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Gender Inclusion in Public Transportation: Assessing the Impact of Design, Policy, and Practices in Kathmandu's Urban Mobility

by:

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I hereby declare that the thesis entitled "Gender Inclusion in Public Transportation: Assessing the Impact of Design, Policy, and Practices in Kathmandu's Urban Mobility" which is being submitted to the Department of Architecture, Pulchowk Campus, Institute of Engineering, Tribhuvan University. Under the direction of Dr. Ajay Chandra Lal, I completed a research project as part of my master's degree requirements in urban planning (MsUrP). I declare that the work is my own and has not been submitted for a degree from another University.

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This is to certify they have read, and recommended to the Institute of Engineering for the acceptance, a thesis report titled "Gender Inclusion in Public Transportation: Assessing the Impact of Design, Policy, and Practices in Kathmandu's Urban Mobility" submitted by Ms. Prajina Shrestha (079-MSUrP-011) in the partial fulfillment of the requirements for the degree of Masters of Science in Urban Planning.

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ABSTRACT

Women in Kathmandu continue to encounter multiple challenges in accessing public transportation, including harassment, safety risks, and limited accessibility, all of which hinder their mobility and contribute to their social marginalization. This research explores gender inclusion in public transport by evaluating design elements, policy frameworks, and operational practices through surveys with 190 users, key informant interviews, and field-level observations.

The findings reveal that issues such as overcrowding, frequent harassment, and insufficient infrastructure particularly poorly illuminated bus stops and a lack of public toilets exacerbate women's vulnerability in transit spaces. Although policies like the Public Transport Code of Conduct exist, their weak implementation allows these problems to persist. Interventions such as low-floor buses, installation of CCTV cameras, and gender-sensitivity training for transport personnel demonstrate promising impact.

Drawing from the findings, this study proposes a context-specific framework for gender-inclusive public transportation, emphasizing the need for stricter policy implementation, improved infrastructure, and greater inclusion of women within the transport workforce. These recommendations aim to assist urban planners and policymakers in developing safer, more inclusive urban mobility systems.

Keywords: Gender Inclusion, Public Transportation, Safety Perception of women, Vehicle Design and Infrastructure

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Prajina Shrestha

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CHAPTER 1: INTRODUCTION

1.1 Background

Gender-based safety concerns in public transportation have long existed, but they are now receiving greater attention due to their significant impact on the mobility and everyday experiences of women and gender-diverse populations. Research indicates that public transport frequently serves as a setting for sexual harassment and violence, often resulting in altered travel behavior and heightened psychological distress among those affected. (Useche et al., 2024). In numerous urban areas, women frequently express feelings of insecurity while using public transport particularly in spaces like buses, metro systems, and bus stops an issue that becomes more pronounced during nighttime hours. (Ouali et al., 2020). The feeling of insecurity in public transportation is intensified by wider societal problems, such as crime and social inequality, which further amplify the difficulties encountered by women and gender-diverse individuals when navigating transit systems. (Panjwani, 2018).

In Nepal, as in many developing countries, road public transportation is operated by private individuals, encompassing buses, microbuses, tempos (three-wheelers), and taxis. (Das et al., 2024). The Department of Transport Management (DoTM) estimates that the average annual growth rate of vehicles in Kathmandu Valley is 14% (Aryal et al., 2022), although only 3% of registered vehicles in Kathmandu Valley are public transport (DoTM, 2020). Among these, over 94% are low-occupancy vehicles, such as minibuses and microbuses, which carry an average of 15-20 passengers (JICA, 2017). As of FY 79/80 1.9 million vehicle were registered in Bagmati Province. Although 12.33% of travelers use two-wheelers, these vehicles account for a staggering 79.1% of the total vehicle fleet. About 56% of Kathmandu has convenient access to public transportation i.e. access to bus stop (*Scoping Urban Transport in Kathmandu*, 2023). This imbalance intensifies the pressure on Kathmandu's public transport system, leaving numerous commuters without dependable alternatives (*Why Does Kathmandu's Public Transport Need a Complete Revamp?*, n.d.). Given that 83% of Nepali women are engaged in work, it is crucial to understand their unique transportation needs. As women frequently depend on public transport for work and education, it is essential to evaluate how well current systems address or fail to address these needs (Bajracharya et al., 2022; *Riding a Bus in Kathmandu*, 2014). Women frequently report feeling unsafe while using public transport

due to harassment and overcrowding. Studies indicate that personal insecurity is a significant concern for female commuters, with 33% citing it as a major issue compared to 16% of men. Addressing these safety concerns through research can lead to actionable solutions that enhance women's mobility (Gender and Public Transport, 2013). The physical design of public transport systems often overlooks the needs of women, particularly regarding safety features and accessibility. Research can identify specific design flaws that contribute to insecurity and discomfort for female passengers, leading to more inclusive infrastructure development (Bajracharya et al., 2022). Current policies designed to protect women in public transport, such as reserved seating, often fall short due to weak enforcement and deep-rooted societal attitudes. Research can assess the effectiveness of these policies and propose stronger frameworks that truly improve women's safety and mobility. There is a pressing need for policies that incorporate gender perspectives into urban transport planning. By understanding how gender affects travel behavior, policymakers can create systems that are fair and responsive to the needs of all users (“Women in Transport,” 2021).

1.2 Need for Research

Research shows that public transportation system designs often reflect male-centric perspectives, leading to environments that fail to fully address women’s safety concerns. Studies have highlighted that women are much more likely to feel unsafe in public transport settings than men, with factors such as the placement of bus stops and the quality of lighting playing key roles in shaping their experiences (Ouali et al., 2020). Moreover, the fear of harassment and violence in public spaces can discourage women from using public transport, resulting in social exclusion and restricted access to essential services (Kaygan et al., 2023). This underscores the urgent need for gender-sensitive design interventions that prioritize safety and inclusivity within public transportation systems.

Policy frameworks play a crucial role in addressing gender disparities in urban mobility. Gender mainstreaming in transport policies is essential for creating equitable systems that meet the diverse needs of all users. Research has highlighted the importance of incorporating gender considerations into urban planning and transport policies to improve women's mobility and safety(Basbas et al., 2023). For instance, the implementation of gender-specific policies, such as dedicated spaces for women on public transport, has been shown to enhance perceptions of safety and encourage greater use of these services

(Agrawal & Sharma, 2015). However, such measures need to be supported by broader social practices that challenge existing norms and foster gender equity in urban mobility.

The rise of ride-sharing platforms in Kathmandu has introduced new dynamics in gendered mobility. Although some platforms have incorporated gender considerations into their design, gender representation remains superficial, potentially overlooking deeper issues of gender-based violence. This calls for a more nuanced understanding of how gender is expressed and experienced in these contexts (Hamal & Huijsmans, 2022).

The existing literature inadequately addresses the safety concerns women face while traveling in Kathmandu (Gender and Public Transport, 2013). While there is significant discourse on urban transportation, there is a notable gap in understanding and addressing the specific safety challenges faced by women commuters navigating Kathmandu's transport infrastructure. Consequently, there is an urgent need for research that explores the intersection of gender, safety, and public transportation in Kathmandu. While some initiatives have focused on gender-specific aspects in transport planning, there remains a significant gap in understanding gendered mobility challenges, particularly concerning women's perceptions of safety in public spaces (Hanson, 2010).

1.3 Importance of Research

Addressing key issues of equity, safety, and accessibility in urban transport systems is complex and multifaceted. As urban populations grow, the need for inclusive transportation policies that account for gender differences becomes increasingly crucial. Research on gender inclusion and safety in public transportation is important because it can significantly enhance the quality of life for women and gender-diverse individuals. Women often face unique challenges in public transport systems, such as safety concerns and accessibility barriers, which can limit their mobility and participation in public life. Studies show that women are more likely to perceive public transport as unsafe compared to men, which can greatly influence their travel behavior and choices (Muhoza et al., n.d.). By identifying and addressing the specific safety concerns and barriers faced by these groups, public transport systems can become more inclusive and equitable (Panjwani, 2018). Furthermore, improving safety in public transport can lead to greater usage, promoting sustainable urban mobility and reducing reliance on private vehicles (Odufuwa, 2012). This research also has important implications for policy-making,

offering evidence-based insights that can shape the development of gender-sensitive transport policies and practices.

Research in this area can offer valuable guidance on best practices and strategies that can be applied to Kathmandu's public transport systems. Additionally, social practices and cultural norms play a significant role in shaping women's mobility and safety in urban environments. In many contexts, societal attitudes towards gender roles can limit women's movement and access to public transport (Muhoza et al., n.d.). Understanding these social dynamics is essential for creating interventions that not only improve physical infrastructure but also challenge and transform harmful social norms. Research exploring the interaction between social practices and transportation can help identify barriers to women's mobility and inform community-based strategies to promote gender equity in public transport.

1.4 Problem Statement

Nepal has an active female workforce, and women are becoming increasingly mobile. Urban public transportation is crucial for promoting equitable and inclusive mobility in cities like Kathmandu. However, achieving gender inclusion and safety in public transport remains a significant challenge. Gender disparities in urban mobility are evident in various aspects, such as safety concerns, accessibility, and the adequacy of transport services that cater to the specific needs of female commuters. Women often face heightened fears of violence and harassment in public spaces, which can lead to social exclusion and limit their mobility options (Gauvin et al., 2020). This fear is exacerbated by poor infrastructure, poorly designed transit environments, and insufficient policy frameworks that fail to address women's unique needs (Kaygan et al., 2023). A World Bank study highlights that personal insecurity is a major issue for female commuters, with women reporting increased vulnerability to harassment and violence while using public transport (Gender and Public Transport, 2013). Despite legal mandates such as Section 107 of the Vehicles and Transport Act, 1993, which requires reserved seating for women, these rules are frequently violated by public vehicles, as evidenced by the detention of 922 public vehicles in the fiscal year 2021-22 alone (*No Public Transport for Nepalis Living with Disabilities*, n.d.). Public transport facilities often fail to consider women's needs, such as safe waiting areas and well-lit bus stops. The lack of gender-sensitive design in public transportation affects not only women's safety but also their overall participation in economic and social activities (Dunckel-Graglia, 2013).

The Gender and Public Transport study (2013) revealed that women made up at least one-third of peak-hour passengers, and several studies emphasize the pressing need to explore the unique travel challenges women encounter within Kathmandu's transport system (Breezy, 2020; Hada, 2020). A report by ActionAid Nepal reveals that more than half of women in Nepal feel insecure while traveling on public transportation or walking around bus stands. Nearly 63% of female respondents regarded public transportation as the most unsafe means of travel ("Women in Transport," 2021). Gender-based differences highlight that personal insecurity, including fears of pickpocketing, injury, and various forms of sexual harassment, is a major issue, especially for women aged 19-25, who are nine times more likely to express concerns about personal safety than men of the same age group (*Riding a Bus in Kathmandu*, 2014). Kathmandu's public transport is often overcrowded, making travel uncomfortable and increasing the risk of harassment. Women, particularly those traveling with children or the elderly, face significant challenges navigating crowded buses and microbuses (Jupp, 2014). Reports of mistreatment by bus conductors and staff are common, with women frequently encountering verbal abuse or being ignored when seeking assistance (Kumal, 2024). While initiatives such as women-only buses have been introduced, they are not widespread enough to meet the needs of all female commuters (*Nepal's Women-Only Buses*, 2015).

Notably, Hada (2020) pointed out the lack of attention to women and gender relations in Nepal's transport context, emphasizing the need for a more gender-sensitive approach in transport policies. The concerns about overcrowding, unsafe boarding and alighting practices, and inadequate infrastructure design significantly affect women's access to safe and reliable transportation (Gender and Public Transport, 2013).

1.5 Research Objectives

The primary objective of this research is to evaluate how the design, policies, and operational practices of public transportation systems in Kathmandu can be enhanced to promote safety and inclusivity for women, while addressing gender-based challenges and barriers in urban mobility.

To support this primary objective, it is further divided into secondary objectives:

a. To assess the current public vehicle interior design, infrastructure, and operational practices and their impact on women's inclusivity.

b. To analyze the effectiveness of existing gender-related transportation policies in addressing inclusivity challenges.
c. To develop a localized framework for a gender-inclusive public transportation system tailored to Kathmandu’s urban context.

1.6 Limitations

Limitations of this study are as follows:

a. The study focuses solely on women, excluding other gender identities and vulnerable groups such as the elderly, disabled, and LGBTQ+ individuals.
b. Convenience sampling was used, which may limit the diversity of perspective.
c. The analysis was conducted only under predefined indicators: vehicle interior design, infrastructure, and operational practices.
d. The study was confined to selected routes within Kathmandu, which may not reflect the full range of women's mobility experiences across different urban areas.

CHAPTER 2: LITERATURE REVIEW

2.1 Concepts and Definitions

2.1.1 Gender

"Gender" refers to the socially constructed roles, behaviors, and identities associated with being male or female, as well as the relationships between them. The definition of gender has evolved to include transgender or third-gender categories, encompassing individuals who do not identify with all or some of the gender roles traditionally assigned to their biological sex as male or female. Gender identity is an individual's internal sense of self, which may align with or differ from the sex assigned to them at birth. It refers to how individuals perceive themselves and what they identify as, whether male, female, a blend of both, or neither (MoPIT, 2017).

2.1.2 Gender Equity

"Gender Equity" refers to the process of ensuring fairness and justice between women and men. It involves taking deliberate actions to achieve equality in the distribution of benefits, responsibilities, opportunities, and resources, addressing the unique needs and challenges faced by each gender. Gender equity aims to create an environment where both women and men have equal access to opportunities and are treated justly (MoPIT, 2017).

2.1.3 Gender Equality

"Gender Equality" refers to the concept that all individuals, regardless of gender, have the freedom to develop their personal abilities and make choices without being constrained by rigid gender roles. It involves recognizing, valuing, and supporting the different behaviors, aspirations, and needs of women and men equally, ensuring that both genders have the same opportunities and are treated with equal respect and fairness (MoPIT, 2017).

2.1.4 Social Exclusion

"Social Exclusion" describes the experience of groups that are historically disadvantaged because of discrimination based on income, gender, caste, ethnicity or religion or location (MoPIT, 2017).

2.1.5 Social Inclusion

"Social Inclusion" refers to a process that ensures individuals at risk of poverty and social exclusion have access to the opportunities and resources necessary for full participation in economic, social, and cultural life. It enables them to enjoy a standard of living and well-being considered typical in their society. Social inclusion also ensures these individuals have a greater role in decision-making on issues that affect them and access to resources, opportunities, and services, allowing them to exercise their fundamental rights (MoPIT, 2017).

2.1.6 Gender Inclusion

Gender inclusion is the process of ensuring equal access, opportunities, and participation for individuals of all genders in social, economic, and political spheres. It seeks to address systemic inequalities stemming from cultural norms, institutional biases, and historical discrimination. The focus of gender inclusion is to acknowledge and accommodate gender-specific needs, ensuring fair treatment and equitable outcomes for women, men, and other gender identities. It is essential for achieving gender equality and empowering marginalized groups. Gender inclusion plays a key role in creating environments where everyone, regardless of gender, can equally participate in decision-making, access services, and contribute to sustainable development (UN Women, 2020).

2.1.7 GESI Mainstreaming

Gender Equality and Social Inclusion (GESI) Mainstreaming refers to the process of recognizing and addressing the obstacles faced by women, the poor, and marginalized groups across all areas of infrastructure development. This includes policies, institutional systems, work environments, program and budget development, service delivery, as well as monitoring, evaluation, and research activities (MoPIT, 2017).

2.1.8 Public Transportation

Public transportation refers to a system of transport that encompasses various modes, such as buses, trains, subways, and taxis, which are accessible to the general public. It enables the movement of people between locations and can also be used for transporting goods. The key features of public transportation include efficiency, accessibility, and availability, allowing large numbers of passengers to travel conveniently and at an affordable cost. Public transportation is crucial for urban development, offering essential

mobility options that improve access to services like healthcare, education, and job opportunities (Janeau, 2023).

2.2 Gender Dimension to Transport

Women and girls constitute nearly half of Kathmandu Valley's population (49.38%) (Census, 2021). Despite their substantial presence, the region's transportation system frequently overlooks their specific mobility needs and safety issues. A survey by the World Bank found that women were twice as likely as men to report personal insecurity (33% versus 16%). Women's concerns primarily included fears of pickpocketing, personal harm, and various forms of sexual harassment while using public transport (Gender and Public Transport, 2013).

"Transport is not gender-neutral." This was the key takeaway from a high-level gender discussion organized by the World Bank and the World Resources Institute during the "Transforming Transport 2018" conference in Washington, DC, on January 11-12, 2018 (Gonzalez, 2018). It was the first time in the event's 15-year history that a plenary session was dedicated exclusively to the gender aspects of transport. Urban transport systems often place different burdens on women and men, yet transportation regulations in many countries remain oblivious to gender differences. Providing safe, comfortable, convenient, and affordable transport can meet women's practical needs, such as commuting to school or the market, while also contributing to their strategic empowerment by improving access to social and economic opportunities (Gonzalez, 2018).

Women may avoid traveling without a male or feel compelled to dress "decently" to avoid harassment. They may pass up better job opportunities further from home due to unreliable or unsafe transport options, choosing lower-paying local jobs instead. Girls may drop out of school due to the lack of dependable and affordable transport. Addressing these barriers requires implementing and reinforcing legal and institutional frameworks on gender equality while strengthening accountability mechanisms to ensure existing commitments are met. Achieving gender-inclusive transportation will demand strong political will and increased multi-stakeholder engagement. This includes collaboration among national and local governments, civil society organizations, private sector actors,

academic institutions, and media to ensure that women fully exercise their rights and benefit from development opportunities (Gonzalez, 2018).

Women tend to have different travel behaviors than men, typically making shorter trips and traveling more frequently during off-peak hours. They are more reliant on walking and public transportation, whereas men are more likely to use private vehicles (ESCAP, 2023). Economic inequality also affects women's transportation choices those from lower-income households are more inclined to walk or use public transport due to affordability, while women from higher-income groups are more likely to use private cars or taxis (ESCAP, 2023).

An important dimension of gendered mobility is the occurrence of "care trips," where women often travel to accompany children to school, run household errands, or provide caregiving support. These trips typically involve multiple stops, making conventional point-to-point transport systems less suitable for women's travel patterns (ITF, 2021). As a result, inclusive transportation planning must account for these complex travel routines and aim to ease the burden on female commuters. Safety remains one of the most pressing challenges for women using public transport. Research from cities like Jakarta and Kuala Lumpur reveals that women are significantly more likely than men to view public transit as unsafe, prompting them to avoid certain transport options or limit travel to specific times (Hidayati, 2023). In Jakarta, for instance, nearly 90% of women rated train safety poorly or very poorly, in contrast to just 35% of men (Priya Uteng & Turner, 2019). Sexual harassment continues to be a widespread issue in public transport systems throughout Asia. Surveys suggest that around two-thirds of women in the region have encountered harassment while commuting. Due to entrenched gender norms and a lack of sensitivity among transport personnel, these issues often go unaddressed. This highlights the urgent need for comprehensive safety measures, including improved lighting, CCTV monitoring, and training for transport staff (ESCAP, 2023).

Transport systems that are both sustainable and inclusive must account for gender-specific needs. Women's mobility patterns often differ significantly from men's and are shaped by enduring inequalities. In urban contexts, women typically shoulder a greater share of household-related travel, making more frequent trips for caregiving and domestic responsibilities. Enhancing women's mobility is essential not only for their empowerment providing access to economic and social opportunities but also for challenging restrictive

gender norms. Improved mobility for women, particularly in low-income households, can enhance access to employment and contribute to poverty alleviation. When evaluating transportation, women and men tend to prioritize different aspects. While men generally emphasize speed, often overlooking service quality or safety, women prioritize personal security, comfort, respectful treatment, and cleanliness. Despite the widely recognized reality that men and women experience cities differently, gender is often overlooked in transport planning. This is largely due to gender-blind urban development practices that prioritize infrastructure and real estate projects without considering who benefits from them or how equitably those benefits are distributed (Singhai & Singhai, 2021).

Globally, women use public transport more than men, particularly those from lower-income backgrounds. For instance, women represent about two-thirds of public transport users in France, 55% in the United States, and a majority in Germany (Hasson & Polevoy, 2011). Yet public transportation authority's often fail to collect gender-disaggregated data that could reveal women's specific mobility needs or the barriers they face—such as issues related to cost, access, information, and safety. This lack of targeted data contributes to an inadequate understanding of how well transport systems serve women and what unintended consequences may arise from gender-insensitive planning. Women's travel patterns also show more variation than men's. In Argentina, for example, over two-thirds of men's trips are for employment, while only half of women's trips serve the same purpose. In contrast, nearly one-third of women's journeys are for domestic activities, compared to only one-eighth for men. Based on these insights, Buenos Aires is now working to implement gender-responsive transport solutions (Gonzalez, 2018). In developing countries, gender disparities in mobility are especially pronounced, calling for urgent, gender-aware policy interventions. As mobility both influences and is shaped by gender relations, addressing this complex interaction requires transformative action through inclusive transport policies (Singhai & Singhai, 2021).

2.3 Gender Inclusion in Urban Transportation

An inclusive transportation system is vital for developing public transit that is accessible, safe, affordable, and efficient for everyone—including women, persons with disabilities, the elderly, and low-income communities. However, despite its importance, inclusivity in transport is frequently neglected in infrastructure development, particularly within Asia-Pacific regions(ESCAP, 2023). With increasing rates of urbanization and

motorization, it is now more critical than ever to implement gender-responsive and socially inclusive transport policies.

Gender inclusion within urban mobility is a key factor in achieving equitable and sustainable transportation networks. Studies consistently show that urban transport systems are not neutral when it comes to gender men and women use and experience transport differently due to varied social roles, safety risks, and financial constraints (Ollivier & Nikore, 2022). For example, women are more likely to take shorter trips, engage in trip chaining, and depend heavily on public transportation. Yet, urban planning often fails to accommodate these distinct travel behaviors, contributing to persistent inequalities in access and safety (Gauvin et al., 2020). Addressing these disparities requires targeted policies, inclusive community participation, enhanced safety infrastructure, and institutional capacity development to uplift underrepresented groups. Through gender-sensitive urban design and participatory governance, cities can become more inclusive, fostering equal access to mobility and strengthening both social and economic inclusion.

2.4 Gendered Impact of Poor Transport

Gender often plays a more influential role than either age or income when individuals decide on their preferred mode of transportation be it private vehicles, public transit, cycling, or walking. This tendency is largely shaped by several key factors:

2.4.1 Economic Potential and Labor Market Participation

The insufficiency and unreliability of transport services in Nepal greatly hinder women’s ability to participate in the economy. The Nepal Labor Force Survey (2017/18) reveals that women represent a mere 2% of the transport workforce, while men account for 98% (ESCAP, 2023). This significant gap not only highlights prevailing societal biases but also points to systemic challenges such as safety issues, non-standard work hours, and caregiving duties.

Poor transport infrastructure limits women’s mobility, often compelling them to choose lower-paying jobs near home over better opportunities further away. The scarcity of safe and affordable public transportation disproportionately affects women's access to formal employment, ultimately curbing their role in driving economic growth in Nepal (ESCAP,

2023). Tackling these transport-related constraints is key to unlocking women's economic potential and enhancing workforce diversity across the country.

2.4.1.1 Safety Concerns and Harassment in Public Transport

Sexual harassment remains a widespread and serious concern for women using public transportation in Nepal. This harassment often includes behaviors such as groping, catcalling, and intrusive staring, all of which discourage women from utilizing public transport. Such experiences significantly restrict their mobility, diminish their confidence, and hinder their access to educational and professional opportunities.

The issue is intensified by the lack of adequate safety infrastructure within the transport system. Poorly lit bus stops, limited surveillance, and a shortage of trained security staff contribute to an unsafe commuting environment. To combat these challenges, ESCAP (2023) advocates for the implementation of safety measures such as installing CCTV cameras, panic buttons, and improved lighting at transit points, alongside recruiting and training security personnel to enhance protection for women passengers.

2.4.2 Employment in the Transport Sector

Women's involvement in Nepal's transport sector continues to be notably limited. Although women make up 80% of Safa Tempo drivers in the Kathmandu Valley, they tend to earn less than their male peers due to operating on shorter, less profitable routes (ESCAP, 2023). Furthermore, their roles are largely restricted to conductors or administrative staff, with very few women occupying leadership or decision-making positions.

Initiatives aimed at boosting female employment in the sector have faced numerous obstacles, including inadequate infrastructure like gender-specific restrooms, demanding work hours, and persistent safety concerns. Even inclusive services such as Sajha Yatayat have made limited progress employing only a handful of women as drivers and conductors within a team of 250 staff members (ESCAP, 2023).

2.4.3 Barriers Faced by Women Passengers

Women passengers in Nepal face multiple challenges when using public transport, including:

- Safety Risks: Harassment by transport workers and fellow passengers.
- Rude Behavior: Unprofessional conduct by transport staff.
- Congested and Inconvenient Routes: Long commuting times and a lack of last-mile connectivity.
- Seat Reservations: Reserved seats for women are often occupied by male passengers, and enforcement is weak.
- Accessibility Issues: Women with disabilities face increased risks and physical challenges due to inaccessible infrastructure.

2.5 Feminist Approach to Urban Mobility

The feminist perspective on urban mobility critiques conventional, male-dominated planning models and calls for more inclusive and equitable transport systems that reflect the specific needs of women and other marginalized communities. Centering gender in mobility planning, this approach prioritizes safety, accessibility, and active participation as key factors in shaping urban environments that are inclusive and just for all (Palifrovska, 2024).

2.5.1 Historical Context of Feminist Urbanism

Urban planning has sidelined the needs of women and gender minorities by embracing male-centered frameworks that focus primarily on men's mobility patterns. As a result, urban spaces and transportation systems have been designed without fully considering the travel behaviors of women, who are more likely to make shorter, multi-stop trips during off-peak hours due to caregiving duties. In response to this systemic exclusion, feminist urbanism has developed as a movement promoting equitable, inclusive, and gender-responsive approaches to urban planning (Visakha, 2023).

2.5.2 Core Principles of Feminist Urban Mobility

A feminist approach to urban mobility is built on the following principles:

- Safety and Security: Prioritizing measures to ensure that women can navigate urban spaces without fear of harassment or violence. This includes better lighting, secure waiting areas, and the presence of security personnel in public transport.
- Accessibility: Designing transport systems that accommodate the needs of diverse users, including women, persons with disabilities, and elderly passengers.

Gender-responsive infrastructure such as low-floor buses and accessible sidewalks are essential.

- Affordability and Connectivity: Ensuring that public transport is affordable and well-connected to cater to women's complex travel patterns.
- Participation and Inclusion: Including women and marginalized communities in planning and decision-making processes ensures their perspectives are considered and their needs are effectively addressed (Haas & Mehaffy, 2024).

2.5.3 Safety as a Core Concern

Safety is a crucial concern influencing women's mobility in urban areas. The notion of being able to "walk at night without fear" highlights the unequal ways in which men and women navigate city environments. Feminist approaches to urban planning seek to address this by embedding safety measures into both city infrastructure and public transportation systems. These measures include adequate street lighting, secure and well-kept pedestrian routes, and dependable transit services available during early and late hours (Visakha, 2023).

2.5.4 Participatory Tools for Feminist Urban Mobility

Implementing feminist principles requires the use of participatory tools that empower women and marginalized groups to identify and address mobility challenges:

- Safety Audits: Community-driven assessments to evaluate the safety of urban spaces and transport routes.
- Exploratory Walks: Engaging women and marginalized groups in walks to assess urban mobility challenges and suggest improvements.
- Community Mapping: Visual representation of safe and unsafe spaces in the city, informed by local experiences.

2.5.5 Feminist Urban Design Strategies

Feminist urbanism advocates for city planning approaches that emphasize compact, mixed-use communities and walkable street designs. These strategies aim to minimize dependence on motorized vehicles while promoting mobility that is safe, sustainable, and accessible for all. Ideas like the "15-minute city" align with this vision by ensuring that

everyday services and amenities are reachable within a short walk or bike ride (Haas & Mehaffy, 2024).

2.6 Gender and Mobility Patterns

Gender is a dynamic concept that varies across different settings, serving as the framework through which distinctions based on presumed biological sex are created, interpreted, and given significance in specific contexts (Nightingale, 2006). The history of gender is complex, intertwined with how society has defined gender roles and the perceived differences between men and women. Gender roles are deeply rooted in historical and cultural contexts and reflect power imbalances arising from societal expectations and ascriptions. These roles have traditionally placed men and women in distinct domains, often leading to disparities in access to opportunities, resources, and social privileges. Gender, as a social construct, transcends biological differences and includes a range of attributes, behaviors, and roles assigned to individuals based on their gender identity. Understanding the complexities of gender is crucial for challenging entrenched social norms, advocating for gender equality, and promoting inclusivity in various aspects of life, including the workplace, education, and public transportation (Hanson, 2010).

Mobility refers to the physical movement of individuals within a given space, facilitated by various transportation options and infrastructure (Lehmann, 2020). It can also include the movement of goods or long-distance migration (Hanson, 2010). Urban mobility specifically pertains to all forms of movement within urban areas, encompassing both motorized and non-motorized transport and their spatial organization in the built environment (Singh, 2023). Mobility extends beyond just movement to include how individuals interact with their homes, communities, and society as a whole (Hanson, 2010). As such, understanding mobility requires considering social, cultural, and geographical factors, along with the specifics of location, time, and the people involved (Hanson, 2010). Additionally, mobility is not just about physical movement but also about the potential and ability to move (Cresswell & Priya Uteng, 2008).

The intersection of gender and mobility reflects the social constructs that shape access to space. Historically, public and private spaces have been associated with masculinity and femininity, reinforcing gendered divides (Cresswell & Priya Uteng, 2008). A feminist approach to mobility planning recognizes the challenges individuals face in navigating

spatial inequalities, evaluating how transportation systems either facilitate or limit access to public spaces, resources, and independence (Joelsson & Scholten, 2019). The study of gender and mobility dates back to the 1970s, when feminist transport geographers and urban planners began exploring differences in travel behaviors between men and women (Law, 1999). By analyzing mobility patterns, researchers have connected gender relations, transportation choices, accessibility, and the spatial and temporal organization of daily life. This perspective underscores mobility's crucial role in promoting social inclusion and equity in urban settings.

Research shows that women generally travel less frequently and cover shorter distances than men, highlighting distinct gendered mobility patterns. These differences emphasize the need for gender-sensitive urban transportation planning to ensure inclusivity and fairness (Moriarty & Honnery, 2005). A study by Astrop et al. (1996) on travel behavior in low-income households in Pune, India, revealed that women primarily rely on walking for short trips and buses for longer commutes, while men tend to use motorcycles or scooters in addition to family vehicles. Similarly, research in Pakistan found that women make half as many trips as men, with a large portion of their travel relying on public transport (Adeel et al., 2014).

These findings illustrate how mobility constraints can affect women's daily lives, particularly in terms of leisure time due to longer travel durations. Understanding these gender-specific travel patterns is vital for developing transport policies that promote

accessibility and equity.

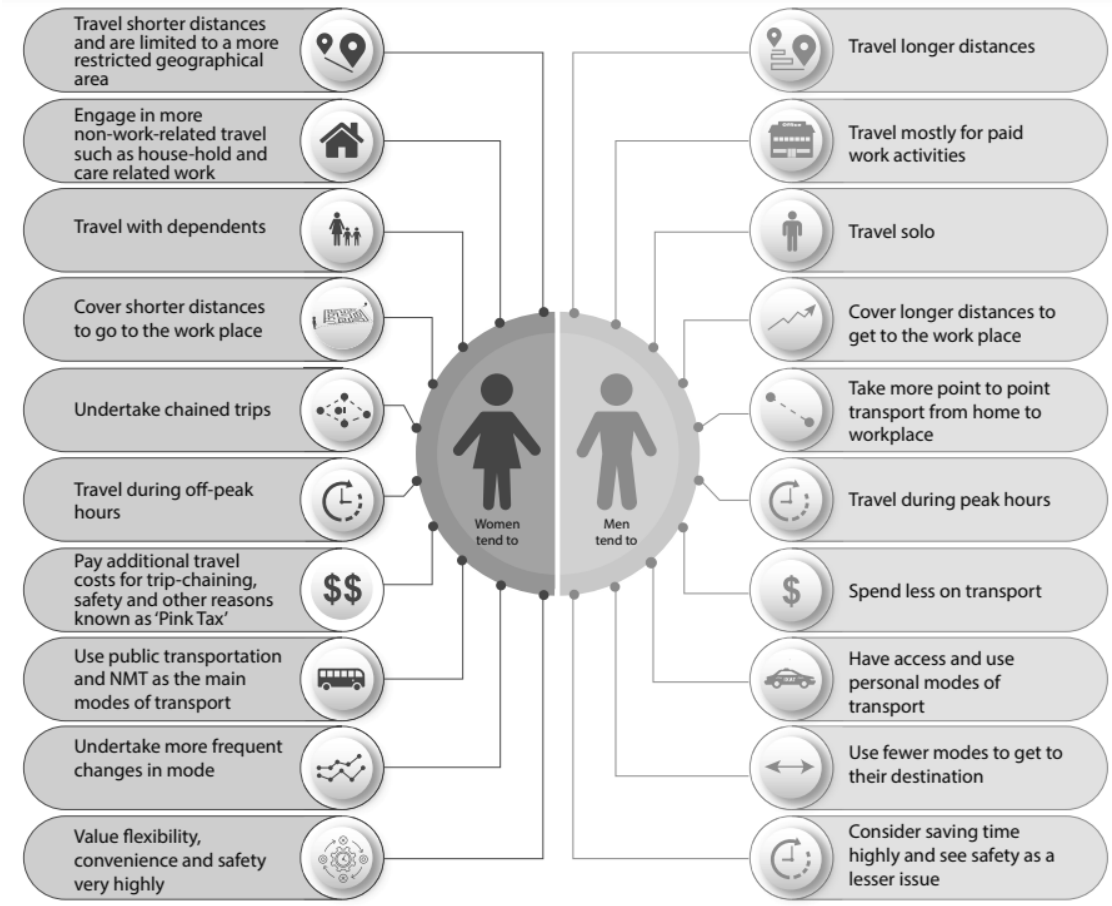

Figure 2.1 Difference in mobility pattern between men and women

(Ollivier & Nikore, 2022)

2.7 Safety Perception of Women in Public Transport

Women's perceptions of safety significantly influence their transport choices, affecting decisions related to routes, travel times, and modes of transport. Research explores the complex relationship between gender, safety perceptions, and transportation decisions, considering external factors such as spatial layout and socio-cultural influences, alongside internal factors like personal characteristics. Understanding these interactions is key to developing inclusive and effective transport policies (Hidayati et al., 2020).

The perception of safety for women while traveling is a complex issue shaped by multiple factors, including urban planning, infrastructure, transport management, and concerns about harassment. Women's feelings of safety in public spaces and on transportation systems can vary based on their social, cultural, and economic backgrounds, age, frequency of transport use, and how long they have lived in the city (Mishra, 2022).

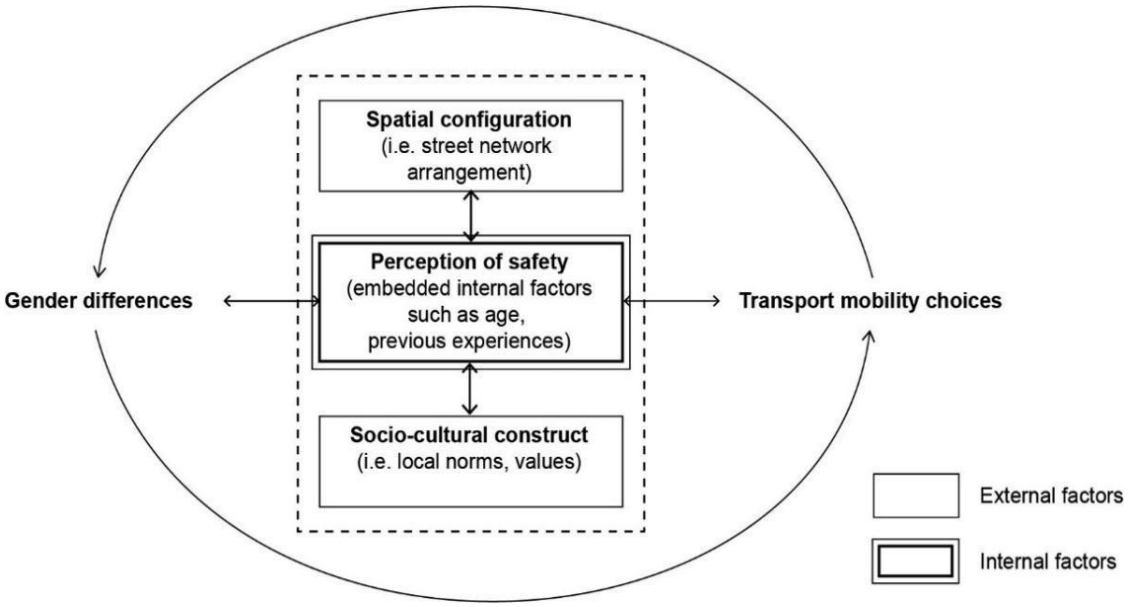

Figure 2.2 Gender differences in transport mobility choices

(Hidayati et al., 2020)

The role of urban planning and design in creating safe, inclusive public spaces is critical, particularly when it comes to women's mobility and safety in urban settings. One of the key issues is the lack of sufficient street lighting, which leads to poorly lit public areas and increases feelings of insecurity, especially at transport stops. Inadequate infrastructure, including poorly designed transport stops and obstructed footpaths, creates additional barriers to mobility. Moreover, the absence of basic facilities, such as public toilets and drinking water stations, further limits accessibility and comfort for women in public spaces. These challenges often force women to adapt their travel habits, such as avoiding poorly lit areas, traveling in groups for safety, or opting for longer but better-lit routes to mitigate perceived risks.

Urban planning directly shapes women's mobility patterns and safety perceptions, making it essential to adopt a comprehensive approach that incorporates well-lit spaces, accessible routes, and amenities designed with women's specific needs in mind. Prioritizing these aspects allows urban planners to enhance women's safety and inclusivity in public spaces, contributing to a more secure and comfortable environment for all.

Overcrowding in public transport is another significant challenge impacting women's safety. Crowded vehicles increase the risk of harassment, both physical and visual, leading to discomfort and potential threats. To cope with this, women often wait for less crowded vehicles, opt for more expensive travel options, or adjust their schedules. The prevalence of harassment, especially sexual harassment, exacerbates these concerns and influences women's decisions regarding their education and employment opportunities. Many women take self-defense measures, such as traveling in groups, using safety apps, or carrying pepper spray (Gender and Public Transport, 2013).

Ensuring safe mobility is crucial for women, as it affects their access to opportunities, productivity, confidence, and overall quality of life. Addressing safety at every stage of the journey from waiting at stops to boarding and traveling inside vehicles is vital. By prioritizing safety in these aspects, urban planners and policymakers can create environments where women feel confident and unrestricted, enabling their full participation in urban life.

The layout of urban spaces, in conjunction with socio-cultural factors, influences how women perceive safety in public spaces. For example, streets that are desolate or lack visibility can heighten feelings of vulnerability. These spatial configurations can affect travel decisions, with women often avoiding such areas due to safety concerns. Understanding the interaction between spatial design and cultural factors is essential for urban planners and policymakers aiming to improve safety and create secure environments for all, regardless of gender (Hidayati, 2023).

2.8 Influence of Design and Built Environment

Research consistently indicate that women have unique mobility needs compared to men, largely due to caregiving duties and trip chaining, where they make several stops on a single journey to complete family-related tasks. The International Transport Forum report highlights that women tend to use public transport more than men, with their trips being shorter but more frequent ("Women in Transport," 2021). This emphasizes the importance of designing transport systems that account for women's travel patterns, a factor frequently neglected in male-dominated planning processes.

2.8.1 Enhancing Safety through Environmental Design

A gender-sensitive design approach considers the particular safety and comfort requirements of vulnerable groups in the design of buses, bus stops, and transit hubs. The Crime Prevention through Environmental Design (CPTED) theory suggests that the way the physical environment is designed and managed can minimize crime opportunities and boost public trust in transportation systems (Cozens, 2003).

Key design elements include:

- **Lighting and Visibility:** Proper lighting in buses, bus stops, and surrounding pathways can help minimize the risk of harassment and improve safety perceptions, especially during nighttime. Areas with inadequate lighting are often linked to higher crime rates and lower usage by women. (Mowri et al., 2024).
- **Surveillance Features:** Installing CCTV cameras, panic buttons, and implementing clear emergency protocols in buses and transit areas deter criminal activity and ensure swift responses in unsafe situations.
- **Seating Arrangements:** Dedicated seating for women and accessible seating for the elderly and disabled contribute to a more inclusive experience. Unregulated seating and overcrowding create opportunities for harassment and discomfort.

2.8.2 Promoting Accessibility and Inclusivity

Creating transport systems that cater to all users, including people with disabilities, children, and elderly passengers, is vital for promoting inclusivity. Essential features like low-floor buses, ramps, wide doorways, and accessible walkways are necessary for smooth boarding and alighting. In Kathmandu, the lack of such infrastructure poses a major obstacle, restricting the mobility of vulnerable groups. Gender-sensitive infrastructure upgrades should focus on meeting the needs of these users, ensuring fair access to transportation services (Mowri et al., 2024).

2.8.3 Addressing Psychological Comfort

The design of public spaces and transport systems directly influences psychological comfort. Women and other vulnerable groups feel safer in environments with clear visibility and fewer secluded areas (Cozens, 2003; Mowri et al., 2024). In contrast, poorly maintained infrastructure and overcrowded buses lead to stress and discourage the use of public transport. Safety audits have proven effective in identifying problematic areas and driving design improvements (Whitzman et al., 2009). By considering the lived

experiences of women and marginalized groups, these audits provide practical recommendations that enhance psychological comfort and support more inclusive urban spaces.

2.9 Segregated Transport Provision

Women-only transport services have become increasingly popular in South Asia as a response to widespread safety concerns women face in public transportation. These services include reserved seats on public buses, women-only sections in metro systems, and ride-sharing services operated exclusively by women (Harrison, 2012). These initiatives aim to create a safer and more comfortable commuting environment for women, addressing issues such as harassment, overcrowding, and the absence of gender-sensitive infrastructure.

The provision of segregated transport, especially women-only spaces, has arisen as a response to the persistent issue of sexual harassment in public transport systems worldwide. Governments have introduced measures like ladies' coaches, segregated buses, and dedicated taxis to improve safety for women commuters (Shah et al., 2017). While these initiatives are often low-cost and quick to implement, they have sparked debates about their effectiveness and their impact on gender equality.

Studies on women-only compartments in the Delhi Metro, India, show that these spaces positively affect women’s travel experiences. Research indicates that these compartments help women feel relieved from the constant vigilance required in mixed-gender spaces, promoting a shift in travel behavior. This shift allows women to move from relying on male companions to achieving greater autonomy in their journeys. Observations also show a friendly and supportive atmosphere, with women engaging in conversations and sharing experiences, such as watching television shows together on mobile screens (Seki & Yamada, 2020). Supporters argue that these women-only compartments, such as those in the Delhi Metro, offer a sense of security and comfort, helping women travel without the constant alertness needed in mixed-gender environments. These spaces enable women to gain independence from male chaperones and create a welcoming environment where they can connect with others during their commutes (Gopal & Shin, 2019; Khurana, 2020). Observations revealed a friendly atmosphere where women engage in conversations and share experiences during their journeys (Dunckel-Graglia, 2013).

2.9.1 Critiques of Segregated Transport Solutions

Despite their widespread adoption, women-only transport services have faced criticism for being short-term fixes that do not address the underlying causes of gender-based violence. Gekoski et al. (2015) argue that segregation shifts the responsibility for safety onto women, requiring them to avoid mixed-gender spaces instead of addressing the behavior of the perpetrators. Peters (2013) further claims that while segregation may reduce immediate risks, it does not prevent violence; rather, it only delays it. This approach also reinforces the male-dominated nature of public spaces, implying that women need separate spaces to feel safe.

Moreover, implementing segregated transport services presents significant challenges. Haider (2017) points out issues such as high operational costs, poor maintenance, and limited availability. For instance, Rahman's (2010) study on women-only buses in Bangladesh found infrastructural deficiencies, such as insufficient seating, water leakage during rain, and poor ventilation. These services are also economically unfeasible, with low ridership during off-peak hours and limited route coverage, leaving working-class women in informal sectors excluded (Rehman & Khalid, 2016).

Another important issue is the exclusion of transgender and non-binary individuals. Shah et al. (2017) note that women-only spaces can be hostile to those who do not conform to traditional gender norms, such as sex workers or lesbians in "butch attire." This exclusion further perpetuates patriarchal norms and limits the inclusivity of segregated transport solutions.

2.9.2 Women-Only Buses in Kathmandu

In response to rising incidents of sexual harassment and groping on public buses, the Nepalese government launched women-only buses in Kathmandu in January 2015. This initiative, introduced by the Bagmati Federation Transport Union, aimed to create a safer commuting environment for women during peak hours. Initially, four 17-seater minibuses were deployed on a busy east-west route, operating during the morning and evening rush hours. The buses were prominently labeled with "women-only" signs to ensure they were reserved exclusively for female passengers (*Nepal's Women-Only Buses*, 2015).

Figure 2.3 Women Only Bus in Kathmandu (Balkot to Kalanki)

(*Nepal's Women-Only Buses*, 2015)

Purpose and Implementation

The primary goal of the women-only buses was to reduce incidents of sexual harassment and create a safer space for women in public transportation. The initiative reflected a broader commitment to addressing gender-based violence and improving women's mobility in Kathmandu. While the service was initially limited, there were plans to expand it based on its success and public reception.

Operational Structure

The women-only buses were operated by male drivers, with at least one female conductor on board. Authorities expressed intentions to hire more female drivers and conductors to further enhance the safety and inclusivity of the service. However, finding qualified female candidates proved challenging, highlighting systemic barriers to women's participation in the transport sector.

Public Reception

The response from female commuters was largely positive. Many women reported feeling safer and more comfortable using the women-only buses, particularly during nighttime travel when risks of harassment are heightened. For instance, a student noted that the availability of these buses significantly alleviated her safety concerns, allowing her to travel with greater peace of mind.

Impact on Gender Awareness

The introduction of women-only buses also contributed to raising awareness about gender-based violence and harassment in public transportation. It sparked discussions around women's rights and safety in Nepalese society, challenging societal norms and encouraging a broader dialogue on gender inclusion in urban mobility.

2.9.3 Challenges and Limitations

Although women-only buses in Kathmandu were initially welcomed, they encountered numerous limitations. Their limited fleet size and operation restricted to peak hours made them less accessible, particularly for women engaged in informal work or traveling at off-peak times. Moreover, the continued employment of male drivers and the absence of gender-sensitivity training for transport personnel revealed shortcomings in the program's execution. These issues point to the need for a more integrated and sustainable strategy to combat gender-based violence in public transport.

Such exclusive services mark an important preliminary measure in improving safety for women in transit. While they offer short-term relief, they do not resolve the deeper structural issues of harassment and gender discrimination. Long-term progress requires the development of inclusive and gender-responsive transport systems that cater to the diverse needs of all users, including transgender and non-binary individuals. A holistic approach combining inclusive design, supportive policies, and active community involvement is essential for cities like Kathmandu to ensure safe, equitable, and accessible urban mobility for everyone.

2.10 Transport Policies and Legislation in Nepal

Nepal's transport policies and legal frameworks have increasingly incorporated goals of gender inclusivity and safety. Although significant progress has been made, there are still persistent challenges in ensuring the effective implementation and enforcement of these initiatives to build a truly gender-responsive transportation system.

Table 2.1 Transport-related legislation and policies in Nepal

(Choo, n.d.)

Documents	Women in transport workforce	Women passengers

Motor Vehicle and Transport Management Act 1993		Seat reservations for women, PWDs
Motor Vehicles and Transport Management Rules 1997		Extending convenience to women
National Transport Policy		
Transport Codes of Conduct 2011	Priority hiring of women staff in public transport	Safe & inclusive public transport system for women
Road Maintenance Group Guidelines 2016		At least 33% of women members in the committee

2.10.1 Public Transport Code of Conduct

The Public Transport Code of Conduct establishes a set of guidelines designed to foster safe, inclusive, and efficient urban mobility. A central element of the code is the emphasis on respectful communication within public vehicles. Drivers and conductors are expected to interact courteously with passengers, while male passengers, in particular, are encouraged to speak respectfully when addressing women. The code promotes the creation of a welcoming and secure environment for all passengers, with special attention to women, children, and the elderly. To support gender-sensitive service, operators are responsible for educating their staff and raising awareness on these issues.

Regarding boarding and alighting procedures, the code stipulates that passengers must use designated stops and follow orderly conduct. This is intended to improve operational efficiency and ensure passenger safety, especially for women. The code requires that specific seats be reserved for women and individuals with disabilities, while priority seating is also mandated for the elderly, the sick, pregnant women, and those with young children. Night-time service guidelines further prioritize women's seating needs, and drivers and conductors are expected to provide them with additional attention and support.

Addressing harassment is another vital component of the code. Public vehicles should display messages discouraging gender-based violence and promote respectful behavior. Legal mechanisms are in place to address sexual harassment, empowering authorities to

act against offenders. Awareness initiatives targeting both staff and passengers are encouraged to reinforce a culture of gender sensitivity.

The code also mandates transparency in fare systems. Vehicles must clearly post fare rates and ensure that passengers are not overcharged. Operators are forbidden from exceeding government-set fares, and the vehicle's registration number must be prominently displayed for easy identification.

Lastly, the code underscores the importance of maintaining vehicle standards. Public transport vehicles must be clean, well-maintained, and comfortable for passengers. Regular inspections are required to ensure reliability and punctuality, with vehicles expected to adhere to their scheduled routes and stops. Together, these provisions aim to enhance public transport services, prioritizing safety, inclusivity, and accessibility for women and other vulnerable groups.

2.10.2 Motor Vehicle and Transport Management Act of 1993

The Motor Vehicle and Transport Management Act of 1993 served as an initial framework for promoting inclusivity in public transportation by incorporating fundamental gender-sensitive provisions, including reserved seating for women and persons with disabilities (PWDs). This legislation represented an essential early effort to recognize the unique needs of vulnerable groups and to ensure a basic standard of accessibility and comfort for women passengers.

2.10.3 Motor Vehicles and Transport Management Rules of 1997

Expanding on the foundation laid by the 1993 Act, the Motor Vehicles and Transport Management Rules of 1997 broadened the scope of inclusivity by incorporating provisions for elderly passengers, children, and persons with disabilities (PWDs). This development emphasized the importance of addressing the varied needs of commuters, reflecting a shift toward a more accessible and equitable public transport system.

2.10.4 National Transport Policy (2001/02)

The National Transport Policy of 2001/02 set out a strategic framework for the development of transportation, but it did not specifically address gender-related issues. The lack of attention to gender in this policy highlights the need for more focused efforts to ensure inclusivity and safety for women and other vulnerable groups.

It has been over a decade since the 2001 transport policy was established. The policy was designed to promote transportation services in remote areas of Nepal with minimal resources, improve the reliability of existing transport infrastructure, and create an environmentally sustainable transportation system in both rural and urban areas. The 2001 policy introduced important goals for enhancing public transport, including improving comfort, reliability, safety, frequency, availability, and affordability, while also reducing harmful emissions from public transport. To achieve these objectives, the policy outlined provisions for maintenance, route management, and standards, which were considered promising initiatives.

The Department of Transport Management (DoTM) is responsible for issuing route permits, although no agency is designated specifically for route planning. As a result, the transport network has developed primarily through the efforts of various operators' associations. Another key element of the policy is the development of urban transport infrastructure in alignment with the urban development master plan. While local authorities are empowered to manage local needs, the national government retains significant responsibility for transportation infrastructure and urban environmental management decisions.

The 2001 National Transport Policy also includes several important actions for urban transport management, such as:

- To restrict motorized vehicles in prescribed core areas.
- To operate bus, tram and other vehicles powered by gas, electricity and solar power.
- Not to allow more motor vehicles than the certain density. For this purpose, the means of controlling vehicle ownership and city parking fee shall be taken up.
- Arrangement shall be made as to not allowing parking except in specified places.
- Sound and air polluting vehicles shall be restricted. To manage separate standard for the vehicles operating in the urban area.
- The infrastructure and services of transport shall be developed and expanded according to the long-term planning of Kathmandu Valley.

However, National Transport Policy 2001 is mainly focused mainly on infrastructures i.e. road network rather than holistic approach focusing on other aspects of transportation.

2.10.5 Transport Codes of Conduct (2011)

The implementation of the Transport Codes of Conduct in 2011 represented a major step forward. This policy focused on increasing the participation of women in the transport workforce, encouraging them to take on roles such as drivers, conductors, and other positions. By boosting the representation of women in the historically male-dominated transport sector, the policy sought to create a safer and more inclusive environment. Furthermore, the Codes of Conduct introduced measures aimed at making transportation more affordable and safer for women, elderly individuals, and persons with disabilities, thereby improving their confidence in using public transport.

2.10.6 Road Maintenance Group Guidelines (2016)

The Road Maintenance Group Guidelines of 2016 highlighted the significance of involving women in decision-making processes concerning transport infrastructure. The guidelines required that at least 33% of the members in road maintenance or user groups be women, thereby enabling them to represent their unique needs and viewpoints during policy implementation.

2.10.7 Article 38 in the Constitution of Nepal 2015

Article 38 of the Constitution of Nepal 2015 guarantees women the right to engage in all state institutions and ensures their entitlement to affirmative action and special employment opportunities. Furthermore, Article 253 assigns the National Women Commission the responsibility of promoting gender integration across different sectors, including transportation.

2.10.8 Other Relevant Legislation and Strategies

The Public Offences and Penalties Act of 1970 classifies sexual harassment as any verbal or physical actions of a sexual nature. The law stipulates a fine of about USD 120 and the possibility of imprisonment as penalties. However, enforcement of this law remains inadequate (IRIN, 2012).

Criminal Code (Muluki Ain): Criminalizes rape, sexual assault, and sexual harassment, thereby addressing violence against women (VAW) in public spaces.

Five-Year National Strategy and Plan of Action for Gender Empowerment and Ending **Gender-Based Violence:** This strategy emphasizes a comprehensive approach to combating gender-based violence.

National Transport Management Strategy: The Government of Nepal's overarching strategy aims to develop a safe, efficient, and environmentally friendly transport system. Under the second pillar, 'Management of Road Transport,' there is specific reference to the particular needs of women in transport.

Code of Conduct for Transport (2010): A booklet jointly published by the Department of Transport Management, Traffic Police, Nepal Entrepreneurs Federation, and the National Women's Commission. It includes guidelines to protect the rights of women, children, senior citizens, and PWDs in public transport.

2.11 Gender Inclusive Policies and Practices around the World

Across cities globally, public transportation systems are being assessed from a gender perspective, acknowledging that women's experiences with mobility differ greatly from those of men. This difference is shaped by factors like safety issues, cultural expectations, and caregiving duties, all of which impact how, when, and why women use public transport.

2.11.1 Case of Lucknow, India

An evaluation of public bus services in Lucknow emphasized the changing role of public transport in meeting women's distinct mobility needs. Singh (2016) identified that safety concerns, particularly the fear of harassment, often discourage women from using buses. This insight has led to a push for public transportation systems to focus on attracting and retaining a more diverse user base, including women. The study highlights the importance of prioritizing women's safety by incorporating their experiences and feedback into service design. Key measures like better lighting, designated seating for women, and security features such as CCTV and alarms are essential for ensuring a safer commuting environment (Singh, 2016).

2.11.2 Case of Cape Town, South Africa

The way gender influences mobility worldwide highlights how social norms, regulations, and urban design affect the inclusivity and safety of public transportation systems. Cape

Town, South Africa, is a key example where public transportation spaces reflect broader societal trends. Rink's (2022) research emphasizes that bus services in Cape Town are deeply affected by both the conditions of carriage and the social dynamics within these spaces. Women's experiences of mobility are shaped not only by the physical infrastructure but also by the social behaviors, norms, and power relations present in public spaces (Rink, 2022).

- **Conditions of Carriage:**

Rules and guidelines governing passenger behavior on public transportation play a crucial role in shaping perceptions of safety and inclusion. In Cape Town, the absence of enforceable regulations allowed harassment and discriminatory practices against women passengers to go unchecked.

- **Social Norms:**

Gendered social norms dictate who feels entitled to use public spaces, including transport. Women in Cape Town often reported modifying their travel behavior to avoid harassment or unsafe situations, reflecting the broader gender power imbalance.

- **Need for Cultural Shifts:**

The study emphasized that fostering a culture of respect within public transportation systems is critical. Establishing clear behavior guidelines and ensuring their enforcement are foundational to promoting gender-inclusive mobility.

2.11.3 Practices of Gender Inclusiveness in the City of Vienna

The City of Vienna has taken a proactive approach to advance gender equality over 30 years by practicing gender mainstreaming in city building and policy making (Wood, 2020). The increased participation of women in architectural design has influenced the development of buildings with lower heights to enhance street visibility. Infrastructure improvements such as broader sidewalks, ramps for bicycles and strollers, and enhanced lighting have helped alleviate mobility-related anxiety. Additionally, the implementation of gender-responsive budgeting has contributed to greater accessibility within urban spaces (Hunt, 2019). An interesting initiative in transport service is the inclusion of gender-balanced public signage such as female pictograms on the pedestrian crossing and road worker signage.

2.11.4 Kochi, Kerala

Kochi has made significant strides in promoting inclusivity for women and the transgender community within its metro system workforce. By involving women in various roles, the metro system has challenged traditional gender-based job divisions, fostering a belief among the public that the work is not gender-specific. Through the Kudumbashree community, 640 women have been empowered, and women now comprise 16% of the staff, positively influencing public perceptions of the system. For commuters, 85% cited cleanliness as a major factor in choosing the metro, while 80% attributed satisfaction to aspects such as safety, security, comfort, and reliability. The city's widely used bus system remains popular due to its affordability and extensive network, with the introduction of women ticket checkers further enhancing user satisfaction. However, infrastructure issues like poorly maintained bus shelters, terminals, and lack of comfort zones have kept some riders dependent on buses, while the metro's superior infrastructure has attracted more choice riders (UN.ESCAP, 2021).

CHAPTER 3: METHODOLOGY

This section outlines the core principles and philosophical foundation that guide the research process within the specific context of this study. It explains how knowledge will be generated and validated through an appropriate methodological approach. The selection of research methodology is informed by the epistemological position of the study, which is itself shaped by underlying ontological assumptions and the broader paradigmatic framework. The section elaborates on the various methods and data sources used in the study, describing how information will be gathered, examined, and interpreted to meet the research objectives.

Research is fundamentally about understanding the complex interactions between people, space, place, and the environment. It is an ongoing process of inquiry and discovery (Kitchin & Tate, 2013). It involves producing knowledge by systematically seeking answers to questions (Mikkelsen, 1995). As described by Kitchin & Tate (2000, p. 6), research follows a coherent set of principles and procedures to explore a given phenomenon. The research objectives largely influence the choice of methodology, which encompasses a structured plan for generating, analyzing, and interpreting data using scientifically sound procedures.

The methodology is grounded in a theoretical framework that underpins the entire research process (Sen, n.d.). As emphasized by Kitchin & Tate (2013), theory, methodology, and practice are deeply interconnected. Warf (2006, p. 486) describes methodology as a mid-level theoretical tool that enables researchers to operationalize their philosophical and theoretical foundations into practical data collection and analysis. Accordingly, this chapter outlines the methodological framework adopted for this research, including the philosophical stance, study design, sampling techniques, measurement tools, data collection methods, and analytical procedures employed to derive meaningful findings.

3.1 Research Paradigm

A research paradigm represents the foundational set of beliefs, assumptions, and practices that guide how researchers perceive and explore a phenomenon. It incorporates ontological, epistemological, and methodological orientations that collectively shape the research approach. Paradigms act as lenses through which reality is interpreted, valid

knowledge is defined, and strategies for acquiring that knowledge are established(Rehman & Khalid, 2016). Clearly identifying the research paradigm is crucial, as it directly influences the selection of research methods, tools for data collection, and modes of analysis.

This study adopts an interpretivist paradigm, which prioritizes understanding individuals' subjective meanings and experiences within their specific social and cultural settings. This perspective is particularly appropriate for the research, as it seeks to examine women's perceptions and lived experiences with public transportation in Kathmandu, focusing on issues of safety, accessibility, and inclusivity. In contrast to positivist paradigms that pursue objective and universally applicable truths, interpretivism acknowledges that reality is socially constructed and shaped by multiple viewpoints. This paradigm aligns with the study's goal of exploring how social norms, cultural expectations, and institutional structures influence the everyday mobility of women and other marginalized groups.

3.2 Ontology

Ontology concerns "the nature of our beliefs about reality" and prompts researchers to question what kind of reality exists (Richards, 2003). It reflects a belief system that shapes how individuals interpret what constitutes a fact. Simply put, ontology deals with the fundamental question of whether social phenomena are perceived as objective realities or subjective constructions.

This study adopts a constructivist ontological perspective, which views reality as being socially constructed and shaped by context. Rather than treating women's experiences in public transportation as uniform or static, this viewpoint recognizes that these experiences are influenced by personal perceptions, cultural expectations, and broader societal structures. For instance, a woman's feeling of safety while commuting may differ based on variables like time, location, and her previous encounters. This approach allows the research to embrace the varied and nuanced nature of gendered mobility experiences within Kathmandu.

3.3 Epistemology

Epistemology is the philosophical study of knowledge its nature, origin, and how it is acquired, understood, and shared (Cohen et al., 2017). It explores what constitutes valid knowledge and the processes through which it is generated and communicated.

This research adopts a subjectivist epistemological stance, which holds that knowledge emerges through the interaction between the researcher and participants, and through the interpretation of social realities. The study emphasizes the importance of capturing women's lived experiences, acknowledging that their perspectives offer critical insights into the barriers and possibilities for gender inclusion in public transportation. By using methods such as surveys, interviews, and direct observation, the research aims to collaboratively construct knowledge that authentically represents women's everyday mobility experiences in Kathmandu.

3.4 Methodology

Research methodology is the systematic framework that guides how a study is designed and executed. It encompasses the principles, strategies, and procedures used to collect, analyze, and interpret data. As defined by (Crotty, 2020), it represents the overarching plan of action or strategy that informs the selection and application of specific research methods. Essentially, methodology provides a structured path that ensures the research is methodologically sound, aligned with its objectives, and capable of producing valid and reliable results.

In this study, a mixed-methods approach is employed, integrating both qualitative and quantitative techniques to provide a holistic view of the research problem. Qualitative methods such as key informant interviews and field observations are employed to gain nuanced insights into women's experiences and perceptions in public transportation. At the same time, quantitative methods, primarily through structured surveys, help identify broader trends related to safety, accessibility, and travel behavior. The combination of these approaches enables the research to produce both rich, contextualized understanding and generalizable data.

3.5 Research Methods

This study adopts a mixed-methods approach to comprehensively examine gender inclusivity in Kathmandu's public transportation system.

3.5.1 Preliminary Survey

This preliminary survey was conducted to assess the preferences of public transport users in Kathmandu Valley. The study aimed to identify the most and least preferred modes of transportation among daily commuters. The most preferred and least preferred mode of transport will be studied in detail. A total of 35 respondents, all public transport users, participated in the survey. The demographic distribution included 51.4% female and 48.6% male respondents. Regarding age groups, 25.7% were between 16-25 years old, while the majority, 74.3%, were aged between 25-50 years. This sample representation provides valuable insights into the commuting behaviors and preferences of both younger and middle-aged individuals.

The survey results indicate that the bus is the most preferred mode of public transport among respondents, with over 20 individuals selecting it as their top choice. Tempo is the second most preferred mode, albeit with significantly fewer votes than buses. In contrast, microbuses were identified as the least preferred transport mode, receiving the lowest number of responses. This preference pattern suggests that buses are considered more reliable, accessible, and comfortable for daily commutes. Microbuses, on the other hand, might be perceived as inconvenient, overcrowded, or lacking in comfort and accessibility.

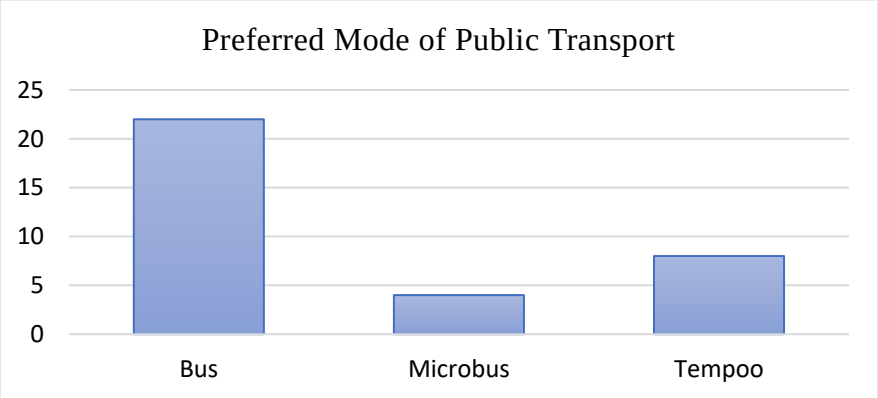

Figure 3.1 Preferred Mode of Public Transport

The gender-based analysis of mode preference reveals distinct patterns. A higher proportion of male respondents prefer buses, whereas females show a stronger preference for tempoos and microbuses. This trend aligns with previous research on gender and public transport, highlighting the role of factors such as safety, comfort, and convenience in shaping transport choices for women. Studies, such as the 2013 report on "Gender and Public Transport," have emphasized that women often prioritize safer and more

predictable transport options. The preference for tempoos among female commuters in Kathmandu Valley could reflect concerns about safety, accessibility, or the availability of seats in other transport modes.

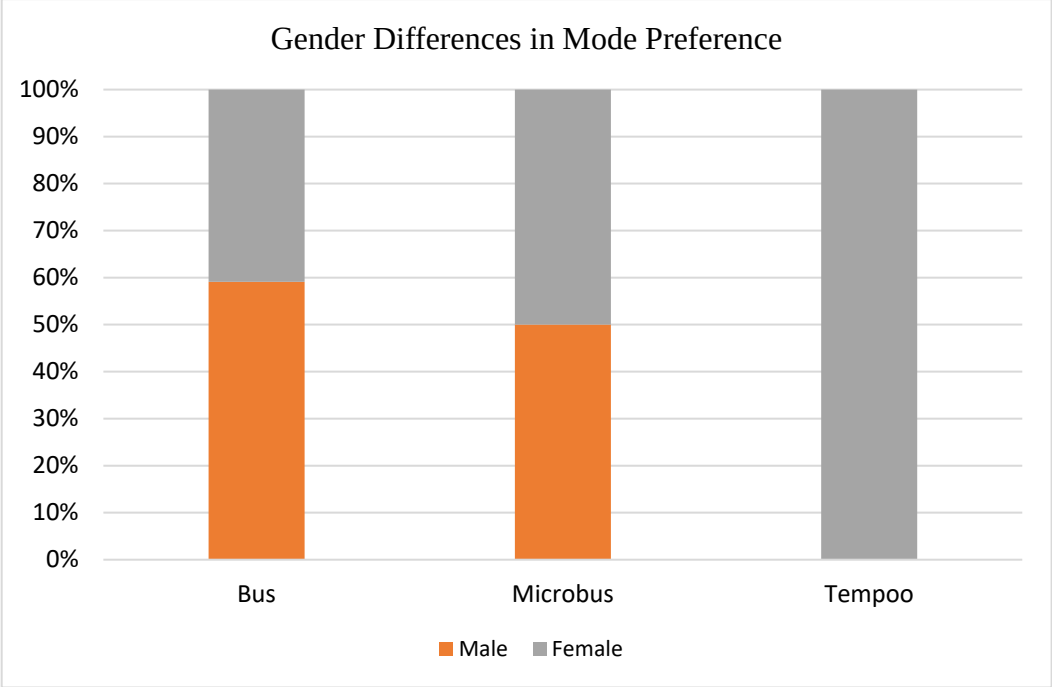

Figure 3.2 Gender Differences in Mode Preference

3.5.2 Literature Review

A comprehensive literature review was conducted to understand global and local perspectives on gender inclusivity in public transportation. This review examined academic articles, policy reports, case studies, and best practices from other cities to identify critical factors influencing women's safety, accessibility, and comfort in urban mobility. The literature provided a theoretical foundation for understanding the relationship between transportation design, policy, and women's travel experiences. It also highlighted gaps in existing research and best practices that could be adapted to Kathmandu's context.

An extensive review of national and local transportation policies was undertaken to evaluate the effectiveness of gender-related provisions in addressing inclusivity challenges. Policy documents from agencies such as the Department of Transport Management (DOTM) and the Ministry of Physical Infrastructure and Transport (MOPIT) were analyzed. The review focused on identifying existing measures to promote gender-sensitive transport services and assessing their implementation and impact.

3.5.3 Stakeholder Identification

Stakeholder identification is the critical first step in understanding who affects or is affected by public transportation systems, particularly when addressing gender inclusion. A systematic identification of stakeholders ensures that all relevant actors are considered in the planning, implementation, and evaluation of gender-inclusive transport policies and interventions. The various stakeholders identified in Kathmandu's public transportation system are categorized as follows:

3.5.3.1 Government Bodies

- Department of Transportation Management (DoTM)
- Traffic Police
- Local Municipalities

3.5.3.2 Operators

- Sajha Yatayat
- Suvakamana Yatayat
- Nepal Yatayat
- Blue Micro

3.5.3.3 Others

- Public Transport Users
- Drivers
- Conductors

3.5.4 Field Observation

Observation is a widely recognized method in urban planning research for gathering real-time data about physical infrastructure and human behavior (Carmona, 2021). To assess the current design, infrastructure, and operational practices of public transportation in Kathmandu, field observations were conducted. This involved a detailed assessment of vehicle interiors and transport stops to examine their suitability for women passengers. Particular attention was given to the layout of seating, boarding and alighting conditions, accessibility features, and overall maintenance of public vehicles. These observations helped identify physical and operational aspects that impact women's safety, comfort, and inclusivity.

3.5.5 Questionnaires Survey

Surveys and structured questionnaires were designed to gather primary data from women passengers who regularly use public transport. These surveys captured information about perceived safety, comfort levels, operational challenges, and experiences of harassment or inconvenience. The data provided quantitative insights into the daily commuting challenges faced by women and their expectations for a more inclusive and safe public transportation system.

Sample Size Determination

In research, the term sample size refers to the number of participants or observations required to accurately represent the target population. It is a critical element of research methodology, as it directly influences the reliability, validity, and generalizability of study findings (Wikipedia, 2005). The sample size is determined based on factors such as cost, time, the need for sufficient statistical power, and the desired level of precision in estimates ("Calculate Sample Size Geopoll," n.d.).

Several key factors are used to determine the optimal sample size:

1. **Confidence Intervals:** These indicate the degree of certainty (or uncertainty) associated with the sampling technique, quantifying the potential error in the estimates.
2. **Confidence Level:** This represents the probability that the confidence interval generated from a random sample will include the true population parameter.
3. **Standard Deviation:** This metric measures how much the data values vary from the mean, which is crucial for understanding both the average response and the variability within the data. The sample's standard deviation can also be used to estimate the population's standard deviation.

To calculate the sample size Corchan equation (1963) with a 95% confidence level and precision of 10% is adopted. The sampling method considers the entire population of passengers that travel during the 3 days of the survey.

$n = [z^2*p*(1-p)]/e^2$

Where, n = required sample size

z = Z-score corresponding to the desired confidence level (for 95% confidence level, $Z \approx 1.96$)

p = Estimated proportion of an attribute that is present in the population. (50%)

N = Total population size of passenger

e = desired margin of error (precision), expressed as a proportion (e.g., 0.10 for 10%)

Calculate the sample size n

$n = [1.96^2 * .5*(1-.5)]/0.10^2$

$n = 96.04$

Since the sample size n should be a whole number. Therefore, n= 97

3.5.6 In-depth Interviews

In-depth interviews were conducted with key stakeholders, including women passengers, transport operators. These interviews provided detailed qualitative insights into the lived experiences of women in public transportation, operational practices, and policy implications. The discussions explored personal challenges, suggestions for improvement, and perspectives on the effectiveness of existing transportation policies in promoting gender inclusivity.

3.5.7 Key Informant Interviews

Key informant interviews were conducted with policymakers, representatives from NGOs, and transport authorities. These interviews provided expert insights into the current state of gender-related transport policies and operational practices. The discussions also explored challenges in implementing inclusive policies and potential strategies to address these gaps.

Table 3.1 Key Informant Interview

Category	Purpose
Bus Operators and Associations	Understand what they see as special needs of women as travelers. What provisions they make for comfort, safety and security of all passengers. What plans they have for improvement. What challenges they face. What efforts have failed in the past and why. What opportunities are there for women employment in their operations and pros and cons of this.
Police	Understand their views of safety and security on public transport and their resources to deal with these. Their understanding of

	what constitutes harassment, who are the perpetrators, who reports cases, what is their understanding of prevalence.
National Women's Commission	Collect information on women's employment particularly recent trends and projected trends in Kathmandu Valley. Do they have data on harassment in public spaces and how they see the issue? Assessment of how informed they are about the real experiences of the travelling public.
Department of Transport Management	Understand their perspectives of gender and transportation, what provisions DOTM have introduced, how they encourage compliance and their future plans.
Women tempo drivers	Discuss how they use public transport themselves, their views of being women drivers, why people seem to prefer tempos and particular problems they may face as women drivers.
Women bus conductors	What are their experiences, biggest problems they have to face on the buses, what they think are improvements of Sajha compared to other public transport.

Table 3.2 shows the methods used for the accomplishment of the objectives.

Table 3.2 Data Collection Methods

Research Objective	Methods	Data Sources	Data Required
To assess the current public vehicle interior design, infrastructure, and operational practices and their impact on women's inclusivity.	-Field observations of vehicles and stops. - Surveys and questionnaires with women passengers. - In-depth interview with women.	- Public transport users (passengers). - Transport operators. - Field observations.	- Vehicle and stop design features. - Perceived safety and comfort levels. - Operational practices and challenges.

Research Objective	Methods	Data Sources	Data Required
To analyze the effectiveness of existing gender-related transportation policies in addressing inclusivity challenges.	- Review of national policies. - Key informant interviews with policymakers, NGOs, and transport authorities.	- Policy documents (e.g., DOTM, MOPIT). - Key informants (policymakers, NGOs).	- Gender-related transport policies. - Policy impact assessments. - Stakeholder perspectives on policy effectiveness.
To develop a localized framework for a gender-inclusive public transportation system tailored to Kathmandu's urban context.	- Synthesis of findings from Objectives (a) and (b). - Stakeholder workshops to validate and refine the framework.	- Analysis from primary and secondary data. - Stakeholder workshops (transport authorities, NGOs, women's groups).	- Insights from policy and practice gaps. - Stakeholder recommendations for a gender-inclusive framework.

Table 3.3 Parameters and Indicators of Each Objectives

Category	Parameter	Indicator
Vehicle Design	Seating Arrangement	Adequacy of reserved seats for women,
	Accessibility	Ease of entry and exit points for women, ramps, low floor buses
	Interior Space Design	Comfort and safety of women passengers
Infrastructure	Safety Monitoring	Presence of lighting, CCTV, GPS tracking, emergency helpline, panic buttons
	Condition	Maintenance and strategic location of bus stops, toilets

	Lighting & Ventilation	Adequate lighting and ventilation inside buses and at bus stops
	Signages & Wayfinding	Availability and clarity of signage (route information, stops, emergency numbers)
Operational Practices	Staff Behavior	Gender sensitivity and behavior of transport staff
	Scheduling and Frequency	Timely service, connectivity, and commuter convenience
	Overcrowding	Level of overcrowding during peak hours
	Women Representation	Proportion of women employed as drivers, conductors, or managerial roles
Policy	Gender-sensitive Policies	Effectiveness of policies addressing gender issues
	Awareness	Awareness of staff and users regarding policies
	Implementation	Adherence to reserved seating and safety measures

3.5.8 Data Analysis

The collected data will be analyzed using both quantitative and qualitative methods. Statistical analysis will be performed on survey data to calculate the Customer Satisfaction Index (CSI) and identify correlations between service attributes and passenger satisfaction. The collected responses were coded and cotered in SPSS software for the appropriate analysis. Before analyzing the data, questionnaires including response omor or missing values were removed. The data collected from the survey were analyzed using statistical techniques like descriptive statistics, Cronbach's alpha test, ANOVA, t-test, Friedman test and Tukey test. Qualitative data from interviews and observations will be thematically analyzed to extract key insights regarding operational challenges and opportunities for improvement.

- **Descriptive Analysis**

Descriptive statistics (mean and standard deviation) were used to describe results obtained. The mean values were used to determine the degree of inclination of the

respondents towards the particular factor regarding public transportation. Similarly, the standard deviation was used to determine the statistics by which the overall response deviated from the mean values.

- **Hypothesis Testing**

This section deals with the analysis of possible relationships between prior formulated variables. For this purpose, the researcher tested hypothesis conducting t-test, ANOVA and Friedman test.

- **T-test**

Under t-test, one sample t-test has been carried out. In this study, there is no any direct dependent and independent variable, where the value of dependent variable is determined by the values of independent variables. The researcher is trying to identify whether the variables are significant in the development of corporate bond market or not. So, here is no possibility of computing correlation and regression to test the relationship. In this situation, the appropriate tool is one sample t-test, which is used to test whether independent variables are significant in making investment decision by investors in bond market or not.

- **ANOVA**

Analysis of variance (ANOVA) is a statistical technique that is used to check if the means of two or more groups are significantly different from each other. ANOVA checks the impact of one or more factors by comparing the means of different samples. Here, ANOVA was used to test the relationship between the variables such as age and other independent variables, income level and other independent variables, saving and other independent variables etc. When the independent variables, saving and other independent variables etc. When the relationship between such variables is significant, further Tuckey test is conducted to know the relationship in depth.

- **Friedman test**

The Friedman test is the non-parametric alternative to the one-way ANOVA with repeated measures. It is used to test for differences between groups when the dependent variable being measured is ordinal. Here, for the test of variable riskiness of investment, respondents are required to rank the securities they prefer to invest, rank the securities in terms of risk, ranking of sector where the prefer to invest etc. All these things are

measured on ordinal scale. So, the appropriate tool to test such relationship is Friedman test.

3.5.9 Limitations

The limitations of the research can be listed as follows:

- Some respondents may not have been truthful while answering survey questions or may have provided socially desirable responses.
- In survey and in interview, a low response rate raises concerns about the representativeness of the collected data.
- Limited sample size impact the generalizability of findings and the ability to draw broader conclusions.
- Limited time for data collection and analysis restrict the comprehensiveness of the study.

3.5.10 Research Logic

Familiarity with research logic enhances critical and structured thinking in research. Logic helps differentiate between sound and flawed reasoning. It is both a science and an art where the science investigates and organizes principles for sound reasoning, and the art involves applying these principles effectively. Research logic generally falls into four categories: deductive, inductive, retroductive, and abductive (Uprety, 2022).

- Deductive Logic: This starts with a theory and tests a hypothesis to confirm or refute it. It is often associated with quantitative research to validate existing theories.

- Inductive Logic: This begins with specific observations, patterns, or tentative hypotheses that lead to broader conclusions or theories. Since inductive logic only offers probable truths, it may sometimes lead to false conclusions.
- Retroductive Logic: A blend of deductive and inductive reasoning, retroductive logic is used when site access is limited, such as in the formation theories of planets.
- Abductive Logic: Unlike deductive or retroductive methods, abductive logic emphasizes understanding social life by using meanings, terms, and actions that social actors employ. In this approach, researchers become self-measuring tools.

Given the research's objectives, a combination of inductive and abductive logics was employed. Inductive reasoning allows the analysis of patterns and facts obtained through

questionnaire surveys to make sense of observations and reach conclusions. Abductive reasoning helps interpret participants' perspectives and social interactions, making it a robust approach for developing social science insights.

3.5.11 Research Ethics

Ethical considerations in research refer to guidelines that shape study designs and practices. These are especially crucial when dealing with human subjects to explore real-world issues, develop solutions, and improve lives. Two primary ethical frameworks are:

- Deontological Ethics: A rule-based approach that prioritizes ethical adherence to methods over outcomes.
- Teleological Ethics: A consequence-based perspective focusing on the research outcomes.

This research followed a deontological approach, ensuring that the survey was conducted ethically and respectfully. Efforts were made to avoid disrupting participants' work schedules and to ensure voluntary participation without discrimination based on race, ethnicity, gender, sexual orientation, religion, or other factors. The survey respected participants' rights, safeguarded data confidentiality, and ensured scientific integrity.

3.5.12 Research Validity and Reliability

To establish the validity and reliability of the study findings, multiple analytical techniques were employed:

- Regression Analysis: Used to assess hypotheses regarding the relationship between passenger satisfaction and the overall performance of public transportation using quantitative data.
- Narrative Analysis: Applied for qualitative data collected through self-observation, key informant interviews, and secondary data. Triangulation was used to validate and cross-check the data from different sources.

Prior to the main study, a pilot test validated the reliability of the survey questionnaire. Feedback from this pilot study prompted revisions to complex questions to improve clarity. Content validity was ensured by adapting items from established literature.

To test the internal consistency of scale items, Cronbach's Alpha Coefficients were computed. This statistical test measures the reliability of collected data across different variables. A Cronbach's Alpha value of 0.60 or above was considered acceptable for this study, indicating reliable data for further analysis.

CHAPTER 4: STUDY AREA

4.1 Overview

Kathmandu, the capital of Nepal, is situated in a scenic valley that encompasses three districts: Kathmandu, Lalitpur, and Bhaktapur. These districts, collectively referred to as the Kathmandu Valley, are separate administrative units but are closely interconnected in terms of daily travel and socio-economic activities. The valley is home to three of Nepal's six metropolitan cities, along with several municipalities that are well connected to these major centers. This concentration of urban areas has led to the centralization of key facilities and infrastructure within the capital and its neighboring regions.

The valley's distinctive bowl-shaped landscape has experienced significant expansion into the surrounding hills in recent years, driven by rapid urban growth, poor resource management, and high population increases. The limited availability of land has resulted in the encroachment of agricultural and forest areas to meet the rising demand for housing and infrastructure. However, this unplanned development has brought about several challenges, including poorly designed streets, mismanagement of essential services, and increased exposure to environmental hazards.

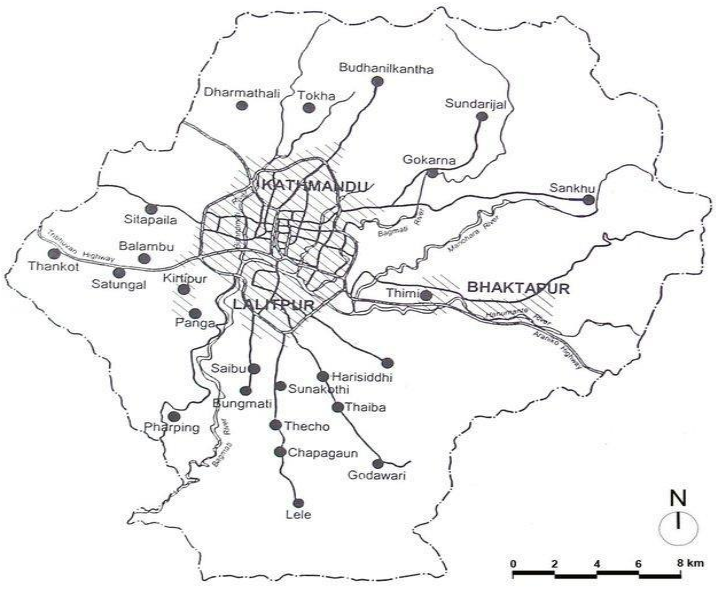

Figure 4.1 Map of Kathmandu Valley

(Source: (Chitrakar, 2015))

4.1.1 Demographic Trend

According to the National Census 2021, the Kathmandu Valley has about 3 million permanent residents. However, when the significant floating population is taken into account, the total number of people in the valley is estimated to be around 5 million (50 lakhs). With a population density of approximately 5,108 people per square kilometer, the valley is a bustling hub of activity.

Within this dynamic urban region, the resident population is distributed as follows: Kathmandu District is home to about 2,041,587 people, Bhaktapur District houses roughly 432,132 residents, and Lalitpur District accounts for approximately 575,667 inhabitants (NSO, 2021). This diverse demographic composition, along with the constant daily influx of commuters, underscores the critical need for urban planning and transportation systems that address gender-specific requirements. With nearly equal numbers of women and men in the valley and with a growing number of women independently commuting for work, education, and other daily activities, it is imperative that public transport is safe, accessible, and responsive to the unique needs of all users.

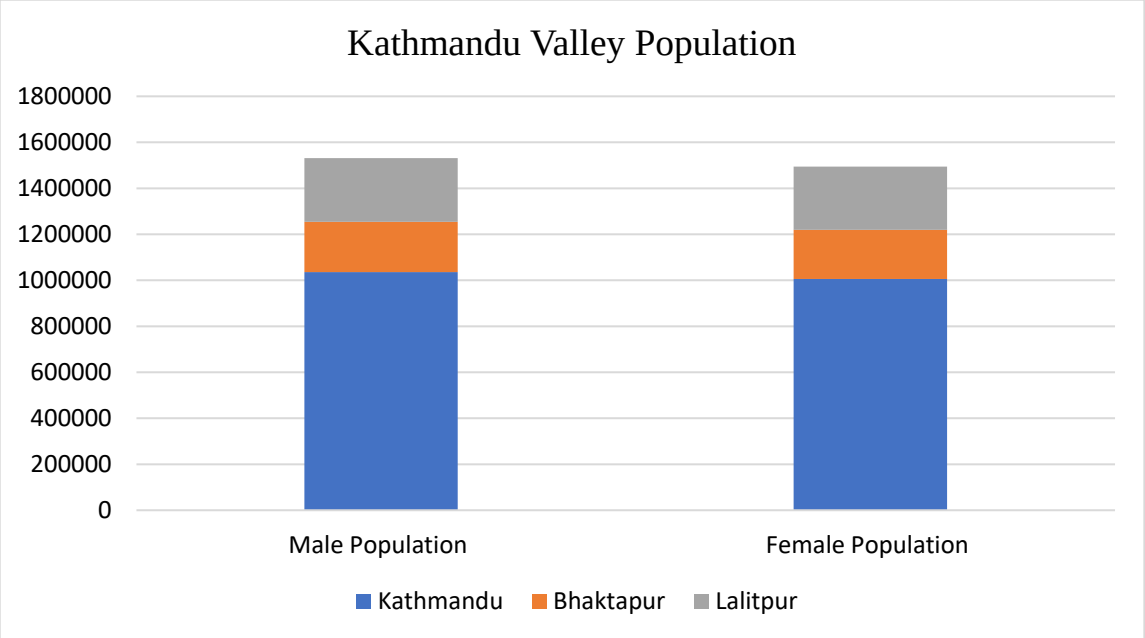

Figure 4.2 Kathmandu Valley Population

4.1.2 Transportation trends in Kathmandu Valley

Kathmandu Valley faces significant transportation challenges due to rapid urbanization and increasing vehicle ownership. For instance, in the fiscal year 2080/81, a total of 1,942,072 vehicles were registered in the valley. Out of these, public transport vehicles

numbered 36,844, while two-wheelers accounted for 1,555,041, four-wheelers for 276,807, and electric vehicles for 17,575. The valley also has an extensive road network spanning 229,223 kilometers. The traffic police force comprises 1,113 stationed officers and 1,835 actively deployed officers, along with 76 units. Each officer in the unit is responsible for monitoring about 25,554 vehicles and roughly 30.16 kilometers of road, whereas a standard traffic officer oversees around 1,059 vehicles and about 1.25 kilometers of road (*Nepal Traffic Police*, 2024).

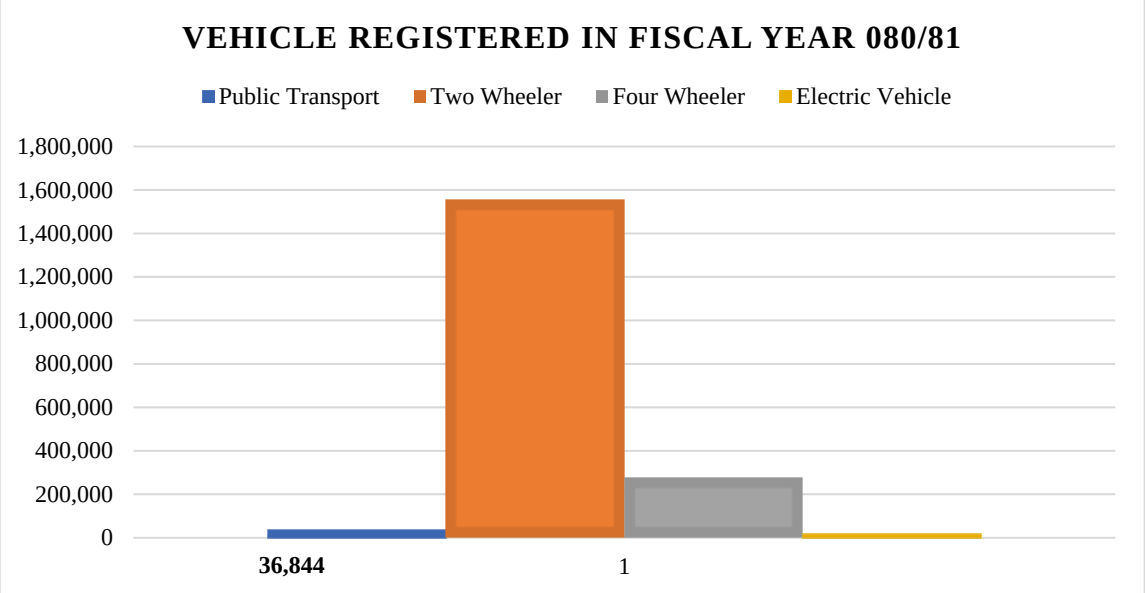

Figure 4.3 Registered Vehicle in FY 080/81

Kathmandu Valley, which includes major urban centers such as Kathmandu Metropolitan City, Patan, Kirtipur, Thimi, and Bhaktapur, experiences an average annual vehicle growth rate of 14%. Public transportation represents only 3% of the total vehicle fleet, with 94% consisting of low-occupancy private vehicles (Aryal et al., 2022; JICA, 2017). Despite the limited public transport options, around 87.67% of daily commuters rely on it, highlighting the urgent need for a more effective and inclusive transportation system. In addition, motorcycles and scooters dominate the vehicle landscape, comprising 81% of all registered vehicles. The accessibility of low-interest bank loans and growing dissatisfaction with overcrowded public transport have contributed to the rise in private vehicle ownership. Road safety continues to be a major concern, with approximately 150 serious traffic accidents and over 1,200 minor accidents reported every day.

Urbanization has also transformed gender roles within the transportation sector. As of 2023, about 83% of Nepali women are part of the labor force, with many relying on public transport for their daily commutes (*Nepal Labour Force Survey*, 2018). Observations during peak travel times indicate that women constitute at least one-third of public transport users, primarily consisting of working women and students who travel independently to fulfill their educational and professional commitments (Neupane & Chesney-Lind, 2014). Given these factors, there is an increasing need for a safer, more accessible, and gender-sensitive transportation system in Kathmandu Valley.

4.2 Public Transport in Kathmandu

Public transportation in the Kathmandu Valley is characterized by a diverse range of services aimed at meeting the mobility needs of its residents. The primary modes of public transport include buses, microbuses, tempos (three-wheeled electric vehicles), and taxis. The system is predominantly operated by private entities, with limited government involvement, leading to a variety of service quality and operational practices.

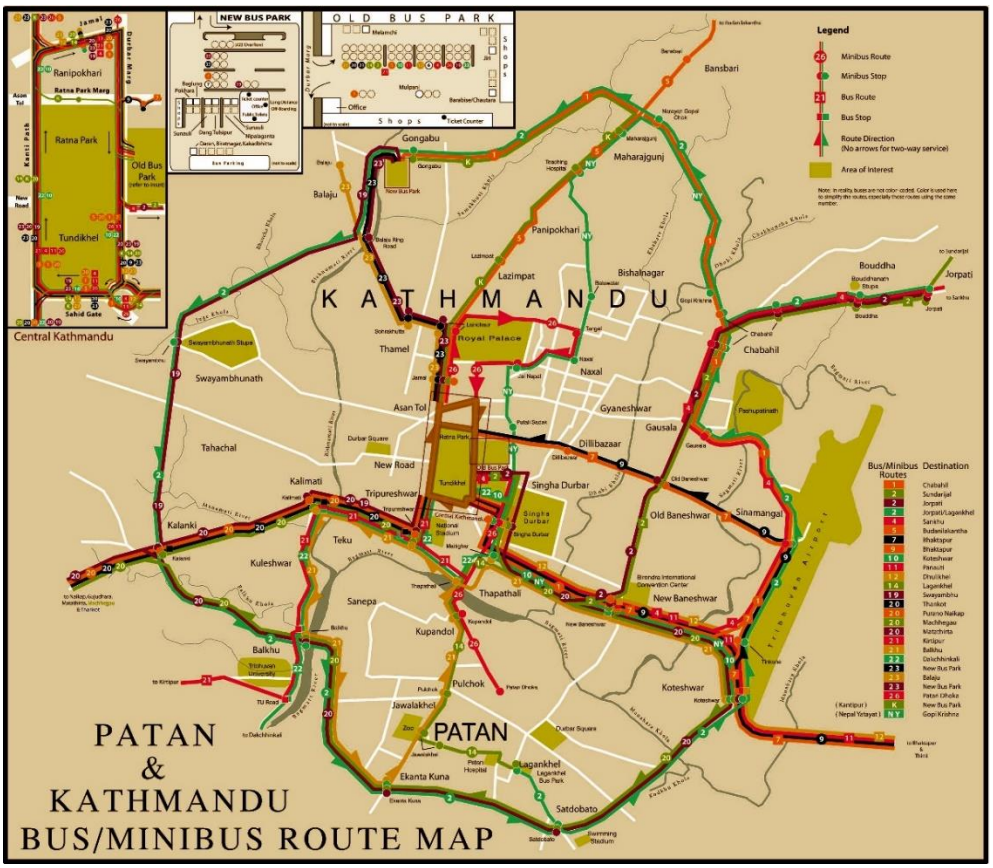

Figure 4.4 Public Transport Route Map of Kathmandu

(*Maps of Kathmandu*, 2024)

4.2.1 Key Modes of Public Transportation

1. **Buses**: Buses are one of the primary modes of public transport in Kathmandu Valley, operated by both private companies and cooperatives. They serve key routes connecting Kathmandu, Lalitpur, and Bhaktapur and are relatively affordable. Larger buses are operated under companies such as Sajha Yatayat and other cooperatives. Sajha Yatayat is one of the most recognized public bus systems in Kathmandu, providing extensive coverage throughout the valley. Established in 1962, Sajha Yatayat operates several routes connecting key areas within Kathmandu and Lalitpur. The service has been modernized over the years, including the introduction of electric buses to promote environmentally friendly transportation (*Sajha Yatayat*, 2023).

Figure 4.5 Key Modes of Public Transportation

2. **Microbuses and Microbus**: These smaller vehicles are widely used for short-distance travel and can navigate through narrower streets that larger buses cannot access. They typically have a higher frequency of service but can become overcrowded during peak hours.

3. **Safa Tempo**: Introduced in 1993 as an eco-friendly alternative to diesel-powered three-wheelers, Safa Tempos are electric vehicles that provide an important mode of transport for many commuters. Currently, around 600 Safa Tempos operate on

various routes within the valley, catering to approximately 100,000 passengers daily (*Clean Energy Nepal*, 2025).

4.3 Selected Public Transport Route

The study area for this research is Kathmandu Valley, a busy urban region in Nepal with many public transportation options. The study focuses on public transportation along the Koteshwor to Kalanki route within the Kathmandu Valley. The Koteshwor to Kalanki route is a crucial segment of Kathmandu's public transportation network, connecting the eastern and western parts of the valley. This corridor serves as a vital link between residential areas, office districts, educational institutions, and commercial hubs. Koteshwor acts as a gateway for commuters from Bhaktapur and surrounding regions, while Kalanki is a major junction for traffic heading to the outskirts of Kathmandu. The route experiences high passenger volumes, including office workers, students, traders, and homemakers, making it a dynamic and essential corridor for urban mobility.

The area offers critical home-work-market connectivity, with numerous transport modes such as buses, microbuses, and three-wheelers operating along the route. However, challenges such as traffic congestion, inadequate bus stops, overcrowding, and safety concerns for women persist. Women passengers frequently face issues related to seating availability, harassment, and discomfort, highlighting the need for gender-sensitive transport solutions. This corridor was selected for the study due to its strategic importance, high commuter diversity, and relevance for evaluating the impact of design, policy, and operational practices on women's inclusivity in public transportation. The findings from this study will contribute to developing a gender-inclusive framework for urban mobility in Kathmandu Valley.

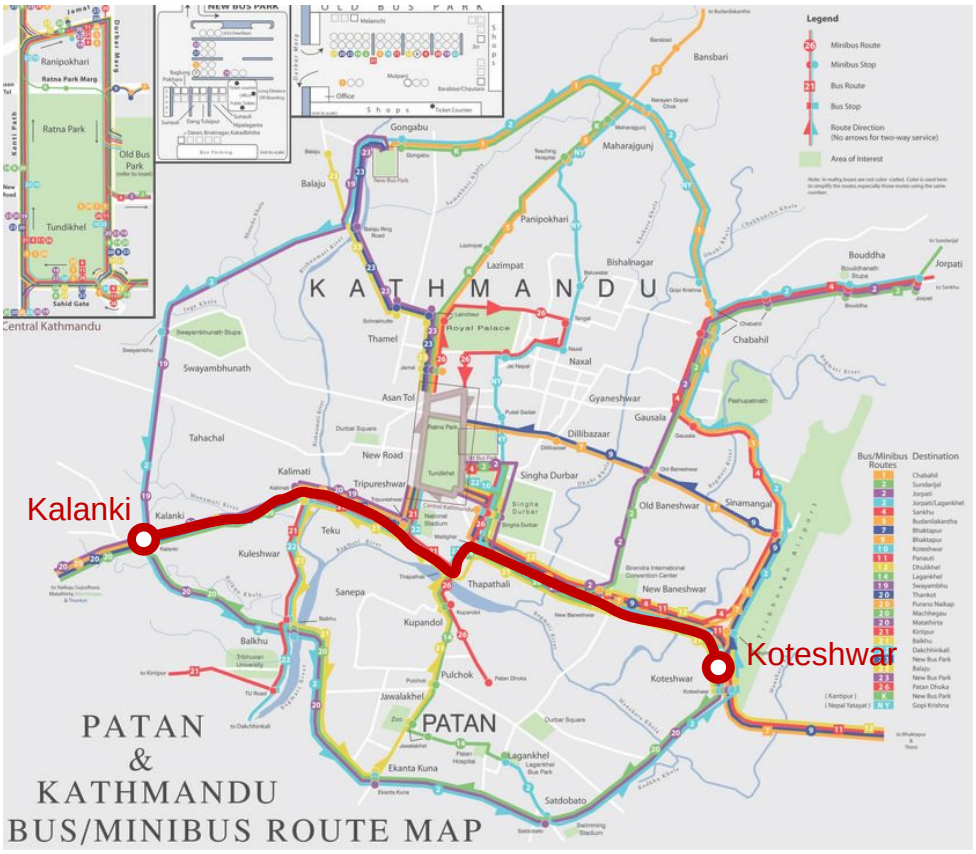

Figure 4.6 Study Area

CHAPTER 5: FINDING AND ANALYSIS

5.1 Findings and Analysis of Observations

The observational component of the study focused on the Koteshwor to Kalanki route, which is a critical corridor in Kathmandu's public transportation network. The observations were conducted to assess the vehicle interior design, infrastructure, operational practices, and passenger experiences.

5.1.1 Bus Stops

Findings:

Four distinct types of bus stop designs were identified along the Koteshwor to Kalanki route:

5.1.1.1 Type A

Found in Koteshwor, this design features a curved roof that provides shelter from rain and sunlight. However, the seating consists of a single rod structure, which is uncomfortable for passengers. The bus stop lacks essential amenities such as lighting and passenger information displays.

Figure 5.1 Bus Stop Design (Type A)

5.1.1.2 Type B

Located in areas like Tinkune, Minbhavan, Babarmahal, Baneshwor, Thapathali, and Tripureshwor, these bus stops have a modern design with solar panels for lighting. However, the seating platform is lower than the surrounding footpath due to recent repairs, making it less comfortable for passengers.

Figure 5.2 Bus Stop Design (Type B)

5.1.1.3 Type C

Found in Tripureshwor, this design has an inverted slope roof. The seating area is less comfortable due to the raised footpath level, and there is no lighting, making it inconvenient at night. However, a public toilet is available nearby.

Figure 5.3 Bus Stop Design (Type C)

5.1.1.4 Type D

Located in Shantinagar and Bijulibazar, these bus stops are built in a traditional "Falcha" style, inspired by Nepalese culture. They are equipped with lighting and comfortable seating benches, making them more passenger-friendly.

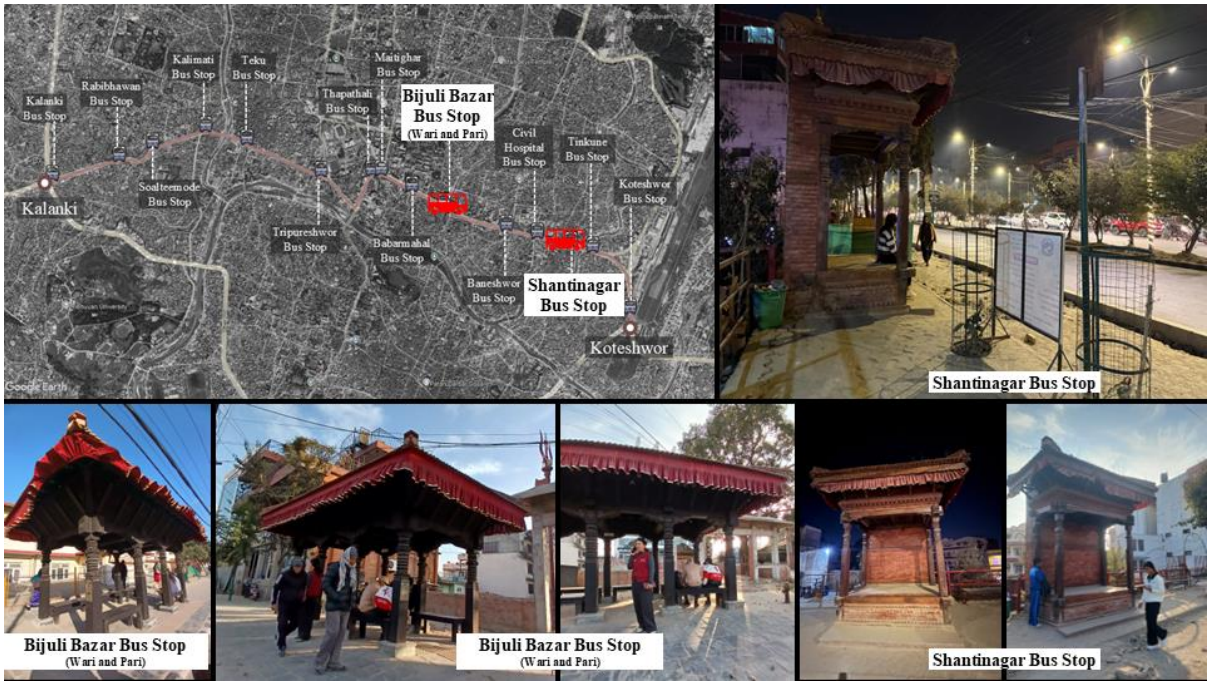

Figure 5.4 Bus Stop Design (Type D)

Despite the presence of 15 designated bus stops along the route, buses frequently stopped at unofficial locations, leading to chaos and confusion. Key locations like Kalanki, Kalimati, and Maitighar lacked proper bus stops with shelters, while Tripureshwor was the only area with a public toilet near the bus stop.

The lack of uniformity in bus stop design and the absence of basic amenities such as lighting, seating, and public toilets create significant discomfort for passengers, particularly women. The raised footpath levels in some areas have made seating platforms less practical, further reducing passenger comfort.

The frequent stopping of buses at unofficial locations indicates poor adherence to designated bus stops, which can lead to safety concerns and inefficiencies in the transportation system. The absence of proper shelters and lighting at key locations exacerbates these issues, especially during nighttime.

5.1.2 Vehicle Design

5.1.2.1 Sajha Yatayat

- **Diesel Buses**

Sajha Yatayat diesel buses prioritize passenger accessibility and safety with wide entry and exit doors, 16 inches above the ground, making boarding easier for women, elderly passengers, and individuals with limited mobility. The spacious interior, with 38 seats and a 2'6" wide aisle, allows better passenger movement and reduces congestion. Modern features such as CCTV cameras and GPS tracking enhance passenger security. Wheelchair-accessible options further promote inclusivity. However, the relatively high bus floor compared to electric models may still pose challenges for individuals with limited mobility.

- **Electric Buses**

With low steps positioned 13 inches above the ground and separate entry and exit doors, the electric buses are more accessible than their diesel counterparts. Features like grab bars for stability, information screens, and a first-aid box provide added convenience and safety. The inclusion of foldable seats adds flexibility during peak hours. The "Sajha Plus" mobile app for real-time tracking further modernizes the user experience. Nevertheless, the limited number of electric buses constrains their potential benefits for the larger public transport network.

5.1.2.2 Nepal Yatayat

Nepal Yatayat buses have a practical design with 2'5" wide doors, a 15-inch floor height, and grab bars positioned at 5'7", allowing easier boarding and stability for passengers. The 2-foot-wide aisle offers a reasonable amount of space for passenger movement, and the seating capacity of 37 passengers meets basic transportation needs. However, the design lacks modern safety features like CCTV cameras, which are essential for enhancing passenger security. The relatively high floor height can also be a barrier for elderly passengers and individuals with mobility challenges.

5.1.2.3 Suvakamana Yatayat

The 15-seater minibuses operated by Suvakamana Yatayat have a compact design with a 15-inch floor height and grab bars at 5'8". Although the small size allows the buses to navigate narrow streets, it significantly limits passenger capacity and comfort. The aisle space of only 1'7" makes movement within the bus challenging, especially during peak hours. The cramped seating arrangement further diminishes the travel experience. The lack of essential features, such as modern safety systems and comfortable seating, makes these buses unsuitable for long-distance or high-demand routes.

5.1.2.4 Blue Micro

Blue Micro vehicles, with their compact design and 14-passenger seating capacity, are well-suited for navigating Kathmandu's narrow urban roads. The door width of 2'5" and a door step height of 12 inches make boarding relatively easier compared to other minibuses. However, the small and uncomfortable seats present a significant challenge for passengers on longer commutes. The aisle space of 2'6" allows for some passenger movement but is insufficient for managing overcrowding during peak hours. The absence of safety features further undermines passenger satisfaction and security.

Table 5.1 Comparison of vehicle dimensions with bus body building standards and observational data

Source: (Bus Body Building Standard, 2018)

Vehicle Type	Components	Bus Body Building Standard, 2018	Observation
Sajha Yatayat (Diesel Bus)	Bus floor ht. from ground	340 mm	330 mm
Sajha Yatayat (Electric Bus)		340 mm	406 mm

Vehicle Type	Components	Bus Body Building Standard, 2018	Observation
Nepal Yatayat		340 mm	381 mm
Suvakamana Yatayat (minibus)		340 mm	381 mm
Blue Micro (microbus)		340 mm	305 mm
Sajha Yatayat (Diesel Bus)	Gangway (Aisle Space)	450 mm	762 mm
Sajha Yatayat (Electric Bus)		450 mm	610 mm
Nepal Yatayat		450 mm	610 mm
Suvakamana Yatayat (minibus)		300 mm	483 mm
Blue Micro (microbus)		300 mm	762 mm
Sajha Yatayat (Diesel Bus)	Hand Rail ht.	1500 mm	1702 mm
Sajha Yatayat (Electric Bus)		1500 mm	1702 mm
Nepal Yatayat		1500 mm	1702 mm
Suvakamana Yatayat (minibus)		1500 mm	1727 mm
Blue Micro (microbus)		1500 mm	
Sajha Yatayat (Diesel Bus)	Door Width	650 mm	1270 mm
Sajha Yatayat (Electric Bus)		650 mm	1702 mm
Nepal Yatayat		650 mm	736 mm
Suvakamana Yatayat (minibus)		650 mm	736 mm
Blue Micro (microbus)		650 mm	736 mm
Sajha Yatayat (Diesel Bus)	Door Ht.	1800 mm	> 1800 mm
Sajha Yatayat (Electric Bus)		1800 mm	> 1800 mm
Nepal Yatayat		1800 mm	> 1800 mm
Suvakamana Yatayat (minibus)		1650 mm	> 1650 mm
Blue Micro (microbus)		1500 mm	1448 mm

5.1.3 Operational Practices

5.1.3.1 Sajha Yatayat

Sajha Yatayat stands out for its operational efficiency and passenger-centric approach. The inclusion of modern safety features such as CCTV cameras, GPS tracking, and a real-time tracking app demonstrates a commitment to passenger safety and convenience. However, the limited fleet size of only 46 buses restricts its impact on Kathmandu's public transportation system. Despite high passenger demand, especially during peak hours, the small fleet often results in overcrowding and service limitations. Expanding the fleet and optimizing routes could significantly improve service delivery.

5.1.3.2 Nepal Yatayat

Nepal Yatayat provides extensive route coverage at affordable fares, making it a popular choice among commuters. However, operational challenges such as overcrowding during peak hours, inconsistent service schedules, and occasional maintenance issues negatively affect passenger satisfaction. The lack of safety features like CCTV cameras compromises security, particularly for women and vulnerable passengers. Addressing service reliability and enhancing safety measures could significantly improve the overall commuter experience.

5.1.3.3 Suvakamana Yatayat

Suvakamana Yatayat minibuses often face overcrowding, with passengers reporting discomfort due to cramped seating and limited space. Their small size makes them unsuitable for long-distance travel and high-demand periods. Operational inefficiencies and the absence of essential features, such as adequate grab bars and comfortable seating, further reduce passenger satisfaction. Improving fleet size and vehicle design could enhance operational efficiency and passenger comfort.

5.1.3.4 Blue Micro

Blue Micro vehicles excel in navigating narrow urban roads, providing quick and flexible service on short-distance routes. However, operational practices are hindered by overcrowding during peak hours and the lack of comfort for passengers. The absence of safety features further reduces the appeal of these vehicles. While they are efficient for

short commutes, enhancements in comfort, capacity, and safety features are necessary to better meet passenger expectations.

5.2 Findings and Analysis from Key Informant Interview

5.2.1 Key Informant 1- Driver

The driver highlighted that women's reserved seats are generally respected, but overcrowding during peak hours often prevents women from accessing these seats. A significant gap is the absence of formal training for drivers on handling harassment or misconduct, limiting their ability to address gender-sensitive issues. Traffic congestion was also noted as a persistent challenge.

A female driver shared her positive experience working in a traditionally male-dominated field. She emphasized the empowerment she felt in challenging gender stereotypes and contributing to public transportation as a professional driver.

A tempo driver with seven years of experience shared how vehicle ownership brought financial independence, increasing her earnings significantly. Despite occasional challenges, she highlighted better treatment from traffic police and expressed pride in supporting her family through her work.

The experiences of drivers show that while women's entry into the transportation workforce is empowering, challenges remain due to the lack of structured support, training, and societal norms. Overcrowding and inadequate driver training on gender-sensitive issues are critical concerns. Providing targeted training and making operational improvements can help foster a more inclusive and supportive environment.

5.2.2 Key Informant 2- Conductor

The efficiency of the two-door boarding system and the positive impact of CCTV cameras in deterring misconduct. However, overcrowding during peak hours still affects women's ability to access reserved seats.

Operational design features such as CCTV cameras and two-door systems contribute to better passenger safety and flow. Nonetheless, peak-hour overcrowding remains a significant concern. Expanding fleet size and better scheduling can help address this issue.

5.2.3 Key Informant 3- Traffic police

Traffic police conduct daily inspections to ensure compliance with reserved seating for women and other traffic regulations. The Yatru Maitri Aviyan 2080 initiative focuses on improving the implementation of gender-sensitive seating.

Passengers can report issues through hotlines (103 for Traffic Police and 100 for General Police). However, there is limited public awareness about these services, and response efficiency remains a challenge.

The proactive role of traffic police in inspections and awareness initiatives is commendable. However, challenges such as overcrowding and limited public awareness of complaint mechanisms persist. Strengthening enforcement and improving public awareness campaigns can enhance passenger safety and inclusivity.

5.2.4 Key Informant 4- Department of Transport Management (DoTM)

The department highlighted the need for separate licenses for professional drivers and emphasized the importance of gender-sensitive training programs. The responsible driving behavior of women was acknowledged, along with the need to encourage greater female participation in the transportation workforce.

Proposals to phase out older vehicles and implement embossed number plates were emphasized as measures to enhance vehicle tracking and passenger safety. The department also plays a vital role in implementing urban transport masterplans for the Kathmandu Valley.

The department's focus on gender inclusion and infrastructure improvements is promising. However, the introduction of formal training programs on gender sensitivity and stronger enforcement mechanisms are critical to achieving a gender-inclusive transportation system. Effective collaboration between central and provincial authorities will be crucial for the successful implementation of these initiatives.

5.2.5 Key Informant 5- Operator Perspectives

Operators highlighted various aspects related to gender inclusivity and safety in public transportation. One operator noted the positive impact of employing a female conductor, which created a sense of safety and comfort among women passengers. However, challenges such as the lack of formal training for conductors on gender-sensitive issues

and incidents of pickpocketing were identified. Another operator emphasized their efforts to address harassment through a collaborative campaign with multiple stakeholders, including traffic police and advocacy groups. Additionally, the operator's intention to hire more women was highlighted as a step towards fostering inclusivity.

The employment of female conductors demonstrates a positive shift toward creating a safer and more inclusive transportation environment. Collaborative initiatives addressing harassment have proven effective in tackling gender-based concerns. Nonetheless, the absence of formal training for conductors and limited security measures remains a gap. Implementing comprehensive training programs and stricter security protocols is essential to sustain and enhance safety and inclusivity.

5.3 Stakeholder Mapping

Table 5.2 Stakeholder Mapping

Stakeholder	Interest	Influence	Role	Findings
Department of Transport Management (DoTM)	High	High	Regulates vehicle permits, policies, and standards.	Advocate for gender-sensitive training mandates, GPS monitoring, and stricter enforcement (e.g., embossed number plates).
Traffic Police	High	High	Enforcement of policies.	Strengthen collaboration with DoTM; expand "Yatru Maitri Aviyan 2080" initiatives.
Public Transport Operators	Medium	High	Provide gender sensitivity trainings to drivers and conductors.	Operation of women only bus by Bagmati Yatayat.
Drivers & Conductors	Medium	Medium	Responsible for vehicle operation and passenger safety, enforce seating policies	Lack of enforcement of reserved seatings, ethical behaviors towards women.

Users	High	Low	Daily users affected by current system	Experience harassment, overcrowding, inaccessibility issues in public transport.

5.4 Findings and Analysis from In-depth Interview

The in-depth interviews revealed significant insights into the experiences, challenges, and suggestions of public transportation users in Kathmandu, with a strong focus on gender inclusion and safety. One of the most pervasive issues highlighted was harassment, including unwanted physical contact, verbal abuse, and staring, often exacerbated by overcrowding. Inaction by bystanders and occasional misconduct by transport staff were also noted. Many women reported traumatic experiences, which impacted their sense of security while commuting.

The interviews further revealed operational challenges, such as overcrowding during peak hours, unreliable schedules, and inadequate vehicle conditions. Safety concerns were a recurring theme, with fears of pickpocketing and harassment discouraging women from using public transport. Infrastructure issues, such as poorly lit bus stops and insufficient seating, compounded these challenges. Passengers frequently cited rude behavior from transport staff and increasing fares as additional concerns.

Participants suggested several measures to improve public transport for women, including enhanced safety measures such as CCTV cameras, panic buttons, and GPS tracking. Hiring more female staff, enforcing stricter laws against harassment, and conducting public awareness campaigns on gender sensitivity were seen as crucial steps. Improved infrastructure, such as better-lit bus stops and clean public toilets, along with limiting overcrowding and introducing larger buses, were highlighted as necessary improvements.

The findings underscore the urgent need for a gender-sensitive approach to public transportation in Kathmandu. Harassment and safety concerns create a hostile commuting environment, disproportionately affecting women and limiting their mobility. Overcrowding and the lack of reliable schedules contribute to an unsafe and

uncomfortable travel experience. The absence of formal training for transport staff on gender-sensitive issues further exacerbates the problem.

Implementing technological solutions, such as CCTV cameras, panic buttons, and GPS tracking, can help monitor and address safety concerns in real time. Increasing the presence of female staff can foster a sense of security for women passengers. Additionally, introducing women-only buses during peak hours can provide a safer commuting option.

Structural improvements, such as better lighting at bus stops and well-maintained bus stands, are essential for enhancing the overall public transport environment. Enforcing strict penalties for harassment and conducting public education campaigns can help shift societal norms and encourage respectful behavior. Collaboration between the government, transport operators, and civil society is crucial to implementing these measures effectively and ensuring a safe, inclusive, and efficient public transportation system in Kathmandu.

5.5 Findings and Analysis from Questionnaire Survey

The findings and analysis presented in this chapter are based on extensive primary and secondary data collection methods aimed at understanding the gender dynamics within Kathmandu's public transportation system. The study employed a range of data collection techniques, including surveys, in-depth interviews, and participant observations. These methods were carefully selected to capture diverse perspectives from key stakeholders, such as public transport users, transport operators, DoTM. In addition, literature reviews and secondary data from relevant studies and official reports were examined to contextualize the findings and identify best practices.

Surveys are a primary method for collecting both quantitative and qualitative data from a target population, particularly in transportation research (Litman, 2017). For this study, a structured survey was developed using Kobo Toolbox. The surveys were carried out on buses, at bus stops, and with key stakeholders, including drivers and operators. A representative sample size was carefully chosen to ensure the results could be applied to the broader public transport network. The use of digital tools, such as Kobo Toolbox, improved the efficiency and accuracy of the data collection process.

A Four-Point Likert Scale, ranging from "strongly disagree" to "strongly agree," was employed to gauge respondents' perceptions and experiences, forming part of the descriptive statistical analysis of the collected data.

5.5.1 Demographic Information of Respondents

5.5.1.1 Findings and Analysis from Survey

The analysis integrates quantitative data to provide a comprehensive understanding of the challenges and opportunities for promoting gender inclusion in Kathmandu's public transportation system. Questionnaire survey was done among 190 respondents.

5.5.1.2 Gender Distribution of Survey Respondents

The gender distribution of the survey respondents indicates a slight majority of male participants. Out of the total sample size, 105 respondents (55.26%) identified as male, while 85 respondents (44.74%) identified as female. This balanced gender representation provides insights into the differing perspectives and transportation needs of both male and female commuters. The data suggests that both genders actively rely on public transportation, making it necessary to consider gender-specific concerns such as safety, comfort, and accessibility in transportation planning.

5.5.1.3 Age Distribution of Survey Respondents

The age distribution of survey respondents reveals that the majority fall within the 18-30 age group, with 147 respondents (77.37%) belonging to this category. The 31-50 age group follows, comprising 28 respondents (14.74%). A smaller proportion of respondents are under 18 years old (10 respondents, or 5.26%), while the least represented group is those above 50 years, with 5 respondents (2.63%). This highlights the predominance of younger individuals in public transportation usage, emphasizing the need for services catering to students, early-career professionals, and middle-aged commuters.

5.5.1.4 Occupation Distribution of Public Transport Users

Survey data suggests that students form the largest user group of public transportation, accounting for 57.89% of respondents. This aligns with the dependency of students on public transport for daily commuting to schools, colleges, and universities. Private sector employees make up the second-largest group at 28.42%, reflecting their reliance on buses and other public transit options, particularly during peak commuting hours. Civil servants

constitute 11.05% of users, typically traveling during structured work hours, while homemakers represent a small 1.58%, using public transport for household-related errands. Lastly, 1.05% of respondents fall under the "Others" category. This diverse occupational distribution indicates the need for flexible and efficient transport services catering to varying commuter requirements.

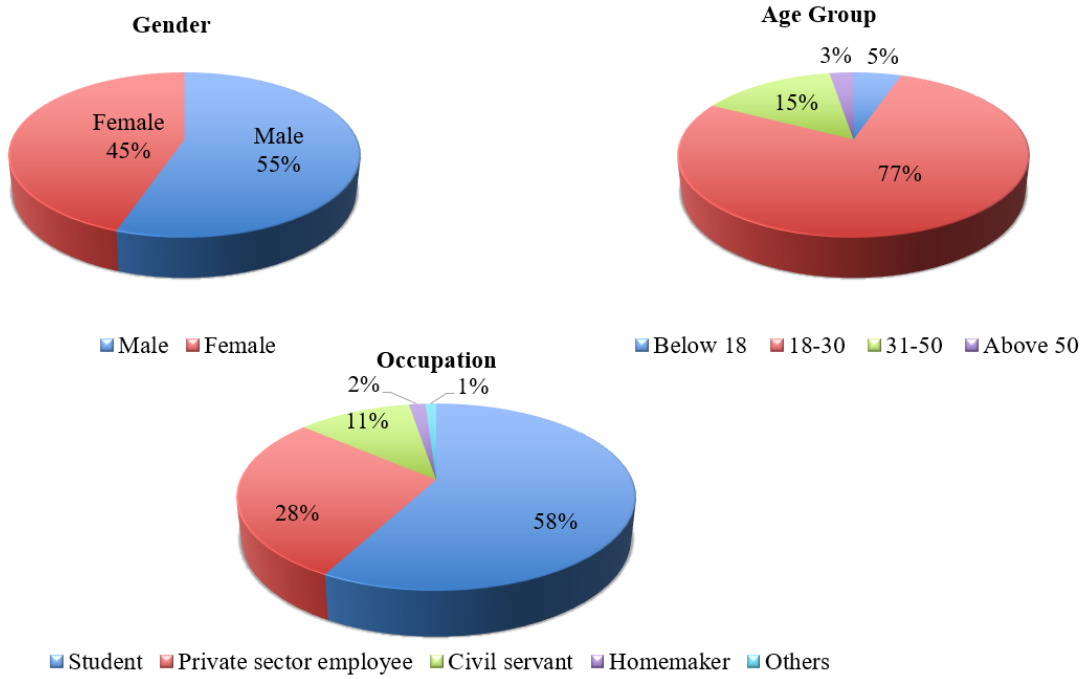

Figure 5.5 Gender, Age, and Occupation of Respondents

5.5.1.5 Purpose of Trip

The primary reason for using public transportation in Kathmandu is educational travel, with 62.63% (119 respondents) relying on transit to reach schools and universities. Work-related trips account for 57.89% (110 respondents), making employment a significant driver of public transit use. Additionally, social and personal trips contribute to 38.42% (73 respondents), reflecting the role of public transport in maintaining social interactions. Shopping trips were reported by 25.26% (48 respondents), while a small proportion (1.58%, or 3 respondents) cited other specific purposes such as medical visits or administrative tasks. The wide range of trip purposes underscores the essential role of public transport in supporting various aspects of daily life.

5.5.1.6 Purpose of Trip

The majority of passengers using the observed public transportation route are daily commuters, constituting 62.63% (119 passengers) of the total respondents. These

individuals rely on public transport for work, education, and other routine activities, emphasizing the need for consistent service quality, reliability, and passenger comfort on this route.

In addition to daily users, 24.21% (46 passengers) travel occasionally, using the route for shopping, social visits, or other infrequent trips. Their travel patterns are irregular compared to daily commuters, reflecting the varied purposes of public transport usage.

A smaller proportion, 13.16% (25 passengers), consists of weekly travelers who use the route for scheduled activities occurring once a week. This group represents those with specific but less frequent mobility needs.

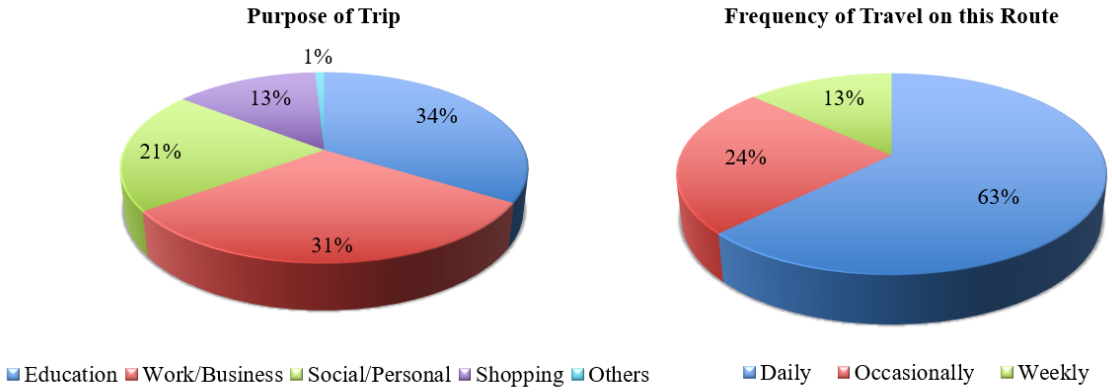

Figure 5.6 Purpose of trip and Frequency of travel of Respondents

5.5.2 Vehicle Design

The survey results indicate several challenges and concerns regarding the design of public transportation vehicles in Kathmandu. The findings highlight issues related to comfort, accessibility, safety features, and gender-sensitive infrastructure, which can significantly impact commuter experiences.

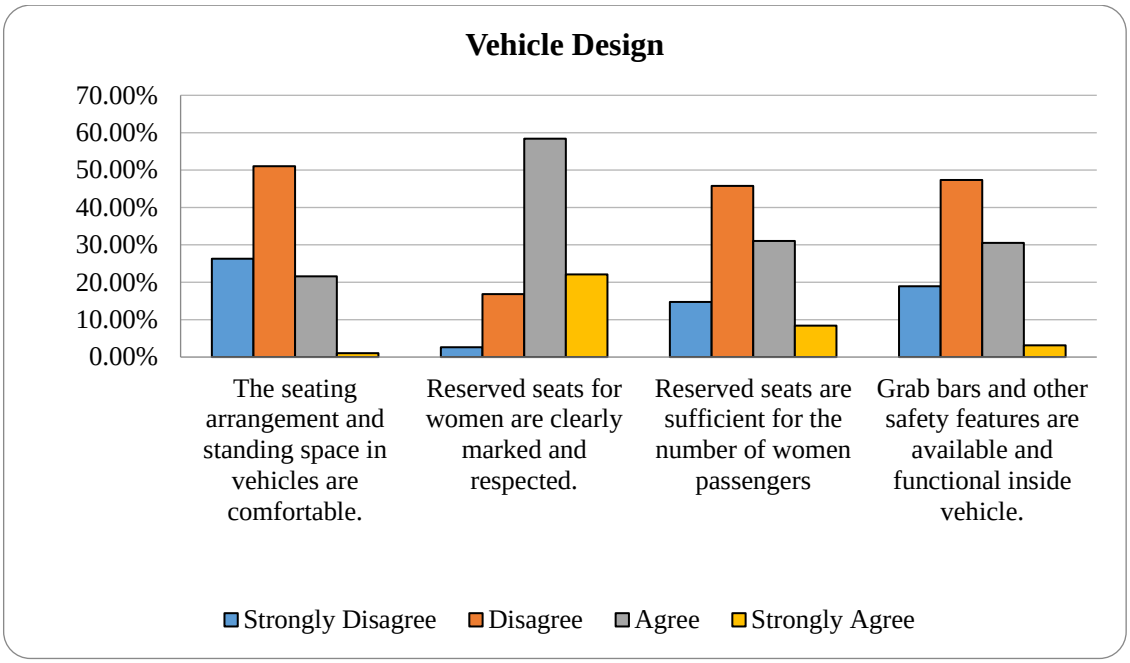

Figure 5.7 Bar Chart Illustrating Survey Data on Vehicle Design

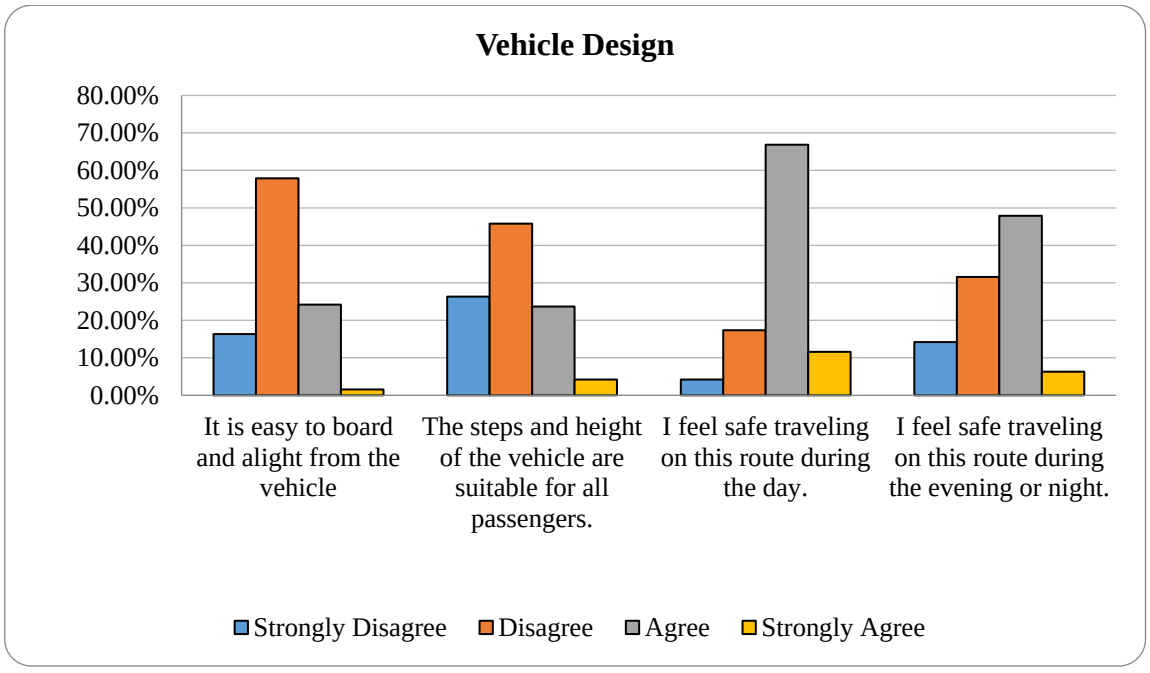

Figure 5.8 Bar Chart Illustrating Survey Data on Vehicle Design

Seating and Standing Space

A significant portion of respondents (51.05%) expressed dissatisfaction with the available seating and standing space, suggesting issues related to overcrowding and discomfort. This could be attributed to poor vehicle design, lack of space optimization, or overloading during peak hours.

Reserved Seats for Women

While 58.42% of respondents acknowledged the presence of reserved seating for women, 45.79% felt that the number of these seats was insufficient. This indicates that although efforts have been made to ensure gender-sensitive transportation, the current allocation does not meet demand, which could leave female passengers feeling unsafe or uncomfortable during travel.

Safety Features

The inadequacy of safety features such as grab bars and handrails was reported by 47.37% of respondents, indicating a serious design flaw in public transport vehicles. The lack of such features increases the risk of accidents, especially for standing passengers or those with mobility challenges.

Boarding and Alighting Difficulties

With 57.89% of respondents facing challenges when boarding and exiting vehicles, accessibility issues appear to be a major concern. Poorly designed entrances, high steps, and overcrowding could contribute to these difficulties, particularly for elderly passengers, children, and those with disabilities.

Vehicle Steps and Height Issues

The fact that 45.79% of respondents found the vehicle steps and height unsuitable suggests that ergonomic design improvements are needed. High steps or steep entryways can be problematic for passengers, particularly women wearing traditional attire or individuals carrying luggage.

Safety During Travel – Day vs. Night

While 66.84% of respondents felt safe traveling during the daytime, only 47.89% felt secure at night, highlighting concerns about personal security in the evening and nighttime hours. Factors such as poor lighting, overcrowding, and lack of security monitoring may contribute to the heightened sense of vulnerability among passengers, particularly women and marginalized groups.

The survey findings emphasize the need for urgent improvements in vehicle design to ensure safety, accessibility, and comfort for public transport users.

5.5.3 Infrastructure

The infrastructure assessment reveals key strengths and shortcomings in Kathmandu's public transportation system. Infrastructure assessment focused on safety monitoring, navigation tools, and public facilities:

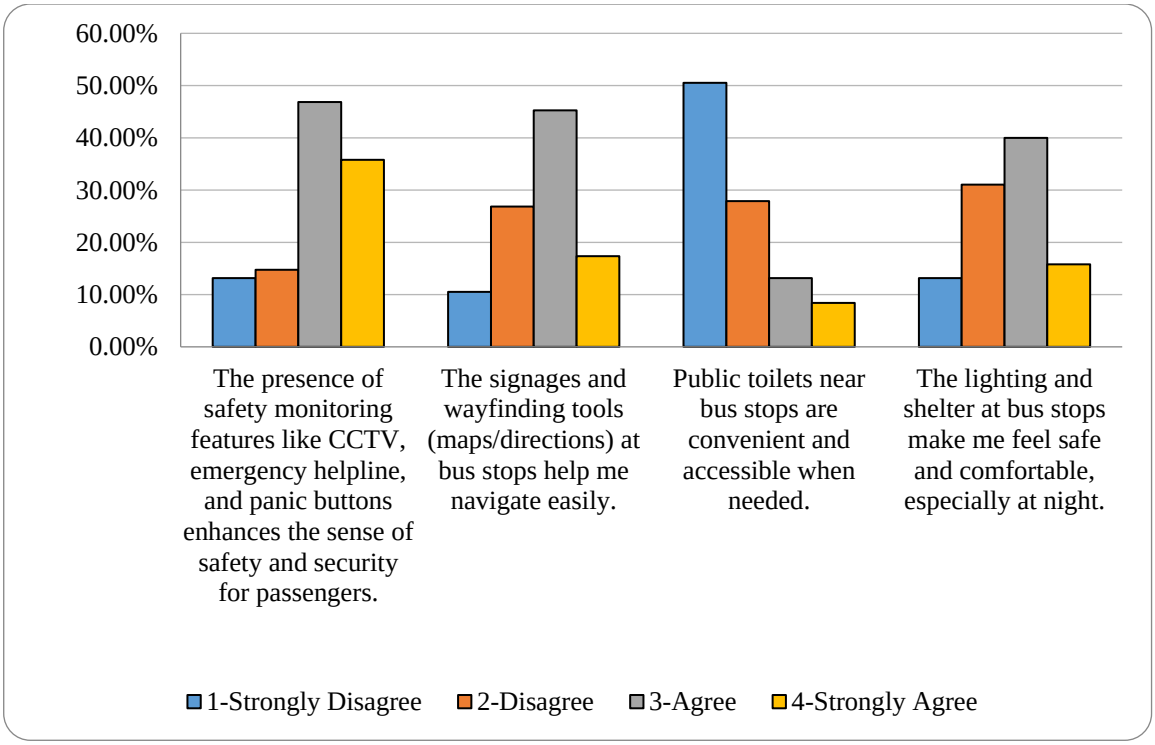

Figure 5.9 Bar Chart Illustrating Survey Data on Infrastructure

Safety Monitoring

The overwhelming majority (82.63%) of respondents acknowledged the positive impact of security features like CCTV on enhancing passenger safety. However, the 13.16% who disagreed indicate that either security measures are inconsistently implemented or passengers still feel unsafe despite surveillance. This suggests a need for expanding security infrastructure and ensuring its proper functioning.

Signage and Way finding

While 62.63% of respondents found navigation tools useful, a significant 26.84% found them inadequate. This indicates that while efforts have been made to improve wayfinding, there are still gaps in signage clarity, accessibility, and consistency, which may pose challenges for first-time users or those unfamiliar with certain routes.

Public Toilets

The lack of adequate toilet facilities near bus stops emerged as a critical issue, with 78.42% of respondents reporting dissatisfaction. This deficiency can negatively impact the comfort and convenience of commuters, particularly for long-duration travelers, elderly passengers, and women. Addressing this gap would require infrastructure investment in well-maintained, accessible public toilets at key transit points.

Lighting and Shelter

More than half of the respondents (55.79%) indicated that bus stop shelters and lighting were inadequate, especially at night. Poor lighting not only reduces comfort but also increases safety concerns, particularly for women and vulnerable groups traveling during late hours. Enhancing shelter infrastructure and installing better lighting would significantly improve passenger experience and security.

The findings highlight the need for targeted improvements in public transport infrastructure. While safety monitoring measures like CCTV are largely effective, gaps remain in wayfinding, public facilities, and nighttime security.

5.5.4 Operational Practices

The findings from the survey highlight significant operational shortcomings and safety concerns within Kathmandu's public transportation system. These issues, if unaddressed, can severely impact the efficiency, accessibility, and overall trust in the public transport network.

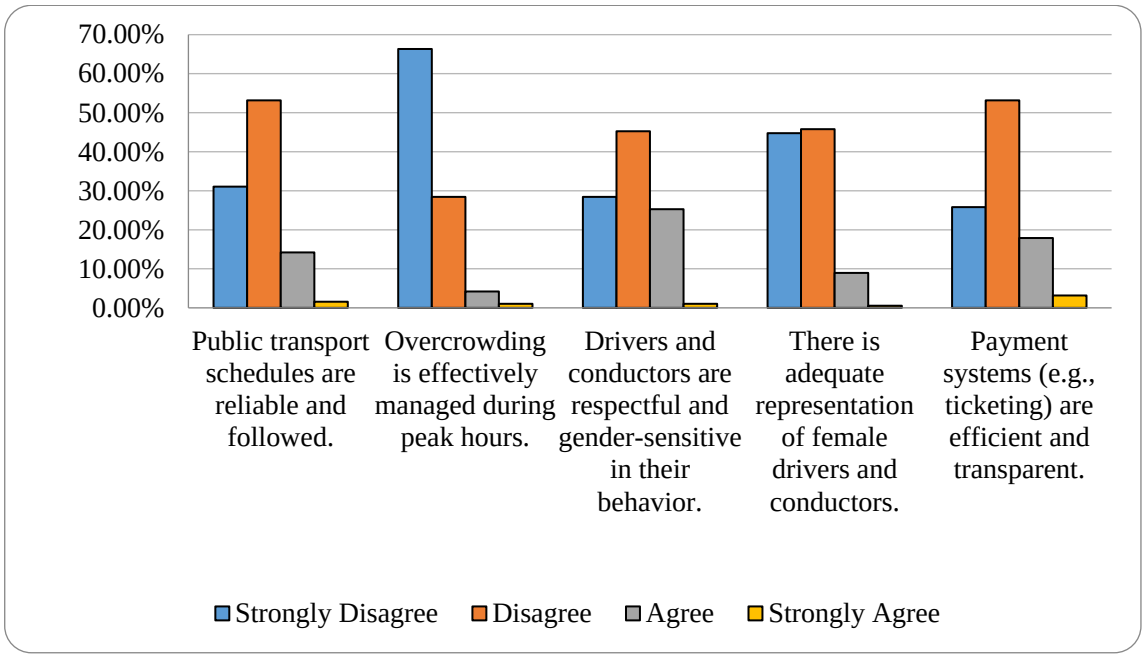

Figure 5.10 Bar Chart Illustrating Survey Data on Operational Practices

Figure 5.11 Bar Chart Illustrating Survey Data on Operational Practices

Schedule Reliability Issues (84.21% dissatisfaction)

The widespread dissatisfaction (84.21%) with bus schedule reliability suggests a lack of consistency in service frequency and adherence to published timetables. Unpredictable schedules can lead to delays, overcrowding, and inconvenience for daily commuters.

Overcrowding during Peak Hours (94.74% dissatisfaction)

The overwhelming concern regarding overcrowding indicates insufficient fleet capacity and ineffective crowd management strategies. This issue exacerbates passenger discomfort, increases safety risks, and reduces the overall efficiency of the transport system.

Disrespectful and Gender-Insensitive Staff Behavior (73.68% negative feedback)

A significant proportion of respondents found driver and conductor behavior problematic, particularly regarding gender sensitivity. This reflects a need for professional conduct training and stronger enforcement of behavioral guidelines for public transport staff.

Low Female Representation in Transport Workforce (90.53% concern)

The severe lack of female conductors and drivers highlights gender disparity in the transport workforce. Increasing female participation could improve the perception of safety and comfort for women commuters.

Inefficient Payment Systems (78.95% dissatisfaction)

A majority of respondents found the payment process inefficient, possibly due to outdated cash-based systems, lack of digital payment options, and potential fare disputes.

Inadequate Women's Safety Measures (78.42% concern)

The perception that public transport does not prioritize women's safety raises serious concerns. The absence of dedicated security personnel, insufficient reserved seating, and lack of female-friendly policies contribute to this issue.

Frequent Violations of Traffic Rules (90% observed non-compliance)

The high rate of observed traffic violations and disregard for vehicle capacity limits suggests weak enforcement of transport regulations, potentially compromising passenger safety.

Lack of Gender-Sensitive Training for Staff (92.11% concern)

The overwhelming consensus on the absence of gender-related training points to a critical gap in transport policy. Training programs for public transport staff could help address harassment, misconduct, and gender-based discrimination.

Absence of Safety Announcements and Signage (88.95% concern)

The lack of visible safety signage and announcements reflects a failure to effectively communicate safety measures to passengers, particularly women and vulnerable groups.

Poor Cleanliness and Maintenance (88.42% dissatisfaction)

The significant dissatisfaction with vehicle cleanliness indicates inadequate maintenance and hygiene standards, which can deter public transport use and affect passenger health.

Harassment Prevalence in Public Transportation

The survey's findings on harassment are particularly concerning, with 45.79% of respondents reporting that they or someone they know has experienced harassment on public transport. This statistic highlights the urgent need for stronger interventions, including:

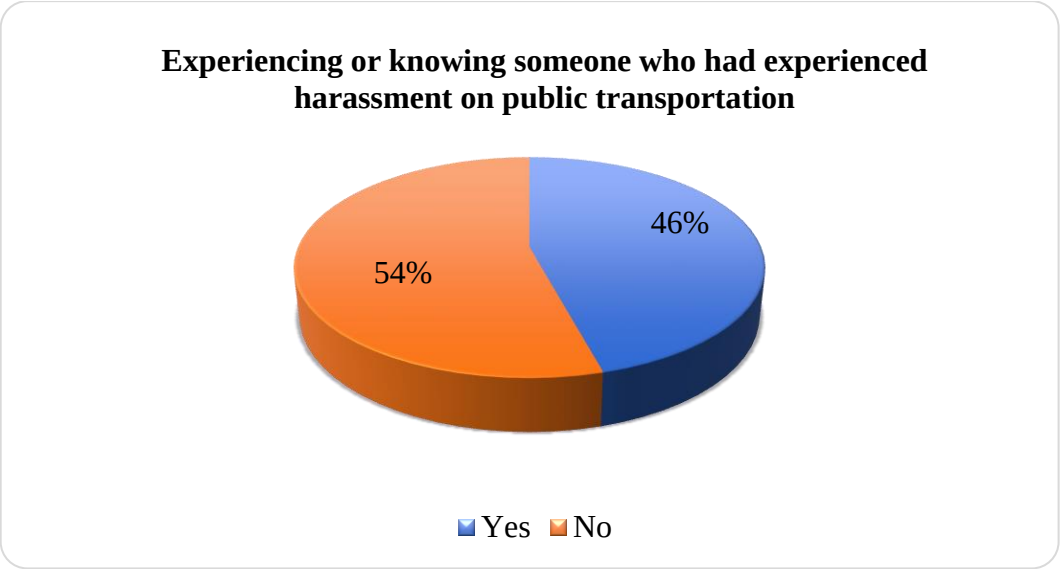

Figure 5.12 Experiencing or knowing someone who had experienced harassment on public transportation

The identified operational inefficiencies and safety concerns emphasize the need for comprehensive transport reforms in Kathmandu. Improving service reliability, addressing overcrowding, enhancing gender sensitivity, enforcing stricter safety measures, and modernizing payment systems are crucial steps in fostering a more accessible and secure public transportation system.

5.6 Analysis

5.6.1 Descriptive Analysis

This section presents the descriptive analysis of the data gathered through the questionnaires during the study. Descriptive statistics is the study of statistically characterizing the main elements of data collection. Descriptive statistics can be used to logically simplify large amounts of data pertaining to these variables. For this purpose, respondents were provided with "Four-Point Likert Scale" questions, ranging from "strongly disagree" to "agree," and scored from 1 to 4.

5.6.1.1 Vehicle Design

Table 5.3 Descriptive Analysis of Vehicle Design

Vehicle Design	N	Mean	Std. Deviation
Comfortable Seating arrangement and standing space	190	1.97	0.723
Clearly marked and respected reserved seats for women	190	3.00	0.705
Sufficient reserved seats for no. of women passengers	190	2.33	0.830
Grab bars & other safety features are available & functional	190	2.18	0.770
It is easy to board and alight from the vehicle	190	2.11	0.677
steps & height of vehicle suitable for all passengers.	190	2.06	0.818
I feel safe traveling on this route during the day.	190	2.86	0.663

- Seating arrangement and standing space are comfortable

The low mean indicates that respondents generally disagree or strongly disagree with this statement, showing dissatisfaction with the comfort of seating and standing arrangements. The standard deviation is relatively small, suggesting a consistent response pattern, meaning most participants had a similar perception of discomfort.

- Reserved seats for women are clearly marked and respected

With a mean of 3.00, respondents agree that reserved seats for women are marked and respected. The relatively low standard deviation indicates that there is little variability, meaning most respondents agree on this positive aspect of the service.

- Reserved seats are sufficient for the number of women passengers

The mean falls between disagree and agree, leaning toward disagreement, which suggests that the number of reserved seats may not be adequate for all female passengers. The higher standard deviation reflects greater variability, indicating a mix of opinions—some respondents may find the seats sufficient, while others do not.

- Grab bars and other safety features are available and functional

The mean indicates that most respondents disagree, reflecting concerns about the availability and functionality of safety features. The moderate standard deviation suggests some variability in responses, with a significant portion of respondents perceiving safety features as inadequate.

- It is easy to board and alight from the vehicle

The mean score shows that respondents tend to disagree, indicating difficulties in boarding and alighting. The relatively small standard deviation means responses are fairly consistent, with most respondents agreeing on the inconvenience of accessing the vehicle.

- Steps and height of the vehicle are suitable for all passengers

The low mean indicates a general disagreement about the suitability of the vehicle's height and steps for all passengers. The larger standard deviation suggests more diverse opinions, indicating that some passengers might not face difficulty while others do.

- Feel safe traveling on this route during the day

The mean indicates that respondents agree with feeling safe traveling during the day. The small standard deviation reflects a high level of agreement, showing that the majority of respondents have a consistent sense of daytime safety.

5.6.1.2 Infrastructure

Table 5.4 Descriptive Analysis of Infrastructure

Infrastructure	N	Mean	Std. Deviation
The presence of safety monitoring features like CCTV, emergency helpline, and panic buttons enhances the sense of safety and security.	190	2.95	1.017
The signages and wayfinding tools at bus stops help me navigate easily.	190	2.69	0.880
Public toilets near bus stops are convenient and accessible when needed.	190	1.79	0.968
The lighting and shelter at bus stops make me feel safe and comfortable, especially at night.	190	2.58	0.909

- The presence of safety monitoring features like CCTV, emergency helpline, and panic buttons enhances the sense of safety and security for passengers.

  The mean of 2.95 indicates that most respondents agree that safety monitoring features like CCTV and panic buttons help them feel secure while using public transportation. However, the relatively high standard deviation (1.017) shows divergence in responses, suggesting that while some passengers feel adequately protected, others may not be aware of or fully trust these measures.

- The signages and wayfinding tools (maps/directions) at bus stops help me navigate easily.

  A mean of 2.69 suggests that respondents generally agree that maps and directional signage improve navigation at bus stops. The standard deviation of 0.880 reflects moderate consistency, indicating that while many passengers find the tools helpful, a portion may experience difficulties due to unclear or insufficient signage.

- Public toilets near bus stops are convenient and accessible when needed.

  With a low mean of 1.79, it is evident that most respondents disagree, expressing significant dissatisfaction with the availability and accessibility of public toilets near bus stops. The standard deviation (0.968) suggests some variability in responses, with a minority having a more favourable experience.

- The lighting and shelter at bus stops make me feel safe and comfortable, especially at night.

  The mean score of 2.58 indicates that respondents somewhat agree that lighting and shelter at bus stops provide a sense of safety and comfort at night. However, the standard deviation of 0.909 highlights diverse experiences, with some passengers feeling secure and others still concerned.

5.6.1.3 Operational Practices

Table 5.5 Descriptive Analysis of Operational Practices

Operational Practices	N	Mean	Std. Deviation
Public transport schedules are reliable and followed.	190	1.86	0.707
Overcrowding is effectively managed during peak hours.	190	1.4	0.624
Drivers and conductors are respectful and gender-sensitive in their behavior.	190	1.99	0.763
There is adequate representation of female drivers and conductors.	190	1.65	0.663
Payment systems are efficient and transparent.	190	1.98	0.752
Public transportation services prioritize the safety and comfort of women.	190	1.99	0.713

Traffic rules and vehicle capacity limits are followed by buses.	190	1.6	0.696
Staff are trained to handle gender-related issues effectively.	190	1.69	0.645
There are adequate signs or announcements about women's safety.	190	1.68	0.679
The vehicles are clean and well-maintained.	190	1.74	0.684

- Public transport schedules are reliable and followed.

The mean of 1.86 indicates that most respondents disagree, reflecting dissatisfaction with the reliability of public transport schedules. The standard deviation (0.707) shows consistent responses, suggesting that the problem is widely experienced.

- Overcrowding is effectively managed during peak hours.

With a very low mean of 1.40, respondents overwhelmingly disagree, highlighting a significant issue with overcrowding during peak hours. The small standard deviation (0.624) reflects high consistency in the responses.

- Drivers and conductors are respectful and gender-sensitive in their behavior.

The mean of 1.99 indicates that respondents slightly disagree, showing concerns about driver and conductor behavior regarding gender sensitivity. The moderate standard deviation (0.763) suggests some variability, indicating different experiences among passengers.

- There is adequate representation of female drivers and conductors.

The low mean of 1.65 shows that most respondents disagree, pointing out a significant lack of female representation in public transportation. The standard deviation (0.663) suggests consistent responses.

- Payment systems (e.g., ticketing) are efficient and transparent.

The mean of 1.98 suggests that respondents somewhat disagree with the efficiency and transparency of payment systems. The standard deviation (0.752) reflects moderate variability, indicating that some passengers have better experiences than others.

- Public transportation services prioritize the safety and comfort of women.
  With a mean of 1.99, respondents slightly disagree that services prioritize women's safety and comfort. The standard deviation (0.713) indicates consistent perceptions across respondents.

- Traffic rules and vehicle capacity limits are followed by buses.
  The low mean of 1.60 shows that most respondents disagree, indicating frequent violations of traffic rules and capacity limits. The standard deviation (0.696) suggests relatively uniform experiences.

- Staff are trained to handle gender-related issues effectively.
  The mean of 1.69 indicates disagreement, reflecting that respondents do not believe staff are adequately trained to manage gender-related issues. The standard deviation (0.645) shows consistent responses across participants.

- There are adequate signs or announcements about women's safety (e.g., no harassment policies).
  The mean of 1.68 shows that most respondents disagree, highlighting a lack of visible safety-related signage or announcements for women. The standard deviation (0.679) suggests some consistency in responses.

- The vehicles are clean and well-maintained.
  With a mean of 1.74, most respondents disagree, indicating concerns about cleanliness and maintenance. The standard deviation (0.684) reflects consistent dissatisfaction regarding vehicle conditions.

5.6.2 Reliability Test

Cronbach's Alpha is used to assess the internal consistency and reliability of the items measuring different variables in a survey. It ranges from 0 to 1, with values between 0.7

and 0.8 considered acceptable, while values above 0.8 indicate good reliability. The following analysis is based on the Cronbach's Alpha values provided for Vehicle Design, Infrastructures, and Operational Practices.

Table 5.6 Reliability of Data

Variables	Cronbach's Alpha
Vehicle Design	0.754
Infrastructure	0.786
Operational Practices	0.855

- Vehicle Design (Cronbach's Alpha = 0.754)

The Cronbach's Alpha value of 0.754 indicates acceptable internal consistency for the items measuring aspects related to vehicle design. This suggests that the questions or indicators under this variable are sufficiently correlated and reliably assess the intended concept. While there is some variability in responses, the scale is stable enough to be considered a reliable measure.

- Infrastructures (Cronbach's Alpha = 0.786)

With a Cronbach's Alpha of 0.786, the items assessing infrastructure-related features show high internal consistency. This value is close to 0.8, indicating that respondents have given consistent answers across items measuring the quality, availability, and condition of infrastructure. The reliability of this scale ensures that the underlying concept is being measured accurately.

- Operational Practices (Cronbach's Alpha = 0.855)

The highest Cronbach's Alpha value among the three variables, 0.855, reflects good reliability for items related to operational practices. This indicates that the items are well-aligned, and responses are highly consistent. Such a high level of reliability ensures that the items provide a strong and coherent measurement of operational practices in public transportation services.

The analysis of reliability statistics confirms that all three variables—Vehicle Design, Infrastructures, and Operational Practices—have acceptable to good reliability. The Operational Practices variable demonstrates the highest consistency, while Vehicle

Design and Infrastructures also meet the reliability threshold, ensuring that the survey items provide consistent and reliable data for these dimensions.

5.6.3 Regression Test

Gender and Other Variables

Table 5.7 Regression Test

Variables	R	R Square	Adjusted R Square	Std. Error of the Estimates
Vehicle Design	0.281	0.079	0.038	0.489
Infrastructures	0.116	0.014	-0.008	0.500
Operational Practices	0.293	0.086	0.035	0.490

- Gender and Vehicle Design

  The regression model summary indicates that the predictors collectively explain 7.9% of the variance (R Square = 0.079) in the dependent variable, with an Adjusted R Square of 0.038, suggesting limited explanatory power after adjusting for the number of predictors. The R-value of 0.281 reflects a weak positive correlation between the predictors and the outcome variable. The Standard Error of the Estimate (0.489) represents the typical deviation of observed values from the predicted values, indicating moderate variability in prediction accuracy. The predictors included in the model such as perceptions of safety during the day and night, adequacy of reserved seating, ease of boarding, availability of safety features, and comfort show some relevance but only partially explain the dependent variable. The modest R Square and high unexplained variance (92.1%) imply that other factors not captured in this model likely play a significant role. Overall, while the predictors provide useful insights, the model's explanatory capacity remains limited.

- Gender and Infrastructures

  The regression model reveals a very weak relationship (R = 0.116) between the predictors and the dependent variable, with an R Square of 0.014, indicating that only 1.4% of the variance in the dependent variable is explained by the model. The negative adjusted R Square (-0.008) suggests that the predictors do not significantly enhance the model’s accuracy. The standard error of 0.500 indicates moderate

variability in predictions. The predictors lighting and shelter at bus stops, safety monitoring features, public toilet accessibility, and navigation signage offer limited explanatory power, suggesting that while these factors are relevant, they are insufficient to fully explain the variance in the outcome. This indicates that additional factors likely have a more substantial influence on the dependent variable.

- Gender and Operational

  The regression model shows a weak positive relationship (R = 0.293) between the predictors and the dependent variable, with an R Square of 0.086, meaning that 8.6% of the variance is explained by the predictors. The adjusted R Square (0.035) indicates that after accounting for the number of predictors, the model's explanatory power decreases, suggesting that some predictors have minimal impact. The standard error of 0.490 reflects moderate variability in prediction accuracy. The predictors vehicle cleanliness, representation of female drivers, schedule reliability, adherence to traffic rules, payment transparency, overcrowding management, visibility of safety measures, and staff training on gender-related issues are relevant but explain only a small portion of the overall variability, indicating that other factors significantly influence the outcome.

5.6.4 Tests for Normality

1. Vehicle Design

The Kolmogorov-Smirnov test shows that all variables have p-values < 0.001, indicating that none of the data follows a normal distribution. The test statistics range from 0.249 to 0.369, confirming significant deviation from normality for all items. This suggests the presence of skewed or clustered responses, with participants showing strong opinions, particularly on safety, vehicle accessibility, and comfort.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
The seating arrangement and standing space in vehicles are comfortable.	.259	190	<.001	.825	190	<.001
Reserved seats for women are clearly marked and respected.	.305	190	<.001	.811	190	<.001
Reserved seats are sufficient for the number of women passengers	.261	190	<.001	.865	190	<.001
Grab bars and other safety features are available and functional inside vehicle.	.255	190	<.001	.849	190	<.001
It is easy to board and alight from the vehicle	.307	190	<.001	.813	190	<.001
The steps and height of the vehicle are suitable for all passengers.	.249	190	<.001	.851	190	<.001
I feel safe traveling on this route during the day.	.369	190	<.001	.762	190	<.001
I feel safe traveling on this route during the evening or night.	.287	190	<.001	.843	190	<.001

a. Lilliefors Significance Correction

Figure 5.13 Normality Test for Vehicle Design

2. Infrastructures

The Kolmogorov-Smirnov test results show that all variables have p-values less than 0.001, indicating that none of the variables follow a normal distribution. The test statistics for infrastructure-related factors such as safety monitoring features (Statistic = 0.242), signages and wayfinding tools (0.262), public toilet accessibility (0.300), and lighting and shelter at bus stops (0.234) demonstrate significant deviations from normality. This suggests that participant responses for these variables are clustered and skewed, likely reflecting polarized opinions or strong tendencies toward particular responses.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
The presence of safety monitoring features like CCTV, emergency helpline, and panic buttons enhances the sense of safety and security for passengers.	.242	190	<.001	.827	190	<.001
The signages and wayfinding tools (maps/directions) at bus stops help me navigate easily.	.262	190	<.001	.868	190	<.001
Public toilets near bus stops are convenient and accessible when needed.	.300	190	<.001	.768	190	<.001
The lighting and shelter at bus stops make me feel safe and comfortable, especially at night.	.234	190	<.001	.877	190	<.001

a. Lilliefors Significance Correction

Figure 5.14 Normality Test for Infrastructure

3. Operational Practices

The variables related to public transportation operations and staff behaviour show consistent non-normal distributions, with statistics ranging from 0.231 to 0.402. Overcrowding during peak hours has the highest statistic (0.402), indicating a notable deviation from normality, which reflects a high level of dissatisfaction or varied experiences. Other variables, such as payment system efficiency (0.281), representation of female staff (0.285), adherence to traffic rules (0.316), and gender-related staff training (0.285), confirm significant non-normality. These results imply that non-parametric statistical methods are necessary for further analysis, as the data does not meet the assumptions of normality required for parametric tests.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Public transport schedules are reliable and followed.	.266	190	<.001	.809	190	<.001
Overcrowding is effectively managed during peak hours.	.402	190	<.001	.647	190	<.001
Drivers and conductors are respectful and gender-sensitive in their behavior.	.231	190	<.001	.831	190	<.001
There is adequate representation of female drivers and conductors.	.285	190	<.001	.768	190	<.001
Payment systems (e.g., ticketing) are efficient and transparent.	.281	190	<.001	.828	190	<.001
Public transportation services prioritize the safety and comfort of women.	.278	190	<.001	.823	190	<.001
Traffic rules and vehicle capacity limits are followed by buses.	.316	190	<.001	.753	190	<.001
Staff are trained to handle gender-related issues effectively.	.285	190	<.001	.762	190	<.001
There are adequate signs or announcements about women's safety (e. g., no harassment policies)?	.275	190	<.001	.778	190	<.001
The vehicles are clean and well-maintained.	.263	190	<.001	.788	190	<.001

a. Lilliefors Significance Correction

Figure 5.15 Normality Test for Operational Practices

5.7 Discussion

5.7.1 Vehicle Design

In terms of vehicle design, most public vehicles especially minibuses and microbuses fail to comply with the Bus Body Building Standards. High floor heights exceeding 340 mm, narrow gangways, cramped seating arrangements, and the absence of functional grab bars are common, making boarding, standing, and alighting difficult and unsafe for women, particularly those in traditional attire, elderly passengers, or those carrying children or

goods. While Sajha Yatayat buses do include some women-friendly features such as low-floor entry, separate doors for entry and exit, and CCTV cameras, these features remain underutilized due to a lack of user awareness and proper enforcement. Moreover, vehicle interiors are not designed with gender sensitivity in mind, often facilitating overcrowding and exposing women to unwanted physical contact.

5.7.2 Infrastructure

The analysis of transport infrastructure further reveals that bus stops across Kathmandu are poorly maintained and inadequately equipped to support safe and inclusive transit experiences for women. Except for the Falcha-style (Type D) bus stops, most stops lack adequate lighting, shelter, seating, signage, and safety features. This contributes to a heightened sense of insecurity, particularly during early morning or evening hours. The absence of public toilets near major bus stops disproportionately affects women, especially those traveling long distances or during menstruation, thereby restricting their mobility and travel confidence.

5.7.3 Operational Practices

One of the most pressing concerns highlighted by the study is the prevalence of harassment in public transport. A significant 45.79% of respondents reported experiencing harassment or knowing someone who had faced harassment while commuting. The survey and passenger interviews underscore the severity of these issues, with respondents detailing incidents of unwanted physical contact, inappropriate touching in overcrowded vehicles, and verbal harassment. One participant recounted an incident where a middle-aged man persistently harassed a female passenger in a microbus despite the presence of other commuters. Another respondent described how conductors frequently forced additional passengers into an already full vehicle, leading to situations where women were pushed into uncomfortable and vulnerable positions.

> *"A man was sitting beside me and touching me without me realizing. I have often faced men staring at me, making me uncomfortable."*

> *"In peak office time hours when the bus is packed, people cramped up standing, male hands and legs inappropriately touched. A guy folded hands and tried to touch private parts."*
> Female respondent

> *"My aunt and I were travelling. The bus was crowded and when we were getting down, she was groped by a couple of guys. She slapped one of them and it became an issue. Even though public supported her and removed those guys from the bus, that incident traumatized her and she has always been wary of travelling in public transport since."*
> Female respondent

> *" In a full packed microbus during peak hour time of a day, I was standing and I was near the door trying to stand still but failing due to a hell lot of people, I felt somebody touched my private parts and I assume that was conductor of the bus. I was on the opposite side so I couldn't see it, who did it but I felt that. It's not the only time. So, it has been quite a normal thing."*
> Female respondent

Overcrowding emerged as a major catalyst for harassment, with 94.74% of respondents expressing dissatisfaction with crowd management. KII data indicate that drivers and conductors lack proper training on crowd control, exacerbating the problem. Furthermore, there is limited awareness about reporting mechanisms although the traffic police operate a hotline (103), public awareness remains low, leading to significant underreporting of harassment cases. Additionally, 88.95% of respondents noted the absence of women's safety announcements or signage in public transport. Literature on public safety and transport (Paudel, 2011) suggests that visual and audio reminders can play a crucial role in fostering accountability and reducing harassment incidents.

Existing studies support these findings, with research consistently identifying safety concerns as a major barrier to women's mobility in Nepal and other developing countries. According to ESCAP (2023), women across Asian urban transport systems frequently report sexual harassment incidents. The Gender and Public Transport study (2013) found that 33% of women in Kathmandu felt personally insecure compared to only 16% of men, and 80% of women identified overcrowding as their primary concern. Overcrowding not only increases the likelihood of harassment but also restricts women's ability to move freely within the vehicle, further exacerbating their vulnerability.

Beyond harassment, 73.68% of passengers reported experiencing disrespectful behavior from conductors and drivers, particularly regarding gender sensitivity. KII interviews

with transport operators confirmed that no formal gender-sensitivity training exists for staff. Moreover, only 47.89% of respondents felt safe traveling at night, with female passengers citing harassment and the lack of security measures as primary concerns.

The accounts from respondents highlight a systemic failure to ensure passenger safety in public transportation. Overcrowding, insufficient surveillance, and the absence of trained personnel create a culture where harassment often goes unchecked. The lack of secure, well-lit infrastructure exacerbates women's vulnerability, particularly during nighttime commutes. Despite provisions in the Public Transport Code of Conduct for respectful communication and seat reservations for women, weak enforcement allows these issues to persist.

The heavy reliance on microbuses and minibuses with limited seating capacity further exacerbates the overcrowding issue, compromising passenger comfort and safety. Inadequate infrastructure at bus stops, such as poor lighting and insufficient seating, limits women's mobility and access to public transport, reinforcing a sense of insecurity.

5.7.4 Policy

Despite the introduction of progressive transport policies in Nepal, enforcement remains a significant challenge. Policies such as the Motor Vehicle and Transport Management Rules (1997) and the Public Transport Code of Conduct (2011) include gender-sensitive measures, but their practical implementation is limited.

Weak enforcement mechanisms undermine the effectiveness of these policies. ESCAP (2023) emphasizes the need for stronger accountability frameworks and the integration of safety measures into transport systems to ensure effective implementation. The lack of monitoring also allows misconduct and non-compliance to persist.

For instance, data revealed that over 3,500 public vehicles were detained in FY 079/80 for violating reserved seat policies, demonstrating that despite legal mandates, enforcement is insufficient. Establishing a dedicated regulatory body to monitor compliance with gender-inclusive transport policies is crucial. Enhanced coordination between the Department of Transport Management (DoTM), traffic police, and civil society organizations is also necessary to improve enforcement and public awareness.

Awareness campaigns should be launched to educate passengers and transport staff on gender sensitivity and respectful behavior, encouraging proactive reporting of misconduct.

CHAPTER 6: CONCLUSION AND RECOMMENDATION

6.1 Recommendations

Based on the findings of this study, the following recommendations are proposed to enhance gender inclusion in public transportation systems in Kathmandu. These are structured around vehicle design, infrastructure, operational practices, and policy.

Vehicle Design

a. Enforce Bus Body Building Standards: ensure compliant floor heights (max 340 mm), wider gangways (450 mm), and accessible handrails (at 800–1000 mm from ground).
b. Introduce more low-floor buses and prioritize two-door entry/exit systems to ease boarding and reduce crowding.
c. Mandate longitudinal seat layouts to reduce crowding and increase visibility.
d. Install safety features like CCTV cameras, panic buttons, and anti-slip surfaces in all public vehicles.

Infrastructure

a. Upgrade bus stops with adequate lighting, comfortable seating, passenger information systems
b. Security features (CCTV, panic buttons) across all public vehicles.
c. Build public toilets near major bus stops with special focus on women's hygiene and safety.

Operational Practices

a. Introduce mandatory gender-sensitivity training for all public transport staff.
b. Launch public awareness campaigns in collaboration with NGOs (e.g., Zonta, SABAH).
c. Implement real-time complaint systems (e.g., hotline or mobile apps) with follow-up mechanisms.
d. Ensure monitoring and crowd management, especially during peak hours.
e. Promote female employment in transport: offer incentives and training to hire more female conductors and drivers.

Policy

a. Strengthen policy implementation through dedicated monitoring units under DoTM.
b. Develop a Gender-Inclusive Public Transport Strategy with stakeholder participation.
c. Reinforce and enforce reserved seating rules, with penalties for violators.
d. Create public-private partnerships to support gender-friendly initiatives (e.g., bus upgrades, digital complaint systems).
e. Institutionalize multi-agency collaboration involving transport departments, traffic police, local governments, and NGOs.

6.2 Conclusion

This study reveals that Kathmandu's public transportation system is not yet equipped to meet the mobility needs of women in a safe, inclusive, and accessible manner. Issues related to poor vehicle design, inadequate infrastructure, weak operational practices, and limited policy enforcement continue to create significant barriers for female commuters. Although some positive initiatives such as the introduction of low-floor Sajha buses and gender-sensitive transport policies exist, their impact has been minimal due to fragmented implementation and lack of institutional accountability.

By investing in gender-responsive transport policies, infrastructure upgrades, and stricter enforcement, we can create a public transportation system that empowers women and fosters inclusivity. As a result, women's mobility will increase, enabling them to travel freely without fear of harassment or discomfort. Daily commutes whether for work, education, or essential needs will become safer and more reliable. Moreover, economic productivity will rise as more women participate in the workforce without transportation barriers. In the long term, the national economy will benefit from increased workforce participation and efficient urban mobility.

By identifying the current challenges and aligning them with stakeholder insights, design standards, and policy frameworks, this research strongly advocates for a gender-inclusive approach to transport planning one that centers safety, dignity, and accessibility for all women.

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APPENDICES

Appendix A: Observation

For the observational component, the selected route from Koteshwor to Kalanki was studied in detail. Based on preliminary survey findings, it was determined that public transport users strongly prefer buses over microbuses with microbuses being the least preferred mode of transport. Detailed observations were carried out on several bus services, including Sajha Yatayat, Nepal Yatayat, Suvakamana Yatayat, and Blue Micro. Given the significant presence of women drivers in the tempo segment, Safa Tempos were also included in the study.

The observation process focused on several key aspects:

- **Vehicle Interior Design:** Assessing how the layout and design of vehicles affect user comfort and safety.
- **Infrastructure:** Examining the condition and adequacy of bus stops, waiting areas, and public toilets.
- **Operational Practices:** Evaluating how vehicles operate, including boarding and alighting procedures.
- **Participant Observation:** Researchers engaged in a participant observation exercise to "audit" transport facilities. This involved visiting bus stands, using waiting areas, inspecting toilet facilities, and walking to and from bus stops—especially at night to experience firsthand the issues highlighted by survey respondents.

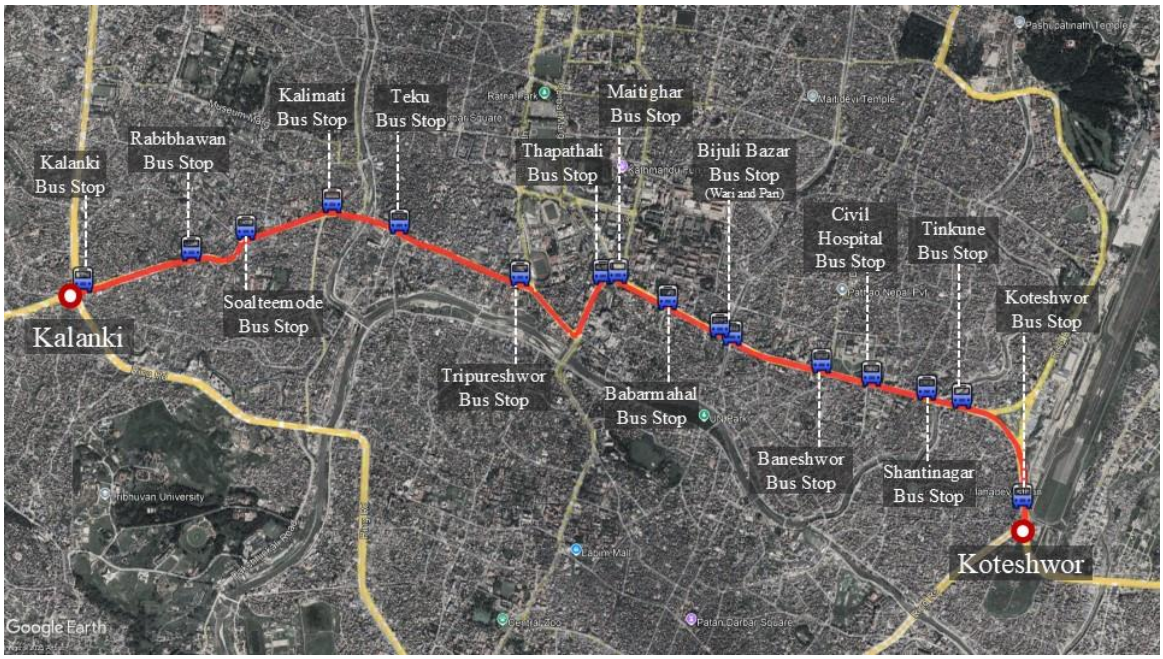

Figure 0.1 Bus Stops along the Route

1. **Bus Stops**

The route from Koteshwor to Kalanki has a total of 15 designated bus stops. However, it was observed that buses frequently boarded and alighted passengers at locations other than these official stops. Four distinct types of bus stop designs were identified along the route.

Certain areas, such as Tinkune and Babarmahal, had designated bus stops, but buses were often seen stopping elsewhere instead. In contrast, key locations like Kalanki, Kalimati, and Maitighar lacked proper bus stops with shelters. Among the entire route, Tripureshwor was the only area where a public toilet was available near the bus stop, highlighting a significant gap in essential passenger amenities.

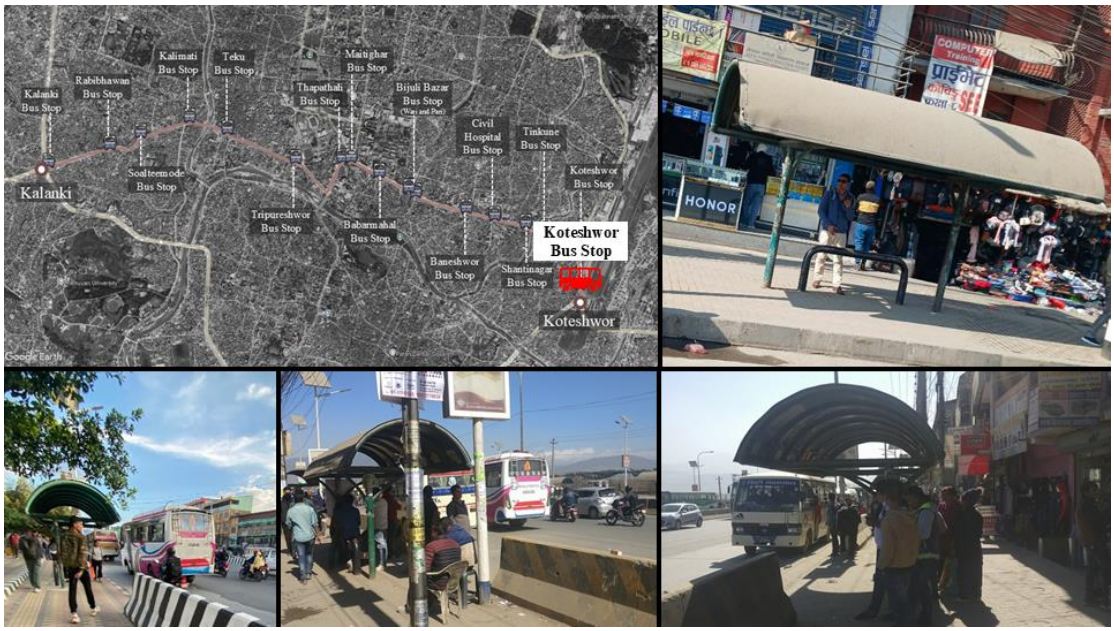

Figure 0.2 Bus Stop Design (Type A)

The Type A bus stop design, seen at Koteshwor, has a curved roof that protects passengers from rain and sunlight. It features a curved, overhanging canopy that provides shelter from rain and sunlight, with the curved shape effectively directing water runoff. The sides of the structure are open, allowing for easy access and ventilation. The seating consists of a single rod structure, which appears more suited for leaning rather than comfortable seating. The bus stop lacks essential amenities such as lighting or passenger information displays.

Figure 0.3 Bus Stop Design (Type B)

Type B bus stops are located in areas such as Tinkune, Minbhawan, Babarmahal, Baneshwor, Thapathali, and Tripureshwor. These bus stops feature a modern design with branding displayed on the upper section. The roofs are equipped with solar panels that provide lighting during the night, enhancing passenger convenience. However, changes in the surrounding infrastructure have created some issues. When the footpaths were repaired and raised, the seating platform became lower, making it less comfortable and practical for passengers to use. Additionally, the seating design lacks ergonomic support, further impacting comfort for those waiting at the stops.

Figure 0.4 Bus Stop Design (Type C)

Type C bus stops can be found in Tripureshwor. These bus stops have a roof with an inverted slope design. However, the seating area has become less comfortable because the footpath level was raised, causing the seating platform to be lower than the surrounding footpath. There is no lighting at this bus stop, making it inconvenient during the evening and night. On a positive note, there is a public toilet nearby, which adds convenience for passengers waiting at the stop.

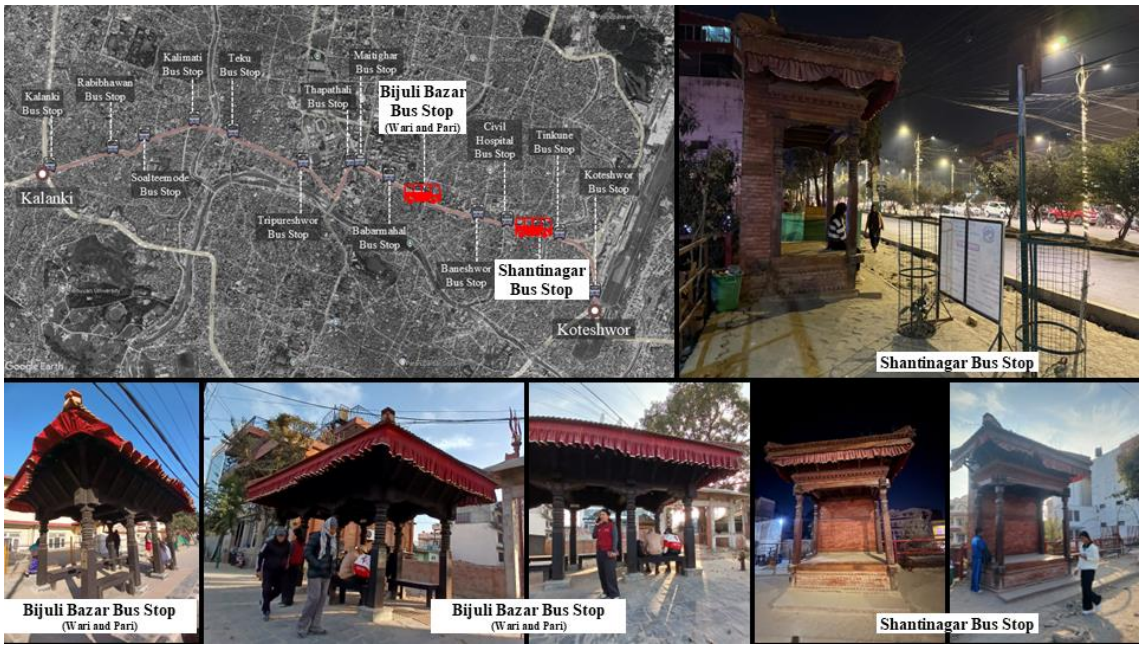

Figure 0.5 Bus Stop Design (Type D)

In Shantinagar and Bijulibazar, Kathmandu Metropolitan City has built bus stops in a traditional "Falcha" style, inspired by Nepalese culture and architecture. The design adds a cultural touch to the urban environment. These bus stops are equipped with lighting to help passengers during nighttime. Comfortable seating benches have also been provided, making it convenient for people waiting for their buses. The traditional design not only serves as a functional structure but also adds aesthetic value to the area.

2. Sajha Yatayat

Sajha Yatayat is a cooperative public transportation organization established in 1961/1962 in Nepal, primarily aimed at providing efficient and affordable transport services within the Kathmandu Valley and for inter-district travel. Over the decades, Sajha Yatayat has played a pivotal role in shaping the public transport landscape of Nepal, despite facing numerous challenges and periods of operational disruption.(Public Transportation in Kathmandu Valley, 2014). Over the years, it expanded its fleet with international support, such as Japan's donation of Isuzu buses in 1980. However, mismanagement and political interference led to its closure in 2007 (Longtail-e-media, n.d.). The organization was revived in 2013 and now operates a fleet of 46 modern buses equipped with safety features like CCTV cameras and automatic doors. Sajha Yatayat serves key routes within Kathmandu Valley and inter-district areas, focusing on affordability, reliability, and sustainability. It remains a vital part of Kathmandu’s public

transport system, addressing urban mobility challenges while promoting eco-friendly transportation solutions.

A comprehensive study was conducted on the operations of Sajha Yatayat along the Thankot to Tribhuvan International Airport route, which intersects with the Koteshwor to Kalanki corridor—part of my primary study area. Sajha Yatayat is one of the most prominent public transport services in Kathmandu Valley, recognized for its organized operations, modern fleet, and commitment to safe and reliable transit. The Thankot-Tribhuvan Airport route is a major corridor, serving both residential and commercial areas and providing critical connectivity for long-distance travelers, office-goers, and students.

- **Sajha Diesel Bus**

Sajha Yatayat diesel buses are recognized for their spacious design and modern features, offering a comfortable and efficient public transport option in Kathmandu Valley. These buses are designed with wide entry and exit doors, positioned 16 inches above the ground, allowing for smooth boarding and alighting particularly beneficial for elderly passengers and women. Inside, the buses have designated seating areas to ensure comfort for women, the elderly, and passengers with special needs. Sturdy handrails provide stability for standing passengers.

The buses are configured with 38 seats and feature a 2’6” wide aisle for better movement within the vehicle. Some models have even removed the front seat to accommodate more standing passengers perhaps in response to peak-hour demands? Modern features such as CCTV cameras enhance passenger security, while GPS tracking integrated with the "Sajha Plus" mobile app allows passengers to monitor bus arrivals in real time, making travel planning more convenient. Additionally, some buses are equipped with wheelchair-accessible features, underscoring their commitment to inclusive public transport services.

Figure 0.6 Sajha Yatayat

Figure 0.7 Sajha Yatayat Design Dimensions

- **Sajha Electric Bus**

Sajha Yatayat electric buses are known for their modern design and advanced features, providing an environmentally friendly and efficient public transport option in Kathmandu Valley. These buses are equipped with separate entry and exit doors, measuring 4'2" and 2'5" wide, respectively, and allowing smooth passenger flow during boarding and alighting. The door step, positioned 13 inches above ground level, makes access easier for elderly and differently-abled passengers. Grab bars at a height of 5'7" provide stability for standing passengers, enhancing safety.

Design and Interior Features:

- Separate Entry and Exit Doors: Wide doors measuring 4'2" and 2'5" respectively, facilitating efficient passenger flow.
- Low Door Step: Positioned 13 inches from ground level for easy boarding and alighting, particularly for elderly and physically challenged passengers.
- Grab Bars and Rods: Grab bar height of 5'7" and rod height of 6', ensuring passenger stability.
- Wide Aisle Space: A 2-foot aisle for smooth passenger movement inside the bus.
- Seating Capacity: 24 fixed seats and 2 foldable seats for flexible passenger accommodation.
- Safety and Passenger Amenities:
- Dustbin: Provision to maintain cleanliness inside the bus.
- CCTV Cameras: Enhances security by monitoring passenger activities.
- Information Screen: Displays real-time updates for passenger convenience.
- First Aid Box: Equipped for emergency medical situations.
- Passenger Monitoring Board: Provides critical information and monitoring during trips.

Technology Integration:

- Sajha Plus Mobile Application: Allows passengers to track buses, view schedules, and plan routes efficiently.
- Electronic Ticketing System (Yatra Card): Initially implemented to streamline the ticketing process but later terminated.

The electric buses are a significant step toward sustainable public transport solutions in Kathmandu Valley, offering modern amenities and technological advancements to improve the overall commuting experience.

Figure 0.8 Sajha Electric Bus

Figure 0.9 Sajha Electric Bus Design Dimension

3. Nepal Yatayat

Nepal Yatayat is a prominent privately operated bus service in Kathmandu Valley, playing a vital role in the daily commute of thousands of residents. Known for its extensive route coverage, it connects key urban hubs, including central areas and peripheral neighborhoods, thereby facilitating smooth and accessible mobility for a diverse group of commuters. The service offers an affordable transport option, although field observations reveal some challenges, such as overcrowding during peak hours, inconsistent service reliability, and occasional vehicle maintenance issues.

Nepal Yatayat operates 37-seater buses on several major routes, including: Tikathali to Kapan Gumba which is serviced by 69 buses running from 5:00 AM to 8:00 PM with a frequency of every 4 minutes. Gothatar to Ratnapark route provides a crucial connection to the city center. Harhar Mahadev to Balkhu route enhances connectivity to the southwestern part of the valley. Nepal Yatayat covers a significant portion of the selected study area between Kalanki and Koteshwor, making it a vital transport link for commuters along this route.

Nepal Yatayat buses are designed with a door width of 2'5". The bus floor is positioned 15 inches above the ground, grab bars are installed at a height of 5'7" while the 2-foot-wide aisle allows movement within the vehicle.

Figure 0.10 Nepal Yatayat Vehicle Design

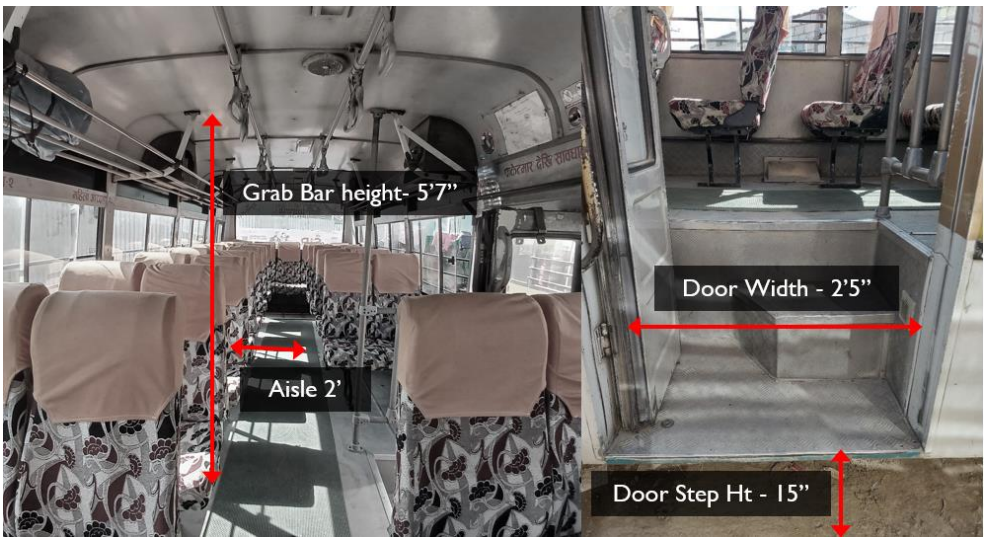

Figure 0.11 Nepal Yatayat Design Dimension

4. Suvakamana Yatayat

Suvakamana Yatayat is a privately operated public transport service in Kathmandu, Nepal, providing essential transportation for commuters in the valley. The service primarily runs along the Balkot to Kalanki route, which connects key urban areas for daily travelers. Operating from 5:00 AM to 8:00 PM, Suvakamana Yatayat utilizes 15-seater minibuses, which are commonly referred to as "Force buses" by locals. These minibuses have a bus floor height of 15 inches from the ground, grab bars positioned at a height of 5'8", and an aisle space of 1'7" between the seats.

Figure 0.12 Suvakamana Yatayat Minibus

Figure 0.13 Suvakamana Yatayat Design Dimension

5. Blue Micro

The Blue Micro is a small but robust gas-powered public transport vehicle operating on the route from Ratnapark to Kalanki in Kathmandu Valley. Managed by "Nilo Micro

Tatha Bus Pvt. Ltd.," this service plays an essential role in providing reliable transportation for short-distance commuters. Operating from 4:00 AM to 10:00 PM, Blue Micro ensures coverage throughout the day, including peak travel hours.

Each Blue Micro vehicle has a seating capacity for 14 passengers, specifically designed for short-distance travel. However, the seats are notably uncomfortable, posing challenges for passengers during longer commutes. The compact design makes these vehicles ideal for navigating narrow and congested urban roads. Key design specifications include a door width of 2'5" for boarding and alighting, a door step height of 12 inches from the ground, and a 2'6" aisle space between the seats. The seating arrangement features small seats facing each other within the limited space.

Figure 0.14 Blue Micro

Figure 0.15 Blue Micro Design Dimension

6. Tempoo

Safa Tempo is a popular electric three-wheeled public transportation vehicle in Kathmandu Valley, introduced in the mid-1990s as an environmentally friendly alternative to traditional diesel-powered vehicles. Designed to reduce air pollution and provide efficient short-distance travel, these tempos have become an integral part of the valley's transport system. Their compact size allows them to navigate narrow and congested urban streets effectively. Safa Tempos typically have a seating capacity for 11 to 12 passengers, depending on the configuration. Key design features include a door step height of 1'3", a door width of 2'5" to facilitate passenger entry and exit, grab bars positioned at a height of 4'9" for added stability while seating, and a 2'6" wide aisle that allows passenger movement within the vehicle. These features, combined with their environmental benefits, make Safa Tempos a reliable and eco-conscious option for daily commuting in Kathmandu Valley.

Figure 0.16 Tempoo

Appendix B: Questionnaire Survey

1. Questions for Survey

Section 1: Demographics

Gender*

- Male
- Female
- Others

Age*

- Below 18
- 18-30
- 31-50
- Above 50

Occupation*

- Student
- Civil Servant
- Private Sector
- Employee
- Homemaker
- Others

Purpose of Travel*

- Work
- Education
- Shopping
- Social/Personal
- Others

Frequency of Travel on this Route*

- Daily
- Weekly
- Occasionally

Section 2: Vehicle Design

Rate the following statements on a scale of 1–4 (1 = Strongly Disagree, 4 = Strongly Agree)

- The seating arrangement and standing space in vehicles are comfortable.*
- Reserved seats for women are clearly marked and respected.*
- Reserved seats are sufficient for the number of women passengers*
- Grab bars and other safety features are available and functional inside vehicle.*
- It is easy to board and alight from the vehicle*
- The steps and height of the vehicle are suitable for all passengers.*

- I feel safe traveling on this route during the day.*
- I feel safe traveling on this route during the evening or night.*

Section 3: Infrastructure

Rate the following statements on a scale of 1–4 (1 = Strongly Disagree, 4 = Strongly Agree)

- The presence of safety monitoring features like CCTV, emergency helpline, and panic buttons enhances the sense of safety and security for passengers.*
- The signages and wayfinding tools (maps/directions) at bus stops help me navigate easily.*
- Public toilets near bus stops are convenient and accessible when needed.*
- The lighting and shelter at bus stops make me feel safe and comfortable, especially at night. *

Section 4: Operational Practices

Rate the following statements on a scale of 1–4 (1 = Strongly Disagree, 4 = Strongly Agree)

- Public transport schedules are reliable and followed.*
- Overcrowding is effectively managed during peak hours.*
- Drivers and conductors are respectful and gender-sensitive in their behavior.*
- There is adequate representation of female drivers and conductors.*
- Payment systems (e.g., ticketing) are efficient and transparent.*
- Public transportation services prioritize the safety and comfort of women.*
- Traffic rules and vehicle capacity limits are followed by buses.*
- Staff are trained to handle gender-related issues effectively.*
- There are adequate signs or announcements about women's safety (e.g., no harassment policies)?*
- The vehicles are clean and well-maintained. *

Section 5: Open Ended Questions

Have you or someone you know experienced harassment on public transportation? *

- Yes No

What are the main challenges you face while traveling on this route?

What measures do you think are necessary to improve public transport more inclusive for women?

Appendix C: Key Informant Interview

1. Driver

Nepal Yatayat Driver (Bishal Shrestha):

Bishal Shrestha has worked as a conductor for five years before transitioning to a driver position just five months ago. As a driver for Nepal Yatayat, he observes that women's reserved seats are generally respected, and no significant problems have been reported regarding this issue. However, one challenge that persists is the traffic congestion on the route, which can impact the timeliness of the service. Bishal has not received any formal training on how to handle situations involving harassment or misconduct. Regarding passenger behavior, he notes that women passengers often struggle to find seats during peak hours due to overcrowding. Although reserved seats for women are respected, male passengers in other seats do not usually vacate them for women.

Figure 0.17 Key Informant Interview with Driver

Tempo Driver (Muna, Name Changed):

Muna, a tempo driver, started driving only a few months ago and expresses enjoyment in her new role. She finds it empowering to work in a traditionally male-dominated profession, and views her work as breaking gender stereotypes associated with driving. Muna's enthusiasm for the job reflects her positive experience in challenging norms and enjoying the independence of her role.

Tempo Driver (Sita, Name Changed):

Sita, 35 years old, has been driving a tempo for the past seven years. Recently, she was able to purchase her own vehicle with financial assistance. Sita shares that, as a woman, she was able to acquire her vehicle at a lower cost compared to male drivers. Previously, when driving someone else's vehicle, she earned a maximum of Rs. 1,200 per day. However, with her own vehicle, her earnings have increased to up to Rs. 4,500 daily. Despite the equal treatment she receives from traffic police, Sita acknowledges that being a female driver still presents some challenges. Nonetheless, she takes pride in her work, as it allows her to provide for her family while working alongside male drivers in the same field.

Figure 0.18 Key Informant Interview with Female Driver

2. Conductor

Saajha Yatayat Conductor (Bikas, Name Changed):

Bikas has been working as a conductor for Saajha Yatayat for the past three years, receiving a regular salary for his role. He has expressed no significant issues with his job thus far and plans to eventually transition into a driver position. One of the major challenges faced by women passengers, as Bikas observes, is during peak hours when the bus tends to become overcrowded. However, the implementation of the two-door system, which allows passengers to board and exit through separate doors, has improved the flow and efficiency during these busy times. Bikas also credits the presence of CCTV cameras

on the buses for deterring any incidents of misconduct, contributing to a safer environment. Overall, he believes the buses offer comfortable seating and ample standing space, which enhances the overall passenger experience.

3. Traffic Police

Inspections and Monitoring

The traffic police conduct daily inspections of public transportation with a team of five to six officers assigned to monitor buses and other public vehicles. One of their primary responsibilities is to ensure that reserved seats for women are clearly marked and properly utilized. These random inspections also verify that vehicles comply with traffic regulations, including adherence to safety measures and appropriate conduct within the buses. A key focus during these inspections is to check whether the provision for women's reserved seating is visible and accessible. Ensuring that these seats are available and respected is part of the ongoing efforts to create a more inclusive and safer public transport environment.

Yatru Maitri Aviyan 2080 Initiative

The traffic police are currently operating the Yatru Maitri Aviyan 2080, a project aimed at improving the implementation of reserved seating for women. The initiative encourages compliance with public transport rules and raises awareness about the importance of gender-sensitive seating arrangements. While the initiative is a positive step towards inclusive public transportation, challenges persist, such as overcrowding during peak hours and male passengers failing to vacate reserved seats for women. The campaign seeks to address these concerns by enforcing regulations more rigorously and educating passengers.

Complaint Handling and Response Mechanism

Passengers who encounter issues such as being charged excessive fares, misconduct by drivers or conductors, or other operational irregularities can lodge complaints by calling 103 (Traffic Police) or 100 (General Police). Upon receiving complaints, the traffic police promptly investigate and take corrective actions as necessary. This rapid response mechanism aims to maintain order and improve service delivery within public transportation.

Persistent Challenges in Implementation

Despite ongoing efforts by the traffic police, challenges remain in the practical implementation and enforcement of gender-sensitive transportation policies. Women continue to face difficulties, including overcrowding and reserved seats being occupied by male passengers. Although progress is being made, daily commuter challenges highlight the need for continued awareness campaigns, stricter enforcement, and collaborative efforts between stakeholders to create a safer and more inclusive public transport system.

Figure 0.19 Key Informant Interview with Traffic Police

4. Department of Transport Management (DoTM)

In an interview with Er. Shreekant Yadav, Technical Director of the Department of Transport Management (DoTM), he highlighted the evolving responsibilities of the department, particularly following the decentralization of authority to provincial governments in Nepal. Many of DoTM's functions, including public transportation regulation, have been delegated to provincial authorities. Despite this, DoTM continues to play a crucial role in overseeing public transportation operations and monitoring traffic police activities. The department conducts periodic inspections, and violations often result in stricter penalties than those imposed by other authorities.

Er. Yadav emphasized the importance of gender inclusion in public transportation, which is explicitly outlined in various legal and regulatory documents, such as the Public Transport Code of Conduct, Vehicle and Transport Management Act 2049, Transport Management Procedures Directives 2060, and Vehicle and Transport System Regulation

2054. These policies provide comprehensive guidelines on passenger conduct, the responsibilities of drivers and conductors, and procedures for handling complaints and misconduct. DoTM formulates rules and regulations, while traffic police are responsible for enforcing them. Instructions for punitive actions also originate from DoTM.

Coordination Between Provincial and Central Authorities:

Following federalization, the operation of transportation offices has been distributed to 49 provincial units. Provincial governments can create their own rules but must align them with central regulations. Any provincial rule that contradicts central directives is deemed invalid. Vehicle inspection offices under DOTM also conduct regular monitoring to ensure compliance with established regulations.

Gender Inclusion and Training for Drivers

Er. Yadav highlighted the growing presence of women tempo drivers and emphasized that women are often more responsible drivers. He noted that during his tenure examining license trials, he observed that women applicants, especially for tempo driving, were conscientious and skilled. He admitted to occasionally loosening trial requirements to encourage women in the profession, believing that fostering gender diversity in driving would benefit the transportation sector.

He stressed the need for the introduction of separate licenses for professional and non-professional drivers. Drivers in public transportation, given their significant responsibilities, should be empathetic, gender-sensitive, and well-trained to handle diverse passenger needs. DOTM should establish training centers to equip public transportation drivers with knowledge and skills on gender sensitivity and respectful passenger interaction. He further highlighted that the driving profession should be elevated and treated with dignity, which would foster a more inclusive transportation environment.

Improvement in Transportation Infrastructure and Policy Enforcement

DOTM has proposed phasing out 20-year-old public service vehicles, adopting best practices from neighboring countries. However, this initiative has faced resistance from vehicle owners and operators. Additionally, the mandatory adoption of embossed number plates for all public vehicles has been emphasized as a key step toward improving vehicle

tracking and monitoring. This measure is expected to enhance enforcement efforts and promote passenger safety.

The DOTM also plays a critical role in implementing the Kathmandu Valley Urban Transport Masterplan, which includes strategies to improve public transportation and enhance gender inclusivity in urban mobility. Er. Yadav reiterated that fostering respect for drivers and improving their working conditions would contribute positively to creating a gender-inclusive public transportation system.

Er. Subash Thing emphasized that the perception of gender differences becomes more ingrained the more society separates men and women. He highlighted that in many European countries, there is no psychological barrier regarding what women can or cannot do. Women are seen as equally capable of handling challenges and responsibilities as men.

"In Nepal, however," he noted, "the mentality that women cannot perform certain tasks has made them appear weaker." He stressed that harassment should not be tolerated, and women should be empowered rather than made to feel vulnerable. "Encouragement and integration, rather than separation, are key," he added.

He expressed concerns about the idea of segregating women by introducing women-only buses, suggesting that such measures could further reinforce gender divides. Instead, he advocated for creating an inclusive and supportive environment where men and women can coexist safely and respectfully in public spaces.

Er. Thing also emphasized that women have repeatedly demonstrated their competence by excelling in education and holding top positions in the country. He noted, "Our society's restrictive mindset has contributed to women feeling weaker, but in reality, they are equally capable."

5. Operators

- **Suvakamana Yatayat Pvt. Ltd.**

The observed route is from Balkot to Kalanki, primarily serviced by minibuses commonly referred to as "force buses." While there are no women drivers, there is one female conductor, Ms. Parbati Tamang, who occasionally drives as well. Passengers, particularly

women, feel more comfortable with her presence due to the sense of safety and ease she provides.

The timekeeper for the route is Mr. Sunil Thapa, and the accountant of the Sangathan is Mr. Hari Sharan Karki. No formal training is provided to drivers or conductors regarding handling gender-related issues.

A noteworthy historical initiative was the introduction of women-only buses by the former Bagmati Yatayat Pvt. Ltd., which operated for nine months. However, the service was discontinued after the transition of Bagmati Yatayat into Suvakamana Yatayat.

Instances of pickpocketing are relatively common on this route, though such incidents often go unreported to the police. A notable case involved a conductor witnessing a pickpocket in action and alerting passengers, who then intervened and assaulted the perpetrator. Tragically, a few days later, the same pickpocket retaliated by stabbing the conductor on the head with a knife. Fortunately, the conductor survived the attack.

- **Sajha Yatayat**

The Campaign against Sexual Harassment in Public Transport was a campaign launched in 2018 to address sexual harassment in public transportation in Nepal. The campaign involved Sajha Yatayat, a cooperative bus company, the Zonta Club of Kathmandu, and the Nepal Traffic Police (*Campaign Against Sexual Harassment in Public Transport*, 2018). The campaign was launched on November 24, 2018, as part of the 16 Days of Activism against Gender-Based Violence Campaign. The campaign aimed to address sexual harassment in public transportation in Nepal. The campaign aimed to create a safe environment for passengers and end sexual harassment in public transportation. Sajha Yatayat is a cooperative bus company that aims to provide dignity in public transportation. Sajha Yatayat has said that they intend to hire more women to create a safe environment for passengers.

Figure 0.20 Campaign Against Sexual Harassment in Public Transport

Appendix D: In-depth Interview

In-depth interviews conducted with passengers to understand their experiences, challenges, and suggestions regarding gender inclusion and safety in Kathmandu's public transportation system. The insights obtained are systematically categorized to provide a comprehensive understanding of the key issues.

1. Experiences or Observations Related to Harassment on Public Transportation

Common Themes:

Unwanted Physical Contact: Many respondents reported experiencing or witnessing unwanted physical contact, especially in crowded vehicles. This includes touching, groping, and inappropriate brushing against body parts.

Verbal Harassment: Instances of catcalling, lewd comments, and vulgar words were mentioned.

Staring and Visual Harassment: Several respondents noted that men often stare at women, making them feel uncomfortable.

Inaction of Bystanders: Many incidents go unnoticed or unaddressed by other passengers or transport staff.

Trauma and Fear: Victims often feel violated, helpless, and traumatized, leading to a general sense of insecurity in public spaces.

Harassment by Transport Staff: Some respondents reported inappropriate behavior by bus conductors and drivers, including touching and staring.

Specific Incidents:

Specific incidents mentioned by the users of public transportation.

Overcrowding and Unwanted Physical Contact:

"Too much crowd in the vehicle causing unwanted physical contact, whether standing or sitting."

"A man was sitting beside me and touching me without me realizing it. I have often faced men staring at me, making me uncomfortable."

Verbal Harassment and Catcalling:

"Touching, eve-teasing, vulgar words."

Persistent Harassment Despite Intervention:

"A middle-aged man inappropriately touched a woman in a crowded microbus. Despite being called out, he continued his behavior, using every turning and braking to act improperly. Witnesses felt helpless until the victim exited the vehicle."

Misbehavior by Transport Staff:

"A conductor came to sit beside me and touched my thigh."

Groping While Boarding or Alighting:

"My aunt and I were traveling on a crowded bus. When getting down, she was groped by a couple of guys. She slapped one of them, and it became an issue. Even though the public supported her and removed those guys, the incident traumatized her."

Inappropriate Actions Masked as Accidents:

"A man pretended to be asleep while rubbing against a woman in a crowded bus."

Targeted Harassment:

"In a fully packed microbus during peak hours, I was standing near the door but failing to remain stable due to the crowd. I felt somebody touch my body inappropriately. I couldn’t see who did it, but such incidents are common, targeting specific body areas."

Harassment by Fellow Passengers:

"One time, a man touched a woman's hair while standing behind her."

Frequent Instances of Harassment:

"Each and every girl seems to have faced it, from my aunt’s age to mine. One incident when I was 15 involved a middle-aged man behaving inappropriately. It was a disgusting experience, and it left a lasting impact."

Traumatizing Incidents Witnessed:

"We were in a crowded bus from Putalisadak to Gaushala. A boy's hand brushed around my back, and then he clung to the same metal bar I was holding, pushing himself toward me. It was disgusting. As soon as I called my brother, the harasser quickly turned around and left."

2. Main Challenges Faced While Traveling on Public Transport

The responses from the survey highlight several recurring issues that passengers face while using public transportation. These challenges not only affect the overall travel experience but also raise significant concerns about safety, comfort, and efficiency.

- **Overcrowding**

Overcrowding is the most frequently mentioned challenge, particularly during peak hours. Buses and microbuses are often packed beyond capacity, leading to discomfort and safety concerns. Overcrowding creates an environment where passengers are forced to stand in close proximity, increasing the risk of harassment, pickpocketing, and physical discomfort. Overcrowding makes it difficult for passengers to board and alight from buses, especially during peak hours. Many women reported fear of being touched intentionally by men while standing in crowded buses.

- **Unreliable Schedules**

Buses often do not arrive on time, causing delays and uncertainty in daily commutes. Unreliable schedules make it difficult for passengers to plan their journeys, leading to frustration and longer waiting times at bus stops.

- **Safety Concerns**

Many passengers, especially women, expressed fear of harassment, pickpocketing, and general insecurity while using public transport. Safety concerns discourage people, particularly women, from using public transportation, limiting their mobility and access to essential services.

- **Poor Vehicle Conditions**

Buses are often described as unhygienic, with inadequate seating and standing space. Poor vehicle conditions contribute to a negative travel experience, making passengers feel uncomfortable and unsafe.

- **Traffic Congestion**

Heavy traffic leads to longer travel times and delays. Traffic congestion exacerbates the challenges of overcrowding and unreliable schedules, further reducing the efficiency of public transportation.

- **Rude Behavior by Staff**

Conductors and drivers are often described as disrespectful, using inappropriate language and behavior. Rude behavior by staff creates a hostile environment, discouraging passengers from using public transport and undermining trust in the system.

- **Lack of Seats**

Many passengers are forced to stand due to insufficient seating, especially during peak hours. The lack of seats exacerbates discomfort and safety issues, particularly for women, who may feel more vulnerable while standing in crowded buses.

- **High Fares**

Some respondents mentioned that fares are increasing, and student discounts are not always honored. High fares make public transportation less accessible, particularly for students and low-income individuals.

- **Inadequate Infrastructure**

Poor lighting at bus stops, lack of proper bus stops, and unsafe walking conditions at night were frequently mentioned. Inadequate infrastructure contributes to safety concerns, making it difficult for passengers, especially women, to feel secure while waiting for or accessing public transport.

3. Measures to Improve Public Transport for Women

To address the challenges faced by women in public transportation and create a safer, more inclusive environment, respondents suggested a variety of measures. These measures range from immediate safety enhancements to long-term systemic changes.

- **Enhanced Safety Measures**

CCTV Cameras: Installing CCTV cameras inside buses and at bus stops to monitor and deter harassment.

Panic Buttons: Introducing panic buttons in buses for passengers to alert authorities in case of emergencies.

GPS Tracking: Implementing GPS tracking systems in buses to ensure real-time monitoring and quick response to incidents.

- **Women-Only Transport**

Women-Only Buses: Introducing women-only buses or compartments, especially during peak hours or at night, to provide a safer travel option for women.

- **Increased Female Staff**

Female Drivers and Conductors: Hiring more female drivers and conductors to make women feel safer and more comfortable while using public transport.

- **Strict Enforcement of Laws**

Harsher Penalties: Implementing stricter penalties for those who commit harassment to deter such behavior.

- **Awareness Campaigns**

Public Education: Conducting awareness campaigns to educate the public, especially men, about respecting women's space and rights.

Gender Sensitivity Training: Providing training for drivers, conductors, and passengers on gender sensitivity and appropriate behavior.

- **Improved Infrastructure**

Better Lighting: Improving lighting at bus stops and inside buses to enhance safety, especially at night.

Clean Public Toilets: Providing clean and accessible public toilets near bus stands for the convenience of women passengers.

Well-Maintained Bus Stands: Ensuring that bus stops are well-maintained and equipped with basic amenities.

- **Limiting Overcrowding**

Enforcing Capacity Limits: Implementing and enforcing rules to prevent buses from carrying more passengers than the seating capacity.

Increased Frequency: Increasing the frequency of buses on popular routes to reduce overcrowding and waiting times.

- **Designated Seating**

Reserved Seats for Women: Allocating more reserved seats for women and ensuring strict enforcement to prevent men from occupying these seats.

- **Real-Time Tracking and Technological Advancements**

Mobile Apps: Developing mobile apps for real-time bus tracking, updates, and online complaint lodging to improve efficiency and convenience.

Digital Ticketing Systems: Implementing digital ticketing systems to streamline fare collection and reduce conflicts over fares.

- **Emergency Helplines**

Quick Response Systems: Establishing emergency helplines and quick response systems for reporting harassment or other emergencies.

- **Training and Capacity Building**

Crowd Management: Training drivers and conductors on effective crowd management and polite behavior.

Gender Sensitivity: Providing gender sensitivity training for transport staff to create a more respectful and inclusive environment.

- **Introduction of Larger Buses**

Replacing Microbuses: Replacing small microbuses with larger, more comfortable buses to reduce overcrowding and improve passenger comfort.

- **Implementation of BRT Systems**

Bus Rapid Transit (BRT): Introducing BRT systems to provide faster, more efficient, and safer public transportation options.

- **Encouraging Alternative Transport**

Bicycle Lanes: Encouraging the use of bicycles by providing dedicated lanes, which can reduce reliance on overcrowded buses.

- **Government Regulation and Control**

Increased Government Oversight: Ensuring more government control over public transport to regulate fares, routes, and service quality.

Public Awareness Campaigns: Conducting campaigns to educate the public about respecting others' space and rights.

- **Cleanliness and Hygiene**

Better Maintenance: Improving the cleanliness and hygiene of buses and bus stops to enhance the overall travel experience.

- **Installation of Emergency Call Buttons**

Emergency Call Buttons: Installing emergency call buttons in buses and at bus stops for passengers to report incidents quickly.

Appendix E: Summary from Secondary Data

Various literature related to gender and transport in Nepal has been analyzed and summarized below.

1. Gender and Public Transport, Kathmandu, (Gender and Public Transport, 2013)

The study was commissioned by The World Bank to inform the Government of Nepal's National Transport Management Strategy. The research, conducted between October and December 2013, highlighted critical gender-related challenges and provided actionable recommendations for enhancing public transportation in Kathmandu Valley. The study comprised a review of secondary data and collection of primary data through a questionnaire survey with 470 public transport users (60% women), qualitative conversations with 165 participants (58% women), focus group discussions, and key informant interviews with transport operators, police, and government officials.

The study highlighted the rapidly changing urban and transport dynamics in Kathmandu Valley, where population growth has exceeded 60% in the last decade, and vehicle numbers have surged by over 400%. With more than 5,300 public transport vehicles in the valley, the primary reasons for public transport use were identified as work and education. Speed and frequency were the main criteria for choosing a mode of transport, with a preference for blue microbuses. Notably, women were more likely to wait for the next bus to avoid overcrowding.

Harassment and personal insecurity emerged as significant concerns, particularly for women. While 80% of women and 70% of men identified overcrowding as their main concern, women and physically smaller individuals faced greater disadvantages due to inadequate infrastructure design. Personal insecurity was twice as likely to be mentioned by women (33% compared to 16% for men), with women aged 19-25 being nine times more likely than men of the same age group to report such concerns, primarily due to inappropriate touching. Alarmingly, 26% of women aged 19-35 reported experiencing inappropriate touching on public transport in the past year.

Traveling with young children was highlighted as a significant challenge, with parents citing unsafe and unhygienic conditions as deterrents during peak hours. In response, many parents resorted to using taxis to drop off children before continuing their journey by public transport. Additionally, reckless driving, including speeding and sudden

braking, was identified as a widespread concern, particularly among microbus drivers. Women were more likely than men to report discomfort and poor driving.

The study also found little evidence of the effective implementation of reserved seating for women mandated by the Nepal Motor Vehicle and Transport Management Act. Participants expressed a preference for priority seats for pregnant women, parents with small children, elderly individuals, and those with reduced mobility, rather than gender-based reserved seating. Furthermore, current campaigns to address sexual harassment in public spaces were described as sporadic and ineffective, with participants calling for coordinated and unified messaging.

Based on these findings, the study made several recommendations. It emphasized the need to alleviate overcrowding through improved bus designs rather than increasing vehicle numbers, which would worsen congestion. A ‘Safer Transport for All’ campaign was recommended to promote behavioral change through unified signage, media awareness, and mandatory safety education for drivers and conductors. The study advocated for replacing gender-based reserved seating with priority seating for vulnerable groups and adopting a whole journey safety approach through improved street lighting, policing of hotspots, and SMS-based reporting systems for insecurity incidents. Legal reforms to address sexual harassment in public spaces were also suggested, alongside support for intermediary organizations providing legal and psychological assistance to victims. Importantly, the study underscored the need to involve women in the planning, design, and implementation of public transportation and to require gender-disaggregated data analysis to meet evolving needs. A recommendation was also made to conduct further studies on the transport concerns and needs of persons with disabilities (Gender and Public Transport, 2013).

2. Understanding Masculinities in Public Transport, (Paudel, 2011)

The study "Understanding Masculinities in Public Transport" highlights critical factors influencing violence in Kathmandu's public transportation system. The behavior of drivers and conductors is shaped by societal constructs of masculinity, with pressures from occupational hierarchies and normalized portrayals of heroism contributing to inappropriate behaviors. Gender identity, physical appearance, and hierarchical relationships play significant roles in perpetuating violence, particularly during office hours and evening commutes when women face heightened insecurity. Inadequate policy

enforcement and limited female participation in the transport sector exacerbate these issues, with men acting as primary perpetrators. Forms of violence include mental, physical, sexual, and social abuse, affecting women, girls, and transgender individuals.

To address these issues, the study recommends capacity-building initiatives to improve knowledge of codes of conduct, traffic rules, and human rights among transport operators and traffic police. Transport entrepreneurs should require staff to sign codes of conduct and engage in awareness programs. Strengthened coordination between stakeholders, including government agencies and civil society, is necessary to revise and enforce policies. Educational institutions should be engaged to promote positive behavior, and media mobilization can aid in spreading awareness. Lastly, comprehensive research and dissemination are essential to understand violence's root causes and develop effective management strategies (Paudel, 2011).

3. Gender and Transport in Nepal: Perspectives from a country study by ESCAP, (Choo, 2022)

The study "Gender and Transport in Nepal: Perspectives from a Country Study" conducted by Stephanie Choo, Social Affairs Officer at ESCAP Subregional Office for South and South-West Asia, highlighted key gender-related challenges and opportunities in Nepal's transport sector. The study revealed significant gender disparities in workforce participation, with women making up only 2% of the transport workforce compared to 98% men. Although 80% of Safa Tempo drivers in Kathmandu Valley are women, their numbers remain minimal in other sectors, such as long-haul transport and freight. Women workers often face harassment from peers and passengers, discrimination in recruitment, irregular contracts, and challenges in balancing caregiving responsibilities due to long working hours.

Women passengers face numerous challenges, including harassment, rude behavior by transport workers and fellow passengers, inconvenient and congested transport routes, and limited seat availability. Safety risks discourage women from using public transport, leading to dependency on male family members and lost educational and employment opportunities. The lack of inclusive physical infrastructure poses additional barriers,

especially for women with disabilities. Furthermore, existing transport policies have limited implementation, and seat reservations for women are frequently violated.

The study provided several recommendations to create a gender-responsive and inclusive transport system in Nepal. Cross-cutting recommendations included operationalizing gender-transformative policies, implementing grievance mechanisms with financial penalties for violations, and collecting sex-disaggregated data on transport workers and passengers. A whole-of-government and whole-of-society approach was emphasized, alongside measures to bolster security through online tracking systems, CCTVs, panic buttons, and inclusive infrastructure with separate toilets, breastfeeding rooms, and adequate lighting.

For women in the transport workforce, the study suggested leveraging the role-modeling effect, recruiting women in public institutions, and facilitating private-sector employment through reservations and tax breaks. Measures for decent work, such as regular contracts, paid leave, and social protection, were recommended. Training and apprenticeship programs should account for women's time and financial constraints, and policy support for women transport entrepreneurs should be strengthened through fiscal incentives and simplified administrative processes.

Recommendations for women passengers included integrating women's perspectives in route planning, enforcing seat reservations, and establishing women-first buses. Security personnel hiring, training, and sensitization were proposed, alongside undercover monitoring and pink police initiatives. Technical support, policy reviews, and regional cooperation were also emphasized to foster a safer and more inclusive transportation environment in Nepal (Choo, 2022).

Appendix F: IOE GC Paper Presentation Certificate

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Date: April 21, 2025

To Whom It May Concern:

This is to certify that the paper titled **"The Role of Vehicle Interior Design in Promoting Gender-Inclusive Public Transportation in Kathmandu"** (Submission# **274**) submitted by **Prajina Shrestha** as the first author, which had been accepted for presentation after the peer-review process, has successfully been presented at the 16th IOE Graduate Conference held during April 18 - 20, 2025. Kindly note that the final revision of the papers and publication process of the conference proceedings is still underway and hence inclusion of the accepted manuscript in the conference proceedings is contingent upon timely response to further edits during the publication process.

Dr. Raj Kumar Chaulagain,
Convener,
16th IOE Graduate Conference

Appendix G: IOE GC Paper

IOE Graduate Conference
[Placeholder for Publication Information]

The Role of Vehicle Interior Design in Promoting Gender-Inclusive Public Transportation in Kathmandu

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Abstract
This paper examines gender-based safety issues in Kathmandu's public transportation system, focusing on how vehicle interior design affects women's commuting experiences. Using a mixed-methods approach that includes surveys with 190 users, key informant interviews, and field observations, the study identifies several key challenges. Findings reveal that overcrowding, high-floor designs, and inadequate seating arrangements contribute to discomfort and a heightened sense of insecurity among female passengers. Many women report harassment and difficulty in boarding, with insufficient enforcement of reserved seating policies further exacerbating these issues. While some services like Sajha Yatayat have introduced gender-friendly features such as low floors and separate entry and exit doors, most vehicles still fall short of meeting the necessary safety and accessibility standards. Based on these insights, the paper recommends adopting low-floor designs, optimizing seating configurations, enhancing safety features like CCTV and grab bars, and improving policy enforcement and public awareness. These measures are essential to create a more inclusive, safe, and comfortable public transportation system in Kathmandu.

Keywords
Gender Inclusion, Public Transportation, Safety Perception of women, Vehicle Design and Infrastructure

1. Introduction

The issue of gender-based safety in public transportation is not new, but it has gained increased attention due to its impact on the mobility and daily lives of women. Studies have shown that public transport is a common site for sexual harassment and violence, leading to behavioral changes and increased stress among affected individuals [1].

Like in many developing countries, private individuals operate road public transportation in Nepal, which includes buses, microbuses, tempos, and taxis [2]. The Department of Transport Management (DoTM) estimates that the average annual growth rate of vehicles in Kathmandu Valley is 14 percent [3], although only 3 percent of registered vehicles in Kathmandu Valley are public transport. Among these, over 94 percent are low-occupancy vehicles, such as minibuses and microbuses, which carry an average of 15-20 passengers [4]. In the fiscal year 2080/81, a total of 1,942,072 vehicles were registered in the valley. Out of these, only 2 percent were public transport vehicles [5].

Urbanization has also transformed gender roles within the transportation sector. As of 2023, about 23.68 percent of Nepali women are part of the labor force, with many relying on public transport for their daily commutes [6]. Observations during peak travel times indicate that women constitute at least one-third of public transport users, primarily consisting of working women and students who travel independently to fulfill their educational and professional commitments [7].

Women frequently report feeling unsafe while using public transport due to harassment and overcrowding. Studies indicate that personal insecurity is a significant concern for female commuters, with 33 percent citing it as a major issue compared to 16 percent of men [8]. The physical design of public transport systems often overlooks the needs of women, particularly regarding safety features and accessibility. Research can identify specific design flaws that contribute to insecurity and discomfort for female passengers, leading to more inclusive infrastructure development [9]. This research examines how vehicle interior design influence the safety and inclusivity of Kathmandu's public buses, aiming to identify systemic gaps and provide actionable recommendations for improvement.

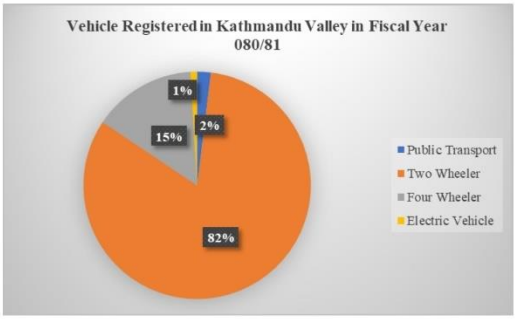

Figure 1: Vehicle Registered in Kathmandu Valley in FY 080/81

2. Research Objectives

The primary objective of this research is to evaluate how the vehicle interior design of public transportation systems in Kathmandu can be enhanced to promote safety and inclusivity for women.

To support this primary objective, it is further divided into secondary objectives:

- To evaluate existing vehicle design practices in Kathmandu's public transportation and their impact on women's commuting experiences.
- To analyze how vehicle interior design influences gender inclusivity in public transportation.
- To recommend design modifications and strategies that foster a more gender-inclusive public transportation environment.

3. Limitations

This study has certain limitations that should be considered when interpreting the findings:

- Route Selection Bias: The Koteshwor-Kalanki route is a high-traffic corridor but may not represent the entire city's transportation challenges.
- Generalizability: The findings may not be directly applicable to other Nepali cities like Pokhara or Biratnagar, which have different public transport systems, transport infrastructures, and commuter demographics.
- Sampling Bias: Convenience sampling was used, which may limit the diversity of perspectives, excluding those with different commuting patterns.

4. Literature Review

Women and girls make up about half of Kathmandu Valley's population (49.38 percent) [10]. Despite their significant presence, the transportation system in the Valley often fails to address their unique mobility needs and safety concerns. A survey conducted by the World Bank highlighted that personal insecurity was twice as likely to be mentioned by women compared to men (33 percent versus 16 percent). Women's concerns included fear of pickpockets, personal injury, and various forms of sexual harassment while using public transport [10].

"Transport is not gender-neutral". This was the main takeaway from a high-level gender discourse conducted by the World Bank and the World Resources Institute during the "Transforming Transport 2018" conference in Washington, DC, on January 11-12, 2018 [11]. This was the first time in the annual event's 15-year existence that a plenary session focused solely on the gender dimensions of transport. Urban transport systems often impose different burdens on women and men, yet transportation regulations in many countries remain gender-blind. Safe, comfortable, convenient, and affordable transport can address women's practical needs, such as commuting to school or the market, and contribute to their strategic empowerment by providing access to social and economic opportunities [11].

Inclusive transport is essential for creating accessible, safe, affordable, and efficient public transportation systems that serve all members of society, including women, persons with disabilities, older persons, and low-income households. Despite its significance, inclusive transport often remains overlooked in transport development, particularly in Asia-Pacific countries [12]. As urbanization and motorization continue to rise, gender-sensitive and socially inclusive transport systems have become increasingly critical.

Gender inclusion in urban transportation is a critical area of focus for creating equitable and sustainable transportation systems. Promoting gender inclusion requires policy interventions, community engagement, improved safety measures, and capacity building to empower marginalized groups. By ensuring gender-responsive urban planning and inclusive decision-making processes, cities can create safer, equitable, and accessible environments for all, fostering greater social and economic participation [13].

"Care Trips" is a significant aspect of gendered mobility where women often travel with children to school, run household errands, or provide caregiving assistance. These journeys typically involve multiple stops, which makes traditional, linear transportation models less suited to accommodate women's diverse travel patterns [13]. Therefore, inclusive transport systems should accommodate these trip patterns and reduce travel-related stress for women. Safety concerns are one of the most significant barriers for women using public transport. Studies from cities like Jakarta and Kuala Lumpur show that women are more likely than men to perceive public transport as unsafe, leading them to avoid certain modes or travel only during specific hours [14].

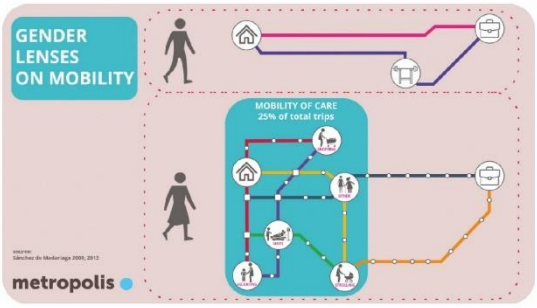

Figure 2: Difference in mobility pattern between men and women [15]

The safety perception of women while traveling is a multifaceted issue influenced by various factors, encompassing urban planning, infrastructure, transport management, and concerns related to harassment. Women's perceptions of safety in public places and transport are subject to variations based on their social, cultural, and economic backgrounds, age, frequency of public transport use, and duration of stay in the city [16].

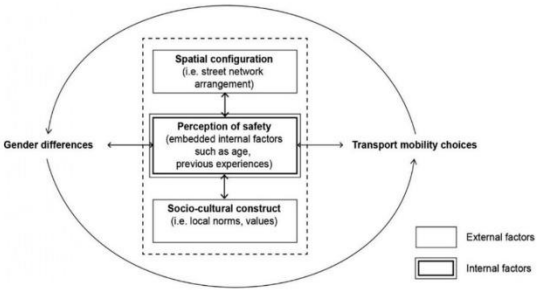

Figure 3: Relating gender differences, transport mobility choices, and the perception of safety [17]

Sexual harassment is a pervasive issue for women using public transport in Nepal. Harassment can take various forms, including groping, verbal abuse, and leering, which deter women from using public transport altogether. These experiences severely limit women's freedom of movement, confidence, and ability to access education and employment opportunities [12]. A lack of safety measures in public transport systems exacerbates the problem. The absence of surveillance, and the unavailability of trained security personnel further heighten the risks for women commuters. To address these concerns, installing surveillance cameras, panic buttons, along with the hiring and training of security personnel is recommended [12].

Women's participation in Nepal's transport sector remains extremely low. While 80 percent of the Safa Tempo drivers in Kathmandu Valley are women, they face lower wages due to shorter loops and less lucrative routes compared to their male counterparts [12]. Additionally, women are often confined to specific roles, such as conductors and administrative positions, with minimal representation in decision-making roles. The Sajha Yatayat bus service, despite its inclusive transport commitment, has only a few female drivers and conductors out of a workforce of 250 [12].

A gender-sensitive design approach takes into account the specific safety and comfort needs of vulnerable groups in the physical layout of buses, bus stops, and transit hubs. Crime Prevention through Environmental Design (CPTED) theory emphasizes that the design and management of the physical environment can reduce opportunities for crime and enhance public confidence in transport systems [18]. Adequate lighting in buses, bus stops, and nearby pathways can reduce the risk of harassment and increase perceptions of safety, particularly at night. Poorly lit areas are frequently associated with higher crime rates and reduced usage by women. Features such as low-floor buses, ramps, spacious entryways, and accessible pedestrian pathways are essential for enabling easy boarding and deboarding [19].

The design of public spaces and transport systems has a direct impact on psychological comfort. Women and other vulnerable groups report feeling safer in spaces that provide clear lines of sight and minimize secluded areas [18]. Safety audits have proven to be effective tools in identifying problematic spaces and fostering tangible design improvements [20]. By incorporating the lived experiences of women and marginalized groups, these audits inform actionable recommendations that promote psychological comfort and inclusive urban spaces.

5. Methodology

This study employed a mixed-methods approach, integrating qualitative and quantitative methods, including surveys with 190 public transport users, key informant interviews (KII), field observations, and literature review. Primary and secondary data were analyzed to assess vehicle interior design affecting women's mobility. Following an interpretivist paradigm, the research explored women's subjective experiences in public transport, emphasizing safety, inclusivity, and accessibility. A constructivist ontological stance was adopted to contextualize gendered mobility.

A convenience sampling method was used, selecting 190 respondents based on availability and willingness. The Koteshwor-Kalanki route, chosen for its high commuter volume and diverse ridership, served as the study area. Key informant interviews followed a semi-structured format, allowing for guided yet flexible discussions with transport operators, policymakers, and frequent female commuters on vehicle interior design and gender inclusivity. Interviews were recorded, transcribed, and thematically analyzed.

The study employed multiple data collection methods to ensure a comprehensive understanding of gender-inclusive public transportation. Structured surveys gathered quantitative data on travel patterns, safety concerns, and experiences, while key informant interviews explored policy effectiveness and gender-sensitive measures. Field observations assessed vehicle design, infrastructure, and gender-specific challenges, and a literature review examined local policies, global best practices, and transport frameworks.

For data analysis, thematic analysis was applied to qualitative data from interviews and field observations, identifying patterns in safety, comfort, and accessibility. Quantitative survey responses were analyzed using descriptive statistics, including frequency distributions, mean, and standard deviation.

Table 1: Research Method and Data source

Research Objective	Methods	Data Sources
To evaluate existing vehicle design practices.	Field observations	Public transport vehicles, bus stops
	Surveys with women passengers	Women passengers
	Interviews with transport operators	Transport operators
To analyze how vehicle interior design's influence on gender inclusivity	In-depth interviews with women passengers	Women passengers
	Policy document reviews	Transport policies, NGO reports
	Interviews with key stakeholders	Transport authorities, advocacy groups
To recommend design changes for gender inclusive public transport.	Synthesis of findings from previous objectives	Analysis of primary and secondary data
	Stakeholder workshops	Transport authorities, women's groups

6. Study Area

The study area for this research is Kathmandu Valley, a busy urban region in Nepal with many public transportation options. The study focuses on public vehicles along the Koteshwor to Kalanki route within the Kathmandu Valley. The Koteshwor to Kalanki route is a crucial segment of Kathmandu's public transportation network, connecting the eastern and western parts of the valley. This corridor serves as a vital link between residential areas, office districts, educational institutions, and commercial hubs. Koteshwor acts as a gateway for commuters from Bhaktapur and surrounding regions, while Kalanki is a major junction for traffic heading to the outskirts of Kathmandu. The route experiences high passenger volumes, including office workers, students, traders, and homemakers, making it a dynamic and essential corridor.

Figure 4: Study Area

6.1 Key Modes of Public Transportation

6.1.1 Buses

Buses are one of the primary modes of public transport in Kathmandu Valley, operated by both private companies and cooperatives. They serve key routes connecting Kathmandu, Lalitpur, and Bhaktapur and are relatively affordable. Larger buses are operated under companies such as Sajha Yatayat and other cooperatives. Sajha Yatayat is one of the most recognized public bus systems in Kathmandu, providing extensive coverage throughout the valley. Established in 1962, Sajha Yatayat operates several routes connecting key areas within Kathmandu and Lalitpur. The service has been modernized over the years, including the introduction of electric buses to promote environmentally friendly transportation (Sajha Yatayat, 2023).

6.1.2 Microbuses and Minibus

These smaller vehicles are widely used for short-distance travel and can navigate through narrower streets that larger buses cannot access. They typically have a higher frequency of service but can become overcrowded during peak hours.

6.1.3 Safa Tempoo

Introduced in 1993 as an eco-friendly alternative to diesel-powered three-wheelers, Safa Tempos are electric vehicles that provide an important mode of transport for many commuters. Currently, around 600 Safa Tempos operate on various routes within the valley, catering to approximately 100,000 passengers daily (Clean Energy Nepal, 2025).

Figure 5: Public Transportations in Kathmandu

7. Findings and Analysis

Overcrowding and limited space emerged as major issues, with 51.05 percent of survey respondents expressing dissatisfaction with the seating and standing arrangements, highlighting discomfort as a primary concern. Literature reviews indicate that inadequate seating and crowded environments increase women's vulnerability to harassment, undermining their sense of security. Observational data confirmed significant overcrowding during peak hours, especially in Suvakamana Yatayat minibuses, where the narrow aisles further restricted space. Insights from drivers and conductors pointed out that overcrowding frequently obstructs access to reserved seats for women, particularly during busy times. The analysis suggests that wider aisles and optimized seating configurations are essential to alleviate these problems, ensuring a more comfortable and safer experience for all passengers, particularly women and the elderly.

Accessibility features also emerged as a concern, with 57.89 percent of survey respondents reporting difficulties in boarding and alighting due to high steps and narrow doors. Literature emphasizes the need for low-floor designs and grab bars to improve accessibility for women, the elderly, and passengers with disabilities. Observations revealed that Sajha Yatayat's electric buses offered better accessibility with lower steps compared to diesel models, though Blue Micro vehicles, despite having slightly lower steps, suffered from narrow doorways. KIIs highlighted that high floors were particularly challenging for passengers carrying children or heavy loads. To enhance accessibility, the expansion of low-floor models and better placement of grab bars is necessary.

Gender-sensitive design features also need improvement. Survey data revealed that 45.79 percent of respondents found reserved seating for women insufficient, while 47.89 percent of women felt unsafe during nighttime travel. Literature underscores the importance of well-enforced reserved seating and the integration of safety features such as CCTV cameras and panic buttons. KII insights from traffic police and drivers revealed that enforcing reserved seating policies was challenging due to overcrowding. Strengthening these policies through clearer signage, increased public awareness, and better enforcement mechanisms is essential to creating a more gender-inclusive transportation system.

Safety features were another significant area of concern, with 47.37 percent of respondents noting the lack of adequate safety measures such as grab bars and handrails. Literature highlights the importance of safety features like CCTV cameras and emergency exits, particularly for female passengers. Observations showed that only Sajha Yatayat buses were equipped with CCTV cameras, while most other vehicles lacked even basic safety features. Traffic police reported that CCTV cameras had a positive impact in preventing harassment but were limited in their availability. The analysis suggests that installing CCTV cameras, grab bars, and handrails across all vehicle types, along with conducting public awareness campaigns on reporting misconduct, would enhance overall safety.

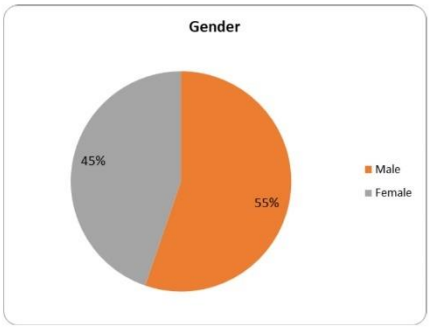

Figure 6: Gender Distribution of Survey Respondents

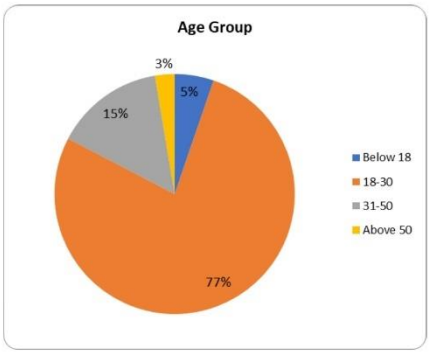

Figure 7: Age Distribution of Survey Respondents

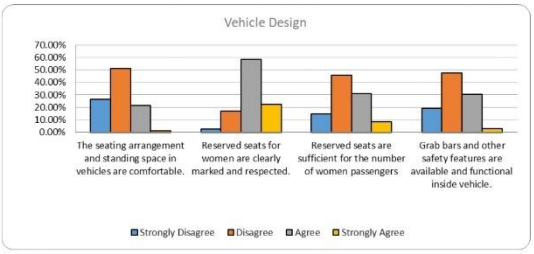

Figure 8: Bar Chart Illustrating Survey Data on Vehicle Design

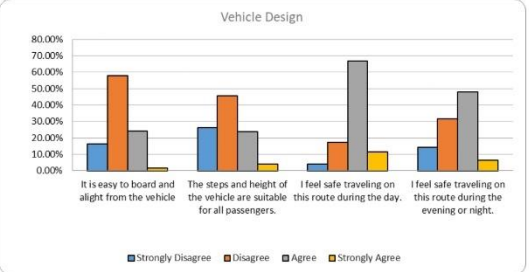

Figure 9: Bar Chart Illustrating Survey Data on Vehicle Design

8. Discussion

The design of public transportation vehicles plays a pivotal role in ensuring the safety, comfort, and inclusivity of passengers, particularly women. In Kathmandu, the current vehicle designs present significant challenges that hinder the development of a truly gender-sensitive transportation system. Many vehicles, particularly microbuses and minibuses, are poorly designed in ways that exacerbate overcrowding, limit accessibility, and fail to address specific needs related to women's comfort and security.

A major issue highlighted in this study is the difficulty in boarding and alighting, especially for women wearing traditional attire. High-floor vehicles make it particularly challenging for women, the elderly, and people with disabilities to use public transport comfortably and safely. The lack of low-floor buses exacerbates this issue, limiting the accessibility of these vehicles and reinforcing a sense of exclusion for certain passenger groups. Literature on gender-sensitive transport systems underscores that low-floor buses are essential for promoting accessibility and inclusivity, and this aspect should be prioritized in vehicle design [21].

The overcrowding issue, which is particularly severe in Kathmandu's public transport system, significantly impacts passenger comfort and safety. Many vehicles are cramped, leaving little room for passengers to move freely. This issue is compounded by the narrow aisles in minibuses, which limit the space available for passengers, particularly in situations where women are forced into vulnerable positions due to overcrowding. This not only reduces comfort but also increases the likelihood of harassment, which is further exacerbated by the lack of proper crowd control measures and the absence of gender-sensitivity training for drivers and conductors. The cramped environment reduces passengers' ability to escape from uncomfortable or threatening situations, thus compromising their safety.

Despite existing policies requiring reserved seats for women, enforcement is weak, and female passengers often feel unsafe, especially after dark only 47.89 percent of women feel safe traveling at night. In addition to vehicle design issues, the enforcement of gender-inclusive policies faces significant challenges. Although the government has regulations in place, such as the Motor Vehicle and Transport Management Rules and the Public Transport Code of Conduct, they are not being consistently implemented. For example, over 3,500 vehicles were detained for violating reserved seating policies, but such violations continue to happen due to weak enforcement [5].

The importance of designing vehicles with gender-sensitive features is evident from both the survey and observational data. Vehicles with low floors, separate entry and exit doors, and spacious standing areas such as those in the Sajha Yatayat fleet have been shown to offer a more comfortable and accessible experience for women. However, these features are not consistently present across the entire public transport fleet, leaving a significant gap in the quality of service provided. Adopting more gender-inclusive vehicle designs, such as low-floor buses, dedicated spaces for women, and additional safety features like grab bars, would help create a more inclusive and secure environment for all passengers, particularly women.

In conclusion, addressing the shortcomings in vehicle design is critical for improving the overall safety and inclusivity of Kathmandu's public transport system. Implementing low-floor buses, optimizing vehicle configurations to reduce overcrowding, and ensuring proper enforcement of reserved seating policies are essential steps toward creating a more gender-sensitive transport system. These design improvements, when combined with better infrastructure and operational practices, can significantly enhance the safety, comfort, and accessibility of public transportation for women and other vulnerable groups.

9. Conclusion and Recommendations

This paper highlights the crucial role of vehicle design in shaping the safety, comfort, and inclusivity of public transportation systems, particularly for women. In Kathmandu, the current vehicle design features significant shortcomings, such as overcrowding, high floors, inadequate seating, and limited accessibility, which contribute to discomfort, insecurity, and vulnerability for women passengers. Despite some positive examples, such as Sajha Yatayat buses with gender-inclusive features like low floors and separate entry and exit doors, the majority of vehicles fail to meet the needs of female passengers, the elderly, and individuals with disabilities. The lack of gender-sensitive design in vehicles, combined with weak enforcement of reserved seating policies, further exacerbates gender-related challenges and harassment in public transport.

Overall, addressing these design flaws through strategic improvements in vehicle architecture, better enforcement of policies, and the incorporation of gender-sensitive features will lead to a safer and more inclusive public transport environment, enhancing the overall commuting experience for all passengers, particularly women.

- **Adopt Low-Floor Bus Designs for Better Accessibility:**

  To improve accessibility, public transport should incorporate low-floor buses, making boarding easier for passengers with mobility challenges and traditional attire. A phased transition can retrofit existing diesel buses with 16-inch steps into electric low-floor models with 13-inch steps, starting with partnerships like Sajha Yatayat.

- **Optimize Interior Layout for Safety and Comfort:**

  Redesigning buses with wider aisles (at least two feet), improved seating, and more standing space can ease congestion. Women prefer tempos due to face-to-face seating, which enhances security [8]. Adapting this layout in larger buses can create a safer commuting environment.

- **Install Safety Features Across All Vehicles:**

  The inclusion of safety features such as CCTV cameras, panic buttons, grab bars, and handrails is critical to ensuring a secure environment for passengers. These features should be standardized across all public transport vehicles to increase passenger safety.

- **Implement Standardized Safety Features:**

  CCTV cameras should be installed in high-risk microbuses, with real-time monitoring by traffic police, expanding later to larger buses and terminals. Grab bar heights should also be adjusted, following Seoul's example, to improve accessibility for shorter passengers [13].

- **Enhance Public Awareness on Gender-Sensitive Transport:**

  Kathmandu could introduce a bystander intervention program inspired by Bogota's whistle campaign to encourage reporting of harassment [22]. Awareness efforts should include anti-harassment posters, digital signage, and an SMS-based reporting system modeled after Delhi's Himmat app for efficient incident response [23].

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Appendix H: Abstract Submitted to Second International Conference on Heritage, Innovation, and Transformation

32 | Far Western University, Kanchanpur, Nepal

O31 Gender Inclusion in Public Transportation: Assessing the Impact of Design, Policy and Practices in Kathmandu

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Kathmandu, home to a population of 3,025,386, with women constituting 49.4%, faces significant challenges in providing gender-inclusive public transportation. This study examines how public transportation in Kathmandu can address barriers such as safety concerns, harassment, and limited accessibility to promote inclusivity for women. The research aims to assess the impact of vehicle design, infrastructure, and policy implementation on women's mobility and inclusivity in public transport systems. Preliminary research involving 35 individuals highlights that buses are the most preferred mode of transport due to relatively better comfort and safety, while microbuses are the least preferred due to overcrowding and harassment. Based on these findings, the study delves into buses and microbuses to evaluate their design, operations, and gender inclusivity. Using a mixed-method approach, the study includes surveys of 150 individuals from diverse age groups and socioeconomic backgrounds, interviews with key stakeholders, and qualitative assessments to understand perceptions of safety, comfort, and accessibility. Findings reveal significant gaps in existing practices, including ineffective reserved seating arrangements, inadequate safety monitoring systems, and a lack of gender-sensitive training for transport staff. By addressing these challenges, the research aims to develop actionable recommendations for a safer and more inclusive public transport system, ultimately promoting equitable access to mobility for all.

Keywords: Accessibility, gender inclusion, public transportation, vehicle design, women's safety

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