectiveness of these initiatives depends on how transport investments are integrated with land-use planning, governance arrangements, and long-term financing mechanisms (Fau, 2016). Similarly, studies on ASEAN secondary cities identify transportation as a fundamental component of urban livability, indicating that accessibility is inseparable from broader questions of urban sustainability and quality of life (Majid et al., 2020).

Although accessibility has received increasing scholarly attention, significant inequalities remain between urban centers and peripheral communities. Public transport services are generally concentrated in central areas where population density, commercial activities, and employment opportunities are highest, whereas peripheral neighborhoods frequently experience lower service frequency, fewer routes, longer travel times, and weaker first-mile and last-mile connectivity. Urban centrality, proximity to transit facilities, and the characteristics of the built environment including density, diversity, design, distance to transit, and destination accessibility substantially influence accessibility outcomes and travel behavior (Kim et al., 2022; Šulíková & Brand, 2021; Wali, 2023). Beyond physical characteristics, governance quality, infrastructure investment, institutional coordination, and spatial planning also shape accessibility disparities. From a transport equity perspective, unequal distribution of transport services can reinforce existing socio-spatial inequalities by limiting opportunities for disadvantaged populations to participate in urban life (Pereira, 2018).

Accessibility disparities have implications that extend well beyond transport performance. Limited access to reliable public transport reduces opportunities to obtain employment, attend educational institutions, access healthcare services, and participate in community activities. These consequences are particularly severe for vulnerable groups, including persons with disabilities, older adults, women, students, and low-income households, whose mobility options are often more constrained than those of the general population. Research increasingly demonstrates that equitable accessibility is essential for sustainable urban mobility because transport systems directly influence individual well-being, social inclusion, and health outcomes (Sunio et al., 2023; Wisutwattanasak et al., 2023). Conversely, transport systems that fail to provide inclusive

accessibility may intensify social exclusion and encourage greater dependence on private vehicles, thereby undermining environmental sustainability and broader urban development objectives.

Evidence from Southeast Asia consistently demonstrates that accessibility inequalities are embedded within broader patterns of uneven urban development. Rapid urbanization has generated significant disparities in infrastructure provision, environmental quality, and access to public services between urban cores and peripheral communities (Arfanuzzaman & Dahiya, 2019; Padawangi, 2022). Studies of ASEAN secondary cities reveal that transportation accessibility interacts closely with other dimensions of urban livability, including housing, healthcare, education, and environmental services, indicating that transport accessibility represents one dimension of wider urban inequality (Majid et al., 2020). Regional connectivity initiatives such as the Master Plan on ASEAN Connectivity have sought to reduce these disparities through improvements in physical infrastructure and institutional cooperation; however, their effectiveness varies considerably depending on governance capacity, planning integration, and local implementation (Fau, 2016). Moreover, political economy perspectives emphasize that accessibility inequalities are not merely technical challenges but are also shaped by historical investment priorities, institutional arrangements, and unequal power relations that influence urban development trajectories (Macagba & Delina, 2024).

Previous accessibility research has developed numerous conceptual and methodological approaches to measure transport accessibility. Existing studies generally classify accessibility measures into infrastructure-based, location-based, and person-based approaches, reflecting different ways of evaluating people's ability to reach desired destinations (Marwal & Silva, 2022). Many empirical studies employ the built-environment "5D" framework density, diversity, design, distance to transit, and destination accessibility to explain variations in travel behavior and accessibility (Šulíková & Brand, 2021; Kim et al., 2022; Wali, 2023). Other investigations rely on indicators such as transit stop density, distance to public transport, network coverage, travel time, or transit ridership to quantify accessibility levels. Recent methodological developments increasingly incorporate web-based mapping technologies, activity-based measures, and spatial analytical techniques to capture accessibility more comprehensively (Marwal & Silva, 2022). While these approaches have significantly advanced accessibility research, they predominantly emphasize measurable spatial indicators and frequently overlook how individuals experience accessibility in their everyday lives.

Despite substantial progress in accessibility measurement, important knowledge gaps remain. Existing research is heavily concentrated in large metropolitan areas and is dominated by quantitative analyses using geographic information systems, accessibility indices, and transport modeling. Comparatively little attention has been devoted to medium-sized cities, even though these urban areas are experiencing rapid demographic growth and significant spatial transformation. Furthermore, relatively few studies investigate accessibility through qualitative, people-centered approaches that examine how residents perceive, negotiate, and adapt to transport constraints in their daily activities. Southeast Asian urban scholarship has specifically highlighted the need for grounded analyses that capture lived experiences, governance processes, and the political dimensions of accessibility, rather than relying exclusively on indicator-based assessments

(Padawangi, 2022; Macagba & Delina, 2024). Likewise, ASEAN livability studies have primarily employed composite indicators instead of exploring how marginalized residents experience transport accessibility in peripheral communities (Majid et al., 2020).

Another important gap concerns the integration of multiple stakeholder perspectives. Most previous studies focus either on transport users or on technical planning assessments, while comparatively few simultaneously examine the perspectives of residents, transport operators, and government institutions responsible for planning and service provision. Moreover, limited research has investigated how accessibility disparities evolve across multiple medium-sized cities using comparative qualitative case studies. Such approaches are essential because accessibility outcomes are strongly influenced by local governance arrangements, institutional capacity, fiscal conditions, urban form, and historical planning decisions, all of which vary substantially across cities (Fau, 2016; Pereira, 2018). Integrating qualitative evidence with established theories of accessibility, transport equity, transport-related social exclusion, and center–periphery development therefore offers considerable potential for advancing understanding of transport inequality in developing urban contexts.

Responding to these gaps, this study investigates public transport accessibility disparities in three Indonesian medium-sized cities Malang, Mataram, and Palu through a qualitative comparative multiple-case study. The research explores how residents living in urban centers and peripheral communities, together with transport operators and local government planners, perceive and experience accessibility differences. Particular attention is given to physical accessibility, service availability, connectivity, affordability, safety, socio-economic consequences, community adaptation strategies, and institutional constraints shaping accessibility outcomes. By integrating Accessibility Theory, Transport Equity, Transport-Related Social Exclusion, and the Center–Periphery Perspective, the study develops a comprehensive framework for understanding how spatial, operational, and institutional factors jointly produce accessibility inequalities. The findings are expected to contribute to the international literature by providing qualitative evidence from Indonesian medium-sized cities, extending existing accessibility research beyond metropolitan contexts, and generating policy recommendations that support more equitable, inclusive, and sustainable public transport planning.

METHOD

Research Design

This study adopted a qualitative research approach using a comparative multiple-case study design to investigate public transport accessibility disparities between urban centers and peripheral communities in Indonesian medium-sized cities. A qualitative approach was selected because the study seeks to understand how accessibility is experienced, interpreted, and negotiated by different stakeholders rather than to quantify accessibility through spatial indicators alone. Accessibility is recognized as a multidimensional concept encompassing transport services, land use, time, individual capabilities, and institutional arrangements. Consequently, understanding accessibility

disparities requires exploring the lived experiences of transport users alongside the perspectives of transport operators and public institutions.

The comparative multiple-case study design enabled the investigation of accessibility disparities across three medium-sized Indonesian cities Malang, Mataram, and Palu. Each city constituted a bounded case, while comparisons between urban centers and peripheral communities allowed the identification of recurring patterns as well as context-specific differences. This design follows qualitative transport accessibility research that employs city-based case studies to examine how accessibility is shaped by local transport systems, governance arrangements, and spatial development processes (Sunio et al., 2023). Comparative case study logic also facilitates cross-case synthesis by identifying mechanisms that explain similarities and differences among urban contexts (Rasmussen et al., 2012; Waring, 2019).

Study Area

The research was conducted in three Indonesian medium-sized cities representing different geographical regions and stages of urban development: Malang in East Java, Mataram in West Nusa Tenggara, and Palu in Central Sulawesi. These cities were selected because they exhibit comparable demographic characteristics while experiencing rapid urban expansion beyond their historical urban cores.

Within each city, one urban center and one peripheral community were selected to facilitate comparison. The study areas comprised Klojen and Kedungkandang in Malang, Cakranegara and Sandubaya in Mataram, and Palu Timur and Mantikulore in Palu. Urban centers generally possess relatively complete transport infrastructure and higher service frequency, whereas peripheral communities experience lower accessibility, weaker connectivity, and fewer transport services. Comparing these contrasting areas enabled the study to investigate how spatial location influences accessibility experiences.

Participant Selection

Purposive sampling was employed to recruit participants capable of providing rich and diverse information regarding public transport accessibility. Rather than seeking statistical representation, participant selection emphasized information richness and variation across stakeholder groups.

Thirteen informants participated in the study. They represented five stakeholder categories: residents living in urban centers, residents living in peripheral communities, vulnerable groups, transport operators, and local government planners. Urban and peripheral residents were selected because they regularly use or attempt to use public transport. Vulnerable participants included a person with disability, an older adult, and a female university student to capture accessibility challenges experienced by groups with differing mobility needs. Transport operators contributed

operational perspectives regarding service provision, while government representatives from the Department of Transportation and the Regional Development Planning Agency (Bappeda) provided institutional and policy insights.

The composition of participants enabled triangulation across user experiences, operational realities, and planning perspectives, thereby strengthening the depth of qualitative inquiry.

Data Collection

Data were collected through semi-structured interviews, field observations, and document analysis between the selected case study locations. Semi-structured interviews were chosen because they provide sufficient flexibility to explore participants' experiences while maintaining consistency across interviews.

Interview questions addressed physical accessibility, service availability, connectivity, affordability, safety, accessibility barriers, socio-economic impacts, adaptation strategies, and institutional constraints. Follow-up questions were used whenever participants introduced new issues relevant to accessibility disparities.

Field observations complemented interview data by documenting pedestrian infrastructure, bus stops, transport facilities, route characteristics, and surrounding land-use conditions. Observations were recorded using structured field notes and photographic documentation where appropriate.

Document analysis was conducted to provide contextual information regarding transport planning and governance. Documents included local transport master plans, regional spatial plans, transport policy documents, and official planning reports. Documentary evidence was used to corroborate interview findings and to understand institutional priorities influencing accessibility.

Using interviews, observations, and documentary evidence enabled methodological triangulation and produced a more comprehensive understanding of accessibility disparities than reliance on a single data source alone (Zarei et al., 2020).

Data Analysis

Data analysis followed the interactive qualitative analysis framework proposed by Miles, Huberman, and Saldaña, consisting of data condensation, data display, and conclusion drawing. Analysis began immediately after the first interviews and continued iteratively throughout the research process.

Interview recordings were transcribed verbatim before repeated reading to achieve familiarity with the data. Initial coding employed an open coding strategy in which meaningful statements relating

to accessibility were identified and labelled. Codes represented participants' descriptions of transport experiences, barriers, institutional issues, and adaptation strategies.

The second stage involved axial coding, during which conceptually related open codes were grouped into broader analytical categories such as physical accessibility, service availability, connectivity, affordability, safety, socio-economic impacts, community adaptation, and institutional constraints.

Selective coding was subsequently undertaken to integrate these categories into overarching themes describing the structure of public transport accessibility disparities. Five principal themes emerged: accessibility disparities, transport inequity, transport-related social exclusion, community adaptation, and institutional and spatial constraints.

Thematic analysis was conducted iteratively, allowing movement between empirical evidence, emerging concepts, and theoretical interpretation. Consistent with best practice in qualitative transport research, themes were developed through systematic comparison across interviews and supported by direct participant quotations and contextual interpretation (Mazengia et al., 2023).

Ensuring Research Trustworthiness

The study adopted the trustworthiness framework comprising credibility, transferability, dependability, and confirmability.

Credibility was enhanced through methodological triangulation by integrating interview data, field observations, and documentary evidence. Participants represented diverse stakeholder groups, enabling comparison of perspectives across residents, operators, and government institutions. Emerging interpretations were reviewed against interview transcripts to ensure that findings accurately reflected participants' experiences. These strategies are widely recommended in qualitative transportation research to strengthen confidence in interpretive findings (Rawal et al., 2024; Zarei et al., 2020).

Transferability was addressed through detailed descriptions of the study context, participant characteristics, transport systems, and analytical procedures. Providing rich contextual information enables readers to determine the applicability of findings to other medium-sized cities and transport settings (Lietz & Zayas, 2010; Singh et al., 2021).

Dependability was maintained through transparent documentation of methodological decisions throughout the research process. Interview protocols, coding procedures, analytical memos, and category development were systematically recorded to establish an audit trail. This documentation allows future researchers to understand how interpretations were generated and supports methodological consistency (Mathis et al., 2025).

Confirmability was strengthened through reflexive analysis and continuous comparison between empirical evidence and analytical interpretations. Coding decisions were repeatedly checked against original interview transcripts to ensure that findings remained grounded in participants' accounts rather than researcher assumptions. The integration of multiple evidence sources further reduced potential interpretive bias and enhanced analytical transparency (Zarei et al., 2020; Mathis et al., 2025).

Finally, the study followed widely accepted qualitative reporting principles emphasizing transparency in participant selection, data collection, analytical procedures, and quality assurance. Consistent with recommendations in qualitative transport research, clear documentation of methodological decisions improves the credibility and reproducibility of qualitative findings and facilitates their use in evidence-informed transport policy (Rawal et al., 2024; Mathis et al., 2025).

RESULT AND DISCUSSION

Physical Accessibility to Public Transport

The interviews revealed a consistent spatial disparity in physical access to public transport between urban centers and peripheral communities in Malang, Mataram, and Palu. Residents of central districts generally reported that public transport stops or informal boarding points were located within a manageable walking distance. By contrast, residents of peripheral communities frequently had to walk much farther, use motorcycle taxis, or rely on assistance from other household members before reaching a public transport route.

In Malang, the participant living in Klojen reported that the nearest public transport stop was approximately 300 metres from the residence and could be reached through relatively adequate pedestrian infrastructure. The participant from Kedungkandang, however, estimated that reaching the nearest active route required walking approximately 1.5 kilometres to a main road. Similar contrasts emerged in Mataram and Palu. Participants in Cakranegara and Palu Timur described public transport as relatively easy to reach, whereas participants in Sandubaya and Mantikulore reported either an absence of formal stops or dependence on motorcycle taxis to access the nearest service corridor.

These findings indicate that walking distance functions as a decisive component of effective public transport accessibility. This pattern corresponds with previous research demonstrating that proximity to stops strongly influences walking and public transport use. Shorter distances, greater stop density, and stronger transit centrality tend to support higher pedestrian activity and public transport participation (Kim et al., 2022; Cui et al., 2023; Marwal & Silva, 2022). Evidence from different urban contexts similarly shows that proximity thresholds can influence whether residents regard public transport as a practical travel option, particularly in areas with sparse networks (Zhou et al., 2018).

Pedestrian Infrastructure

Physical accessibility was shaped not only by distance but also by the condition of pedestrian infrastructure. Central-area residents generally described sidewalks and crossings as more available, although their quality remained uneven. Peripheral participants reported missing sidewalks, poor road surfaces, insufficient street lighting, and unsafe crossings. These deficiencies increased the effort and risk involved in reaching public transport.

The participant with a physical disability in Malang emphasized that several sidewalks could not accommodate a wheelchair because of uneven surfaces, obstacles, and discontinuities. The older participant in Mataram reported that walking long distances was physically exhausting and increased the fear of falling. The female student in Palu highlighted poor lighting along the route to public transport stops, particularly during evening travel.

The findings show that infrastructure quality determines whether the theoretical availability of transport can be converted into actual accessibility. Built-environment research similarly identifies density, diversity, street design, distance to transit, and destination accessibility as interconnected influences on walking and public transport use (Šulíková & Brand, 2021; Kim et al., 2022; Wali, 2023). Nevertheless, the interviews suggest that infrastructure improvements alone may be insufficient when routes remain infrequent or poorly connected. This supports the argument that pedestrian conditions operate together with broader service density, network centrality, and land-use configuration in shaping realized accessibility (Marwal & Silva, 2022; Kim et al., 2022).

First-Mile and Last-Mile Barriers

First-mile and last-mile barriers were especially prominent in peripheral communities. Participants frequently reached public transport only after using motorcycle taxis, walking long distances, or depending on relatives and neighbors. These additional journey stages increased travel time, cost, uncertainty, and physical burden.

The participant from Mantikulore stated that public transport could generally be reached only after taking a motorcycle taxi to the main road. The participant from Kedungkandang similarly relied on motorcycle taxis when carrying goods to the market. In Sandubaya, the absence of a feeder service required teachers and students to share vehicles or organize their departure around the limited availability of transport.

These experiences demonstrate that network coverage alone does not ensure accessibility. A route may technically serve a broader district, but its practical value remains limited when residents cannot reach its stops safely, affordably, and conveniently. Previous research using distance-to-stop, catchment-area, and two-step floating catchment area measures similarly shows that long access distances and low stop density reduce effective accessibility, particularly in peripheral areas (Zhou et al., 2018).

Availability, Frequency, and Reliability

Marked differences were also found in service availability. Urban-center residents generally reported that public transport could be found throughout most of the day. Estimated waiting times ranged from approximately five to fifteen minutes in Klojen, Cakranegara, and Palu Timur. In peripheral communities, waiting times commonly ranged from 25 to 50 minutes, and services were often concentrated in the morning and late afternoon.

The participant from Sandubaya explained that available services mainly corresponded with school hours. After the afternoon period, finding a vehicle became increasingly difficult. The participant from Mantikulore reported occasions when no public transport arrived, requiring a return home or the use of a motorcycle taxi. The female student in Palu also reported that services were almost unavailable at night, creating difficulties for evening academic activities.

Operators attributed low frequency to declining ridership and rising operating costs. The Malang paratransit driver stated that fewer vehicles now operated on several routes because passenger numbers had decreased. The Mataram bus driver explained that services were more frequent during peak periods but difficult to sustain in peripheral areas with dispersed demand. Government participants acknowledged that existing service frequencies had not consistently met expected service standards.

These findings show that accessibility is strongly temporal. Residents may live near a nominal route but remain poorly served when vehicles operate irregularly or only during restricted periods. Reliability was therefore as important as physical proximity in determining whether participants could plan daily activities with confidence.

Route Connectivity and Transfer Conditions

Connectivity disparities appeared through differences in route coverage, transfer requirements, and access to feeder services. Participants in urban centers generally described greater route choice and easier connections to terminals, workplaces, campuses, and public facilities. Peripheral residents often needed to transfer more than once or combine formal and informal transport.

The Kedungkandang participant commonly changed vehicles twice before reaching the destination. In Sandubaya, no direct feeder connected the residential area with the school and central transport corridors. The Mantikulore participant reported that existing routes primarily served main roads and did not extend into newer residential areas. The participant with a disability also stated that transfers were difficult because boarding points and vehicles were not designed for wheelchair users.

Transport operators confirmed that some routes had been shortened or discontinued because of low passenger demand. The Mataram operator noted that new settlements had expanded beyond the reach of established routes. The transport planner in Palu identified first-mile and last-mile integration as a central planning problem, while the regional planner in Malang stated that multimodal integration had become an objective but remained incompletely implemented.

Overall, the connectivity problem was not limited to the absence of routes. It also involved fragmented journeys, long transfer times, uncertain interchange locations, and poor coordination between modes.

Affordability and the Total Cost of Travel

Most participants considered the basic public transport fare relatively affordable. However, peripheral residents experienced substantially higher total travel costs because they frequently required motorcycle taxis, feeder trips, or repeated transfers.

The Kedungkandang participant described motorcycle-taxi expenses as exceeding the cost of the main public transport journey. The Sandubaya participant regarded alternative transport as expensive, especially when services were unavailable in the afternoon. The Mantikulore participant reported that transport expenditure consumed a significant portion of daily earnings. The participant with a disability incurred additional costs when travelling with a companion.

Consequently, affordability was determined by the entire journey rather than the official fare of one mode. Some participants reduced the number of trips, delayed activities, or relied on friends and relatives to control expenditure. The older adult in Mataram reported avoiding nonessential journeys because of both cost and physical difficulty. These findings demonstrate that low advertised fares do not necessarily produce equitable accessibility when first-mile, last-mile, and transfer expenses remain high.

Safety and Comfort

Safety concerns were more pronounced in peripheral communities and among vulnerable groups. Participants identified insufficient lighting, unsafe walking routes, inadequate shelters, poorly maintained stops, and uncertainty during night travel.

The participant from Kedungkandang described the route to the nearest transport point as dark. The participant from Mantikulore expressed concern about returning home after evening work, while the female student in Palu felt uncomfortable travelling alone at night. The participant with a disability described several access routes as physically unsafe because of discontinuous sidewalks and difficult boarding conditions. The older participant feared falling while walking over uneven surfaces.

Operators acknowledged the need to improve stop facilities and vehicle conditions but associated these deficiencies with limited financial resources. Government participants reported that stop revitalization and improved pedestrian facilities had been proposed, although implementation remained uneven across districts.

Socio-Economic Consequences

Accessibility disparities directly affected participants' access to employment, education, and healthcare. Central residents generally reported few disruptions, whereas peripheral and vulnerable participants described delayed arrival, restricted destination choice, and reduced participation.

The Kedungkandang vendor reported occasionally arriving late at the market because of long waits. The Mantikulore laborer stated that inaccessible locations limited the range of employment opportunities that could be accepted. The participant with a disability found it difficult to work independently because travel often required family assistance.

Educational effects included children arriving late at school, students struggling to return home after afternoon classes, and increased costs for university travel. The female student in Palu stated that transport difficulties interfered with internship activities. Operators also identified students as an important passenger group, particularly during peak school hours.

Healthcare access was similarly unequal. Central residents generally reported that clinics and hospitals were easy to reach. Peripheral participants relied on motorcycle taxis or private assistance, especially during emergencies. The older participant sometimes postponed health checks, while the participant with a disability required accompaniment to reach hospital services.

These outcomes demonstrate that transport accessibility disparities extend into broader forms of social exclusion by constraining access to essential opportunities and services.

Experiences of Vulnerable Groups

The three vulnerable participants experienced overlapping physical, temporal, economic, and safety disadvantages. The participant with a disability encountered inaccessible sidewalks, difficult transfers, and additional companion costs. The older participant experienced fatigue, fear of falling, long waiting times, and reduced travel. The female student faced limited night services, poor lighting, high travel costs, and difficulties accessing the campus directly.

Their experiences indicate that uniform transport provision does not produce equal outcomes. Individual capacities, gender, age, income, and physical conditions mediate the ability to use available services. Accessibility inequality was therefore both spatial and social.

Adaptation Strategies

Participants adopted several strategies to manage inadequate services. These included using motorcycle taxis, walking longer distances, sharing vehicles, travelling with family members, adjusting schedules, using private motorcycles, and reducing journeys.

Peripheral residents depended most heavily on informal or private transport. The Kedungkandang participant used motorcycle taxis, the Sandubaya participant shared vehicles with colleagues, and the Mantikulore participant travelled with neighbors when possible. The female student arranged carpooling with friends, while the older participant avoided journeys considered nonessential.

Operators also adapted by modifying routes, waiting until vehicles were sufficiently occupied, or concentrating services during peak hours. Although these strategies reduced immediate mobility constraints, they transferred the burden of inadequate service to users and operators rather than resolving the underlying accessibility gap.

Institutional and Spatial Constraints

Participants from transport agencies and operators associated accessibility disparities with budget limitations, declining ridership, high operating costs, uneven fleet distribution, rapid peripheral expansion, and historically urban-centered planning.

The Palu transport planner stated that limited local government resources constrained route expansion and service frequency. The Malang regional planner acknowledged that previous transport and infrastructure investment had concentrated on central areas. Operators emphasized that low passenger volumes made peripheral services financially difficult to sustain.

The cross-case evidence suggests that accessibility disparities emerge through the interaction of spatial growth and institutional capacity. Malang had the most extensive network but still displayed substantial peripheral gaps. Mataram showed moderate central accessibility and weak feeder integration. Palu exhibited the strongest disparity, particularly where residential expansion had extended beyond established routes.

Overall, the findings demonstrate a persistent center–periphery gradient. Central areas benefited from denser stops, shorter walking distances, higher frequency, and stronger connectivity, whereas peripheral communities faced sparse coverage, poor pedestrian access, longer waits, and greater dependence on informal transport. Similar gradients have been identified in other developing urban regions, although their severity varies according to governance, investment, urban form, and land-use integration (Surya et al., 2020; Gu et al., 2019; Zhou et al., 2018; Wang et al., 2021; Hassler & Ceccato, 2021; Yu et al., 2020). The present findings further show that these inequalities are

experienced not merely as differences in infrastructure, but as constraints on everyday participation, autonomy, and access to essential opportunities.

The findings demonstrate that public transport accessibility disparities in Malang, Mataram, and Palu are produced by the interaction of spatial location, service provision, pedestrian conditions, affordability, institutional capacity, and individual mobility needs. Residents in urban centers generally experienced shorter walking distances, denser route coverage, higher service frequency, and better access to essential destinations. By contrast, peripheral communities faced longer access distances, weak feeder services, extended waiting times, higher total travel costs, and greater dependence on informal or private transport. These patterns confirm that accessibility should not be understood merely as the presence of a route or vehicle, but as the practical ease with which people can reach employment, education, healthcare, and social activities.

Accessibility Theory provides a strong explanation for these spatial differences. Accessibility emerges from the relationship between transport networks, the location of opportunities, travel time, and individual capacity rather than from transport supply alone. Infrastructure-based, location-based, and person-based dimensions therefore need to be considered simultaneously when assessing whether a transport system provides meaningful access (Cui et al., 2023; Gu et al., 2019; Hassler & Ceccato, 2021). In the present study, central residents typically lived within a few hundred metres of public transport, while peripheral residents sometimes walked more than one kilometre or used motorcycle taxis to reach a service corridor. This finding is consistent with studies showing that short walking distances and higher stop density increase the probability of walking and public transport use, particularly when supported by strong network centrality and service availability (Kim et al., 2022; Cui et al., 2023; Gu et al., 2019; Zhou et al., 2018).

The findings also support a multi-scalar interpretation of accessibility. Local pedestrian conditions, including sidewalks, crossings, lighting, and surface quality, interacted with wider route structures, service frequencies, and land-use patterns. The 5D built-environment framework density, diversity, design, distance to transit, and destination accessibility helps explain why central districts generated more favorable conditions for public transport use than peripheral areas (Šulíková & Brand, 2021; Kim et al., 2022; Wali, 2023). However, the interviews show that improved pedestrian infrastructure alone would not fully eliminate accessibility barriers if services remain infrequent or poorly connected. Realized accessibility depends on the combined performance of the walking environment, service network, destination distribution, and first-mile and last-mile connections.

Transport Equity and Transport Justice further clarify why the observed differences represent more than technical inefficiency. Equity concerns the distribution of transport benefits and burdens across places and social groups. Peripheral residents experienced longer waits, more transfers, and higher total expenditure despite often having lower incomes and fewer alternative travel options. These burdens indicate a vertically inequitable system because groups with greater mobility constraints received comparatively weaker services. Equity-oriented transport assessment therefore requires attention not only to aggregate accessibility gains but also to who benefits from investment and who remains underserved (Pereira, 2018).

The results also reveal recognition and procedural dimensions of transport justice. Persons with disabilities, older adults, women, students, and low-income residents encountered distinct barriers that were not adequately addressed through uniform service provision. Difficult boarding conditions, inaccessible sidewalks, poor lighting, and the cost of travelling with a companion demonstrate that equal service supply does not necessarily produce equal accessibility outcomes. Transport Justice therefore requires recognition of differentiated mobility needs and meaningful participation by vulnerable groups in planning processes. Previous studies similarly argue that just transport systems depend on inclusive governance, affordability, reliability, and responsiveness to marginalized populations rather than infrastructure expansion alone (Pereira, 2018; Harris et al., 2015).

The socio-economic consequences identified in the interviews are consistent with Transport-Related Social Exclusion. Participants from peripheral communities reported lateness to work, restricted employment choices, difficulty attending school, delayed healthcare visits, and reduced social participation. These outcomes illustrate how transport disadvantage can become a mechanism of exclusion by limiting access to the activities through which people secure income, develop skills, maintain health, and participate in community life. Transport-related exclusion is therefore multidimensional, involving spatial, economic, temporal, physical, and social barriers that reinforce one another (Ahern et al., 2016; Xia et al., 2016).

The experiences of vulnerable informants further demonstrate that exclusion is produced through configurations of disadvantage rather than a single factor. For the participant with a disability, inaccessible sidewalks combined with difficult transfers and additional companion costs. For the older participant, long walking distances interacted with fatigue, fear of falling, and long waiting times. For the female student, limited night services combined with poor lighting and safety concerns. These overlapping conditions reflect the complex and context-dependent character of transport-related social exclusion described in configurational and comparative research (David et al., 2024; Geet et al., 2021; Sager & Andereggen, 2011; Verweij & Trelle, 2019).

The adaptation strategies reported by participants also require critical interpretation. Motorcycle taxis, carpooling, private motorcycles, assistance from family members, and reduced travel allowed residents to cope with inadequate services, but these responses shifted responsibility from institutions to individuals and households. Adaptation therefore mitigated immediate mobility constraints without resolving structural inequality. In some cases, coping strategies imposed additional financial costs or reduced personal independence. The decision to avoid nonessential journeys is especially significant because it represents suppressed demand and hidden exclusion rather than an absence of mobility need.

The Center–Periphery Perspective explains why these disparities persist across all three cities. Central districts attracted denser routes, better infrastructure, and greater investment because they concentrated commercial activity, employment, institutions, and existing passenger demand. Peripheral areas expanded more rapidly than transport networks, leaving new settlements weakly integrated with established service corridors. Similar patterns have been identified across Southeast Asian cities, where rapid urban growth often produces uneven access to services and persistent

peripheral disadvantage (Arfanuzzaman & Dahiya, 2019; Padawangi, 2022; Majid et al., 2020; Macagba & Delina, 2024).

Institutional evidence from operators and planners reinforces this interpretation. Budget constraints, high operating costs, declining ridership, limited subsidies, and fragmented coordination restricted service expansion. These conditions create a self-reinforcing cycle: low service levels reduce ridership, low ridership weakens operator revenue, and weak revenue discourages further investment in peripheral routes. Connectivity-oriented policies may seek to bridge core and peripheral areas, but their effectiveness depends on coordinated governance, land-use integration, and sustained financing (Fau, 2016; Geet et al., 2021). Peripheral accessibility therefore cannot be improved through isolated route additions alone.

The study has several policy implications. Local governments should prioritize feeder systems, reliable minimum service levels, accessible pedestrian infrastructure, and targeted operational subsidies for socially necessary peripheral routes. Transport and spatial planning must be integrated so that residential expansion is accompanied by service provision rather than addressed retrospectively. Accessibility assessments should combine infrastructure-, location-, and person-based measures to capture both spatial provision and lived experience (Marwal & Silva, 2022; Šulíková & Brand, 2021; Kim et al., 2022). Most importantly, planning should move from a demand-responsive logic based solely on existing ridership toward an equity-oriented approach that recognizes unmet and suppressed mobility needs. In this way, improving public transport accessibility can contribute not only to more efficient mobility, but also to greater social inclusion, spatial justice, and sustainable urban development.

CONCLUSION

This study demonstrates that public transport accessibility in the medium-sized Indonesian cities of Malang, Mataram, and Palu remains unevenly distributed between urban centers and peripheral communities. Residents in central areas generally benefit from shorter walking distances, higher service frequency, better route coverage, and stronger connections to employment, education, healthcare, and other essential destinations. In contrast, peripheral residents face longer access distances, limited operating hours, weak feeder services, extended waiting times, and higher total travel costs due to their dependence on motorcycle taxis, repeated transfers, or private vehicles.

The findings further show that accessibility disparities are multidimensional. They are not caused solely by the physical absence of public transport but also by poor pedestrian infrastructure, limited first-mile and last-mile connectivity, low service reliability, safety concerns, and inadequate accommodation of diverse mobility needs. These barriers are especially severe for persons with disabilities, older adults, women, students, and low-income residents. For these groups, transport disadvantage can restrict participation in employment, education, healthcare, and social life, thereby contributing to transport-related social exclusion.

A central contribution of the study is its demonstration that accessibility inequality emerges from the interaction of spatial, operational, economic, and institutional factors. The results support Accessibility Theory by showing that effective access depends on the relationship between land use, transport networks, walking conditions, travel time, and individual capabilities. They also reinforce Transport Equity and Transport Justice perspectives by revealing that the costs and benefits of transport provision are distributed unequally across locations and social groups. From a Center–Periphery perspective, the findings indicate that historical investment concentration, urban-centered planning, fiscal constraints, and fragmented institutional coordination continue to reproduce accessibility gaps in peripheral areas.

The study also identifies an important distinction between mobility adaptation and mobility inclusion. Residents frequently compensate for inadequate services by using motorcycle taxis, sharing vehicles, relying on relatives, adjusting travel schedules, or reducing travel. Although these strategies provide temporary solutions, they shift the burden of inadequate transport provision onto individuals and households. Reduced travel should therefore not be interpreted as low demand, because it may instead reflect suppressed mobility needs and hidden exclusion.

These findings have several policy implications. Local governments should prioritize integrated feeder services, minimum service standards for peripheral routes, inclusive pedestrian infrastructure, safer access to stops, and targeted operational subsidies. Transport planning should be coordinated with land-use development so that expanding residential areas are connected to public transport from an early stage. Accessibility assessments should also combine infrastructure-based, location-based, and person-based measures to capture both spatial provision and lived experience. More participatory planning processes are needed to ensure that vulnerable groups and peripheral communities influence service design and investment priorities.

The study contributes to existing knowledge by providing qualitative, multi-stakeholder evidence from Indonesian medium-sized cities, a context that remains underrepresented in international transport research. It extends accessibility research beyond metropolitan and predominantly quantitative approaches by demonstrating how residents, operators, and planners interpret and experience accessibility disparities in everyday life. Future studies should combine qualitative evidence with spatial and network-based accessibility measures, include larger and more diverse samples, and examine changes over time as new routes, feeder systems, or transport policies are introduced. Comparative research across additional secondary cities would also help determine which institutional and spatial conditions are most effective in reducing center–periphery transport inequalities.

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