Mind the Gender Gap: A Case Study Analysis of Transit Policies and Design Guidelines for Gender-inclusive Transit Planning

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Table of Contents

Table of Figures

Abstract

This study investigates the use of gender-sensitive planning practices in public transit systems, addressing the disparities in travel behaviors between men and women. Women typically engage in shorter, more complex trips due to caregiving and household responsibilities and often face additional challenges such as safety concerns and inadequate infrastructure for strollers and belongings. This research investigates current transit design practices and agency policies through the lens of gender-inclusivity. To achieve this goal, this research employs a qualitative case study approach, including interviews with staff from nine transit agencies to learn their present and future practices, and an analysis of five transit design and operations manuals to study their recommendations and standards. Key findings reveal progress in gender-sensitive data collection and design initiatives, even as significant barriers, including resource limitations, resistance to change, and infrastructural constraints, remain. While agencies like LA Metro, SEPTA, and WMATA have made notable advancements, the explicit incorporation of gender-sensitive principles in widely used transit design manuals is often lacking. The study concludes that continued commitment and innovation are essential to overcoming existing barriers and enhancing gender-inclusivity in transit systems, offering valuable insights for agencies aiming to create equitable and inclusive transportation environments.

Key words: *Women, Gender, Equity, Public Transportation, Transit, Transit Agency, Transit Design Manual, Operations, Safety*

1. Introduction

Public transit is often described as the lifeblood of cities, moving millions of people daily and providing essential mobility within cities. It grants access to public services, amenities, social activities, education, and employment opportunities. The objectives of public transit systems are diverse, encompassing goals such as increasing accessibility, fostering social inclusion, reducing traffic congestion, and lowering carbon emissions (Manville & Levine, 2018). However, these benefits are not fully realized when transit planning is conducted using standard gender-neutral practices. Over half of the population—women and girls—remains marginalized in these systems, as their specific needs are often overlooked, leaving them vulnerable to violence and unable to fully access their rights.

Women and men typically exhibit different mobility patterns and travel behavior, which reflect their varying roles and responsibilities. Women, who often bear the brunt of unpaid work, including caregiving for children, the elderly, and the sick, tend to have more frequent and complex travel patterns than men (Babbar, Peace, Cooper, Boisjoly, & Grisé, 2022). These responsibilities often require women to navigate public transportation while escorting vulnerable individuals, such as children or elderly family members. Women may also face pressure to move quickly through transit systems, balancing work and caregiving duties while managing considerations of cost, time, and effort. Gender-responsive public transportation systems that are safe, reliable, and affordable are crucial in ensuring women's access to education, economic security, childcare, and health services, thereby contributing to gender equality (Brejnholt, Ansbæk & Burrows , 2016).

Historically, women's perspectives have been largely ignored in urban transport planning and design (Eriksson, 2023), despite the fact that women are more likely than men to walk or use alternative transportation modes—except for bicycles—travel during off-peak hours, and feel unsafe while using public transit (Brejnholt, Ansbæk & Burrows , 2016). The lack of gender consideration in the design and operation of transit systems has significant consequences, limiting women's ability to safely access public transportation and exacerbating gender inequality.

In recent years, the importance of addressing gender in transport policy has gained recognition as essential for developing sustainable and inclusive transit systems. However, systematic gender inclusion—from hiring practices to system design and planning—remains rare. The failure to account for gender differences in public transit planning and service delivery perpetuates the gender-blindness prevalent in society. This oversight is akin to other forms of gender inequality, such as the gender pay gap or workplace issues like thermostat settings, restroom availability, and nursing accommodations. The opportunity to analyze the differentiated use and experience of public transit through a gender lens is critical. Much of the existing research focuses on women's safety while using public transit, addressing issues such as the "Pink Tax," where women incur higher costs by opting for safer but more expensive transportation options. Some responses to these safety concerns include increasing the presence of uniformed staff at transit stations to enhance security for female passengers.

This study aims to build on existing research related to female travel behavior by examining how women's mobility and accessibility needs are being addressed in public transit planning and

service delivery. One significant barrier to implementing women-specific initiatives is the limited collection and analysis of gender-disaggregated data. Without explicit gender information, or with inadequately disaggregated data, the distinctive use and experience of public transit by women remain obscured. Understanding these needs is essential for equitable route design, service coverage, and standards in public transit planning.

The primary focus of this thesis is to assess the current state of transit design and operations through the lens of gender-inclusivity, identifying gaps in women-centered data and contributing to the development of more equitable and inclusive transportation services.

This paper begins with exploration of previous theoretical studies on gender-inclusive transit design and planning, followed by a deep dive into the current condition of practical and recommended application of gender-inclusive transit design and planning. This research adopts a qualitative case study approach and has two key components. First, in-depth interviews that were conducted with representatives from nine U.S. transit agencies, including SEPTA, BART, and LA Metro, to explore their gender-sensitive design practices, policy implementations, and the challenges they face. These interviews provided valuable insights into the current state of gender-inclusive planning and the methods used by agencies to gather and respond to gender-specific feedback.

Second, the study undertakes a comprehensive analysis of widely used transit design and operations manuals, such as the NACTO Transit Street Design Guide and the Transit Capacity and Quality of Service Manual, alongside local guidelines like the BART Basics Guide and Sound Transit Station Experience Design Guidelines. The document review focused on identifying the extent to

which these manuals incorporate gender-sensitive guidelines, including considerations for female and non-binary passengers.

By combining insights from agency staff with an analysis of key industry documents, the research aims to highlight best practices, assess current efforts, and identify gaps in promoting gender equity in transit systems. The findings offer a foundation for advancing more inclusive and responsive transit environments.

2. Background and Literature Review

This paper begins with an in-depth literature review on gender-inclusive transit design and operations to understand the current landscape and define the research questions and scope. The literature review is guided by a set of questions around why women's transit travel matters and how effective design practices are in accommodating women's unique travel needs.

Why is it important to study women using public transit?

Although most women in the U.S. rely on cars for transportation, studies have shown that working women are slightly more likely to commute by car compared to men (Rosenbloom & Burns, 1994). However, women are also more inclined to carpool, particularly with family members, as part of their work commute (Ferguson, 1995; Wachs, 2010). Globally, research has highlighted that mothers often prefer private cars due to the flexibility they offer in balancing work, household, and caregiving responsibilities (Dobbs, 2005). Despite these preferences, studies have consistently revealed that in many cities, women constitute more than half of all

transit-dependent riders (Dill & Bates, 2014). This indicates a significant reliance on public transit among women, making it crucial to study their experiences and needs to ensure that transit systems are designed to support their mobility effectively.

How is female travel behavior different from their male counterparts?

Numerous previous studies have explored the disparities in travel behaviors between men and women, highlighting that women typically undertake shorter trips both in length and duration, and navigate more intricate travel patterns. These differences often stem from the need to juggle work responsibilities, caregiving duties, and household obligations (Babbar et al., 2022; Crane, 2007; Fan, 2017; MacDonald, 1999; McGuckin & Murakami, 1999; Taylor, Ralph, & Smart, 2015; Timmermans et al., 2003).

Research on trip distance indicates that women have a smaller spatial range of daily travel compared to men (Hanson, 2010). Despite narrowing gender gaps in commute distances over recent decades, women still generally commute shorter distances and spend less time traveling per trip compared to men, even after controlling for other factors affecting travel behavior (Crane, 2007; Gordon, Kumar, & Richardson, 1989; Hanson & Johnston, 1985; Lee, Vojnovic, & Grady, 2017; Rapino & Cooke, 2011). Additionally, women exhibit a higher tendency to travel during off-peak hours compared to men, reflecting diverse work schedules and caregiving responsibilities that necessitate travel outside traditional peak commuting times (LA Metro, 2019).

In terms of trip purpose and travel companions, women in the United States typically shoulder a larger portion of caregiving responsibilities for children and elderly family members compared to

men (Rhubart, 2020). This caregiving-related travel, termed "mobility-of-care," was first conceptualized by Inés Sánchez de Madariaga in 2013 (de Madariaga & Zucchini, 2019). Recent work by de Madariaga and Zucchini has further refined the understanding of caregiving trips, utilizing gender-sensitive data and enhanced survey methodologies to capture the nuances of caregiving-related travel patterns (de Madariaga & Zucchini, 2019). Newly published research by collaborators at the Washington Metropolitan Area Transit Authority and Massachusetts Institute of Technology identified mobility-of-care trips and trip-chaining behaviors using transit smart card data from Washington, DC (Shuman et al., 2023). Their findings suggest that women demonstrate a higher propensity for trip chaining, especially during peak hours, with notable overlaps between caregiving trips and trips accompanied by dependents (Shuman et al., 2023). Another study by Fong and Shaw reveals that caregiving travel impacts subjective well-being of men and women differently. Women experience more stress, and less happiness and meaning in such travel since they spend more time engaged in caregiving travel (Fong & Shaw, 2024).

Concerning strollers and belongings, women are observed to frequently carry large shopping bags or push strollers while traveling, a behavior less common among men (McKnight, 1994). While some European transit operators, like Transport for London, allocate space for strollers within their vehicles, such accommodations are lacking in most U.S. public transit systems, leading women to seek alternative transportation modes (Coale, 2015). Many U.S. transit agencies, including New York City’s MTA, only permit strollers on buses if they are folded, necessitating that parents manage their children and belongings while folding strollers, a task that can be challenging and precarious, particularly on crowded buses (Lowry, Furfaro, & Brown,

2017). A Washington, D.C. case study highlights that a ban on open strollers on Metrobuses created significant barriers for caregivers. This policy was lifted in May 2023, reflecting a shift towards more inclusive transportation policies that consider caregivers' needs (Passman, O'Hara, & Levin-Keitel, 2024).

Furthermore, gender roles often shape women's mobility patterns, leading to a greater demand for trip chaining as they balance multiple responsibilities in their daily lives (McGuckin & Murakami, 1999; Mcguckin & Nakamoto, 2005) This practice of "hypermobility" imposes constraints on women's time and resources, making it challenging for transit systems to accommodate their need to make multiple stops during their commute (Blumenberg, 2016).

The burdens of complex travel patterns are compounded by safety concerns, including experiences of sexual harassment in transit settings (Fenster, 2005). Women travelers often modify their behavior and take precautions to mitigate the risk of harassment, such as avoiding traveling alone or at night (Loukaitou-Sideris, 2014). Efforts to address these issues, such as implementing "women-only" cars on heavy rail, are being explored by transit agencies, although their effectiveness remains uncertain.

The fear of safety among women is strongly influenced by the characteristics of their surrounding physical environment, with factors such as design, layout, and environmental elements of the built environment playing a significant role (Kern, 2021; Pain, 1991). Women often express unease when waiting for buses or walking along poorly illuminated paths to and from transit stops, with isolated transportation settings inducing fear of lack of assistance in the event of a crime (Loukaitou-Sideris, 2014; Lynch & Atkins, 1988). Empirical studies indicated that women

are often more attuned than men to potential dangers and signs of social disorder, such as graffiti, malodor, garbage, and neglected or abandoned buildings (LA Metro, 2019; Wekerle & Whitzman, 1995), which are frequently found near transit stops, particularly in low-income areas. A study from Minnesota explored how gender influences activity-travel patterns (Song, Fan, Zhang, & McDonnell, 2023); notably, this study highlighted gender-specific transit barriers, with females and non-binary individuals expressing greater feelings of unsafety while using public transit and encountering difficulties due to the need for multiple stops or carrying strollers/carts (Song et al., 2023).

Are current transit design and practices addressing travel needs of women?

Over the past five years, there has been a growing interest, both among practitioners and academics, in comprehending and addressing the specific needs of women when utilizing public transit. Two recent studies hold particular relevance to this inquiry. The surge in attention towards women's transit needs was likely sparked by the groundbreaking 2019 study titled "Understanding How Women Travel (UHWT)" and the subsequent development of the "Gender Action Plan" spearheaded by the Los Angeles (LA) Metro (Blumenberg, Brozen, & Loukaitou-Sideris, 2018; LA Metro, 2019, 2022). The 2019 study employed a comprehensive methodology to examine women's transit experiences in Los Angeles County. This multifaceted approach involved analyzing data from the 2017 National Household Travel Survey (NHTS) and gender-disaggregated Metro data, conducting surveys, focus groups, observations on transit vehicles, and participatory workshops to gather diverse perspectives and insights into women's transit experiences. The study, grounded in social justice principles, provided nuanced understanding of

women's transit travel patterns and experiences. In response, LA Metro formulated a Gender Action Plan (GAP) with targeted strategies across four key themes—safety, station/stop/vehicle design, fare policy, and service frequency & reliability—to enhance the transit experience for women riders (Blumenberg et al., 2018; LA Metro, 2019).

Subsequently, a nationwide study conducted in Canada aimed to comprehend and address the needs of women utilizing public transit (Babbar et al., 2022). The study highlighted the concept of "gender blindness" in public transit planning, wherein the lack of consideration for gender-specific needs leads to inequitable outcomes, such as increased costs and time for women when opting for perceived safer routes or traveling with dependents (Babbar et al., 2022). Moreover, the study underscored the limitation posed by inadequate data collection and analysis of gender information, hindering the development of inclusive transit initiatives tailored to women's experiences. Similarly, the study noted that existing planning systems and physical design of transit vehicles often cater to the able-bodied male experience, overlooking the diverse needs and experiences of women (Babbar et al., 2022).

How else can female travel experience be improved?

A modest yet expanding body of literature focuses on women's encounters with public transit, their transit behavior, and the necessary improvements in transit systems. Despite commendable efforts to investigate these subjects in previous literature, notably exemplified by LA Metro's UHWT study and subsequent Gender Action Plan, a lack in policy and design guidance is observed that would enable agencies to accommodate women’s specialized physical needs on transit. This led to the overarching research question of this study: what

steps are policy makers and service providers taking to improve female travel experience in terms of transit design and operations?

3. Research Design and Methods

This research follows a qualitative case study approach as described by Corbin and Strauss (Corbin & Strauss, 2008), aiming to investigate current design recommendations and practices through the lens of gender-inclusivity. The study is divided into two parts. In the first part, interviews were conducted with transit staff across the country to learn about their agencies' gender-inclusive design practices and policies. In the second part, transit design and operations manuals were analyzed to evaluate their design recommendations and guidelines. Two widely used transit design manuals were the focus of the study —NACTO Transit Street Design Guide and the Transit Capacity and Quality of Service Manual—as well as three local guidelines used by the agencies that we interviewed—BART Basics Guide, Sound Transit Station Experience Design Guidelines, and Metrolink Southern California Regional Rail Authority (SCARRA) Design Criteria Manual (LA Metro).

3.1 Research Questions

The overarching research question for this exploratory study is: What steps are policy makers and service providers taking to improve female travel experience in terms of transit design and operations?

The study is further guided by the following specific questions:

1. What specific initiatives have transit agencies undertaken to promote gender equity in transit design?
2. To what extent do current transit design manuals incorporate gender-sensitive guidelines?

3.2 Data Collection

The study employed purposive and snowball sampling methods to select local transit agencies across the US for interviews. Staff involved in the design, planning, or equity departments within these agencies were invited to participate in an interview about their approach to gender-inclusive transit planning. Most agencies responded positively and representatives from nine agencies were interviewed: Southeastern Pennsylvania Transportation Authority (SEPTA), Bay Area Rapid Transit (BART), San Francisco Municipal Transportation Agency (SFMTA), Los Angeles County Metropolitan Transportation Authority (LA Metro), Sound Transit, Washington Metropolitan Area Transit Authority (WMATA), Massachusetts Bay Transportation Authority (MBTA), Central Ohio Transit Authority (COTA), and Minneapolis – St Paul Metro Transit (Metro).

The study utilized in-depth, online semi-structured interviews with agency staff. Interviewees were asked about their gender-sensitive design and planning initiatives, the challenges they faced in implementing these initiatives, and their methods for collecting gender-specific data.

3.3 Data Analysis

The interviews were conducted according to Institutional Review Board (IRB) protocols to ensure confidentiality. The 1-hour interviews were conducted via Zoom and recorded, transcribed using OtterAI, and quality-checked. Interviewees' names were redacted, and the recordings and

transcripts were stored in de-identified files ensuring anonymity. Then the transcripts were imported into NVivo for analysis, where a combination of automatic and manual coding methods was utilized. NVivo, a qualitative data analysis software, allows researchers to analyze unstructured data such as interview transcripts by identifying themes, patterns, and relationships. It has an autocoding function that was used to automatically identify and tag segments of text that relate to particular topics or interview questions. Then the transcripts were manually analyzed to capture the themes of the interview answers. For example, one interview question focused on data collection methods. The autocoding function was used to tag all the instances where 'data', 'data collection', 'survey', 'focus group', 'interview', and other related terms were used, then those sections were manually reviewed to see what the interviewees were saying about their agency's data collection methods. Note that the findings reported in this paper are derived from the interviewees' knowledge and perceptions of their agencies' design initiatives.

For the document review, a comprehensive search of the manuals (excluding the appendices) was conducted using gender-related keywords such as 'female,' 'women,' 'pregnant,' 'gender,' 'children,' 'family,' 'LGBTQ,' 'non-binary,' 'equity,' 'stroller,' 'fare' or 'fare capping/discount', 'surveillance', 'camera', and 'lighting,' including various iterations of these terms. Following this, an in-depth review of specific sections was conducted, such as station and vehicle design guidelines, and fare policies, to identify gender-inclusive design or policy recommendations that might not be explicitly labeled as such.

4. Findings

4.1 Transit Agency Practices

The interviews broadly focused on the following topics : (1) data collection practices, (2) vehicle and station design, (3) operational practices and other policies, and (4) challenges and barriers in implementing gender-inclusive policies. Each of these themes is discussed below.

4.1.1 Data Collection Practices

Effective data collection is crucial for understanding and improving gender-inclusivity in transit systems as it provides the foundational insights necessary for informed decision-making and policy development. This section discusses how different transit agencies approach data collection to better address the needs of diverse gender groups, the methods they use, and the

Gender-Disaggregated Data	Example: SEPTA uses gender-disaggregated census, survey, and farecard data that allows them to identify trends and patterns in women's travel behaviors.
Collaborative Data Collection Efforts	Example: SFMTA partners with UCLA to conduct surveys on harassment types and demographics.
Innovative Data Collection Methods	Example: WMATA usese smart farecards and algorithms for disaggregating and mapping data to identify disparities in service quality among different groups, including women.
Addressing Data Gaps	Example: LA Metro conducts focus groups, participatory workshops, and ethnographic observations to gain a deeper understanding of the lived experiences of gender groups.

Figure 1: Examples of Data Collection Practices to Address Gender

challenges they face. Examples and practices of data collection approaches are highlighted in Figure 1 and discussed in the following paragraphs.

Gender-Disaggregated Data

A common theme across several agencies was the importance of collecting gender-disaggregated data. All of the agencies that were interviewed for this study agreed that gender-disaggregated data would be highly insightful in understanding female travel behavior. Unfortunately, less than half of them actually collect data in such a manner, primarily due to funding and staffing limitations, but also to maintain a gender-neutral and unbiased approach. Only a few agencies like SEPTA and LA Metro have been successful in collecting and analyzing gender-specific data to inform their transit planning and policy decisions. SEPTA uses gender-disaggregated census, survey, and farecard data that allows them to identify trends and patterns in women's travel behaviors. This data has been instrumental in making targeted improvements, such as increasing late-night service frequencies to enhance safety for women traveling with children.LA Metro also demonstrated a strong commitment to gender-sensitive data collection. In the development of their Gender Action Plan, they incorporated gender analysis tools to evaluate their initiatives and projects under the lens of gender-inclusivity. By engaging in comprehensive data collection and analysis, LA Metro endeavors to tailor its transit policies to address specific needs and challenges faced by women and non-binary individuals.

Collaborative Data Collection Efforts

Several agencies collaborate with external organizations to enhance their data collection efforts. SFMTA partners with UCLA to conduct surveys on harassment types and demographics. This

collaboration helps SFMTA gain a deeper understanding of the safety concerns experienced by different gender groups and informs their strategies to combat harassment. According to SFMTA, the partnership has helped in addressing complex issues by combining internal data collection with external expertise and perspective.

Similarly, BART's work with the Alliance for Girls on the #NotOneMoreGirl framework highlights the importance of collaborative efforts in developing gender-sensitive transit solutions. By partnering with Alliance for Girls—an organization focused on gender equity—BART has gained insights into the specific needs of girls and gender-expansive youth, and was able to reflect them in their transit design and safety plans.

Innovative Data Collection Methods

Some agencies employ innovative and unconventional methods to gather feedback and data on gender-specific issues. LA Metro utilizes multiple stages of quantitative and qualitative data collection methods, like surveys, community engagement, and focus groups to collect feedback from a diverse range of passengers. They also rely on internal data specialists to ensure that survey questions are equitable and inclusive. This exemplary approach has helped LA Metro to capture a broad spectrum of experiences and perspectives, especially those related to gender.

SEPTA has also adopted qualitative data collection methods with notably positive outcomes. They emphasize that, "It's not just enough to survey women, you *need* qualitative research; and, when it comes to capturing those voices, you need to make sure that you're giving people time to respond."

Similarly, MBTA employs unique data collection technique, where their consultants conduct intercept surveys and audio record the sessions. They then analyze both the content and the intonation of the responses. As one MBTA representative noted, “It helps you better understand the community who is going to be impacted by a project, when you hear it in their own voices and the way that they speak, rather than me trying to talk about a woman's experience while crossing the street with her four-year-olds.”

WMATA’s use of technology, such as smart farecards to collect and analyze data on fare usage patterns, demonstrates a fresher approach to data collection. This farecard data is later disaggregated by gender using an algorithm based on the gender associations of riders' names, and then mapped to reveal mobility patterns and disparities in service quality across demographic groups, including women. WMATA views this smart data collection method, combined with algorithmic analysis, as significantly streamlining the data collection and analysis process. However, they acknowledge that the method is not flawless and requires further refinement.

Addressing Data Gaps

To address data gaps and improve gender-inclusivity in transit systems, agencies are exploring various strategies. Some agencies, like LA Metro, emphasize the importance of ongoing public engagement and feedback to supplement quantitative data with qualitative insights. By conducting focus groups, participatory workshops, and ethnographic observations, LA Metro believes that they can gain a deeper understanding of the lived experiences of diverse gender groups. Additionally, some agencies are working to improve their data collection methodologies

to better capture gender-specific issues. For instance, COTA is focusing on gathering feedback through community partnerships and risk assessment specialists to address gender-sensitive concerns and enhancing service quality.

4.1.2 Vehicle and Station Design

Transit agencies are increasingly recognizing the importance of incorporating gender-inclusive design principles into their infrastructure planning and design practices. These principles aim to address the diverse needs of different gender groups, enhancing safety, accessibility, and overall user experience. This section examines how transit agencies approach gender-inclusive design, highlighting successful and innovative approaches, and areas needing improvement based on the interview findings. The examples are highlighted in Figure 2 below and discussed afterwards.

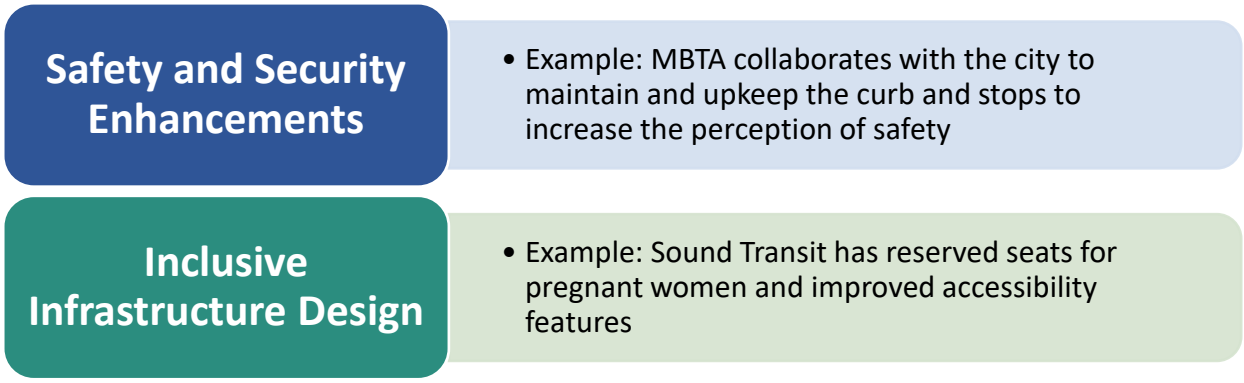

Figure 2: Examples of Gender-Sensitive Design Practices

Safety and Security Enhancements

The foremost priority for all the agencies has been safety and security—a core element of gender-sensitive design. For instance, SEPTA has made significant strides by revising its bus stop design guidelines to improve safety for women, particularly those traveling at night. The inclusion of better lighting, visible bus stops, and increased service frequency at night are some of the key

measures aimed at addressing safety concerns expressed by women in focus groups. MBTA also emphasized the importance of lighting, visibility and surveillance in creating a sense of safety.

All of the agencies recognized the importance of clean, well-lit and well-maintained bus stops or stations without graffiti, broken glass or garbage in the perception of safety as well as comfort of travel. However, only half of the agencies interviewed are able to perform regular maintenance of stops since often the city owns the curb and the stops built on them, and are therefore responsible for their upkeep. Sometimes the agencies, like MBTA, can organize a collaboration with the city for maintaining the stops, but such collaborations are not always possible. Almost all the agencies have developed a version of transit ambassador programs consisting of transit agency representatives, armed or unarmed security personnel and/or mental health counselors, further underscoring their commitment to address women's safety concerns.

Inclusive Infrastructure Design

Inclusive infrastructure design, including station and vehicular design, is another crucial aspect of gender-sensitive transit planning. Agencies like Sound Transit and BART have implemented innovative design features to accommodate the diverse needs of users. Sound Transit has reserved seats for pregnant women and improved accessibility features.

BART's manual for train station design incorporates accessibility guidelines and ergonomic considerations, aiming to create an inclusive environment for all passengers. By addressing issues such as ergonomics and ensuring that facilities are accessible to diverse users, these agencies contribute to an equitable transit experience. LA Metro, BART, Sound Transit, Metro Transit, and SEPTA are procuring new vehicles or retrofitting their legacy fleet to include dedicated space for

stroller parking. Also, even though they are not specifically called out in documentation, design innovations like low bus straps/handles, low seats, on-vehicle bike racks that are accessible for women, etc. came up over and over again in these conversations as elements agencies would like to include in future vehicle design.

4.1.3 Operational Practices and Other Service Policies

Operational practices and other service policies can play a crucial role in implementing and sustaining gender-sensitive transit policies. Effective operations and policies can enhance the overall user experience by ensuring that services are responsive to the needs of diverse gender groups. A few examples are highlighted in Figure 3 and are discussed in the following paragraphs.

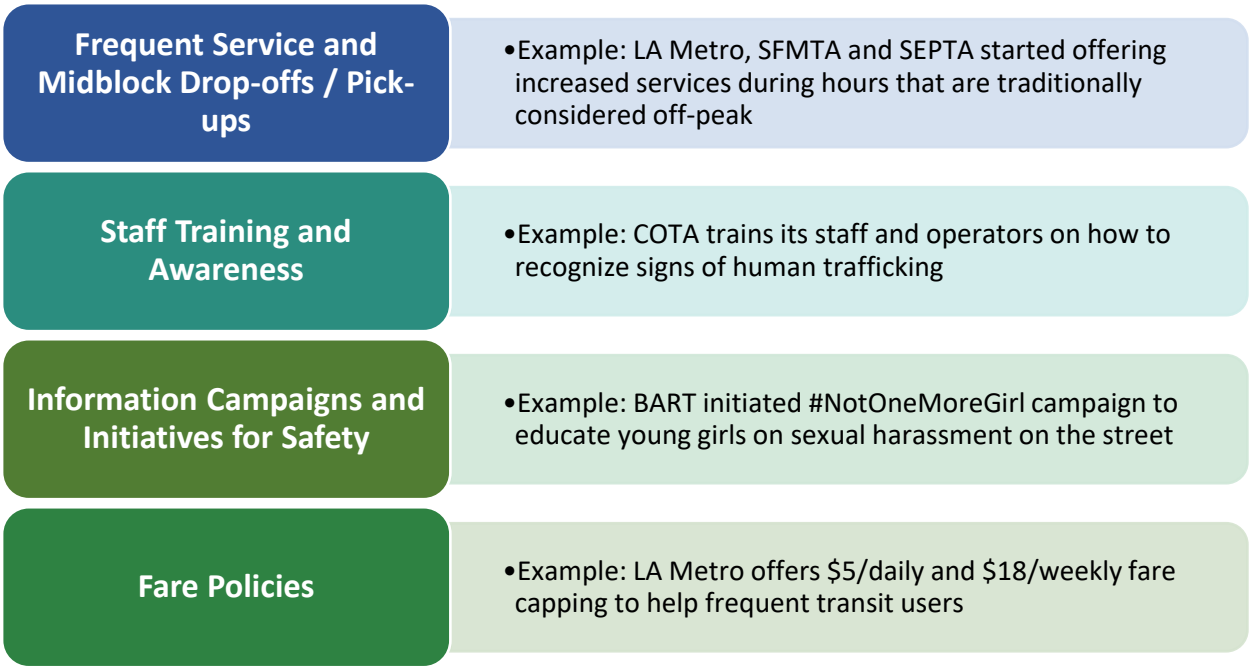

Figure 3: Examples of Gender-Sensitive Operational and Service Practices

Frequent services and Midblock Drop-off/Pick-up services

LA Metro has increased the frequency of their mid-day services, recognizing that a majority of their female customers travel more during the mid-day off-peak hours than their male counterparts. SEPTA has increased their night-time services on certain lines based on the volume and frequency of female riders on those routes at night. Similarly, WMATA has increased frequency of night services on select routes that are used by people working on night shifts. According to the WMATA representative, "We recently made select bus routes in DC run 24/7. For example, I know quite a few of those run to our hospitals, where women are a major portion of night shift workers."

SFMTA, WMATA and MBTA mentioned night-time midblock courtesy-stops for women to ensure safety and reduce risk by reducing exposure. However, MBTA expressed concern about whether this service should only be for women or not, since men travelling with children might also require the service.

Staff Training and Awareness

Staff training and awareness are essential for the successful implementation of gender-sensitive policies. Agencies like BART and COTA emphasize the importance of training staff to recognize and address gender-specific issues. BART's initiatives to address discrimination and violence against female staff highlight the need for ongoing education and awareness among transit operators and frontline staff.

COTA's training on recognizing signs of human trafficking further underscores the role of staff in maintaining a safe and inclusive transit environment. According to them, "our operators are on

the front lines, they are the face of our agency; we want our operators to see the signs of what human trafficking looks like, because what they see on television may not be what they see in real practice." By equipping staff with the knowledge and tools to address gender-related concerns, agencies can improve service quality and ensure that policies are effectively implemented.

Campaigns and Initiatives for Safety

BART's #NotOneMoreGirl initiative, in collaboration with the Alliance for Girls, aims to create a safer and inclusive transit environment for girls and gender-expansive youth. The initiative includes enhanced security measures, community engagement, educational campaigns, and the development of specific policies to address harassment and promote safety. According to their representative, "One of our safety initiatives—shortening the train cars to create a safer, cozier environment that is easier to supervise—was a direct outcome of the feedback from the #NotOneMoreGirl initiative." By focusing on the unique challenges faced by these groups and responding to their feedbacks, BART sets a precedent for other transit agencies and continues to evolve based on ongoing feedback and data collection.

SEPTA has a Women's Safety Strategy Committee and SFMTA sponsors the Safety and Equity Initiative - both aim to ensure safety of women on public transit. SFMTA collaborates with San Fransisco Police Department to encourage reporting of incidents of harassment, and also developed a feature in their online portal where riders can report incidents that they themselves have experienced or have witnessed on the buses either anonymously or not.

Fare Policies for Families

Designing for families and caregivers is a key component of gender-sensitive transit design. Since women are usually travelling with children or seniors more often than men, the burden of paying for multiple riders at once falls more on women. In response to this as well as for many reasons that serve riders better, most agencies are offering fare capping or discounted fares in different forms. SEPTA allows children under 12 to ride for free, whereas on BART, children under 4 ride free. LA Metro has a fare capping system where a rider does not pay more than $5 a day or $18 a week even if they travel more than that. They also offer free one-way transfers for 2 hours. This helps frequent riders and individuals who trip-chain. MBTA, WMATA and SFMTA also have discounted fare policies for children, seniors, and low-income individuals.

4.1.4 Challenges and Barriers to Implementing Gender-Sensitive Transit Policies

Implementing gender-sensitive policies in transit systems presents a variety of challenges and barriers that can affect the effectiveness and sustainability of such initiatives. This section explores the key obstacles transit agencies face, including resource constraints, resistance to change, balancing priorities, and issues related to infrastructure and staff training.

Resource Constraints

One of the most significant challenges is the constraint of resources, including funding, staffing, and time. Resource limitations can impede the ability of transit agencies to design, implement, and maintain gender-sensitive policies and practices effectively.

Sound Transit faces budgetary constraints that impact their ability to implement and sustain gender-sensitive innovations. The allocation of limited resources towards essential operational

needs can leave insufficient funds for testing and integrating new gender-inclusive design features. Similarly, WMATA's financial challenges restrict their capacity to conduct comprehensive data collection and make necessary policy adjustments.

Additionally, resource constraints can affect the ability to address infrastructure needs and maintain gender-sensitive features over time. BART's station maintenance is challenging due to limited staff and resources, hindering the effective implementation and upkeep of gender-sensitive design elements such as improved safety measures and ergonomic accommodations.

Resistance to Change

Resistance to change is another significant barrier that transit agencies encounter when pursuing gender-sensitive policies. This resistance can manifest from various stakeholders, including staff, management, and the public.

A lot of the agencies reported that having women in decision-making positions has helped tremendously while advocating for gender-inclusive innovations. However, a few agencies, like SFMTA, have reported resistance to prioritizing women's safety in transit projects, which slow down or obstruct the implementation of necessary changes. Resistance may stem from a lack of awareness, perceived increased costs, or the challenge of altering established practices and policies.

A recurring theme in discussions about advocating for gender-inclusive design was the recognition that such approaches benefit not only women but also men. For instance, a father traveling with children in a stroller would equally benefit from an open-stroller policy. This

broader understanding could assist policymakers and planners in overcoming resistance to implementing gender-inclusive design and policy strategies.

Balancing Competing Priorities

Most transit agencies mentioned how they face the challenge of balancing competing priorities often, such as budget limits, service demands, and the need for gender-sensitive improvements. This balancing act complicates the integration of gender-sensitive policies into transit planning and operations.

SEPTA is endeavoring to balance fiscal responsibility with the need to increase service frequency for women traveling at night which illustrates the tension between budget limitations and the goal of improving safety and accessibility. They believe the need to address gender-specific issues must be weighed against the constraints of available resources and the broader service demands of the transit system.

Similarly, COTA's focus on family-oriented design, including modifications for female operators and features like elevated seats and stroller storage, requires balancing practical constraints with the goal of enhancing accessibility and equity. According to the COTA representative, "This balancing act involves addressing immediate needs while planning for long-term sustainability."

Infrastructure Limitations

A lot of the interviewees mention infrastructure limitations as a significant barrier to implementing gender-sensitive policies. Many transit agencies operate within the constraints of

existing infrastructure, which can limit their ability to incorporate gender-sensitive design features effectively.

SEPTA's challenges with older infrastructure in Philadelphia illustrate the difficulties in making gender-sensitive improvements within the constraints of existing systems. Upgrading infrastructure to meet contemporary gender-sensitive standards often requires substantial investments and can be constrained by historical design limitations and physical space restrictions.

Similarly, MBTA's issues with inadequate women's restrooms and accessibility challenges highlight the difficulties in modifying existing infrastructure to meet gender-sensitive needs. Addressing these limitations requires careful planning and significant investment to ensure that infrastructure changes are both feasible and effective.

Challenges in Data Collection

Despite the efforts to collect gender-specific data, several challenges persist. Most of the agencies mentioned limitations in budget and staffing as the biggest constraint, which affect their ability to conduct extensive data collection and analysis. MBTA also noted privacy concerns as a notable obstacle. Their farecard only captures the bare minimum of information to ensure client privacy, which makes it difficult to capture gender-specific data. On the other hand, Metro (Minneapolis) mentioned a struggle in analyzing customer feedback data comprehensively due to a lack of centralized data repositories, and also challenges in designing survey templates that specifically ask about bus-design related experiences.

4.2 Document Analysis

Following the interviews with the agencies, we conducted a document review using both nationally recognized design manuals in transit and manuals agencies provided that they use internally for their design practices. As described in the methods, a keyword search followed by a deeper review of the design manuals yielded the following results.

4.2.1 NACTO Transit Street Design

A keyword search of the NACTO Transit Street Design Manual (NACTO, 2014) yielded no results related to women, gender, or family. It briefly addresses universal design elements like lighting and ADA ramps, which benefit women as well. However, its focus is primarily on optimizing streets for transit flow in terms of speed, volume, and comfort, without addressing the varied needs of different demographic groups. While the manual acknowledges the importance of ADA-compliant design for accessibility, it does not explicitly consider how travel experiences might differ between men and women or between single riders and families. Although features like well-lit stations do enhance safety for all users, including women, it does not specify how these features address gender-specific needs. Overall, while the manual effectively addresses transit flow, there is significant opportunity to integrate considerations of gender, accessibility, comfort, and safety into its recommendations.

4.2.2 Transit Capacity and Quality of Service Manual (TCQSM) 3rd Edition

A word search of the TCQSM (Kittleson & Associates, Inc., Parsons Brinckerhoff, KFH Group, Inc., Texas A&M Transportation Institute & Arup, 2013) yielded the following results: ‘female’ came up in the context of pedestrian safety and walking speed for crosswalk design; ‘children’ came

up in the context of human service transportation; ‘equity’ in the context of service equity for communities served; ‘fare’ in the context of fare collection method; ‘stroller’ in the context of boarding time, passenger area calculation, and stroller storage.

It offers design recommendations to enhance transit system capacity, efficiency, and passenger experience. It emphasizes effective passenger flow management through well-designed station layouts and platforms, which helps minimize congestion and guide passengers smoothly. Capacity planning guidelines suggest optimizing vehicle space and service frequency to meet demand. The manual prioritizes accessibility and inclusivity by advocating for ADA compliance and universal design principles, ensuring facilities and vehicles are accessible to all passengers, including those with disabilities and parents with strollers. It also highlights the importance of information systems, recommending real-time updates and clear signage to aid navigation. Safety and security are addressed through adequate lighting, surveillance, and emergency systems. Recommendations for passenger comfort include providing ample seating, shelter, and maintaining cleanliness. Lastly, the manual stresses community engagement through stakeholder involvement and feedback mechanisms to ensure the transit system meets diverse community needs. Even though these design features generally support women's travel needs by enhancing safety, accessibility, and overall comfort, creating an inclusive and secure transit environment, the manual lacks intention and explicit instructions regarding gender-equity. Hopefully, in the upcoming revision currently under preparation we will see more specific recommendations regarding gender equity and inclusiveness.

4.2.3 BART Basics Guide

A keyword search of the BART Basics Guide yielded an almost ‘null’ result. The document does not mention relevant keywords except for ‘fare,’ where it explains BART’s various fare products. A thorough review of the guide reveals that it focuses primarily on practical information about the BART system, including riding instructions, safety measures, accessibility features, and parking information, without explicitly addressing gender-inclusivity (BART, 2023).

Even though the guide addresses the riders rather than transit planners, it still highlights design features that are provided to promote equitability. The design features highlighted include staff assistance available at all BART stations for help with ticket processing and inquiries, accessible via booths or white courtesy telephones. Elevators and escalators in all stations facilitate easy access from street level to train platforms. Platform-level message signs and public address systems provide updates on train arrivals, departures, and transit information, complemented by telecommunication devices (TDDs), Braille, and large-print signs for those with disabilities. Trains offer designated priority seating for seniors and individuals with disabilities, with accommodations for wheelchair users through level boarding from the platform. Emergency procedures include "Attendant Call" intercoms, emergency door releases, and emergency phones, all easily accessible. Station Agents provide direct assistance, fostering community support, and feedback mechanisms indicate openness to community communication and improvement suggestions (BART, 2023).

While the guide does not specifically mention women or their unique travel needs, it emphasizes safety and comfort for all passengers. These design features are transferable to women's travel

needs as they provide enhanced safety, accessibility, and convenience. Staff assistance can offer immediate help in case of harassment or safety concerns, while elevators and escalators make it easier for women traveling with strollers or heavy bags. Communication aids ensure timely and clear information, and priority seating benefits pregnant women and those with young children. The safety features and emergency procedures create a secure environment, addressing the specific concerns of women traveling alone or with dependents. Overall, these features collectively enhance the comfort, safety, and inclusivity of the transit system for female passengers, albeit not explicitly.

4.2.4 Sound Transit Station Experience Design Guidelines

Sound Transit's Station Experience Design Guidelines is unique in its approach to design recommendations. A word search was enough to reveal a strong commitment to gender-inclusivity and inclusivity in its approach to transit design. By searching for terms like, 'female,' 'women,' 'pregnant,' 'gender,' 'children,' and 'family,' we came upon the concept of personas. The persona exercise is a method that Sound Transit uses to gain insights into the diverse characteristics and needs of passengers who use the Link light rail system. It involves creating fictional characters, or "personas," that represent various passenger types based on their frequency of travel and specific abilities or needs. This exercise allows design teams to role-play these personas during the conceptual design phase, helping to identify potential negative emotions and challenges faced by passengers at different touchpoints in their journey. By focusing on the passenger experience, this exercise aims to inform design decisions that enhance overall usability and satisfaction within the transit system (Sound Transit, 2022).

A detailed review shows that the manual explicitly addresses women's travel needs and the unique challenges they face using the transit system. It highlights that women often make multiple trips throughout the day and engage in trip-chaining, making various stops to fulfill responsibilities. This understanding is crucial for designing systems that accommodate these travel patterns. It also considers the needs of pregnant women, noting they may require more space, access to restrooms, and places to sit and rest, and may need more time to navigate the transit environment. Safety concerns are addressed by prioritizing features such as well-lit areas and clear sightlines and natural surveillance by using glass facade, enhancing the sense of security for female passengers. It encourages designers to consider gender as a critical factor in the planning and design process, fostering a safe and comfortable experience for all passengers. Other key features include emergency telephones with alternate power sources, accessible restroom facilities, unisex restrooms, ADA-compliant walkways and ramps, non-glare signage with appropriate contrast and Braille, and well-lit, safe environments. These features are particularly beneficial for women's travel needs by enhancing safety, accessibility, and convenience, ensuring that transit systems are responsive to the needs of all genders.

4.2.5 Metrolink SCARRA Design Criteria Manual

A keyword search of the Metrolink Design Criteria Manual reveals mentions of terms such as ‘women’ (in the context of ‘women’s bathroom’), ‘female’ (in the context of ‘lockers for female workers’), and ‘lighting’ and ‘camera/surveillance’ (in the context of ‘safety and visibility’). Further review shows that the manual prioritizes accessibility, ensuring all users, including those with disabilities, can navigate stations safely and comfortably. The document demonstrates an

explicit commitment to gender-inclusivity and inclusivity in its design criteria, explicitly addressing the needs of different genders through the inclusion of unisex restrooms and facilities that cater to both men and women (Southern California Regional Rail Authority, 2024).

The manual specifies the design of men's and women's restrooms, ensuring these facilities are accessible and compliant with applicable codes. Additionally, it includes unisex restrooms, accommodating individuals regardless of gender identity, thereby promoting inclusivity. The provision of locker areas accessible to both male and female employees, with well-ventilated lockers and built-in benches in restrooms, reflects an understanding of diverse needs in workplace environments (Southern California Regional Rail Authority, 2024).

While the document does not delve deeply into specific travel needs based on gender, its design recommendations inherently support gender-inclusivity by ensuring facilities are accessible and accommodating for all users. Key features include emergency telephones with alternate power sources, accessible restroom facilities, and unisex restrooms for security personnel. Walkways and ramps to platforms must comply with ADA standards, and signage must have non-glare finishes, appropriate contrast, and Braille for critical areas. Visibility at crossings is emphasized, with measures to prevent obstructions, and adequate lighting and surveillance are required for safety. Collaboration with local agencies and community organizations, public meetings, and workshops gather community input, ensuring projects meet community needs. Feedback mechanisms and post-project evaluations help refine future engagement strategies. Vehicles must accommodate all passengers, featuring low-floor designs, ramps, designated spaces for

mobility devices, and modern amenities, with mandatory ADA compliance and advanced safety features (Southern California Regional Rail Authority, 2024).

These design features are particularly beneficial for women's travel needs by enhancing safety, accessibility, and convenience. Staff assistance and emergency telephones provide immediate help in unsafe situations, while accessible walkways, ramps, and elevators ease navigation for women with strollers or heavy bags. Clear signage and good lighting improve safety, especially during nighttime travel, and collaborative efforts with community organizations ensure that women's specific needs are addressed in transit planning.

5. Conclusion

This study highlights significant progress in incorporating gender-inclusivity into transit system planning while also revealing ongoing challenges. Effective use of gender-sensitive practices is crucial for creating equitable and inclusive transportation environments, yet achieving this requires a multifaceted approach. The key takeaways from this study include:

Data Collection and Analysis: The collection and analysis of gender-disaggregated data are pivotal in understanding and addressing the diverse needs of transit riders. While some agencies, such as SEPTA and LA Metro, have successfully implemented robust data collection methodologies to inform their policies and design decisions, there is still a notable gap in the comprehensive collection of gender-specific data across many agencies, especially regarding design-specific questions. Innovative methods and collaborative efforts, such as those demonstrated by

WMATA, provide valuable insights into the future possibilities of rich and exhaustive data collection methodologies.

Gender-Sensitive Design: The commitment to integrating gender-sensitive design principles is evident through safety enhancements and inclusive infrastructure. Agencies like LA Metro, Sound Transit and SEPTA have pioneered design features that address the needs of diverse gender groups, such as improved lighting, stroller storage, natural surveillance and ergonomic considerations. However, we still need to ascertain what design considerations women really desire and determine how to incorporate those designs in our future innovative plans sustainably and economically.

Operational Practices and Policy Implementation: Effective operational practices are crucial for supporting gender-sensitive policies. Customizing service frequency to reflect the non-peak hour travel demand or providing courtesy stops to ensure safety provides sophisticated solutions to the uniqueness of female travel behavior. Other policies like family fare accommodations and staff training programs highlight the importance of addressing the practical needs of passengers and equipping staff to handle gender-specific issues.

Challenges and Barriers: The study reveals that transit agencies face substantial challenges in implementing gender-sensitive policies, including limited resources, resistance to change, and infrastructure constraints. Addressing these barriers requires a concerted effort to align priorities, allocate resources effectively, and foster a culture of inclusivity within the organization. The ability to address data collection challenges and integrate gender-sensitive improvements

into existing infrastructure will be critical for advancing the goals of equity and safety in transit systems.

Guidelines and Manuals: Analysis of transit design guidelines reveals a lack of explicit gender-inclusivity in many cases. While some manuals, like the Sound Transit Station Experience Design Guidelines and the Metrolink SCARRA Design Criteria Manual, incorporate gender-inclusive features, many others, including nationally-recognized manuals such as the NACTO Transit Street Design Manual and the TCQSM 3rd Edition, do not adequately address gender-specific needs. The TCQSM 3rd Edition presents a more inclusive approach by emphasizing universal design principles and accessibility, but still falls short in explicitly addressing gender differences in travel needs. Even though BART itself is incorporating various gender-inclusive design and policy practices in its operations, the BART Basics Guide is practical in its coverage of system operations, and does not delve into gender-specific considerations, despite offering features that inadvertently benefit female passengers.

In contrast, the Sound Transit Station Experience Design Guidelines stand out for their explicit attention to gender-inclusivity. The guidelines incorporate detailed design recommendations based on personas representing various passenger types, addressing the unique challenges faced by women, pregnant passengers, and families. This approach highlights the potential for integrating gender-sensitive design features to enhance safety, comfort, and accessibility for all users. The Metrolink SCARRA Design Criteria Manual also demonstrates a commitment to gender-inclusivity through its provisions for unisex restrooms and accessible facilities. Although

not deeply focused on specific gender-based travel needs, its design features support an equitable environment by accommodating diverse users.

In summary, while progress is being made, there is a clear need for more comprehensive and explicit integration of gender-sensitive principles. Previous research has indicated that the use of explicit language while addressing diverse and disadvantaged demographic groups is crucial for delivering equitable solutions (Ingram, Leih, Adkins, Sonmez, & Yetman, 2020). It informs stakeholders that the local transit authority recognizes the needs of the diverse populations, and is obligated to allocate time, effort, construction, and evaluation towards equitable development of disadvantaged communities. Hence, future revisions of design guidelines should better address gender disparities and improve the overall passenger experience, ensuring transit systems are genuinely inclusive and supportive of all users.

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Appendix: Interview Questions

A. **View on standard transit manuals**
   1. Can you provide an overview of your role and responsibilities within your agency, and how it relates to transit policy and design?
   2. Are you familiar with popular transit manuals such as the Transit Capacity and Quality of Service Manual or NACTO Transit Street Guide? If so, what are your general impressions regarding their gender sensitivity? Or, does your agency use any other transit manual as their guide?

B. **View on gender sensitivity/inclusivity**
   3. From your perspective, what does "gender sensitivity" mean in the context of transit policies and design guidelines?
   4. In your experience, how do transit policies and design guidelines impact different genders (e.g., women, men, non-binary individuals) differently?
   5. Are there any specific aspects of transit policies or design guidelines that you believe are particularly gender-sensitive or gender-neutral? Why?

C. **Agency initiatives**
   6. Can you share any examples of gender-sensitive innovations or initiatives that your agency has implemented or is considering implementing in transit planning or design?
   7. How are your policies affected by the demographics you serve? (In terms of gender, income, employment, age, education, etc.)

D. **Difficulties and Barriers**
   8. Have you encountered any resistance or opposition to gender-sensitive initiatives within your agency or the broader transportation industry? If so, how have you addressed these challenges?
   9. What challenges or barriers do you perceive in implementing gender-sensitive transit policies and design guidelines?

E. **Data Collection**
   10. How does your agency currently gather feedback or data on the gender-specific needs and preferences of transit users?
   11. Are there any specific metrics or indicators that your agency uses to assess the gender sensitivity of transit policies and design?
   12. Can you share any experiences or feedback from transit users regarding gender-specific challenges they face in accessing or using public transportation?

F. **Collaborations and lessons learned**
   13. Can you provide examples of any successful collaborations or partnerships your agency has engaged in to promote gender sensitivity in transit planning and design?

14. Are there any best practices or lessons learned from other regions or countries regarding gender-sensitive transit planning and design that you find particularly relevant?

G. Final thoughts and advices

15. What advice would you give to policymakers or transportation professionals looking to incorporate gender sensitivity into their work?