GENDER & POLICY LAB
GREATER CHENNAI CORPORATION

THE GENDER COMPASS:

HOW DOES GOOGLE MAPS NAVIGATE INCLUSIVITY?

ACKNOWLEDGEMENTS

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We would also like to thank our participants for providing their time and sharing their perspectives and experiences for this study .

We sincerely hope that the study findings pave the way for for further research and action surrounding gender sensitivity and mobility platforms.

Gender and Policy Lab

ABOUT US

GENDER & POLICY LAB
GREATER CHENNAI CORPORATION

The **Gender and Policy Lab (GPL)** was operationalized in February 2022 by the Greater Chennai Corporation (GCC) with support from the Nirbhaya Funds, as part of Chennai City Partnership between the Government of Tamil Nadu and World Bank. Chennai is the only urban local body in India with a dedicated entity such as this, focusing on women's safety, mobility and gender inclusive urban infrastructure. GPL aims to improve women's access to opportunities by improving safety and gender responsiveness in public spaces and public transport, as well as mainstream gender inclusivity so that it becomes an active part of all city-level planning and service delivery decisions.

STUDY TEAM

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INTRODUCTION

This study assesses the **Gender Sensitivity of Google Maps routes**, focusing on safety concerns in the ‘two-wheeler’ mode. Currently, Google Maps optimizes routes based on factors such as real-time traffic, road conditions, route simplicity, and fuel efficiency,[1] overlooking critical aspects like safety—particularly for women and gender minorities.

Prior research across multiple cities has established that gender variations (between men and women) exist in safety perceptions in public transport (Ouali et al., 2020), yet Google Maps' algorithmic choices shape mobility patterns without explicitly considering such disparities.

Given this, a key question arises: how can Google Maps move beyond efficiency to integrate safety and gender inclusivity in route generation? This study examines this question through diverse user perspectives in Chennai, India.

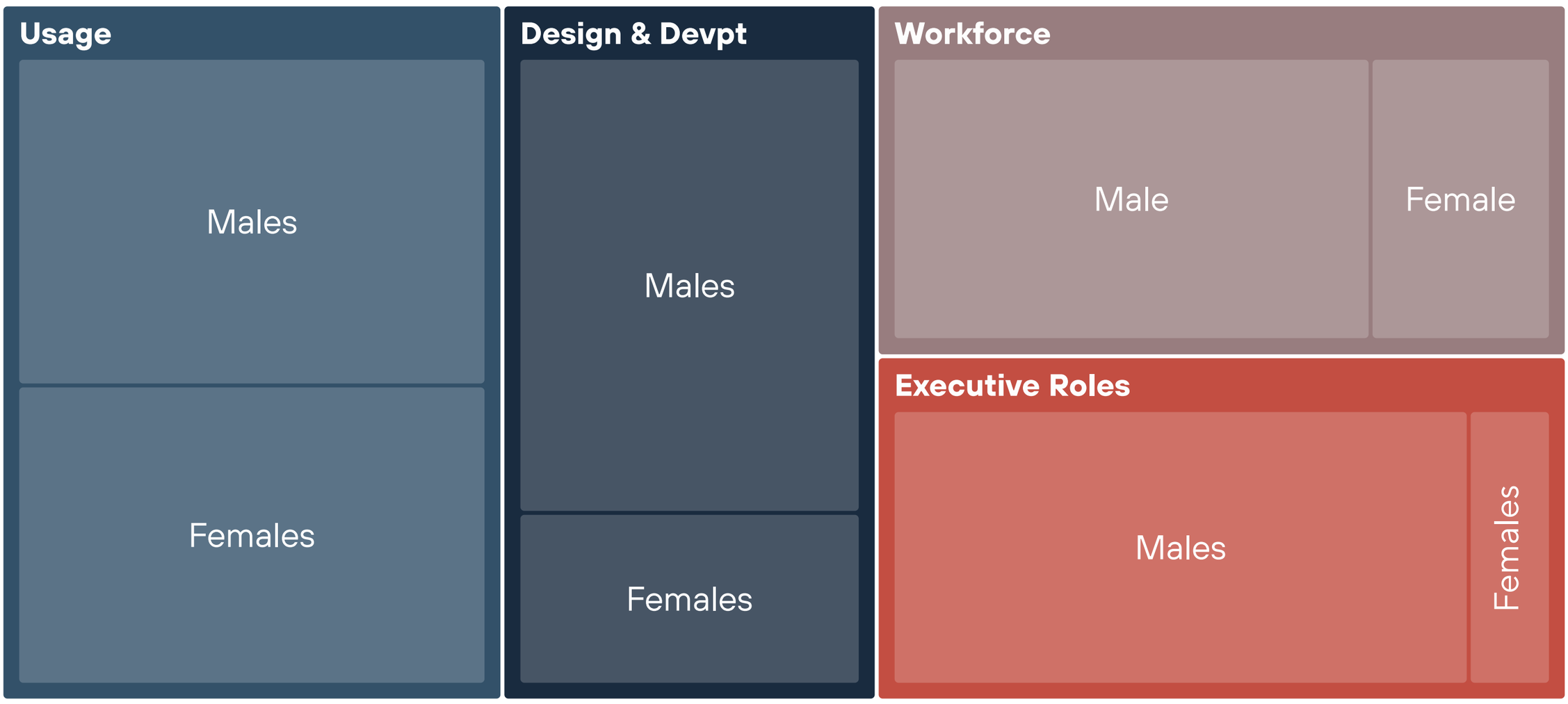
[1] *Use eco-friendly routes on your Google Maps app*. (n.d.). Google Maps Help. https://support.google.com/maps/answer/11470237

KEY FINDINGS

Participant Demographics and Usage Patterns	• 94.8% of two-wheeler mode users of Google Maps fall within the 18-40 age group. 77.5% of users are either private sector employees or students. • Men form 65.2% of the two-wheeler mode users. They are also frequent users, with 69.93% indicating that they use Google Maps often. • Primary reasons for using Google Maps include navigation to unknown places, finding the shortest route, and avoiding traffic congestion.
Safety Concerns	• 49.4% of respondents provided a rating of 3 and below on Google Maps' safety during the night. Night time safety was a pertinent concern among more women than men. • Safety concerns showed gendered patterns, with men citing conditions of roads while women reporting isolated roads, dimly lit areas, and the fear of harassment, as the major concerns.
Coping Mechanisms	• Men tend to avoid specific roads that feel unsafe. • Women, in contrast, take more drastic measures, such as avoiding travel on unfamiliar routes at night, opting for alternative modes of transport, or traveling with company, indicating deeper mobility constraints as opposed to men.
Integrated Suggestions & Study Recommendations	• Route reporting on various safety parameters. • Context-aware route recommendation based on lighting, road conditions, and safety metrics, in addition to the usual efficiency parameters. • Context-based alerting on the basis of road conditions and safety parameters. • Night-mode routing, where alternative safe routes are suggested during nighttime. • SOS to access help.

INCLUSIVITY IN THE TECH INDUSTRY

With technology becoming an integral part of everyday life, it has become a consequential subject of feminist research, particularly by examining women's representation in technology and engineering and their roles as recipients of technological advancements (Faulkner, 2001). Despite incremental progress, gender disparities persist—Global Data's 2021 study on Big Tech companies revealed that while women's representation has slightly increased across all employee levels, senior management remains heavily male-dominated, with women making up only about 25%.[2]



This table presents gender representation across various categories in the tech industry, particularly focusing on workforce composition, executive roles, platform usage, and design/development roles.[3, 4, 5]

Workforce: 67% male and 25% female employees.

Executive Roles: 79% of executives are male, while only 11% are female.

Design and Development: 72% of design and development roles are male, 27% are women.

Usage: 69% of men and 63% of females use navigation platforms.

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[2] GlobalData. (2022, August). *Women representation in Big Tech companies in 2021*. https://www.globaldata.com/data-insights/technology--media-and-telecom/women-representation-in-big-tech-companies-in-2091371/

[3] Ahmed, M. (2024, April 17). *Women fuel India's tech surge, yet leadership gap persists*. People Matters. https://www.peoplematters.in/news/c-suite/women-fuel-indias-tech-surge-yet-leadership-gap-persists-40951

[4] Robinson, C. (2024, June 18). *Women in tech stats: How the industry can provide equal opportunities*. Forbes. https://www.forbes.com/sites/cherylrobinson/2024/06/18/women-in-tech-stats-how-the-industry-can-provide-equal-opportunities/

[5] Gurumurthy, A. (2004). Gender and ICTs: Overview report. Institute of Development Studies. https://www.researchgate.net/publication/297737202_Gender_and_ICTs_Overview_Report

These figures highlight significant gender disparities across all levels, from workforce participation to leadership and design roles, while both males and females technology use is nearly equal.

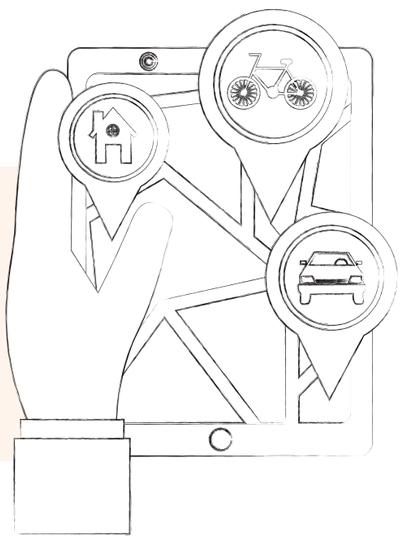
The underrepresentation of women and marginalised identities in tech development reinforces the exclusion of their lived experiences.

This becomes apparent in the context of digital tools such as navigation platforms like Google Maps. These tools have significantly shaped urban mobility by enhancing accessibility and efficiency.

However, these advancements have not been universally inclusive, often overlooking **gendered mobility patterns and safety concerns**.

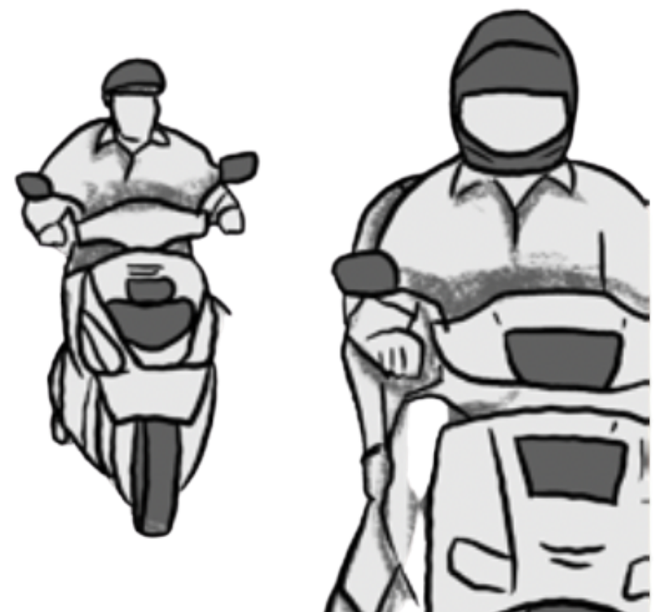
Thus, a bottom-up approach—one that critically assesses digital tools for gender inclusivity—can provide valuable insights for developers on existing gaps and user expectations.

This study focuses on navigation apps as a key category of digital tools to examine these dynamics.

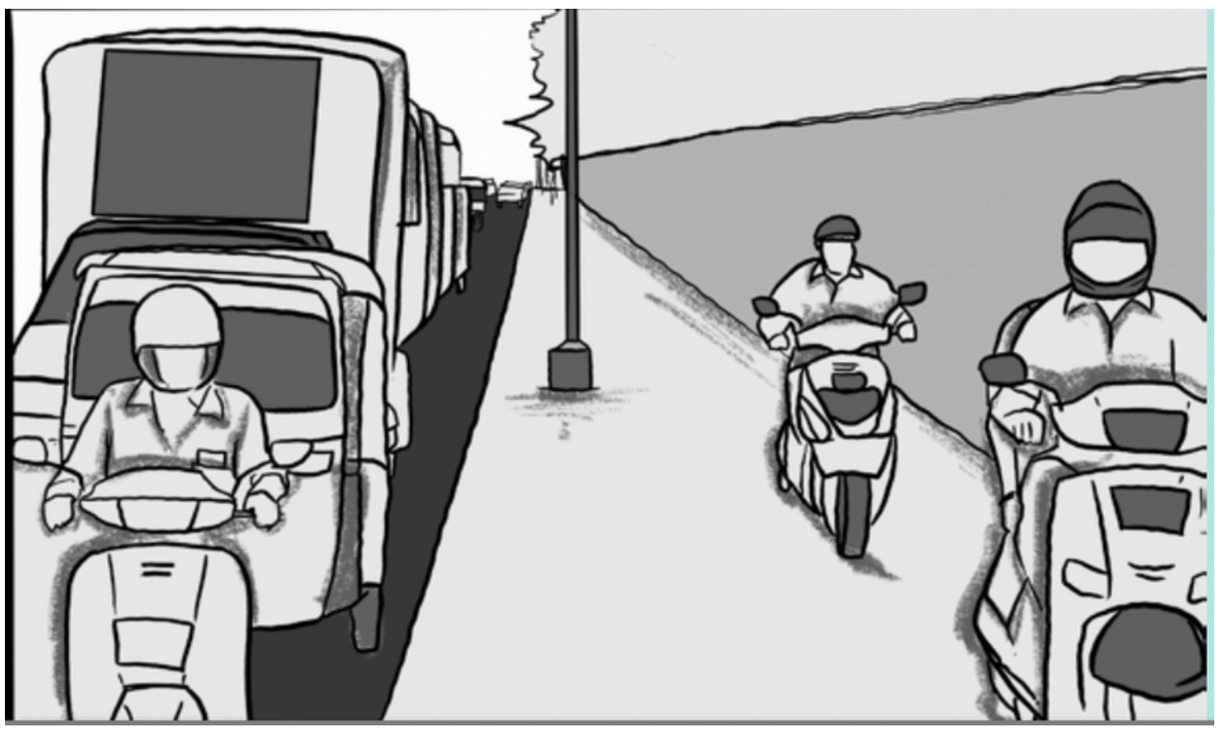


WHY TWO-WHEELERS?

The focus on two-wheeler mode users in this research stems from the fact that two-wheelers are the **preferred mode of transport among 53% of Chennai's population**[6] **and used by 50.7% of women**,[7] on average, for education, shopping, and recreation, making it the second-most preferred commute mode for such purposes.



Moreover, the routing patterns of the two-wheeler mode prioritise shortcuts inaccessible to larger vehicles, creating safety concerns.[8]



Additionally, as per the platform's routes application programming interface (API), routes generated during this mode may not show some bicycle paths, sidewalks, and pedestrian paths, increasing the potential risks for riders.[9] This makes it critical to understand safety perceptions within this user group for addressing mobility challenges in the city.

The two-wheeler mode was introduced in India in 2017 to improve the utility of Google Maps among motorbike drivers (D'Onfro, 2019; Singal, 2017). User research then showed that the drivers checked routes for their travel prior to the start of the trip, which led to the development of a mode with simplified routes and landmarks.

In the 1.5 years since its roll-out, the number of daily users rose by 5 times, with expansion to new markets. These insights suggest the popularity of the two-wheeler mode in India, and emphasize on the importance of this study.

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[6] Chennai Unified Metropolitan Transport Authority (CUMTA). (2024). *Updation of Chennai comprehensive mobility plan*.

[7] Gender and Policy Lab (GPL). (2023). *Baseline study on women's perception regarding access and safety in public spaces and public transport in Chennai city.*

[8] IANS. (2017, December 5). Google Maps introduces two-wheeler mode in India. *Business Standard*. https://www.business-standard.com/article/news-ians/google-maps-introduces-two-wheeler-mode-in-india-117120500507_1.html

[9] *Available route matrix vehicle types*. (2025, March 11). Google Maps Platform. Retrieved March 11, 2025, from https://developers.google.com/maps/documentation/routes/vehicles-rm

OBJECTIVES OF THE RESEARCH

- **Examine gendered patterns in the use of Google Maps and how they reflect disparities in access to technological advancements.**

- **Analyze gender differences in user perceptions and experiences of navigating routes suggested in two-wheeler mode, assessing the gender sensitivity of Google Maps' features and functionality.**

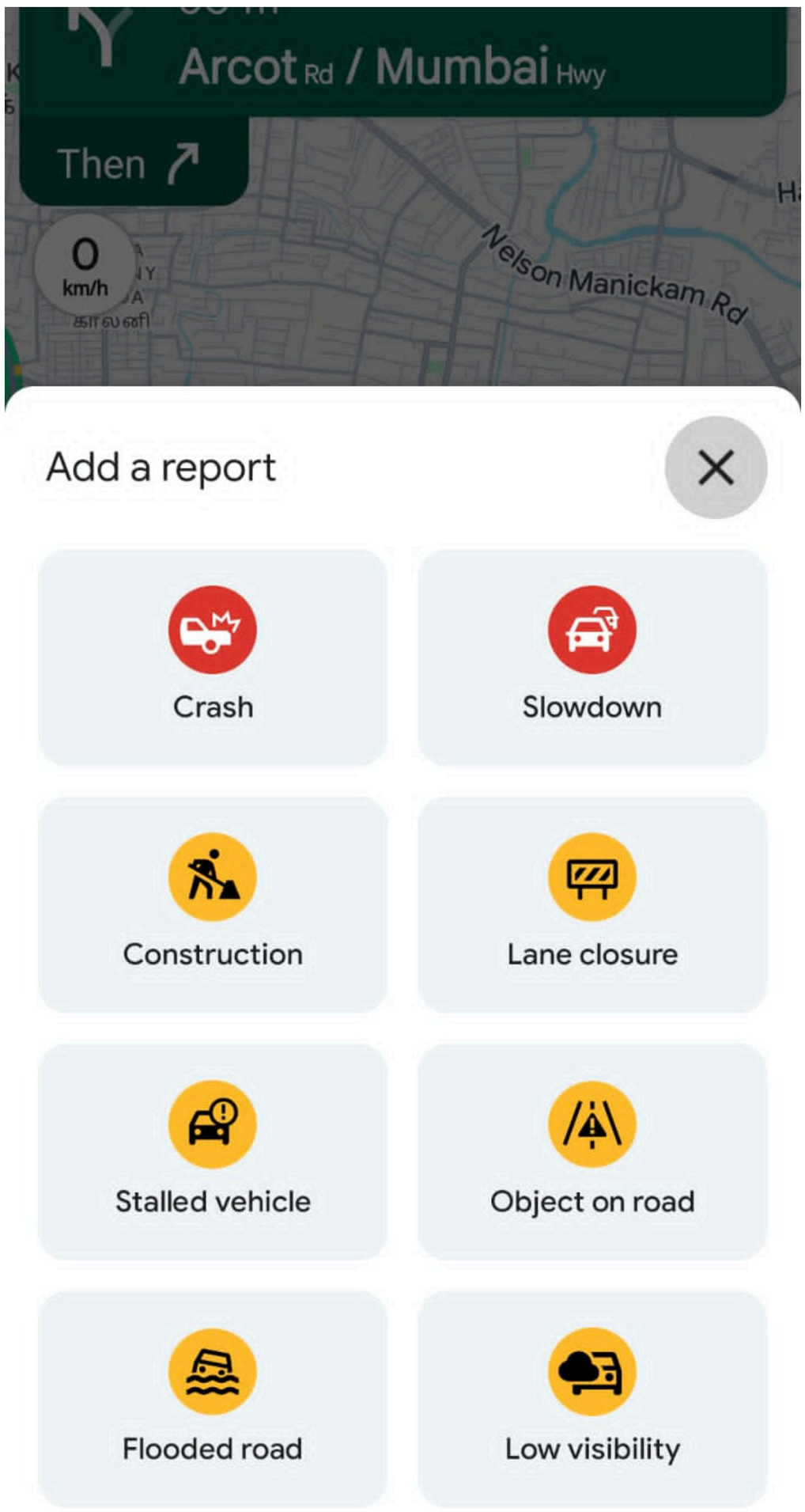
- **Propose recommendations for integrating safety features and enhancing user experiences on Google Maps.**

- **Develop a localized knowledge system and narratives around major platforms like Google Maps, addressing their underrepresentation in the global discourse.**

Current Discourses

The literature reveals that integrating safety features in navigation platforms is a well-explored yet under-optimized concept. Researchers have proposed mapping safe routes and hotspots by using inputs like crime data and crowdsourced reports, as seen in initiatives like Safecity, Free to Be, and Safe & the City, alongside studies from IIT Ropar and local projects in Chennai (Goel et al., 2017; “Free to be,” n.d.; Kowalchuk, 2021; Radhakrishnan et al., 2023; “Red Dot Foundation,” n.d.; “Safecity,” 2025).

Google Maps, on the other hand, has incorporated safety elements such as the pandemic-related public safety features, the India-based ‘Stay Safe feature’, as well as signage provisions at hotspots in South Africa (Capazorio, 2023; Glasgow, 2020; Nagarajan, 2020; PTI, 2019). The application also signals narrow roads and enables users to provide reports of ongoing travel conditions in a particular route (Daniel & Ramani, 2024). However, the use of comprehensive crime-based safety data still remains limited in the context of Google Maps.



Thus, this study aims to combine the findings from the research indications and two-wheeler riders' perceptions of safety, to inform inclusive and responsive navigation design. Safety by itself is a complex concept, extending beyond crime rates, and potentially being influenced by factors such as gender, geography, etc.

Thus, in order to account for the varied perceptions of safety, this study employs Safetipin’s multidimensional approach to mapping safety by incorporating its 9 parameters- lighting, openness, visibility, people, security, walk path, public transport, gender usage, and feeling.[10]

These parameters are also in line with those used by Gender and Policy Lab to conduct safety audits of infrastructures. The parameters employed in this study are relevant for open public spaces, in light with the context of the current study.

[10] *My Safetipin*. (n.d.) Safetipin. https://safetipin.com/our-apps/#:~:text=My%20Safetipin%20is%20a%20personal,has%20many%20other%20features%20too.

Methodology

This research used a mixed-methods approach to collect data, combining both survey and case interviews. The online survey utilised convenience and snowball sampling methods to capture demographic information, usage patterns, safety perceptions, and recommendations of Google Maps users. Descriptive statistics were used for data analysis, with a focus on gender-based comparative analysis. 12 survey participants were selected for the case interviewees, while ensuring an equitable number of respondents among all the age, gender, and occupation categories. The interviews involved structured conversations to gather detailed personal experiences and suggestions.

Data collection was undertaken over a three-week period between mid-December 2024 and early January 2025. Participants were informed of the study purpose and could choose to opt out at any time. Personal information was kept confidential and only used for the current study. Insights from both methods were integrated to provide a comprehensive understanding of the issue.

Quantitative - Surveys

- **423 individuals of varied ages, genders, and occupations found using convenience and snowball sampling**
- **Usage patterns of Google Maps (specifically two-wheeler)**
- **Safety perceptions and experiences using Google Maps routes**
- **Recommendations for improving the application's safety features**
- **Descriptive statistics, Gender-based comparative analysis**

Qualitative - Structured Interviews

- **Representative sample of 12 individuals from the larger group who indicated willingness to share more on their experiences**
- **Structured interviews allowing for narrative responses**
- **Detailed, personal user experiences regarding safety concerns**
- **Specific areas/routes felt unsafe**
- **Coping mechanisms used**
- **Suggestions for app improvement**

Participant Demographics and Usage Patterns

A total of 558 responses received were filtered down to 423 based on their indication of using two-wheeler mode on Google Maps in Chennai.

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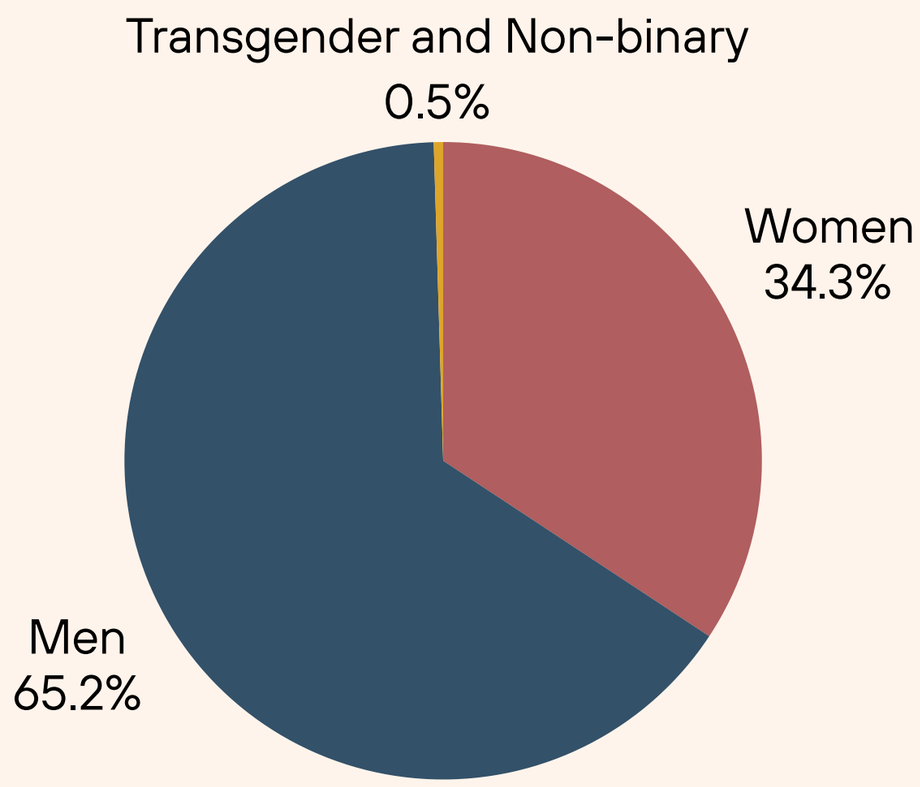


Figure 1. Gender breakdown of two-wheeler mode users

Of the eligible respondents, 65.2% are male and 34.3% are female, with 0.5% accounting for transgender and non-binary respondents [see Figure 1.]. Given that the transgender and non-binary categories represent a very small share of the overall respondents, no conclusions could be drawn for them based on this study and hence they have been excluded from the reporting of overall findings.

AGE

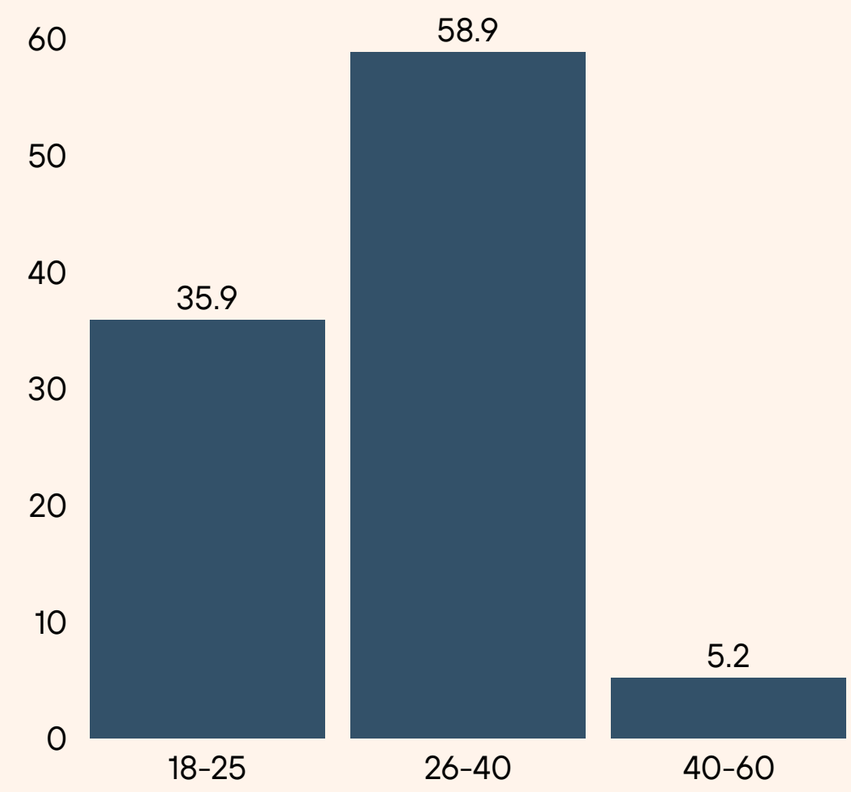


Figure 2. Age breakdown of two-wheeler mode users

In terms of age, 35.9% fell within the 18-25 age range, 58.9% fell in the 26 - 40 age range and less than 5.2% are above the age of 40 [see Figure 2.]

OCCUPATION

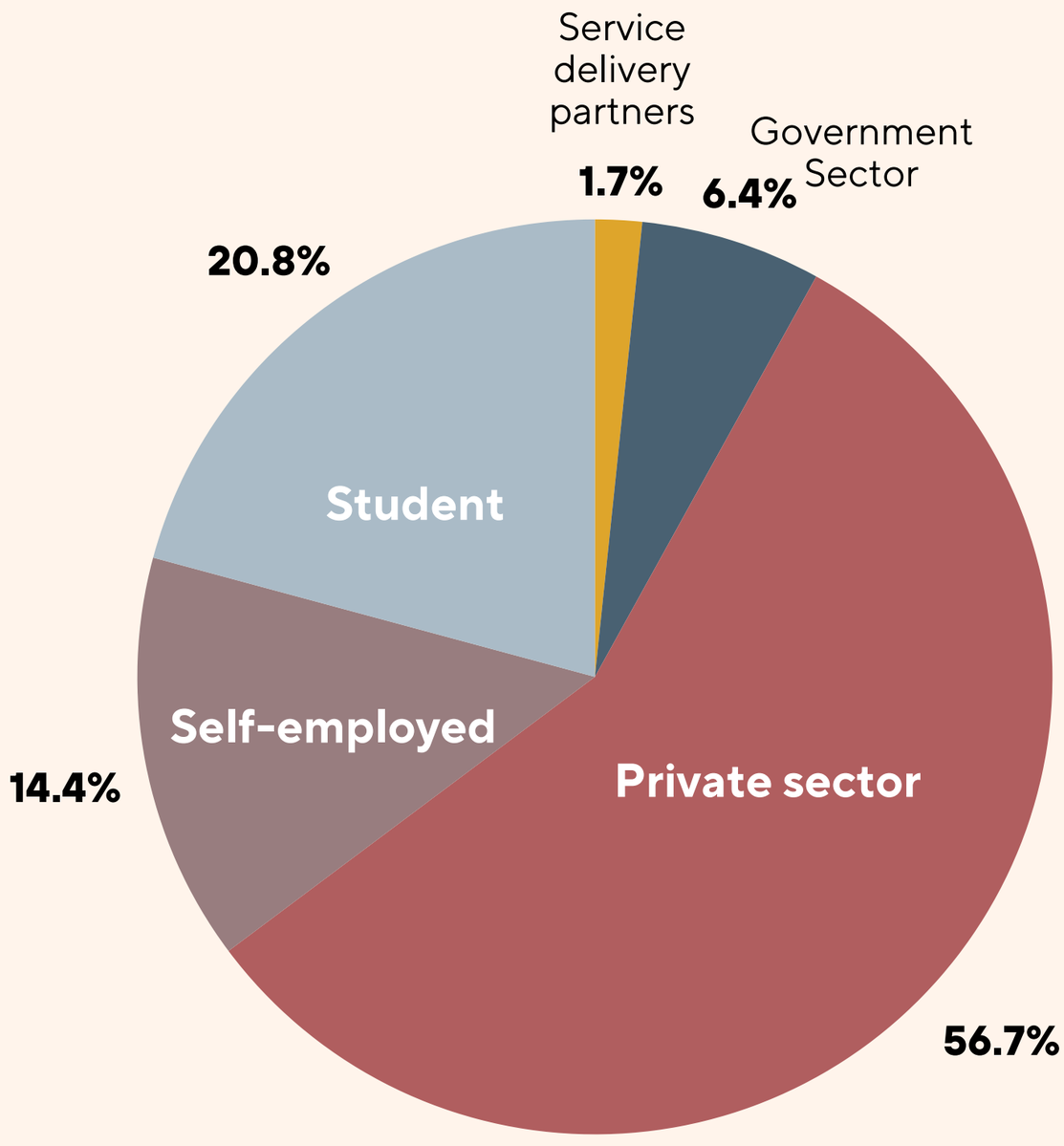


Figure 3. Occupation of two-wheeler mode users

In terms of occupation, private sector employees and students account for 77.5% of the respondents using two-wheeler mode on Google Maps [see Figure 3.]

Among the case interview participants, 4 were students, 4 were self-employed, 2 were private sector employees, 1 was a government sector employee, and 1 was a service delivery partner.

With respect to usage, 66.7% of the respondents used Google Maps ‘often’ in the past month (at the time of the survey). In particular, 69.93% of men and 60.69% of women indicating such frequent usage. Primary reasons for using Google Maps include navigation to unknown/new places, finding the shortest route, and avoiding traffic congestion. 90.8% of respondents used Google Maps during both day and night.

RESULTS

49.4%

Feel Unsafe at Night

When asked to rate safety at night on a scale of 1 to 5 (1 being very unsafe and 5 being very safe), 49.4% rated 3 and below.

3x

More Women Fear Harassment

35.82% of women as opposed to 13.17% of men reported fear of harassment while travelling using Google Maps.

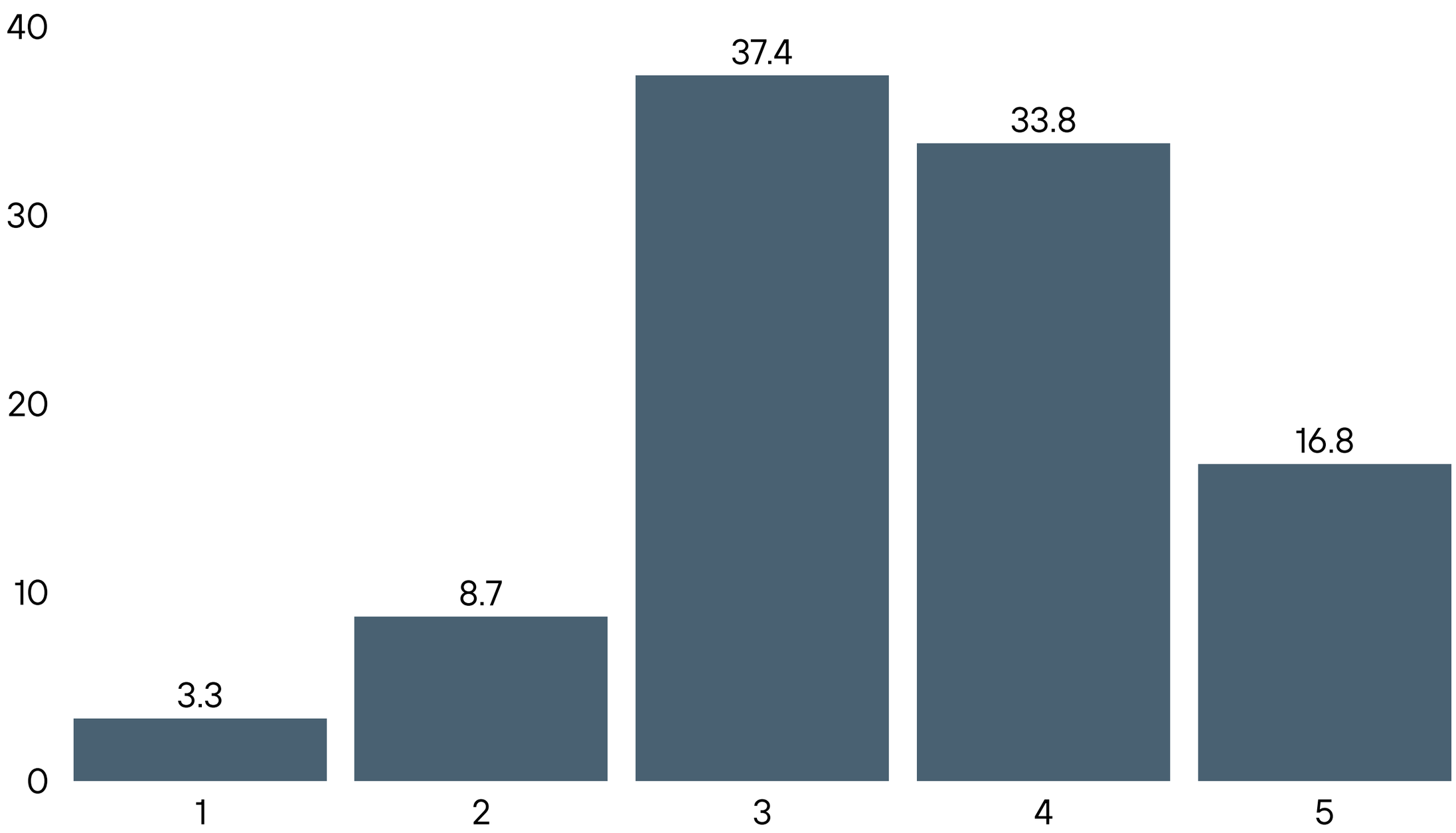


Figure 4. Safety ratings while using Google Maps in the night (1- very unsafe, 5- very safe)

Users' safety rating on Google Maps' safety during the night showed variations in the degree of perceived risk [see Figure 4.]. 49.4% of respondents rated safety as 3 and below. Nighttime safety represented a deeper concern for women, as 58.62% of female as opposed to 44.93% of male respondents provided ratings of 3 and below. These findings indicate that despite the usefulness of Google Maps, routes generated raised safety concerns, particularly during the nighttime.

Figure 5. provides a gendered analysis of the factors contributing to feeling unsafe. For each category, the proportion of male respondents opposed to the proportion of female respondents who indicated the same concern are represented in the bar graph.[11]

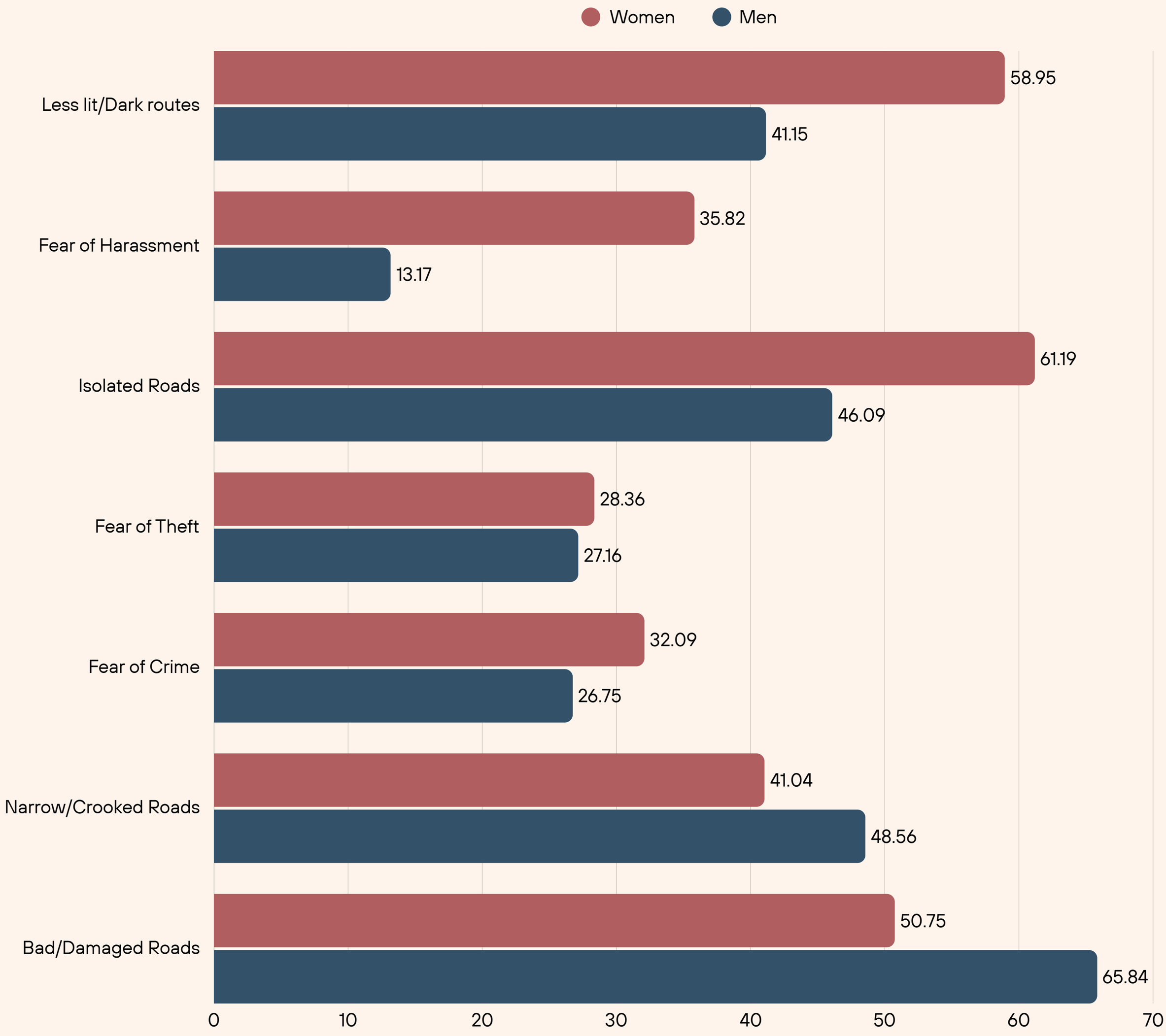


Figure 5. Factors Contributing to Feeling Unsafe

Some gendered patterns can be observed here. For men, issues such as bad/damaged or narrow/crooked roads were the major concerns. In comparison, social factors such as isolated roads, and poor lighting were primary safety concerns among women. In particular, women were thrice as likely as men to report fear of harassment while travelling using Google Maps. Only a small fraction of respondents, 22.23% of men and 15.67% of women, always felt safe while using Google Maps.

[11] A total of 379 respondents answered this question. Of this, 243 respondents are male, and 134 respondents are female.

Figure 6. provides a gendered analysis of the coping mechanisms used by the respondents. For each category, the proportion of male respondents as opposed to the proportion of female respondents who indicated the same mechanism are represented in the bar graph.[12]

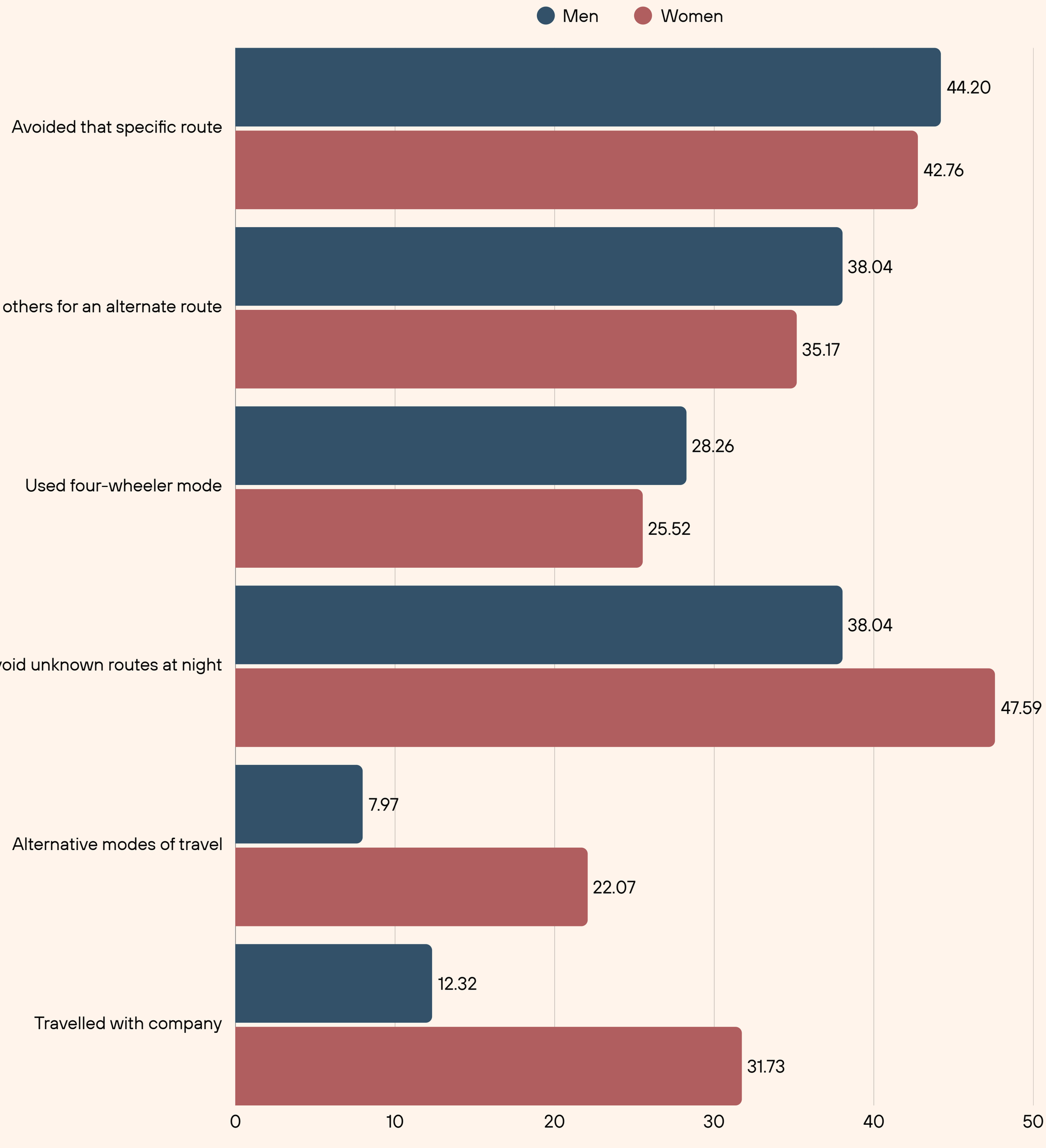


Figure 6. Coping Mechanisms

Men tend to avoid specific/unknown routes at night, or ask others for an alternative route if they face safety risks. In contrast to men, women tend to opt for travelling with someone, alternative modes of travel, and avoiding unknown routes at night. A comparative analysis of coping mechanisms suggests that men generally have more flexibility in modifying their travel paths and may not feel the need to completely avoid certain travel conditions but rather adapt their route choices dynamically. Women's safety concerns lead to restrictive coping strategies, causing significant constraints on mobility particularly during nighttime. A nearly equal proportion of both men and women shift to the four-wheeler mode to avoid narrow/crooked roads.

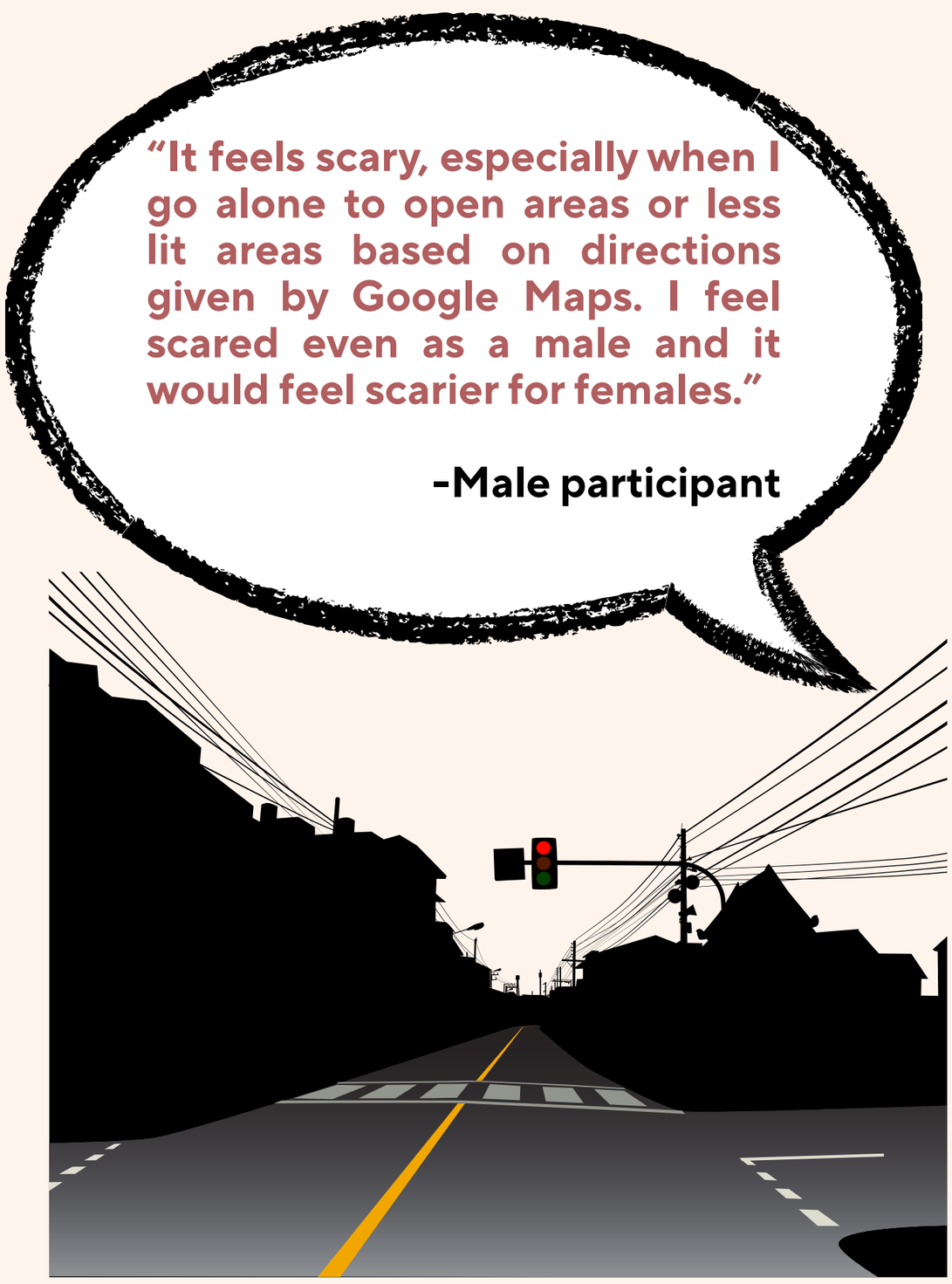
[12] A total of 423 respondents answered this question. Of this, 276 respondents are male, and 145 respondents are female.

ANALYSIS

The Safetipin parameters highlighted in the current study are:[13]

- **Lighting**
- **Openness**
- **Walk Path**
- **People**
- **Security**
- **Feeling**

Lighting



Lighting emerged as a critical factor influencing users’ feelings of safety while following Google Maps routes, particularly for women. Dimly lit routes were cited by 58.95% of female and 41.15% of male respondents as a safety concern.

Poorly lit streets heightened concerns about personal security, with respondents noting that dimly lit or completely dark roads exacerbated fears of harassment and crime.

The absence of adequate street lighting was frequently associated with a sense of isolation, making certain routes feel significantly riskier, especially during nighttime travel.

[13] The 9 parameters for safety outlined by Safetipin are: lighting, openness, visibility, people, security, walk path, public transport, gender usage, and feeling.

Similarly, a transwoman participant highlighted specific locations in Chennai where lighting deficiencies contribute to safety concerns:

"In places like Nesapakkam Road, Guindy Road, Chetpet, after 7 pm, the road will seem calm but they are unsafe. I found even railway stations are not very well lit."

Another female participant further illustrated the impact of lighting and crowd presence, stating,

"Behind Valluvar Kottam, near Child Trust Hospital, the roads are not well lit, and there will be a group of men talking, making me feel unsafe."

Respondents emphasized the need for Google Maps to integrate lighting-based safety indicators, such as a "well-lit route" option or nighttime safety ratings for roads. Such features could provide users with informed choices, particularly for those navigating alone or in unfamiliar areas after dark.

Openness

The perceived openness of a route significantly shaped users' sense of security. 41.04% of female respondents and 48.56% of male respondents cited narrow or crooked lanes as a factor contributing to feeling unsafe. Along with the lighting parameter, when visibility is blocked, individuals are unable to perceive potential threats and remain alert to their environment. Open, well-surveilled streets are preferred, as they provide a sense of accessibility and ease of movement.

A male participant described the unpredictability of Google Maps in routing users through unsafe areas: **“I have felt that routes shown are unsafe at times but this is not very frequent. It does show routes on narrow roads, mud roads, near dams, shores where it is not quite possible to drive a two-wheeler.”**

A transwoman participant similarly noted the variation in safety levels based on location, stating, **“Regarding my experience in terms of safety, I think safety and routes are different. Safety depends on the place. For instance, near park areas, there is no safety.**

People

The presence or absence of crowds played a crucial role in safety perceptions. 61.19% of female respondents and 46.09% of male respondents identified isolated roads as a safety concern. Among female respondents, this issue received the highest level of concern. Deserted streets were often associated with heightened vulnerability—especially for women.

A male respondent recalled an unsettling experience where Google Maps diverted him to an isolated route when en route to Kalahasti Temple, **“Google Maps didn’t show the highway route and instead cut me from going using the highway. I was diverted into a small road. It was dark and I felt like I was going through a forest. I wondered how I would even drive through this. It is unsafe to go with your family at night through such routes.”**

Another male respondent highlighted infrastructure-related concerns, particularly when using cycling routes: **“During the day, if I am in an isolated road, it’s scary for me because there are dogs. I travel a lot on cycle and use Maps to find the shortest roads possible. In narrow lanes, dogs will be there so it is scary.”**

Users preferred routes with a moderate presence of people, ensuring both social surveillance and ease of navigation. Consequently, 31.73% of women preferred travelling with company as a coping mechanism for feeling unsafe.

Walk Path/Infrastructure

Well-maintained infrastructure emerged as a determinant of safety. While women were likely to cite protective infrastructural issues such as lighting, men were more concerned about road quality as a major deterrent to safe navigation. Poor road conditions, were frequently mentioned as hazards, especially for two-wheeler users.

A male respondent explained, **“In the night, the issue is it is dark. For cycle, I use walking mode which takes me through dark alleys, unpaved roads.... In two-wheeler mode, sometimes, I have these kinds of issues but I cannot recall where. I will just switch to car mode.”**

Damaged roads emerged as a safety concern for 50.75% of female respondents and 65.84% of male respondents. This issue ranked the highest level of concern among male respondents.

Security

68.27% of women and 64.49% of men expressed that warnings/reported unsafe routes would have made them feel safer while uing Google Maps. SOS integration was also mentioned during the interviews as a recommended safety measure. Alongside the presence of formal security infrastructure and road infrastructure, access to information about unknown routes, as well as quick access to security systems, were cited as crucial for enhancing safety perceptions.

Particularly, female respondents noted that access to security measures countered their sense of vulnerability, especially during nighttime and while taking unknown or isolated routes. Incorporating security indicators, such as nearby police stations or patrol zones, and providing “safe routes” for nighttime travel would enable users to make more informed route selections. In particular 64.83% of women, and 54.35% of men indicated that nighttime safe route option could be an additional safety feature.

Feeling

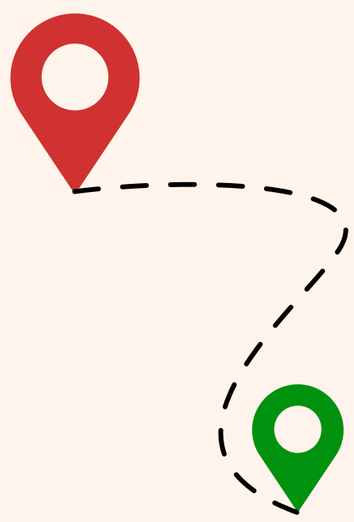
Overall feelings of safety are largely influenced by an interplay of the above-mentioned factors, creating distinct mobility behaviors. Areas that are well-lit, have proper roads, and are moderately used tend to be perceived as safer.

A male participant reiterated his concerns about openness, lighting and infrastructure, stating, **“You can’t really go with your family to such places.”**

As demonstrated in the sentiment expressed above, the ‘feeling’ parameter is directly impacted by the other five parameters. Men primarily adjusted routes based on road conditions, while women employed a more cautious approach, often modifying travel plans to minimize risk exposure.

The combination of openness, moderate crowds, reliable infrastructure, and visible security presence was associated with an increased sense of safety.

Providing information about lighting, security, infrastructure, and visibility could improve feelings of safety by enabling users to make informed choices during their commute. This improvisation would result in more people, especially women, accessing public places at night.



CONCLUSION

These findings underscore a critical gap in Google Maps' navigation system: while the platform prioritizes efficiency, it fails to address safety as a key parameter in route recommendations. This omission disproportionately affects women and other vulnerable users, whose mobility decisions are shaped by security concerns rather than just time or distance.

Recommendations

As shown by the findings of the study, safety in terms of lighting, openness, walk path, people, security, and feeling, presents a deep concern for Google Maps users and has to be taken into consideration in the design and functioning of the application.

Thus, the following recommendations are provided to address these concerns and improve the user experience on Google Maps. These features already exist in some form on Google Maps for other functions and in mobility platforms like Ola and Uber, implying them to be viable additions to the current interface.

Route reporting

- Introduce a feature to report routes on various safety indicators as used by Safetipin and highlighted by participants.
- Users should be allowed to provide a comprehensive rating of routes/areas based on the following parameters: lighting, openness, walk path, people, security, and feeling.
- Implement as a review-style feature (similar to e-commerce platforms) allowing users to add text and images, in order to ensure that systemic inequalities are not reinforced

Context-aware route recommendation

- Introduce safety as an additional aspect in the algorithmic route generation system
- Improve route suggestion algorithms using open and crowdsourced data on lighting and road conditions and users' safety reports

Context-based alerting

- Generate real-time warnings to users using crowdsourced data on the six parameters and road conditions to make informed decisions
- Flag indicators rated poorly to users travelling through a particular route
- Highlight safety provisions in the route such as presence of security cameras
- In this way, user choice is preserved as they weigh in on the subjective importance (which could vary by gender, time of the day, etc.) of the alert

Night-mode routing

- Users of this mode should be prompted with alternative routes rated highly on the safety indicators, during nighttime travel
- Such routes could include main roads, well-lit walkways, and broad paths

SOS integration

- Implement an emergency SOS feature within Google Maps for immediate access to help

Limitations

This study focuses on Google Maps users in Chennai, and can be extended to other cities and urban mobility platforms. Gender analysis was largely limited to male-female differences due to a lack of responses from other genders, and the study did not differentiate between perceived and actual risk. Further research could employ different research methods to address these gaps.

Potential unintended consequences should also be considered. For example, if users consistently report routes as unsafe, Google Maps may stop suggesting them, potentially exacerbating safety issues rather than resolving them. Redirecting all users to safer routes could also lead to increased congestion on those paths.

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