EXPLORING THE FACTORS AFFECTING THE MOVEMENT OF FEMALE PEDESTRIANS AT NIGHT-TIME IN DHAKA CITY

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Declaration

It is hereby declared that this thesis/project report, wholly or partly, has not been submitted to somewhere else for the award of any Degree or Diploma.

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Dedication

To our beloved family members and learned teachers

for

their guidance, forbearance, and most notably, for trusting us.

Acknowledgment

All praise to Almighty Allah, whose boundless mercy enabled us to complete our research agenda. Our deepest devotion remains with Allah, the Most Gracious and Most Merciful.

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Preamble

The study aims to find the factors that discourage and encourage females to go out at night as pedestrians in Dhaka City. The study's outcomes will empower policymakers to prioritize road infrastructure enhancements and enact legislation to enhance the safety and well-being of female pedestrians during nighttime in developing cities like Dhaka. Furthermore, safety authorities can utilize the insights from this paper to implement a strong monitoring system in areas where women experience higher rates of sexual harassment and violence.

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Abstract

In Bangladesh, where women make up half the population, the majority have experienced sexual harassment or violence in public spaces. Urban areas, especially during nighttime, pose notable challenges to women's safety and mobility, resulting in heightened insecurity and a reluctance to venture outdoors. Existing research in Bangladesh focuses on specific groups like garment workers, leaving a gap in understanding women's experiences compared to studies in developed nations. This study aims to find the factors that discourage and encourage female pedestrian movement at night from the perspective of a developing country. A questionnaire, segmented into six categories, was designed with 47 questions by reviewing existing literature, considering the local context, and conducting a pilot survey. It encompassed a range of socio-economic & demographic features, road infrastructure, surrounding environment, safety and security, incident reporting, and policy and social awareness. Data were collected from 500 women of diverse ages and backgrounds. The chosen dependent variable for this study is whether women commute outside during nighttime, with independent variables including age, income, road condition, road type, and others. Employing an Ordered Probit Model due to the ordinal nature of the dependent variable, the analysis will reveal whether certain factors encourage or discourage women from walking at night and which group of women are most affected. The study's outcomes will empower policymakers to prioritize road infrastructure enhancements and enact legislation to enhance the safety and well-being of female pedestrians during nighttime in developing cities like Dhaka. Furthermore, safety authorities can utilize the insights from this paper to implement a strong monitoring system in areas where women experience higher rates of sexual harassment and violence.

CHAPTER 1: INTRODUCTION

1.1 Background

Walking, as an active mode of transportation holds significant importance for individuals, communities, and society as a whole. According to Hasan et al. (2015), walking stands out as the most significant form of transportation. It not only serves as a vital connector for intermodal transitions in key urban hubs. Its benefits extend beyond just physical exercise and include various environmental, economic, and social advantages. Walking is a low-impact, accessible, and inclusive form of physical activity that promotes cardiovascular health, helps control weight, and reduces the risk of chronic diseases such as obesity, diabetes, and heart disease. According to Lee et al. (2008), for age differences, a notable pattern of reduced cardiovascular disease (CVD) risk was observed as the duration of walking increased. It reduces stress, anxiety, and depression while promoting relaxation and a sense of well-being. As a sustainable mode of transportation, it has a minimal environmental impact. It produces no greenhouse gas emissions, air pollution, or noise pollution. Promoting walking as a mode of transportation can contribute to reduced traffic congestion and the preservation of natural resources. It is one of the most cost-effective modes of transportation. It requires no fuel, vehicle maintenance, or infrastructure development. Litman et al. (2013) upon investigating the effects and expenses associated with strategies aimed at alleviating traffic congestion, found that walking shows the most potential for reducing congestion effectively while maintaining reasonable costs. Walking can help alleviate traffic congestion in urban areas, which is not only frustrating for commuters but also costly in terms of time and fuel consumption. Promoting walking can free up road space for other modes of transportation. Walking consumes fewer energy resources than motorized transportation. It contributes towards energy conservation, especially when coupled with other sustainable practices like walking to public transportation.

Dhaka is the capital and most populous city of Bangladesh, with a population of over 20 million people. It is also one of the most densely populated cities in the world. In the most recent surveys conducted as part of the Strategic Transport Plan in metropolitan Dhaka, walking emerged as a prominent mode of transportation, constituting 22% of the total personal trips (STP, 2005). A field survey conducted by Saha et al. (2013) revealed that a higher proportion of women utilize the current transportation system (comprising at-grade crossings, underpasses, and overpasses) compared to men. Female pedestrians in Dhaka are particularly vulnerable at night. A 2019 study by the Bangladesh Institute of Development Studies found that 82% of women in Dhaka have experienced some form of sexual harassment or violence in public spaces. The study also found that women are more likely to be harassed or attacked at night. There are a number of factors that contribute to the vulnerability of female pedestrians in Dhaka at night. The patriarchal culture of Bangladesh also

contributes to the vulnerability of female pedestrians at night. Women are often discouraged from going out alone at night, and those who do are often seen as being "immoral." This can make it difficult for women to report crimes against them, and it can also lead to a sense of impunity for criminals. Addressing the vulnerability of female pedestrians in Dhaka at night is essential to creating a more equitable and just society.

1.2 Objectives

The study focuses on the analysis of the factors influencing a female pedestrian's decision to go out at night in Dhaka city. The study is proceeded with purposes-

To determine the factors which encourages or discourages females as a pedestrian during night-time movement.

To evaluate the factors based on socio-economic and demography, road infrastructure, surrounding environment, incident report, safety and security, and policy and social awareness.

To help related authorities in finding ways for the development of safer environment and infrastructure for the female pedestrians to facilitate their night-time movement.

1.3 Thesis Outline

The thesis contains five chapters in total. Their brief discussion are as follows:

Chapter 1: Introduction- The introduction contains background and objectives.

Chapter 2: Literature Review- This chapter contains information obtained from previous literatures which helped in creating workflow in the research.

Chapter 3: Data and Methodology- This chapter includes data collection procedure and discussion of the model.

Chapter 4: Result and Analysis- This chapter focuses on the overall data analysis and discussion of the results obtained.

Chapter 5: Conclusion & Recommendation: This chapter represents findings of the research and provides suggestions regarding policy implications.

CHAPTER 2: LITERATURE REVIEW

2.1 Factors affecting choice of walking

2.1.1 Accessibility:

The presence and quality of sidewalks and dedicated pathways for pedestrians and cyclists are essential. Women are more likely to choose active transportation if they have safe and accessible routes. Crosswalks and Pedestrian Signals: Properly marked crosswalks and pedestrian signals at intersections enhance safety perception and encourage walking.

Lambas et al. (2021) stated that when selecting routes, both appeal and ease of access were significant considerations, with appeal being particularly crucial. Comfort levels were nearly identical in both the selected and unselected routes, suggesting that these aspects carried equal importance in both the shorter and actual routes. According to Beimborn et al. (2003) the ability to walk to a transit stop is far more important than has been previously thought for choice users. Aziz et al. (2018) said that the likelihood of walking is greater when the average sidewalk width from the origin to the destination is greater. Lambas et al. (2021) also pointed out that the key factors for selecting the walking routes were those linked to attractiveness (e.g., green areas, amenities, tourist attractions, etc.) and accessibility (e.g., obstacles, pavement width). The purpose of the trip did not change the results, although they were accentuated when the trips were made for shopping.

2.1.2 Safety Perceptions:

Women's safety concerns can be a significant barrier to active transportation. A higher perception of safety, including reduced risk of harassment or assault, is crucial for promoting walking.

Dadpour et al. (2016) stated that the sense of insecurity was defined by the fear of crime. Feelings of insecurity were exacerbated by factors such as the absence of people, inadequate nighttime lighting, closed stores, vacant lots, and parking areas. Vagrants, juvenile delinquents, and antisocial behavior, such as alcohol and drug abuse, were other contributors to the feeling of insecurity. The presence of traffic in proximity to gang hangouts reduced the sense of insecurity. Women mentioned feeling of insecurity as the main barrier to walking. According to Millgram et al. (1977) and Fileborn (2020), urban areas during nighttime are frequently perceived as hazardous, leading to a transformation in our typical daytime trust in unfamiliar individuals, replacing it with vigilance, distrust, and anxiety. During an ethnographic research by Hardley & Richardson (2021), we frequently observed the practice of women reaching out to a trusted person while walking home alone at night, or simulating a phone conversation as part of this behavior.

2.1.3 Crime Mapping:

In another study, Seedat et al. (2006) said that based on a population of 3 254 844, representing a 0.9% growth on the 2001 census figure the rate for violent deaths was 77.4 per 100 000, and the pedestrian fatality rate was 17.2 per 100 000 for Johannesburg in 2002. The South African Police Services Crime Statistics (n.d.) reported 1612 rapes and 18 530 incidents of robbery including aggravating circumstances and a total of 436 cases of kidnapping and abduction for Johannesburg for a one year period. According to a study by Bose (2022), Out of a sample of sixty respondents in Bangalore, a similar megacity to Dhaka, inappropriate touching in public places was reported by 60%. Specifically, 83% of the women in this group had visited Church Street, and among them, 49% had experienced such incidents. When it comes to pubs and clubs in Bangalore, 77% of the respondents had been there, with 44% reporting inappropriate touching encounters. Among 85 student respondents, 77 had visited Church Street, and 23 experienced inappropriate touching incidents. Meanwhile, only 11 out of 17 employees had visited Church Street, and 7 of them had experienced inappropriate touching. Hoch (2019) stated that according to data from the European Union Agency for Fundamental Rights in 2014, an estimated 83 to 102 million women, which makes up 45% to 55% of adult women, have encountered sexual harassment since the age of 15. A separate report by Stop Street Harassment in 2016 revealed that in the United Kingdom, 64% of women have faced street harassment. Furthermore, a 2015 survey conducted by Yougov in London indicated that over 40% of women had experienced street harassment at some point in their lives. These statistics underscore the prevalence and significance of the issue of street harassment, especially for women.

2.1.4 Built Environment & Land Use:

Areas with mixed land use (e.g residential, commercial, recreational) tend to have more active transportation options, as women can easily access essential services and destinations. The proximity of homes to schools, workplaces, grocery stores, and other amenities can influence women's decisions to walk or cycle.

Cervero et al. (1996, 2008), Frank et al. (2006) and Humpel et al. (2002) found out that built environment attributes such as a compact urban form, land use mix, street connectivity, infrastructure, accessibility of services and facilities, and distance to transit and destination accessibility are associated with active transport modes such as walking and cycling. Ewing et al, (1994); Holtzclaw, (1994); Cervero and Kockelman, (1997) stated that densely populated areas generate more non-motorized movement. According to Paydar et al. (2017), the primary factors contributing to women's sense of security included the presence of other individuals, both through stationary and dynamic surveillance, proximity to shops, schools, and parks, open spaces, and the presence of familiar people. Furthermore, an ordered regression analysis revealed that among the various aspects of the built environment, indicators of vitality through furniture arrangement, surveillance, signs of disorder, and vegetation were the most influential in determining women's perceived security.

2.1.5 Impact of Climate & Weather Conditions:

Extreme weather conditions, such as heavy rain, snow, or extreme heat, can make walking uncomfortable and inconvenient. Women may opt for alternative modes of transportation, such as driving or taking public transit, to avoid exposure to harsh weather. Unpleasant weather conditions can have a negative psychological impact, reducing the desire to engage in outdoor activities like walking. This can lead women to opt for indoor or vehicular transportation instead.

Godspeed et al. (2009) found out that weather was the top reason for taking transit modes over walking. Burton et al. (2003); Bird et al. (2009) analyzed the sampling of other studies published since that time which solidify the conclusion that people from a variety of populations perceive inclement weather to be a barrier to physical activity. Neither socioeconomic status nor ethnicity altered the perception of the weather as a deterrent to recreational physical activity in Australian adults, although the sample size in both studies was small. According to Prins R. et. al (2015), higher temperatures, the absence of rain and higher wind speeds were univariately and multivariately associated with more walking. De Montigny et al. (2011) found an association between temperature and walking behavior, with increasing temperature leading to a decrease in walking speed and rate of mode choice. According to Shabaan et al. (2017), during both winter and summer, it was observed that weather conditions, especially unfavorable temperatures, had a significant impact on walking behavior. In the summer, the total number of pedestrians decreased by more than half in comparison to the winter season.

2.1.6 Air Pollution:

High levels of air pollution, especially in urban areas, can lead to respiratory problems such as asthma, bronchitis, and other lung diseases. Concerns about these health risks may discourage women from walking outdoors, particularly in areas with poor air quality. Women, especially pregnant women, the elderly, and children, are often considered more vulnerable to the health effects of air pollution. As a result, they may be more cautious and avoid walking in areas with known pollution issues.

Bunds et al. (2019) concluded the results of the present study with US residents showed that good air quality, low traffic, and little noise, as well as green space increased individuals' preferences for leisure-time walking in urban settings.

Pitsiava et al. (2000) carried out a study focusing on the evaluation of the impact of pedestrianization schemes on the environment. Their research revealed that many traffic and environmental issues are concentrated within the inner areas of urban cities where various activities take place. The implementation of pedestrianization schemes proved to be effective in reducing air pollutant emissions generated by traffic, among other benefits.

Marshall et al. (2009) conducted research to investigate the connection between pedestrians' exposure to air pollutants and the walkability of neighborhoods. This study estimated the levels of

nitric oxides (NO) and ozone (O3) within the population. The research identified neighborhoods with poor walkability, which had a higher likelihood of exposing pedestrians to air pollution. The findings shed light on potential strategies to mitigate the impact of air pollution on urban residents, particularly those with lower socioeconomic status.

In a separate study, Kaur et al. (2005) examined the exposure of pedestrians to various pollutants such as Particulate Matter 2.5, the darkness of particulate matter, carbon monoxide, and ultrafine particle counts along a major road. The research found that Particulate Matter exposure was higher in comparison to afternoon levels and that there were significant variations in exposure on different sides of the road. However, there was no significant difference in pedestrians' exposure to carbon monoxide based on their walking position, walking direction, the side of the road (canyon side), or timing.

2.1.7 Noise Pollution:

Noise pollution can significantly influence females' decisions about outdoor activities, particularly walking. It can lead to stress and discomfort, raise safety concerns due to reduced awareness of their surroundings, and even cause hearing damage. Communication difficulties, reduced quality of life, sleep disturbances, and psychological well-being issues are also associated with noise pollution. In response, some females choose quieter walking routes in parks or residential areas to mitigate these effects. Urban planning and policies promoting low-noise environments are essential for encouraging female walking and overall well-being.

According to Onifade et al. (2022) noise doesn't just affect humans; it can also disrupt animals' breathing and breeding cycles. However, not all sounds qualify as noise pollution. The World Health Organization (WHO) defines noise as any sound above 65 decibels, with harm typically occurring when it exceeds 75 decibels. For reference, a horn produces around 90 decibels, while buses can reach about 100 decibels. Aircraft noise levels vary but can go as high as 130 decibels, depending on the type and age of the vehicle.

Franěk et al. (2018) researched on how noise pollution influences pedestrians' walking speed, categorizing noise into annoying acoustical stimuli (like traffic noise) and relaxation noise (such as forest birdsong). The study found that participants exposed to traffic noise preferred the route less than those who heard relaxation noise (forest bird songs). Pedestrians listening to traffic noise also tended to walk faster than those in a controlled condition and those listening to forest birdsong. Ultimately, the research suggested that different forms of relaxing noise have a positive impact on walking compared to traffic noise.

King et al. (2009) investigated pedestrians' exposure to both noise and air pollution, exploring the potential to reduce environmental pollutants through urban planning and design. The findings indicated that optimal solutions for minimizing environmental pollution could be achieved through structural designs that separate pedestrians from road traffic in urban areas.

2.2 Road Infrastructure

According to Jahan et al. (2020), nighttime pedestrian safety in Dhaka, particularly for women, is a pressing concern that requires immediate attention. Betron et al. (2018) found that despite efforts to promote female mobility, the cultural norms and societal restrictions in Bangladesh still restrict women's movement at night.

According to Zafri et al. (2020), when discussing nighttime pedestrian safety for women in Dhaka city, it's important to focus on both the physical and social factors that contribute to their safety. Unfortunately, women in Dhaka face unique challenges and vulnerabilities when it comes to pedestrian safety at night. One major factor that affects women's safety is the lack of proper lighting infrastructure on streets and in public spaces. This lack of lighting not only reduces visibility for pedestrians but also creates an environment that is conducive to criminal activities such as harassment and assault (Davies & Farrington, 2020). Furthermore, Kalam (2014) and Leão et al. (2021) point out that the social norms and cultural expectations placed on women in Bangladesh also contribute to their vulnerability at night. These societal factors include gender-based violence, limited freedom of movement for women after dark, and a lack of social support systems. Therefore, addressing nighttime pedestrian safety for women in Bangladesh requires a multifaceted approach that considers both the physical and social aspects.

According to Zhu et al. (2023), the physical aspects include improving lighting infrastructure in public spaces, implementing safety measures such as CCTV cameras, and ensuring well-maintained sidewalks and pedestrian crossings.

2.2.1 Lighting Conditions:

According to Fotios et al. (2015), improving the lighting infrastructure in public spaces is crucial for enhancing nighttime pedestrian safety for women in Bangladesh. Insufficient lighting creates an environment where potential perpetrators feel emboldened to carry out acts of violence against women. Uttley et al. (2020) said strategically installing streetlights, particularly in areas with high foot traffic or known safety concerns, is a critical step in addressing this issue. It is equally important to prioritize the maintenance of these streetlights to ensure they remain in working order and provide sufficient illumination. Adequate lighting not only reduces the fear of crime but also enhances visibility, instilling a sense of safety and confidence in women when walking at night. As a result, this mitigates the inclination of women to adjust their travel patterns or avoid nighttime walking altogether due to safety concerns. Thus, it influences women to walk at night, promoting their mobility and independence.

2.2.2 Sidewalks:

Another important aspect of improving nighttime pedestrian safety for women in Bangladesh is ensuring well-maintained sidewalks. According to Banerjee & Maurya (2020), sidewalks provide a designated space for pedestrians, separating them from vehicular traffic and improving their overall safety. Well-maintained sidewalks should be wide enough to accommodate pedestrians comfortably and should be free of obstacles and hazards such as potholes, debris, or uneven surfaces. Also, Zumelzu et al. (2022) said they should also be well-lit to enhance visibility and discourage criminal behavior. It is an important factor in influencing women to walk at night as it provides a sense of security and enhances the overall pedestrian experience. Sidewalks also help in navigation and allow women to confidently traverse the city during nighttime hours. Thus it works as an important factor in promoting pedestrian safety and encouraging women to walk at night.

2.2.3 Road Pattern:

In addition to lighting and sidewalk infrastructure, the road pattern also plays a crucial role in ensuring pedestrian safety at night. Roads should be designed in a way that prioritizes the safety of pedestrians, particularly women who are often more vulnerable to crimes while traveling. In Bangladesh and other densely populated areas, it is important to consider the unique challenges faced by women when it comes to road safety at night. This can be achieved by creating designated pedestrian walkways that are separate from vehicular lanes and provide a safe space for women to walk at night. Properly planned road networks can also encourage female pedestrians to walk at night. (Clark & Scott, 2016; Ferrer et al., 2015)

2.2.4 CCTV Camera:

Lim & Wilcox (2017) stated that CCTV cameras could reduce the fear of crime in women at night. However, according to various research, the effectiveness of CCTV cameras in reducing crime is debated. Xu et al's (2015) study suggests that the presence of CCTV cameras can act as a deterrent to potential criminals, while others argue that their effectiveness in preventing crime is limited.

However, in the context of female pedestrian safety at night in Bangladesh, the presence of CCTV cameras can potentially be beneficial. CCTV cameras can act as a deterrent to potential criminals, potentially increasing the sense of security for women walking at night.

2.2.5 Female Police Officers:

In the context of female pedestrian safety at night in Bangladesh, the presence of female police officers can be instrumental in promoting a safer walking environment for female pedestrians stated

by Allik & Kearns (2017). Mojanoski (2015) said the presence of Police on the road increases the confidence in women and creates a sense of security.
There is no study done regarding the impact of the presence of female Police officers on female pedestrians. This can be a big factor in encouraging female pedestrians to walk at night in Bangladesh. We found this as a research gap.

2.2.6 Night Markets:

It is stated by Hung & Wu (2020) that night markets can also contribute to improving female pedestrian safety at night in Bangladesh. Night markets can provide a lively and bustling atmosphere that increases the perceived safety of the area.

There is no such study done yet on the direct impact of the night market on female pedestrians at night. But this could be a big factor in promoting female pedestrians to feel safer and more comfortable walking at night in Bangladesh.

2.2.7 Car Ownership:

According to Herrmann-Lunecke et al. (2020) in areas where car ownership is high, the reliance on private vehicles for transportation increases. This leads to fewer people walking on the streets at night.

2.2.8 Unsafe Public Transportation:

According to Tiznado-Aitken et al. (2018) and Van Soest et al. (2020) public transport is very related to pedestrian walking. In case of getting access to Public transport, people need to travel a certain distance by walking through any other mode.

Mazumder & Pokharel (2019) found in their research that unsafe public transport would encourage females to use any other mode of transportation, resulting in a decrease in the number of female pedestrians walking. Unsafe public transportation can also negatively impact female pedestrian safety at night in Bangladesh. Public transportation in Bangladesh is often overcrowded and lacks proper security measures. This makes it a potential target for criminal activities. Additionally, Miti et al. (2023) stated that in Bangladesh, women become the victim of various harassment in public transport, specifically in buses. These factors contribute to a sense of fear and insecurity for female pedestrians, further discouraging them from walking. Implementation of ITS (Intelligent Transportation Systems) could potentially improve the safety of public transport and encourage more women to use it at night.

2.2.9 ITS (Intelligent Transportation Systems)

According to Gurbuz & Cheu (2020) Intelligent Transportation System refers to advanced technologies and systems applied to transportation infrastructure and vehicles to enhance safety, efficiency, and sustainability. The implementation of ITS can have a significant impact on female pedestrian safety at night in Bangladesh.

2.2.10 Pedestrian Zones:

Dičiūnaitė-Rauktienė et al. (2018) said pedestrian zone, also known as a car-free zone or pedestrian precinct, is an area within a city or town that is designated solely for pedestrians and prohibits the use of private vehicles. Uddin et al. (2017) found that there are very few pedestrian zones in Dhaka city. The lack of pedestrian zones in Dhaka city contributes to the safety concerns of female pedestrians at night. To address the issue of female pedestrian safety at night in Bangladesh, it is crucial to focus on improving the infrastructure and implementing strategies that prioritize their safety.

2.3 Social and Cultural Factors

2.3.1 Psychological factor and past experiences:

The experience of female pedestrians at night is shaped by a combination of psychological factors and past experiences. For example, According to Mutesi & Abbott, 2013, in Kigali, Rwanda, a survey revealed that 55% of respondents expressed concerns about their safety when traveling to school or college during the nighttime. The survey conducted in Kigali further illuminates the profound sense of insecurity experienced by women and girls. This pervasive unease arises not only from their own encounters within certain public domains but also from a prevailing disquietude that shrouds these spaces. Moreover, it stems from a collective awareness of which public areas are deemed perilous for women and girls to venture into. Their apprehensions are, in particular, anchored in the specter of rape and brutal assaults, as well as the looming threats of muggings and incidents of sexual harassment.

2.3.2 Female presence on road:

Research has shown that the presence of more women on the road can enhance the overall comfort and safety of female road users.

Again according to Mutesi & Abbott (2013), the survey conducted in Kigali also highlights that women and girls experience a sense of insecurity in various settings, including bustling bus stations, crowded public places, bars, pathways between houses, and areas with dense foliage. They also express feeling unsafe when encountering groups of young men or when sharing public spaces with individuals who are substance-dependent or alcohol-dependent. Mohamed & Stanek (2020) mentioned that, there is a clear gender disparity in the population distribution on the easily accessible streets of Cairo, with males significantly outnumbering females. This conspicuous absence of gender equilibrium in public spaces may pose a threat to the safety of women. Consequently, there is a call for city streets to be transformed into inclusive environments welcoming individuals of all ages and genders. According to Orozco-Fontalvo et al. (2019), when utilizing bus stops, women experience a higher level of insecurity compared to men. The presence of overcrowded buses has been identified as the primary factor significantly amplifying their perception of risk.

2.3.3 Socio-economic condition:

The socioeconomic conditions of women pedestrians have a profound impact on their safety, mobility, and overall well-being in urban environments.

2.3.3.1 Income:

The income of a female pedestrian is a major factor in this. According to Nasrin (2016), a survey conducted in Dhaka that examines the commuting habits of individuals across various genders, it becomes evident that the travel patterns of female workers, particularly those with differing income levels, exhibit significant variations. These nuanced distinctions must be seamlessly integrated into the city's transportation planning framework, as they hold the key to developing a more equitable and tailored urban mobility strategy for Dhaka. An exploratory analysis of survey data has brought to the forefront the notable disparities in the commuting experiences of male and female workers. Notably, as the income of women workers increases, they tend to transition toward more favorable transportation alternatives due to the challenges and discomfort associated with road travel for females.

The previous Kigali survey shows that, three distinct categories of women have been identified as particularly susceptible to instances of sexual violence and sexual harassment: street vendors, sex workers, and bar staff. These women have often found themselves compelled to engage in these occupations out of sheer necessity, as viable alternatives for earning a livelihood were limited or nonexistent. Tragically, they have generally come to accept sexual violence and harassment as an unfortunate, inescapable facet of their daily existence, viewing it as a burden they must endure.

2.3.3.2 Age:

Age plays a significant role in this context as well. According to Brownson et al. (2001), International research underscores that although all women and girls face susceptibility to sexual harassment and sexual violence, certain segments of this demographic are more vulnerable than others. Specifically, teenage girls and young women frequently find themselves targets of behaviors like stalking, whistling, and receiving lewd remarks from men. Conversely, older women tend to report feeling the least safe among these groups.

2.4. Policy and Problem Mitigation

Female pedestrians face unique challenges when navigating urban spaces at night, impacting their mobility and quality of life. Policy interventions and problem mitigation strategies can help create safer and more inclusive walking environments that promote gender equity and enhance overall walkability. To understand the significance of policy and problem mitigation in this context, it is important to consider the broader social and gendered dynamics that contribute to the challenges faced by female pedestrians. Gender-specific barriers and socio-cultural norms contribute to the gender gap in walkability. According to Adlakha and Parra (2020), women experience higher levels of fear and perceived safety risks when walking alone at night, leading to constricted daily mobility. Golan et al. (2019) mentioned that perceptions of safety, aesthetics, and neighborhood satisfaction differ between men and women, affecting women's willingness to walk in certain areas. Trumpeter and Wilson (2014) said addressing these barriers is crucial for improving walkability and increasing physical activity among women.

2.4.1 Role of Policies in Shaping Urban Environments and Promoting Pedestrian Safety

Policy approaches can increase pedestrian walkability by prioritizing safety and comfort. Alshammari (2022) said smart pedestrian networks and modern technology can enhance walkability and multiscale walkability analysis can identify suitable streets for pedestrian travel. Muhammad Mulyadi et al. (2022) found that revitalizing sidewalks and implementing road diet concepts greatly improved walkability up to 38.98% and increased public transportation usage by 15.41%. By prioritizing pedestrians and implementing appropriate policies, cities can create more walkable and livable urban environments.

2.4.2. Different Policy Approaches Implemented in Various Contexts

2.4.2.1 Law Enforcement & Community Policing:

Law enforcement plays a vital role in ensuring community safety, including addressing issues related to female pedestrian walkability at night. According to Schaffer (2023) community policing emphasizes collaboration and partnerships between law enforcement and the community, with community development units playing a crucial role in implementing prevention efforts and

improving efficiency. Biantoro et al. (2023) emphasized on citizen-police affiliation, identification and recognition of community issues, and establishing communication and trust through proactive engagement and community-oriented programs.

2.4.2.2 Community Engagement:

According to Yeap and Liow (2023) community engagement plays a critical role in the development and implementation of walkability policies. Krog et al. (2014) mentioned that universities, such as the University of South Africa (Unisa), have recognized the importance of community engagement and have incorporated it into their agenda for transformation. Maghelal and Capp, (2011) put emphasis on the development of community engagement policies that aim to serve the needs of the community. Ripat et al. (2010) mentioned it is important for policymakers to consider the perspectives and input of the community when developing walkability policies. By engaging with the community, policymakers can gain valuable insights into the barriers and challenges faced by residents, as well as identify potential solutions and interventions to improve walkability. This collaborative approach can lead to more effective and sustainable walkability policies that meet the needs of the community.

2.4.2.3 Self-Defense Programs:

Improving female pedestrian walkability during the night requires a multifaceted approach that not only involves law enforcement initiatives but also requires empowering the vulnerable community to take an active role in their own safety. According to Beaujolais (2023), and Hollander and Cunningham (2020) community empowerment and self-defense programs have been found to reduce the risk of sexual assault victimization and increase self-confidence. Hollander & Cunningham (2020) mentioned these programs can also increase feelings of self-efficacy and confidence, reduce levels of depression and anxiety, and protect against traumatic stress symptoms. Additionally, empowerment-based self-defense training challenges the prevailing cultural narrative of weak victims and strong perpetrators, helping individuals discover and maximize their own strengths. Jones and Mattingly (2016) showed these programs are comprehensive, evidence-based, and advocate for social change goals. They empower women and provide them with multiple options for confronting violence. By promoting physical and mental health, education, and creativity, these programs contribute to the overall empowerment of individuals and communities.

2.4.3 Advantages of women-centered policies

2.4.3.1 Toronto's Women's Safety Audit:

The women's safety audit is a methodological tool that was initially developed in Toronto and has been adapted and used in many regions of the world. In Toronto, Canada, the Women's Safety Audit program was implemented to improve the safety of parks and public spaces for women. The program involved conducting safety audits to identify potential safety concerns and implementing recommendations to address them, such as improving lighting, visibility, and signage. According to Sravan Kumar et al. (2022) the audit is effective for bringing about environmental changes, empowering women, and raising awareness among the public and authorities about the shared responsibility for women's safety.

2.4.3.2 Urban planning in Vienna:

Urban planning in Vienna has taken into consideration the issue of female safety. Vienna has implemented a feminist approach towards public safety, with initiatives undertaken by the city council's department for gender-sensitive planning, building and promoting design-led crime prevention. This includes considerations such as well-lit streets, clear signage, and public spaces designed with women's safety in mind, such as wider sidewalks and separate cycling lanes. Stummvoll (2004) mentioned this approach aims to enhance women's safety in cities by creating spaces that are welcoming and inclusive for women of all backgrounds.

2.4.3.3 Interventions to Improve Women's Safety at Night in Delhi:

In 2009, the Delhi Government launched its Safe Delhi Initiative. In 2012-13, the government launched the Safetipin application to carry out safety audits. While the app received positive feedback, its coverage was limited. The Delhi Police's Himmat app for smartphones was launched in 2015. The apps helped and raised awareness among the general public. Technology-dependent apps put the entire burden on the woman; she should always be alert.

2.4.4 Policy Implementation Challenges

Implementing policies for improving walkability faces several challenges. According to Baobeid et al. (2021), one challenge is the lack of standardized walkability theory, which hinders the development of rigorous evaluation tools for policymakers and designers. Another challenge is the absence of adequate urban and space planning, which leads to the lack of accessible and pedestrian-friendly public spaces in cities. Additionally, Abdulla Ph.D. et al. (2016) emphasizes on the need to consider air quality and thermal stress in walkability design, as these factors can impact the decision to walk and nullify health benefits. Furthermore, the heavy dependence on car transportation in some countries, such as Malaysia, poses a challenge to prioritizing walkability over car-centric design. These challenges highlight the importance of addressing the physical elements of the built environment, promoting connectivity, accessibility, and proximity to destinations, as well as considering the needs and perceptions of different user groups. The challenges faced in implementing policies for improving female pedestrian walkability include the need for quantitative measurement of walkability, identification of suitable streets for pedestrian travel, assessment of micro- and mesoscale environmental indicators, consideration of built and natural environments, understanding of social relations, and addressing factors that specifically influence women's propensity to walk.

CHAPTER 3: DATA AND METHODOLOGY

3.1 Introduction

This section describes the methodology and data collection techniques used in our study. We targeted 505 working and non-working women from a range of socio-economic backgrounds across different areas of Dhaka city. The primary method of data collection was a questionnaire survey, conducted through direct interviews in various locations including hospitals, schools, colleges, the garment industry, government and non-government offices, and on-street surveys.

3.2 Questionnaire Preparation

The questionnaire was carefully crafted based on a thorough review of existing literature, stakeholder interviews, and the local context. It consisted of six sections with a total of 47 questions. The sections were:

1. Socio-economic & Demography

2. Road Infrastructure

3. Incident Report

4. Safety & Security

5. Surrounding Environment

6. Policy & Social Awareness

Key questions covered topics such as age, marital status, profession, income, location, previous experiences, safety perceptions, road infrastructure preferences, and views on policies and laws.

3.3 Data Collection

Data was gathered through direct interviews with 505 women from various sectors and localities in Dhaka city. This approach ensured a wide and representative sample of the population, including various socio-economic backgrounds. The diverse data collection settings included hospitals, educational institutions, the garment industry, government and non-government offices, and public areas, capturing a broad spectrum of experiences and perspectives. The interviews took place in diverse environments, including:

1. Hospitals: Interviews with healthcare professionals, patients, and support staff offered valuable insights into the health sector and the unique challenges and experiences of women in medical settings.

2. Educational Institutions: Discussions with female students, teachers, and administrative staff in schools, colleges, and universities highlighted the gender dynamics in night-time pedestrian movement.

3. Garment Industry: Considering Dhaka's key role in the global garment industry, interviews with female workers, supervisors, and factory owners in this sector provided a detailed look at the significance of road-safety for low-income female population of this country.

4. Government and Non-Government Offices: Engaging with women in various government departments and non-governmental organizations offered insights into the role of women in public administration, policy-making, and social development initiatives.

5. Public Areas: Interviews in markets, parks, transportation hubs, and other communal spaces captured the daily experiences and challenges faced by women in public life, including concerns about safety, mobility, and public services.

By incorporating these varied settings into the data collection process, the study amassed a rich and diverse dataset. This thorough approach enabled a deep understanding of the multiple factors impacting women's lives in Dhaka, encompassing a wide range of experiences and perspectives crucial for formulating effective policies and interventions.

3.4 Discussion of the Model

For data analysis, we used the Ordered Probit Model, appropriate for our ordinal dependent variable, "Do you go out at night in Dhaka city?" The analysis was conducted using Stata 15 software. The model equation is:

Model Equation:

$$y_i^* = x_i\beta + \varepsilon_i$$

Where, y_i^*= a latent, unobservable and continuous dependent variable;

x_i= a row vector of observed non-random explanatory variables;

β= a vector of unknown parameter;

ε_i= the random error term, which is assumed to be normally distributed.

Independent variables were retained in the final model based on their significance after multiple iterations. This model provided insights into the factors influencing women's decisions to go out at night in Dhaka city, shedding light on safety perceptions and socio-economic factors.

Table 1: Summary Statistics of the Explanatory variables used in the model

Explanatory Variables	Description of the Variables	Mean	Standard Deviation
1. Socio-economic & Demography			
i. Profession			
Student	If Student = 1, otherwise = 0	0.3412	0.4746
Housewife	If Housewife = 1, otherwise = 0	0.0476	0.2131
Teacher	If Teacher = 1, otherwise = 0	0.1011	0.3018
Service Holder	If Service Holder = 1, otherwise = 0	0.2222	0.4161
Businesswoman	If Businesswoman = 1, otherwise = 0	0.0039	0.0629
Medical Personnel	If Medical Personnel = 1, otherwise = 0	0.0952	0.2938
Housemaid	If Housemaid = 1, otherwise = 0	0.0932	0.2910
Laborer	If Laborer = 1, otherwise = 0	0.0952	0.2938
ii. Marital Status			
Unmarried	If Unmarried = 1, otherwise = 0	0.4027	0.4909
Married	If Married = 1, otherwise = 0	0.5753	0.4947
Widowed	If Widowed = 1, otherwise = 0	0.0079	0.0888
Divorced	If Divorced = 1, otherwise = 0	0.0138	0.1117
iii. Timing of going out at night			
6 P.M. to 8 P.M.	If 6 P.M. to 8 P.M. = 1, otherwise = 0	0.4960	0.5004
8 P.M. to 10 P.M.	If 8 P.M. to 10 P.M. = 1, otherwise = 0	0.3194	0.4667
10 P.M. to 12 P.M.	If 10 P.M. to 12 P.M. = 1, otherwise = 0	0.0912	0.2882
After 12 P.M.	If After 12 P.M. = 1, otherwise = 0	0.0019	0.0445
Doesn't go out at night	If Doesn't go out at night = 1, otherwise = 0	0.0892	0.2854
iv. Purpose of going out at night			
Work	If Work = 1, otherwise = 0	0.3690	0.4830
Education	If Education = 1, otherwise = 0	0.0396	0.1954
Recreation	If Recreation = 1, otherwise = 0	0.1488	0.3562
Physical Exercises	If Physical Exercises = 1, otherwise = 0	0.0813	0.2736
Emergencies	If Emergencies = 1, otherwise = 0	0.2916	0.4549
Doesn't go out at night	If Doesn't go out at night= 1, otherwise = 0	0.0694	0.2544
v. Reason behind the unwillingness to go out at night			
Road Infrastructure	If Road Infrastructure = 1, otherwise = 0	0.0793	0.2705
Social/Religious Norms	If Social/Religious Norms = 1, otherwise = 0	0.1388	0.3461
Fear of Harassment	If Fear of Harassment = 1, otherwise = 0	0.4345	0.4961
Familial Restrictions	If Familial Restrictions = 1, otherwise = 0	0.1825	0.3866
Doesn't face any problem	If Doesn't face any problem = 1, otherwise = 0	0.1309	0.3376
Others	If Others = 1, otherwise = 0	0.0297	0.1700
vi. Companionship			
Never having another individual as a companion	If Never = 1, otherwise = 0	0.0972	0.2965
Rarely having another individual as a companion	If Rarely = 1, otherwise = 0	0.3376	0.3082

Sometimes having another individual as a companion	If Sometimes = 1, otherwise = 0	0.0957	0.2504
Always having another individual as a companion	If Always = 1, otherwise = 0	0.4695	0.4819
2. Incident Report			
i. Experience of being a victim of harassment in a well-lit environment			
No	If No = 1, otherwise = 0	0.2142	0.4107
Sometimes	If Sometimes = 1, otherwise = 0	0.0436	0.2045
Yes	If Yes = 1, otherwise = 0	0.2876	0.4531
Not Applicable	If Not Applicable = 1, otherwise = 0	0.4543	0.4984
3. Road Infrastructure			
i. Lacking sidewalk features that discourage women from walking at night			
CCTV	If CCTV = 1, otherwise = 0	0.1071	0.3096
Street Light	If Street Light = 1, otherwise = 0	0.1805	0.3850
Wide Sidewalks	If Wide Sidewalks = 1, otherwise = 0	0.1646	0.3712
Safety Rails	If Safety Rails = 1, otherwise = 0	0.0178	0.1325
Cleanliness	If Cleanliness = 1, otherwise = 0	0.2738	0.4463
Vendor-free Sidewalks	If Vendor-free Sidewalks= 1, otherwise = 0	0.1130	0.3170
Police Presence	If Police Presence = 1, otherwise = 0	0.1408	0.3482
ii. Type of road that makes women feel unsafe to walk on at night			
Local Roads	If Local Roads = 1, otherwise = 0	0.1428	0.3502
Collectors	If Collectors = 1, otherwise = 0	0.4246	0.4947
Arterials	If Arterials = 1, otherwise = 0	0.3670	0.4824
Highways	If Highways = 1, otherwise = 0	0.0476	0.2131
iii. Perception of safety for using foot over bridges at night			
Unsafe	If Unsafe = 1, otherwise = 0	0.3035	0.4602
Safe when it is crowded and dark	If Safe when it is crowded and dark = 1, otherwise = 0	0.0039	0.0629
Safe when it is empty and dark	If Safe when it is empty and dark = 1, otherwise = 0	0.0059	0.0769
Safe when it is empty and well-lit	If Safe when it is empty and well-lit = 1, otherwise = 0	0.1825	0.3866
Safe when it is crowded and well-lit	If Safe when it is crowded and well-lit = 1, otherwise = 0	0.5039	0.5004
iv. Willingness to walk because of proper road network connectivity			
Never	If Never = 1, otherwise = 0	0.0277	0.1644
Rarely	If Rarely = 1, otherwise = 0	0.0972	0.2965
Sometimes	If Sometimes = 1, otherwise = 0	0.5000	0.5004
Always	If Always = 1, otherwise = 0	0.3750	0.4846
No Impact	If No Impact = 1, otherwise = 0	0.3988	0.4901
4. Surrounding Environment			
i. Impact of traffic congestion on walking at night			
No Impact	If No Impact = 1, otherwise = 0	0.3988	0.4901
Less Traffic	If Less Traffic = 1, otherwise = 0	0.2976	0.4576
More Traffic	If More Traffic = 1, otherwise = 0	0.3035	0.2440
ii. Impact of extreme weather on walking at night			

No Impact	If No Impact = 1, otherwise = 0	0.0634	0.2440
Slightly	If Slightly = 1, otherwise = 0	0.0992	0.2992
Moderately	If Moderately = 1, otherwise = 0	0.2658	0.4422
Heavily	If Heavily = 1, otherwise = 0	0.5714	0.4953
5. Policy & Social Awareness			
i. Effectiveness of social organizations to ensure female pedestrian safety			
Ineffective	If Ineffective = 1, otherwise = 0	0.3511	0.4778
Slightly Effective	If Slightly Effective = 1, otherwise = 0	0.3650	0.4819
Effective	If Effective = 1, otherwise = 0	0.2202	0.4148
Highly Effective	If Highly Effective = 1, otherwise = 0	0.0634	0.2440
ii. Effectiveness of existing policies to ensure female pedestrian safety			
Ineffective	If Ineffective = 1, otherwise = 0	0.2896	0.4540
Slightly Effective	If Slightly Effective = 1, otherwise = 0	0.4444	0.4973
Effective	If Effective = 1, otherwise = 0	0.2420	0.4287
Highly Effective	If Highly Effective = 1, otherwise = 0	0.0238	0.1526

CHAPTER 4: RESULT AND ANALYSIS

4.1 Introduction:

This chapter's primary objective is to comprehend the elements that either motivate or dissuade a female pedestrian to go out at night, as well as the elements associated with safety concerns. Ordered Probit Model has been developed in this study to analyze the variables.

4.2 Result and Discussion:

Table 2: Estimated Parameter of the Model

Variables	Estimated Coefficient (β)	p-value
1. Socio-economic & Demography		
i. Profession		
Student	-0.565	0.011
Housemaid	0.661	0.007
Medical Personnel	0.534	0.053
Laborer	0.598	0.48
ii. Marital Status		
Married	-0.647	0.001
iii. Timing of going out at night		
6 P.M to 8 P.M	2.453	0.000
8 P.M to 10 P.M	2.981	0.000
10 P.M to 12 P.M	3.168	0.000
iv. Purpose of going out at night		
Work	1.046	0.000
Education	0.810	0.005
v. Reason behind the unwillingness to go out at night		
Fear of Harassment	-0.374	0.007
Familial Restrictions	-0.426	0.017
vi. Companionship		
Always having another individual as a companion	-0.432	0.49
2. Incident Report		0.50
i. Experience of being a victim of harassment in a well-lit environment		
Never	0.462	0.002
3. Road Infrastructure		
i. Lacking sidewalk features that discourage women from walking at night		

Cleanliness	-0.348	0.012
Police Presence	-0.439	0.27
ii. Type of road that makes women feel unsafe to walk on at night		
Highway	-0.489	0.54
iii. Perception of safety for using foot over bridges at night		
Unsafe	0.408	0.01
iv. Willingness to walk because of proper road network connectivity		
Sometimes	0.419	0.001
4. Surrounding Environment		
i. Impact of traffic congestion on walking at night		
More Traffic	0.247	0.51
ii. Impact of extreme weather on walking at night		
Heavily	-0.248	0.044
5. Policy & Social Awareness		
i. Effectiveness of social organizations to ensure female pedestrian safety		
Highly Effective	0.995	0.0
ii. Effectiveness of existing policies to ensure female pedestrian safety		
Effective	0.375	0.019

4.2.1 Socio-economic & Demography

Profession: Four factors were found to be significant: 1. Student 2. Housemaid 3. Medical Personnel 4. Laborer. According to the findings individuals in professions such as housemaid (0.661, p = 0.007), laborer (0.598, p=0.048), and medical services (0.534, p= 0.053) exhibit a higher likelihood of going out during night-time compared to homemakers and other professionals. According to a study, most low-income female workers walk to work place as they do not have any other choice other than walking to their work place because of their financial constraints compared to middle- and high-income workers (Nasrin, 2016). A negative co-efficient (-0.565) and p value = (0.011) also denotes that students are very unlikely to go out at night maybe because of academic commitments, fear of harassment or curfews that restrict their nighttime activities. Moreover, teenage girls and young women frequently find themselves targets of behaviors like stalking, whistling, and receiving lewd remarks from men (Brownson et al., 2001). While those engaged in domestic work, labor, and medical services may have work-related obligations that extend into the night, such as night shifts or returning home late from work.

Marital Status: Negative coefficient (-0.647, p = 0.001) shows that, married women compared to unmarried, widowed and divorced women are more discouraged from venturing out at night. Married individuals might prioritize family responsibilities or prefer staying at home.

Timing of going out at night: Three specific timings were found to be significant: (i) 6-8 P.M. (2.453, p = 0.001) (ii) 8-10 P.M (2.981, p = 0.001) and (iii) 10-12 P.M. (3.168, p = 0.001). Women tend to go out more during these times compared to after 12AM.

Purpose of going out at night: Two factors were found to be significant: 1. Work (1.046, p=0.001) 2. Education (0.810, p = 0.005). Women and girls experience a sense of insecurity in various settings, including bustling bus stations, crowded public places, bars, pathways between houses, and areas with dense foliage (Mutesi & Abbott, 2017). Our findings also support that, women are more inclined to venture out at night due to the imperative of work or educational commitments rather than recreational activities, physical exercise, or emergency circumstances. This may be influenced by the structured nature of professional and academic responsibilities, which often require adherence to specific schedules and deadline.

Reason behind the unwillingness to go out at night: Two main reasons women avoid going out at night are fear of harassment (-0.374, p=0.007) and familial restrictions (-0.426, p=0.017). These concerns deter women more than worries about road infrastructure, societal expectations, or religious norms. The fear of harassment and family restrictions directly affect women's sense of safety and autonomy, making them crucial factors in deciding whether to engage in night-time activities. Additionally, women experience a higher level of insecurity compared to men when using bus stops (Soto et al., 2022). This reinforces the idea that public spaces can be particularly intimidating for women at night, adding to the reasons why they might choose to avoid going out.

Companionship: A gender disparity was noted on Cairo's accessible streets, with males significantly outnumbering females (Mohamed & Stanek, 2020). Our findings show that women who always have a night-time companion are more discouraged from going out alone (-0.432). This reliance on companions may heighten their sense of security and dependence, making solo outings less appealing. In contrast, women who occasionally or never have a companion are more accustomed to independent navigation, reducing barriers to night-time activities. This contributes to the gender disparity in public spaces, as women dependent on companions are less likely to be out at night.

4.2.2 Incident Report

Experience of being a victim of harassment in a well-lit environment: The response to this question, which was a significant variable, was found to be ‘Never’ (0.462, P=0.002). The positive coefficient (0.462) indicates women who venture out at night and have been a victim of physical or verbal assault at least once are more likely to have been harassed on poorly lit streets compared to well-lit ones. This indicates that the lighting condition has an impact on the occurrence of harassment. Most of the harassment takes place in streets without sufficient lighting. According to a study, improving the lighting infrastructure in public spaces is crucial for enhancing night-time pedestrian safety for women (Fotios et al., 2015). Strategically installing streetlights, particularly in areas with high foot traffic or known safety concerns, is a critical step in addressing this issue (Uttley et al., 2020). It is equally important to prioritize the maintenance of these streetlights to ensure they remain in working order and provide sufficient illumination.
So, our finding also aligns with the literature reviews supporting the fact the lighting condition of roads has a big impact on ensuring the safety of female pedestrians at night time.

4.2.3 Road Infrastructure

Lacking sidewalk features that discourage women from walking at night: Another important aspect of improving nighttime pedestrian safety for women in Bangladesh is ensuring well-maintained sidewalks. Sidewalks should be well-lit to enhance visibility and discourage criminal behavior (Zumelzu et al., 2022). Our study shows that women are discouraged to venture out at night due to lack of Cleanliness (-0.348, $p = 0.012$) and Presence of Security Personnel (-0.439, $p = 0.054$). A dirty environment may contribute to feelings of discomfort or unease and also be a source for potential hazards, while the absence of police may imply a lack of immediate assistance in case of emergencies or threats.

Type of road that makes women feel unsafe to walk on at night: Negative coefficient (-0.489) and $p = 0.054$ indicates that female pedestrians tend to feel less safe at night along highways compared to inner city roads, local roads, and small lanes. Highways typically have higher speeds of traffic, limited pedestrian infrastructure, and fewer sources of illumination, all of which may contribute to heightened feelings of vulnerability and exposure to potential risks. In contrast, inner city roads, local roads, and small lanes often have lower traffic volumes, better lighting, and more pedestrian-friendly features, which may foster a greater sense of security for women walking at night. They also have sidewalks which provide a designated space for pedestrians, separating them from vehicular traffic and improving their overall safety. (Banerjee & Maurya, 2020)

Perception of safety for using foot over bridges at night: Female pedestrians who venture out at night feel unsafe (0.408, $p = 0.002$) while using foot over bridges, even when crowded and well-lit, due to concerns about personal safety and the potential for encountering harassment or unwanted attention in elevated and relatively secluded spaces. Despite the presence of crowds and adequate lighting, the elevated nature of foot-over bridges may create feelings of vulnerability, as individuals may perceive them as less accessible to assistance or escape routes in case of emergencies.

Willingness to walk because of proper road network connectivity: Women are sometimes (0.419, $p = 0.001$) willing to walk at night because of proper road network connectivity. Properly planned road networks and designated pedestrian walkways separate from vehicular lanes can encourage and provide a safe space for female pedestrians to walk at night. (Clark & Scott, 2016)

4.2.4 Surrounding Environment

Impact of traffic congestion on walking at night: More traffic (0.247, $p = 0.052$) positively impacts a woman's decision to go out at night compared to less traffic congestion. This might be due to perception of safety as it usually means more people around, which can deter potential threats and provide a sense of visibility and support in case of any incident.

Impact of extreme weather on walking at night: Extreme weather heavily (-0.248, $p = 0.044$) discourages a woman to walk at night. In Bangladesh, where weather conditions can be quite extreme, factors like heavy rain, scorching heat waves, or strong winds can cause not only pose physical challenges but also creates a sense of unease, impacting women's perception of safety. A study found that weather was the top reason for taking transit modes over walking (Godspeed et al.,

2019). Another study solidifies the conclusion that people from a variety of populations perceive inclement weather to be a barrier to physical activity. (Bird et al., 2009)

4.2.5 Policy & Social Awareness

Effectiveness of social organizations to ensure female pedestrian safety

The significant variable found as a response to this question was 'Highly effective' (0.995, P=0.000). The positive value (0.995) indicates women who perceive social organizations as highly effective in pressuring authorities to ensure female pedestrian safety are more likely to venture out at night compared to those who do not believe the same. This might be due to their belief in the impactful role of social organizations in advocating for safety measures. So, their faith or belief, which are psychological factors has a big impact on the process of their decision making.

Effectiveness of existing policies to ensure female pedestrian safety

The significant variable found as a response to this question was 'Effective' (0.375, P=0.019). The positive value indicates that women who think the existing policies in the country are effective have a higher tendency to go out at night compared to women who think the policies are ineffective. Individuals who perceive policies as highly effective likely have confidence in the measures implemented by authorities to address various social concerns, such as safety, crime prevention, or infrastructure improvement. This belief may contribute to a sense of security and trust in the public environment, thus encouraging them to venture out at night. From this also we can say their faith or belief, which are psychological factors has a big impact on the process of their decision making.

CHAPTER 5: CONCLUSION & RECOMMENDATION

5.1 Introduction

The safety and movement of female pedestrians at night in Dhaka city is influenced by a variety of socio-economic, demographic, infrastructural, environmental, and policy-related factors. This study aims to identify and analyze these factors to provide a comprehensive understanding of the challenges faced by women and to propose actionable recommendations to improve their safety and mobility.

5.2 Key Findings

The study revealed several significant findings related to the movement of female pedestrians at night in Dhaka:

5.2.1 Socio-economic and Demographic Factors:

- **Profession:** Women in professions such as housemaids, laborers, and medical personnel are more likely to go out at night due to work-related obligations. Students, on the other hand, are less likely to venture out due to academic commitments and fear of harassment.
- **Marital Status:** Married women are more discouraged from going out at night compared to unmarried, widowed, or divorced women, possibly due to family responsibilities.

5.2.2 Timing of Going Out:

- Women are more likely to go out between 6-12 P.M., with a significant decrease in activity after midnight.

5.2.3. Purpose of Going Out:

- Work and educational commitments are the primary reasons for women to go out at night, as opposed to recreational activities or emergencies.

5.2.4 Unwillingness to Go Out:

- Fear of harassment and familial restrictions are the main deterrents for women, outweighing concerns about road infrastructure or societal expectations.

5.2.5 Companionship:

- Women who rely on companions for night-time outings are less likely to go out alone, highlighting a gender disparity in public spaces.

5.2.6 Incident Reports:

- Women who have experienced harassment in poorly lit areas are more likely to avoid going out at night, emphasizing the importance of adequate street lighting.

5.2.7 Road Infrastructure:

- Poorly maintained sidewalks, lack of security personnel, and unsafe road types (e.g., highways) discourage women from walking at night.
- Foot over bridges, even when well-lit and crowded, are perceived as unsafe due to their elevated and secluded nature.

5.2.8 Surrounding Environment:

- Traffic congestion positively impacts women's decision to go out at night, as it provides a sense of safety.
- Extreme weather conditions significantly discourage women from night-time walking.

5.2.9 Policy and Social Awareness:

- Women who perceive social organizations and existing policies as effective in ensuring their safety are more likely to venture out at night, indicating the importance of psychological factors in their decision-making process.

5.3 Recommendations

Based on the findings, several recommendations are proposed to improve the safety and movement of female pedestrians at night in Dhaka:

5.3.1 Enhance Street Lighting:

- Improve and maintain lighting infrastructure in public spaces, particularly in areas with high foot traffic, to reduce the incidence of harassment and increase women's sense of security.

5.3.2 Improve Sidewalk and Road Infrastructure:

- Ensure sidewalks are well-maintained, clean, and equipped with security personnel.
- Develop pedestrian-friendly road networks with lower traffic volumes, better lighting, and designated pedestrian walkways.

5.3.3 Address Socio-economic and Demographic Concerns:

- Provide targeted interventions for women in vulnerable professions, such as housemaids, laborers, and medical personnel, to ensure their safety during night-time commutes.
- Implement measures to support married women in balancing family responsibilities and personal mobility.

5.3.4 Promote Safe Public Transportation:

- Enhance the safety and accessibility of public transportation, especially bus stops, to reduce the fear of harassment and encourage night-time travel.

5.3.5 Raise Awareness and Strengthen Policies:

- Increase awareness about the role of social organizations in advocating for female pedestrian safety.
- Strengthen existing policies and ensure their effective implementation to build public confidence and encourage women to venture out at night.

5.3.6 Mitigate Environmental Barriers:

- Develop strategies to address extreme weather conditions, such as providing sheltered walkways, to ensure women's safety and comfort during night-time travel.

By addressing these factors comprehensively, it is possible to create a safer and more inclusive environment for female pedestrians in Dhaka, thereby enhancing their mobility and overall quality of life.

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