Investigating gender sensitive public spaces in Cairo using women safety audit

Manar Roshdy [1]

1 Ain Shams University

Manar_roshdysalah@yahoo.com.

Abstract

Cities, where everyone should live together in a complementary way, are found designed and built with gendered biased policies and vision. However, women and men have different basic needs in urban public spaces, both practical and strategic gender needs, all of which must be taken into consideration. Basically, providing these needs is the responsibility of decision-makers to translate them into legislation and laws then urban projects that meet women's needs and rights. Therefore, urban legislation is introduced through a gender perspective that considers all women, despite their age, educational level, social background, abilities, etc. The problem lies in women's loss of their rights in urban strategies, thereby limiting their presence in urban public spaces and their participation in decision-making. There are some factors that contribute to women's disappointment in being a part of their community, which affects their everyday life experiences and decisions, the situation of women in such places leads to their lack of comfort, safety, and belonging. Add to them the limited available of safe urban public spaces, especially in Egypt. This study examines the issues of women and girl's safety and inequality of the use at public spaces in Cairo, Egypt. It will then examine the factors of design consideration in creating safe built environment in public spaces and gender sensitive planning in public spaces which aims to understand gender sensitive issues, concerns, and the safety measures. Within this broad aim, analysis of chosen public spaces of Cairo city and to prepare urban design guidelines proposal for improving the safety of women and girls.

Keywords: Gender sensitive, Place making, public space, Urban planning, Women, Safety, Urban design.

1. Introduction

1. Public space and Gender

Gender context of the safe city is indicated in the Sustainable Development Goals: ensure healthy lives and promote well-being for all at all ages (Goal 3: Good health and well-being); achieve gender equality and empower all women and girls (Goal 5: Gender equality); ensure availability and sustainable management of water and sanitation for all (Goal 6: Clean water and sanitation); make cities and human settlements inclusive, safe, resilient and sustainable (Goal 11: Sustainable cities and communities). Gender-sensitive requirements for a safe city, presented in the system of Sustainable Development Goals, should be included in the context of projects for the design and development of public spaces of cities. Particular attention should be paid to the implementation of a comprehensive survey of urban facilities/locations and the measurement of gender-sensitive parameters of urban infrastructure. Creation of a safe space is possible due to the improvement of such infrastructure elements as transport, street lighting, sanitary facilities, playground equipment, etc. Design of public spaces

conferred with proper urban planning and design standards along with safety checklist plays a major role in the prevention of sexual harassment and violence against women outside their homes and workplaces. These spaces can offer lesser opportunities for violence against women and girl children per appropriate design. Women have higher levels of fear of crime and are more at risk and insecure in public spaces that are rendered unsafe by virtue of their bad design, isolation, or inadequate and poor maintenance.

2. The Relationship between Gender and Urban Planning

For more than three decades, ending violence and inequality against women has been the key aim of the international feminist movements but the outcome is insignificant. Women often experience different forms of violence and harassment in public spaces. The issue of employing a gender-based perspective in urban planning is related to the question of how the city contributes to supporting and organizing gender roles and stereotypes. It's about inverting urbanism that has been designed by and for men to develop a city that is also for women and all human groups, to be experienced in a gendered manner. There is a relationship between gender and urban planning, where urban planning strategies are concerned with individuals' safety, comfort, and sense of belonging (Carmona, 2003, p. 136). Yet, many factors contribute to a woman's disappointment to be a part of society, forcing her to stay at home and give up determination for herself' sake and her future. These factors are found in a city with poor urban infrastructures such as dark or weakly lit streets, abandoned parks and empty lots, badly maintained public spaces, inadequate signage, lack of public toilets, etc.

### 3. Consideration of Women's Needs in Urban Public Spaces

Urban public spaces should be characterized by openness, democracy, and equality to meet the various needs, both physical and spiritual, of a diverse population and encourage inclusivity. The assessment of a typical public space depends on different elements such as lighting, landscaping, visibility, motorized traffic, pedestrian traffic, urban furniture, potential hiding spots, signage, security personnel, nearness to other public places, provision of nearby emergency services, and easy access to public transport. Each of these elements should be given a particular consideration from the perspective of women, according to their needs and responding to other different specific circumstances (Livingston, 2019; UN Women, 2010). It's a participatory process by community members especially women to create that desired public space that fits all and everyone – women, men, children, young people, and people with disabilities. It depends on how they express themselves in and interact with urban public spaces.

An inclusive urban public space requires multiple characteristics of spatial determinants such as accessibility, safety and security, as well as providing areas disparate in privacy. Creating a welcoming public space with signs for easy wayfinding, good lighting, close to different means of transport and gratis entry is a right for everyone (Kneeshaw, 2018). It's clean with a high ratio of greenery. In addition, it includes mixed uses for diverse user groups at different times of the day. It has other advantages such as providing a female workers group. These needed characteristics vary from a woman to another, according to her abilities, age, social situation, level of education as well as her cultural background. For example, a mother needs to have a close vision of the playground area, unlike an elderly woman that will not have the same needs but wide sidewalks for slow-moving traffic (UN Women, 2010).

4. Egypt's Crisis

Sexual harassment of women and girls in public places is prevalent and well documented in Egypt. In a 2008 study of about 1,010 women and 1,010 men in Greater Cairo, 83 percent of Egyptian women and 98 percent of foreign women respondents reported they had been sexually harassed (Hassan, Abul Komsan, and Shoukry 2008, 16). A 2013 UN Women study revealed that 99 percent of 2,332 women sampled from seven governorates across rural and urban contexts, including Cairo, Alexandria, Ismailia, Gharbia, Dakahleya, Assiut, and Qena, had been sexually harassed (El-Deeb 2013, 6). Additionally, a 2014 study by Harass Map reported that 95 percent of three hundred women surveyed in Greater Cairo experienced sexual harassment (Fahmy et al. 2014, 6). According to Thomas Reuters Foundation, based on a survey took place on 2017, Cairo is on the top list of 19 mega cities that are dangerous for women, followed by Pakistan , Congo and India.

Figure 1. Reuters survey to most dangerous mega cities.
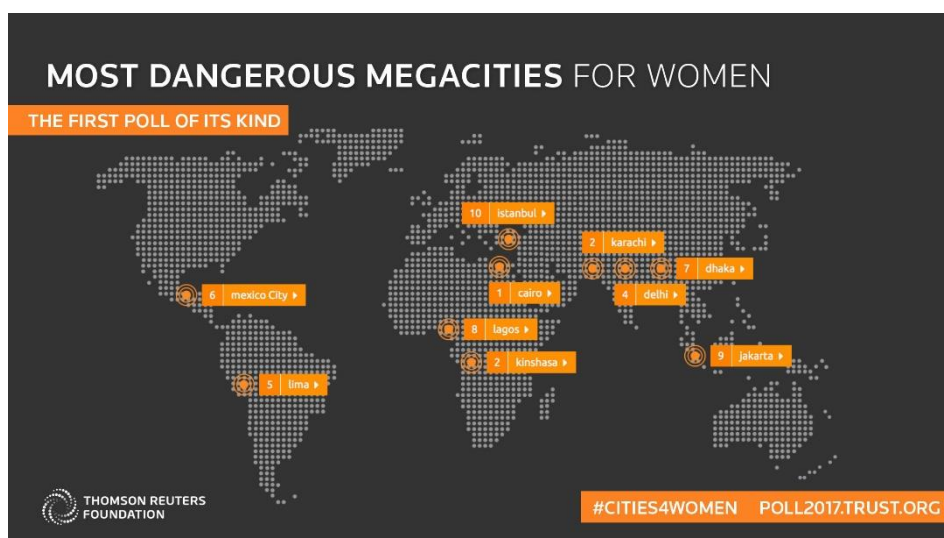
"Everything about the city is difficult for women. We see women struggling in all aspects. Even a simple walk on the street, and they are subjected to harassment, whether verbal or even physical," said high-profile Egyptian journalist and women's rights campaigner Shahira Amin.

Between 2005 and 2010, in contrast, anti–sexual harassment interventions in Egypt by women's and feminist non-governmental organizations had focused largely on raising awareness and improving laws and policies, although there were early efforts at bottom-up approaches that used art, music, and theatrical events; workshops and trainings held at El Sawy Culture Wheel, the Goethe Institute, and the campus of the American University in Cairo (AUC), Harass Map, established in October 2010

5. Safety Audit tool kit: Gender sensitive indicator

A gender-sensitive indicator measures gender-related changes in an urban area over time. By identifying the changes in the status and roles of women and men that one wants to achieve and knowing how one will measure them, one can analyze policies or urban interventions to see whether one is contributing to gender equality. Using gender-sensitive indicators can also

help to understand how changes in gender relations happen, which enables more effective planning of actions.

A Women's Safety Audit is the best available tool for collecting information on public perceptions of the urban safety in relation to the urban design. Without proper knowledge of these public perceptions and experiences, social and physical planners can not theorize why crime happens, politicians cannot formulate, prioritize and implement strategic policies and professionals cannot combat (fear of) crime itself. It is a powerful tool for change, bringing an entire community together. Women's Safety Audits help create a more comfortable environment for women, children, elderly, and people with disabilities - for everyone. (METRAC, 1998; Abusaada, Elshater, 2020; Abusaada, Elshater, 2021).

6. Harass Map and the Safetipin safety audit.

HarassMap was launched in October 2010 by going live with an online crowd mapping system, Ushahidi, a GIS-based technology that asks users to anonymously describe their sexual harassment experience and pinpoint the location of the incident on a Google map (Peuchaud 2014, i115, i118; Skalli 2014, 250),While Safetipin is Safety Audit tool, which is a participatory tool to collect and assess information about users' perceptions of safety in public spaces against nine variables: lighting, openness, visibility, crowd, security, footpaths, availability of public transport, gender diversity and feeling. Harassmap & safetipin uses this data to create reports, maps, and recommendations to urban planners, as well as dashboards which allow city governments to track the impact of interventions to improve urban safety. In

Figure 2. Harass map website.

this study, it is proposed to determine the number of gender-sensitive parameters of the city for creating the map for the safe Cairo-safe city context" The developed gender maps form a powerful tool for integrating the efforts of city authorities and society to improve the urban space and comfortable living of all members of the community. Using an interactive map allows to get information about an object directly from the placement on the map, by calling the help window, GIS map users could determine in real time the quantitative/qualitative gender sensitive characteristics of a city facility/location, and to minimize hazards in everyday urban practices.
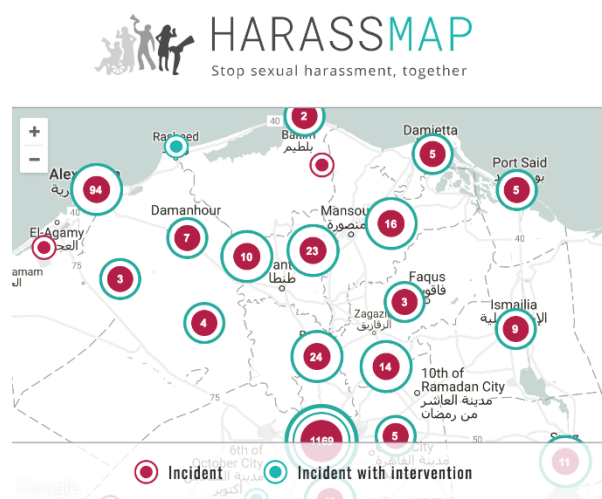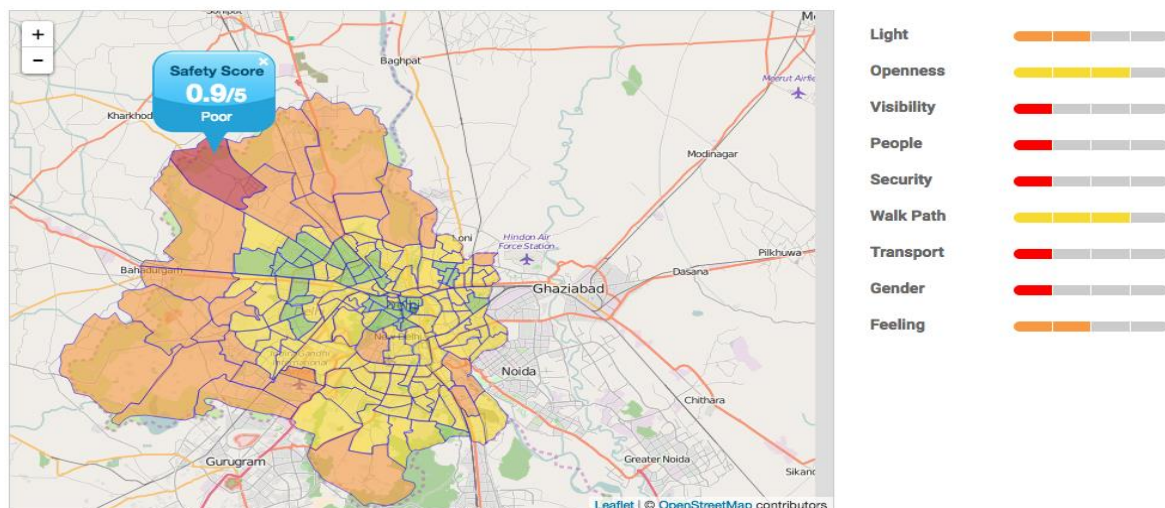
Figure3. Safeti pin safety score

Research Methodology

This research follows the analytical method as the aim of the research is to measure & asses the safety measures and urban gender inequality levels in some selected urban public spaces in Cairo & to understand more about the factors of design consideration in creating safe built environment in public spaces according to the needs & experiences of women, for a study to be successful and impactful in this sensitive area of research, data collection procedure should be designed to include as many vulnerable people as possible.

First: the selection Criteria of the chosen public spaces was selected upon different typology of these spaces (New Communities/ transit-oriented /waterfront(leisure)/Historical) to perfectly assess the gender sensitivity in most of the community typologies in Regional Cairo, Through the harass map website four of the most affected public spaces with different typologies will be selected. Most of the sites were visited over the weekends – day and night time, to ensure that the field visits were running during the peak hours.

Second: Data collection: The study includes two types of data. So, data was collected in terms of population, sex ratio, crime rates against women, government reports and media articles which are used for to identify the women sensitive issues and intensity of the study areas. The type of data collected are as follows:
- Primary Quantitative & Qualitative data collected through field visits to these chosen public spaces through observation, documented photos, Questionnaires & semi-structured interviews, these data have been collected under many indicators to ensure successful assessment of the public space through a gendered lens using Kobo tool box.

- Those indicators are: - Spatial Indicators (Accessibility/ Amenities presence and conditions & suffiency like signage, street lighting, public toilets …. etc.

- Use & users' indicators: (Users in the public space by age, gender and disability / Use of the space/functions day and night/Users feel of lacking in the space)

- Urban Infrastructure indicators

- Soci-Economic indicators (Harassment/cultural differences/drugs / street vendors….etc.).

Third: these data were filtered and cleaned into GIS data base for the four public spaces with different layers according to the indicators measured. According to these data each public space has a safety score through safetipin application.

Fourth: Qualitative data from the questionnaires and the interviews was analyzed to understand the needs & the experiences of the women that use these places safely and freely, then safety concerns will be detected.

Fifth: After analyzing all these data and making comparative analysis for the zones with the indicator mentioned, and after giving each zone a safety score , the data will be compared with the literature review of creation of safe , inclusive public space then gender sensitive design guidelines will be produced.
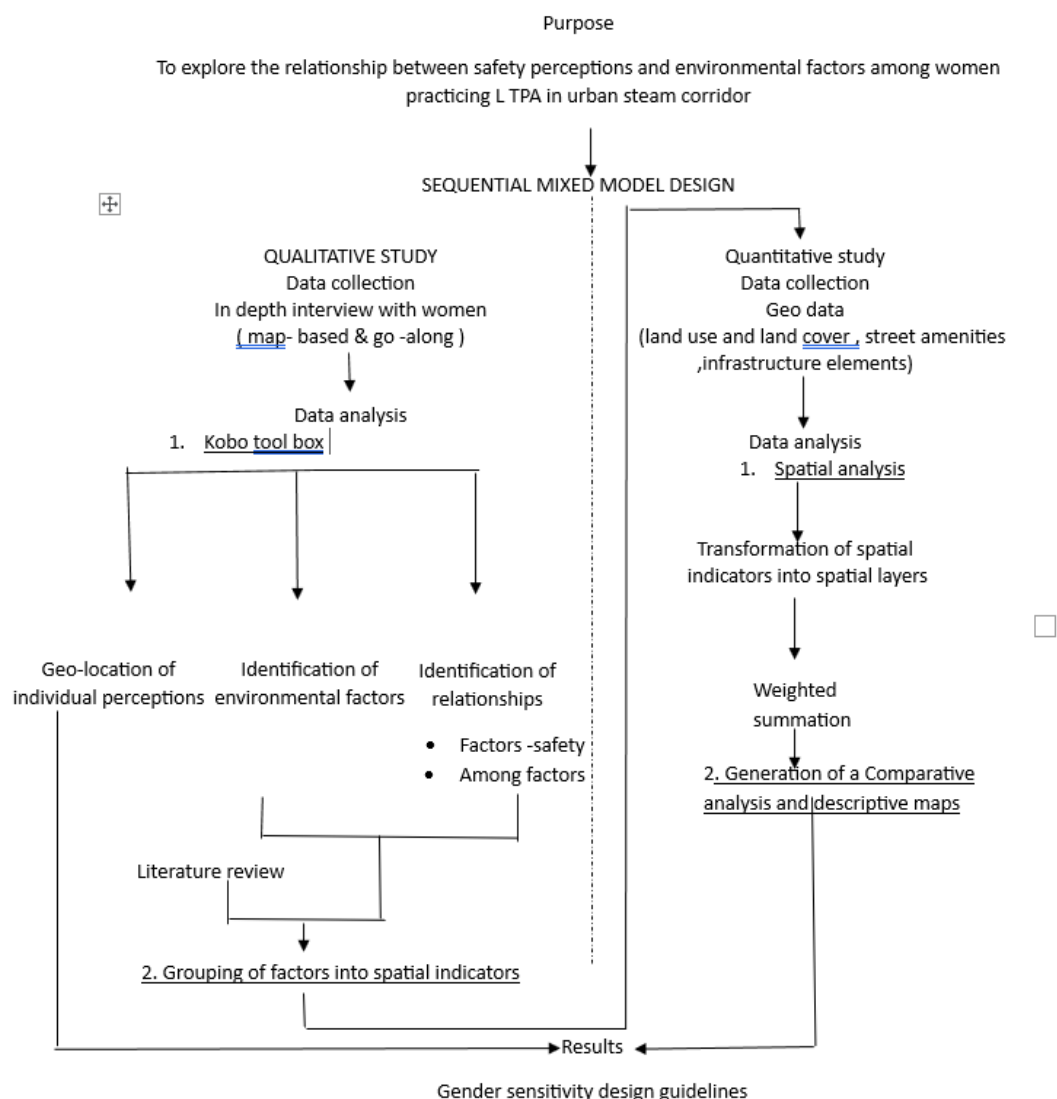
Figure 4. Methodology matrix

Study Areas

1. Tahrir Square (Transit-oriented zone)

It is a major public town square in downtown Cairo, Egypt. The square has been the location and focus for political demonstrations in Cairo since the early 20th century; the city's previous central square was Salah al-Din Square. The square is the northern terminus of the historic Qasr al-Ayni Street, the western terminus of Talaat Harb Street, and via Qasr al-Nil Street crossing its southern portion it has direct access to the Qasr al-Nil Bridge crossing the nearby Nile River.

The area around Tahrir Square includes the Egyptian Museum, the Folklore Arts House, the Mogamma government building, the Headquarters of the Arab League building, the Nile Hotel, Kasr El Dobara Evangelical Church, and the original downtown campus of the American University in Cairo.
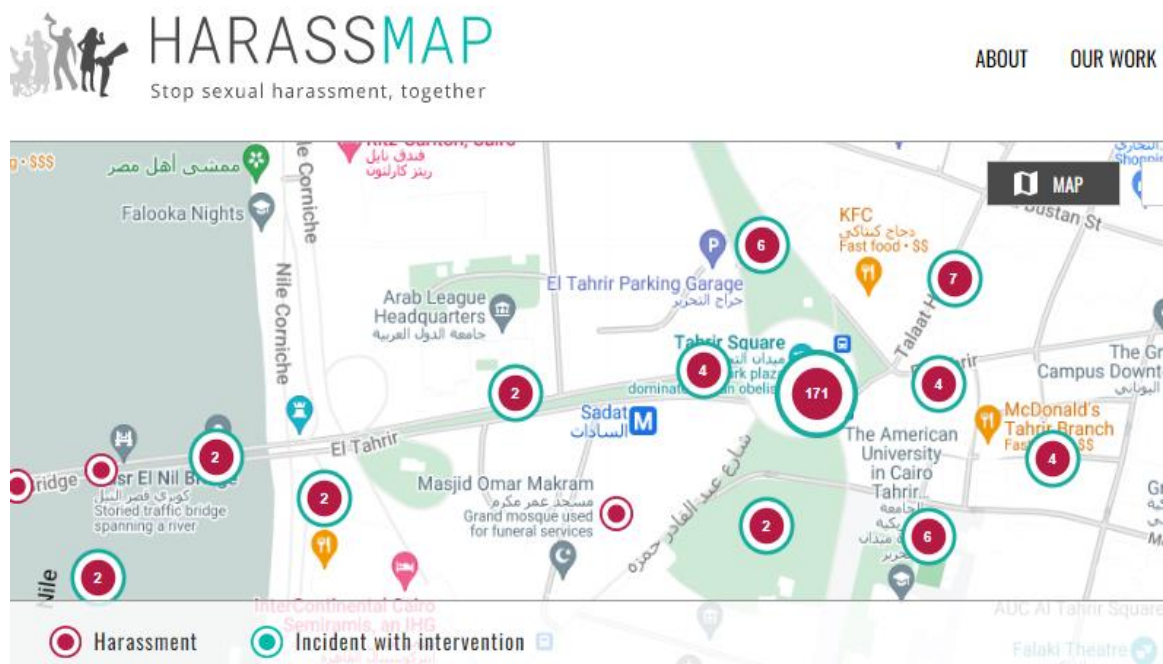

Figure 5 part of the Tahrir District on harass map website.

2. Al-Azhar & Hussein District. (Historical public space)

The old Fatimid – mamluk Islamic historical area which is a very crucial historical avenue for the foreigners . Khan El-Khalili dates to 1382 and is located in Cairo's old Islamic district. Since its inception, the marketplace has attracted visitors from all over the globe. More recently, it remains as one of the top tourist destinations in Cairo. unfortunately, this historical place according to (trip advisor.com), one of the most visited websites for foreigners to review touristic destinations, has a a very bad rates and reviews, mostly from women complaining about the sexual harassments from the vendors, the inappropriate infrastructure, cleanness of the space & how that place is not women-friendly at all. Not to mention the lack of security members, although harass map only shows 5 incidents only happen there.

Figure 6 Al-Azhar district on harass map website.

3.Masperotriangle & Mamsha-Ahl Masr (Waterfront zone)

The Maspero Triangle – a name derived from its triangle shape on the map- dates back to the Mamluk era and is one of Cairo's historic neighborhoods located at the east of Cairo. Moreover, the Maspero area houses the headquarters of the Egyptian Radio and Television Union, the Ministry of Foreign Affairs, Dar El Maaref Printing and Publishing House, the Italian Consulate, Abu El-Ela Mosque, Hilton Ramses Hotel, and the Royal Vehicle Museum. The Maspero Triangle development project is divided into a residential, commercial (Al wekala), and entertainment areas. It contains also Mamsha-Ahl masr which is A remarkable and refining Promenade for the Nile, This was done to give people better access to the waterfront, which can be difficult due to the
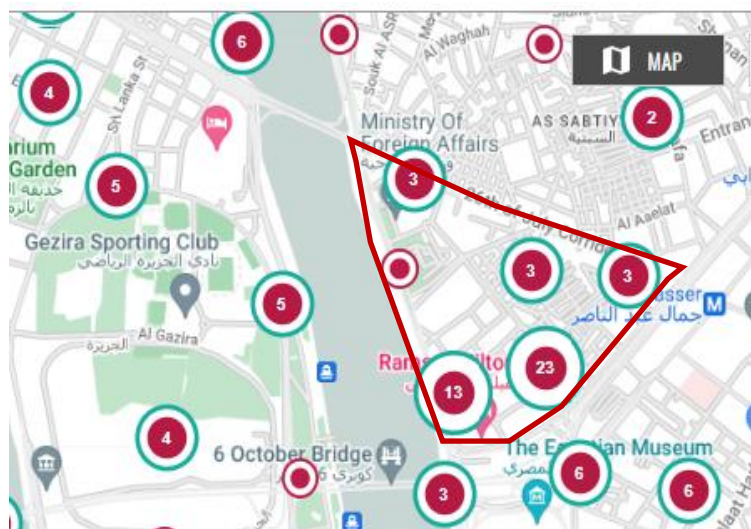

Figure 7. Maspero triangle district on harass map website.

privatization of several parts of the corniche allocated to clubs and restaurants.As we can see through the figure , plenty of women-sexual abuse happen in that public space,many of them during the wekalah market place due to chasing vendors, toktok transportation drivers, or young men who regurarly exists on the Cornish of the nile.

4. Alsheikh zayed District (New Settlements)

El-Sheikh Zayed City is one of the new suburbs Of 6th October governorate that was established in 1995. It locates about 38 KM in the northwest of Cairo downtown and 15 KM from Lebanon

Square, El-Mohandiseen District. It is divided into 20 districts with 4 neighborhoods in each district. Zayed City is distinguished by the very strategic location, bordered by Alexandria desert road on the north, 26th of July Corridor on the south and the city of 6th October City on the west. Health, education, and entertainment services are widely provided for the inhabitants of El-Sheikh Zayed City who are members of the upper class in Egypt.

There are numerous highly qualified medical institutes in the city such as Shiekh Zayed Specialized Hospital and Shiekh Zayed Central Hospital which are in the country. There are numerous Arab students living in El Sheikh Zayed city for learning in its private universities such as El Sheikh Zayed university, Nile University, and many other institutes. Additionally, there are numerous shopping centers in the city such as Hyper One Market and Park Avenue and others. Harass map shows very few incidents in that zone, mainly incidents that have been intervened by decision-makers in the district or by police officers.

Figure 8. Al Sheikh Zayed district on harass map website.

Qualitative study

Data Collection

A formulated and designed structured questionnaire will be uploaded to Kobo toolbox (see fig.10) which is open source mobile application. Capturing data in the field usually means using paper. By using a smartphone or tablet, field data can be collected with all the advantages that electronic data gathering brings (as a reference from The city-wide public space assessment tool kit by UN-Habitat) , The interviews followed a guideline consisting of open-ended questions plus a set of closed-ended questions to gather socio-demographic data. The topics addressed the types of physical activity practiced, with whom, when during the day, and where. The reasons for every answer were explored for a reflective conversation. This approach allowed the topic of safety to arise from the flow of the interviews as influencing the practice of physical activity, enabling further exploration of the women 's perception and her needs in the public space. In-depth interviews reported on women's safety perception, while externalizing their experiences in that public space they happen to be existing. The go-along technique consisted in interviewing and observing while accompanying women on outings along the frequented itineraries. In this case, the

interviewer marked the path travelled and geolocated the places at issue with photos and uploaded it to the application.

So, Data collection was divided into two assessments (according to the city-wide public space tool kit took as a reference):

- public space assessment: Identification of the open public spaces/ Types of the public space assessment /Physical facility assessment /Accessibility assessment Use assessment / Comfort assessment / Green coverage assessment. all these made using the application of kobo toolbox to assess the public space.

- Safety assessment: Perception of safety /safety assessment.

Finally, a paper of safety pin women safety audit (lighting /walk path condition / openness / visibility / public transport / security crowd in the place / gender usage) was demanded to be filled so that later each individual can make a safety score from safetipin application of that studied place out of 10.
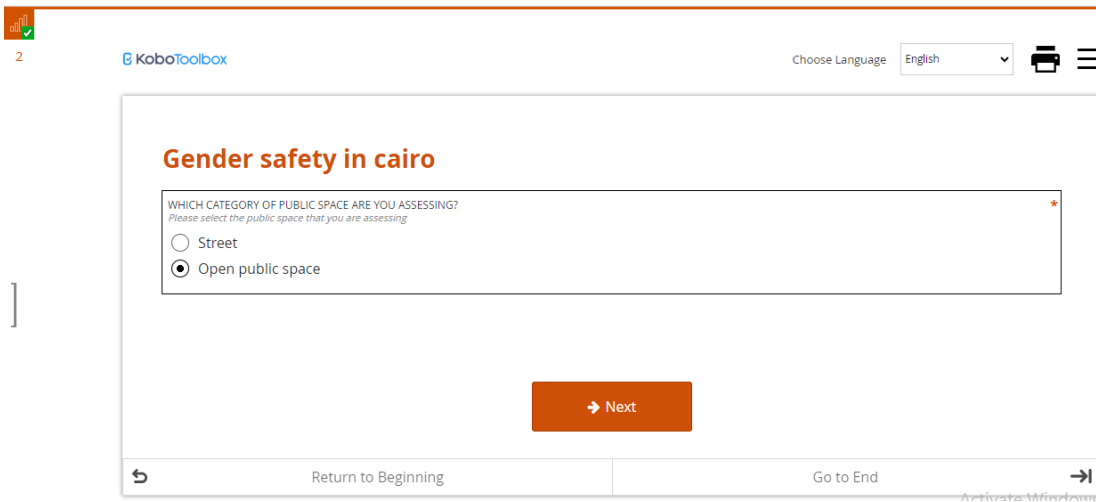

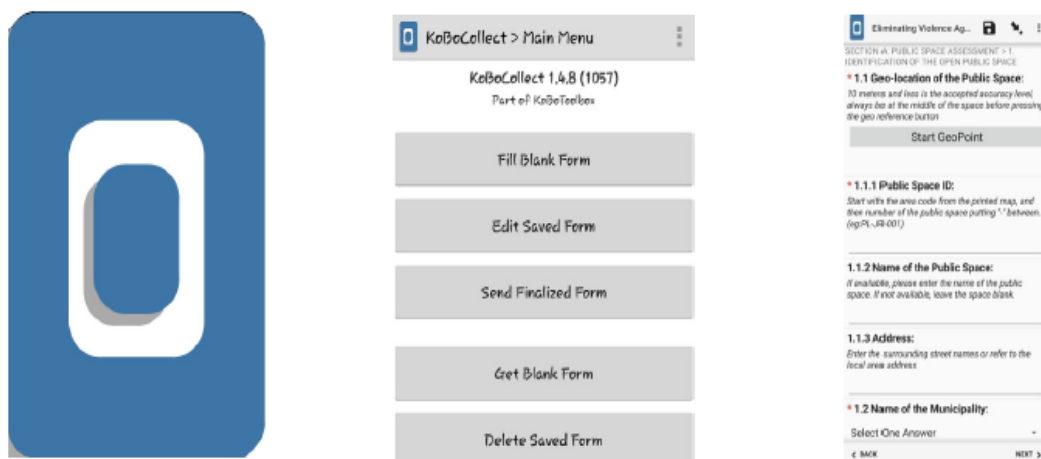
Figure 9. Kobo Toolbox questionnaire form

Figure 10. Kobo Collect Application Format

Quantitative study

In order to map the spatial indicators (taken from the kobo toolbox) and proceed with the spatial analysis, A GIS database made to each zone. This included all the existing open public spaces, the studied zone boundaries, and the main landmark of the public space. Updating the base map was critical prior to commencing the data collection, the main objective of this task was to validate the existing public space in terms of location, area, ownership, use, lighting, visibility, socioeconomic behavior and accessibility, street amenities from furniture to public toilets..etc . The spatial analysis was conducted, in two phases: (1) mapping of spatial indicators and formation of spatial layers and (2) generation of the safety index (score) upon those indicators and the safety concerns conducted from the interview and the observations done of that public space.

Data Analysis

The analysis was conducted to achieve the objectives set out for this paper and therefore it was categorized into three main sections, (a) general state of public spaces and (b) safety concerns in the open public spaces. C) the perception of the women needs toward that public space so that she can enjoy or to be capable to use the space. All the data collected from the field was used in the analysis to develop a spatial and non-spatial gap analysis. This was done by aggregating several indicators. Data analysis consisted of: (1) identifying the physical and social factors related to safety, and (2) grouping and translating environmental factors into spatial indicators. Transcriptions of the women's interviews were analyzed with computer-assisted qualitative data analysis using kobo toolbox server which have the ability to form data graphs, excel sheets that also have the geolocation of the person who was interviewd giving the study more accuracy to pinpoint the spatial indicator or the hazard that happened in that place (Fig 11), also within the application, photos of the public space in different angles were taken, A refining process of reading, coding and verifying was recursively carried out in two stage. During a coding stage, descriptive codes were assigned to safety-related themes and the corresponding quotations were geolocated on a Geo-document that is a digital map of the area of analysis., for each theme, categories and subcategories of (i) social and physical environmental factors, and (ii) safety perceptions were further identified. Afterwards, an analytical stage served to identify the relationships (i) between factors and safety, both positive and negative, and (ii) among the factors themselves. Safety increased for positive relationships and decreased for negative ones.

First, physical and social environmental factors were grouped and translated into spatial indicators

to

Figure 11. Kobo Collect Application Format that shows the Geo-spatial data entry.

allow for spatial analysis main categories of spatial indicators were identified: visibility, vegetation density, lighting, land use, ownership, street amenities (street furniture, public toilets) and level of infrastructure. More specifically, land use included seven subcategories referring to types of sites: streets, residential areas, industrial areas, parking areas, green areas, abandoned areas, and discotheques. These subcategories grouped physical factors (related to types of sites) and social factors (related to the stream users).

Second, A truly comfortable place is pleasant and welcoming for everyone regardless of gender, age, or ability. At the core of this is enjoyment and quality of stay. These are determined by perceptions of safety, cleanliness, the quality of smell in the space, micro-climate, and soundscapes (if it was too loud or too calm) were analyzed too from the observations of the public spaces and the interviewee's perspectives.

Third, among the questionnaire questions it was demanded to count the number of males and females during the time of the interview once at night and during the day time , to make a prediction on the majority of the gender who use the public space, This is because when certain groups, like women or girls, do not use a space, it is usually an indication that the space feels insecure to members of that group. Public spaces with an equal representation of both age and gender have often been perceived as safe.

Fourth, the public spaces street network accessibility of the four districts as be analyze also, research and experience globally show that living within walking distance of public spaces is positively linked to greater use and enjoyment of the amenities, and consequently, multiple outcomes. An average distance most people will typically be willing to walk before opting to drive is 400 meters, coverable in five minutes. Others use 1,000 meters, coverable in ten minutes. It is however important to note that aside from distance, the quality of the streetscape, street network and permeability, weather and micro-climate, and safety considerations play a critical role in determining how long people would be willing to walk. Many people will walk only if it is easier, safer and more interesting than driving. Moreover, From the open – end questions made to interviewees it was asked if they had any obstacle reaching a that public space they were interviewed upon, to be analyzed later if that place has a weak accessibility or not later.

Finally, away from culture and religious extremism, perception of safety in public space was shaped by a variety of factors including lighting, the presence of security guards in the vicinity, level of maintenance, availability of evidence of vandalism, visual access, and eyes on the street among others. Within the four districts, interviews were conducted for users of public spaces. These interviews ensured that there is an age and gender balance to limit subjectivity. An analysis of responses of the women safety concerns was made, it revealed that feeling of unsafety, harassment directed to women and infrastructure problems, traffic and busy places were the main safety concerns in open public spaces.

Results

A comparative analysis was made between the four districts and series of maps of each district was produced through the GIS program, each of the four districts have infrastructure analysis map which shows the current status of the urban infrastructure of the public spaces and streets of that district. A street amenities analysis map (Street furniture , lighting fixtures , garbage pins , shading materials , public toilets , garages , signage) was created including accessibility moreover, socio-economic behaviors maps were produced. Also, a safety score was created to each zone by taking an average number of the safety scores that were measured by the safetipin application from the multiple public spaces and the streets in each of the four districts.in addition to that the safety concerns and women 's perceptions and needs into that public space were shown and produced as graphs and so does the percentage of the gender and their age who mainly uses that space .

Spatial indicator (street amenities & accessibility) analysis

A comparative view (See Table 1) and analysis of various spatial indicators across different districts within Cairo, shedding light on the disparities in accessibility, cleanliness, amenities, and overall urban infrastructure.

Beginning with Tahrir Square and the Downtown District, this area exhibits commendable accessibility, boasting great access to multiple modes of transportation (metro , bus and cycling lanes) , facilitating easy movement for residents and visitors alike. However, it contends with a mixture of cleanliness, as garbage can be found in various places, with sporadic cleanliness efforts visible in specific spots. Lighting stands generally sufficient in the main thoroughfares, yet some of the side streets suffer from inadequate illumination, potentially posing safety concerns, especially during evenings or at night. Despite the adequate signage, the availability of bins is lacking, contributing to issues in waste management and good efficient public seating areas and street furniture. The district is also characterized by heavy noise and traffic levels during the day, but unfortunately, public bathrooms are nonexistent, adding to the inconvenience faced by individuals frequenting the area.

In contrast, the Al Azhar District faces considerable challenges, especially in terms of accessibility, where poor access to transportation facilities hampers the ease of commuting for its residents. The area struggles significantly with garbage accumulation, with widespread uncleanliness presenting an evident issue for the community. Lighting is notably inadequate, particularly within residential areas, leading to concerns about safety and visibility. Furthermore, the insufficiency of signage, bins, and street furniture exacerbates the challenges faced by the community. The area grapples with heavy noise and traffic throughout the day, coupled with the absence of public bathrooms, further complicating the daily experiences of individuals frequenting this district.

Moving on to the Maspero Triangle and Mamsha Ahl Masr, the region experiences moderate accessibility, with some access to transportation facilities, although there are limitations in certain areas. Garbage issues persist, contributing to an unclean environment, particularly noticeable except for Mamsha Ahl Masr, which exhibits relatively cleaner surroundings. Lighting remains somewhat sufficient, although certain sections lack proper illumination, especially in residential zones. Like other districts, the scarcity of signage, bins, and street furniture poses challenges in maintaining cleanliness and providing essential amenities. Noise and traffic congestion are prevalent during the day, while public bathrooms are practically non-existent except in specific commercial and administrative complexes, restricting access for the public.

In contrast, Alsheikh Zayed emerges as a bustling and comparatively better-planned district in greater Cairo region. Offering great accessibility with well-established transportation and parking facilities, this area sets itself apart. It maintains cleanliness relatively well, with minimal garbage accumulation, especially in comparison to other districts. Lighting is fairly sufficient, though some residential areas may require additional illumination. There is a noticeable presence of signage, sufficient bins, t a lack of street furniture. The district experiences less noise and traffic congestion during weekends, providing a more tranquil environment, and public bathrooms are available within commercial and administrative centers, catering to visitors' needs.

The absence of artificial shade across various districts in Cairo, including Tahrir Square, Al Azhar District, Maspero Triangle and Mamsha Ahl Masr, and Alsheikh Zayed, presents a common issue in the urban landscape. This absence impacts the livability and attractiveness of these areas, subjecting individuals to direct sunlight and potentially affecting health and comfort. The lack of shaded spaces limits the functionality of public areas, reducing their appeal for social activities and recreation during hot weather. The need for integrating shade elements like trees or shelters emerges as an opportunity to enhance these districts' usability, comfort, and aesthetic appeal, encouraging outdoor engagements while addressing residents' and visitors' well-being. The absence of artificial shade in public spaces across various districts in Cairo highlights a gender-sensitive issue. The lack of shaded areas affects everyone utilizing these spaces, particularly impacting women and girls. In hot weather, the absence of shade can significantly deter women's use of these areas due to concerns about heat exposure, discomfort, and health risks. Women might avoid or limit their time in these locations, impacting their access to public spaces and their ability to engage in various activities.

Street amenities play a pivotal role in fostering female inclusivity and ensuring safety in public spaces. Adequate and well-maintained amenities such as public restrooms, seating areas, lighting fixtures, signage, and shelters offer women a sense of comfort, security, and convenience. Restrooms, specifically, are crucial for women's access to public spaces, offering them necessary facilities and privacy. Seating areas provide respite and comfort, allowing women to rest or wait without feeling vulnerable. Proper lighting enhances visibility and reduces the risk of harassment or assault, especially during darker hours. Clear and informative signage assists in wayfinding, reducing confusion and potential anxiety in unfamiliar areas. Shelters protect against extreme weather conditions, ensuring women's safety and comfort. When these amenities are well-designed, strategically located, and well-maintained, they significantly contribute to creating gender-sensitive public spaces where women feel welcome, safe, and empowered to participate fully in urban life.

Table 1. Spatial Indicators Analysis

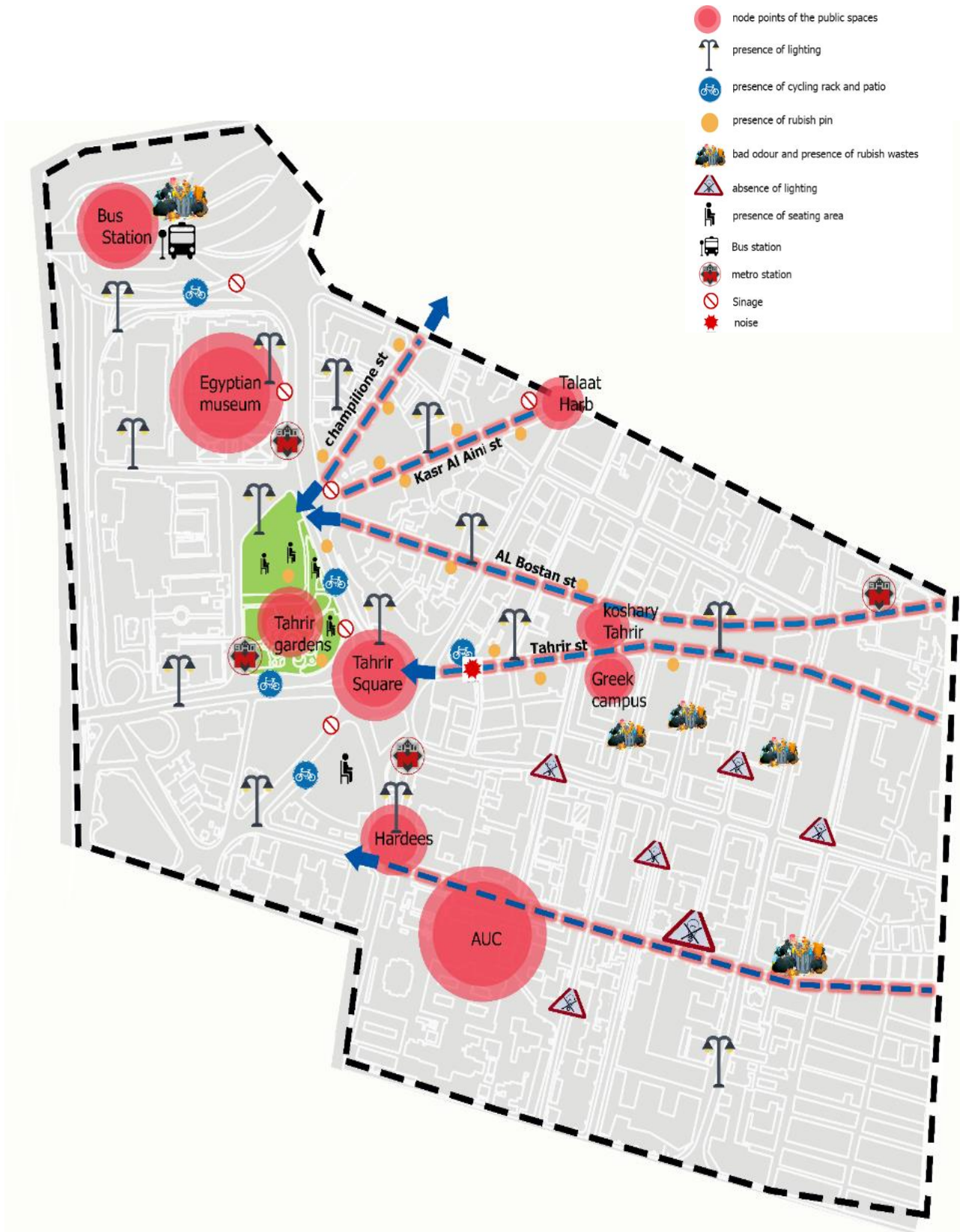| Spatial Indicator	Tahrir square and down town district	Al Azhar district	Maspero triangle and Mamsha ahl masr	Alsheikh Zayed most lively district
Accessibility (entrances / bus station / metro station / cycling)	Great accessibility	Poor accessibility and no parking lot available	Moderate accessibility, no parking lot available but metro Nasser exists	Great accessibility, can be accessed easily and many parking lot and bus stations
Garbage wastes and odour	Exist in many places but also in some places it was partially clean	Exist in many places (very dirty)	Exists in many places (very dirty) except mamsha ahl masr	Very clean
Lighting fixtures	Sufficient lighting but in side streets very low lightings exists	Sufficient lighting in touristic places but inside residential streets very low lightings exist	Sufficient lighting	Not sufficient lighting in residential areas but the entertainment area such as arkan has good quality lighting
Signage	sufficient	Not sufficient	Not sufficient	sufficient
bins	Not sufficient	Not sufficient	Not sufficient	sufficient
Artificial Shade	Don't exist	Don't exist	Don't exist	Don't exist
Street Furniture " seating areas"	Exits and sufficient	Exits but not sufficient (only at muez street)	Exits and sufficient	Don't exist
Noise and Traffic	Very loud and partially crowded at daytime	Very loud and heavily crowded at daytime	Very loud and heavily crowded at daytime	Quiet and partially crowded on weekends only
Public bathroom	Don't exist	Don't exist	Don't exist	Exists only in commercial/ administrative malls like capital and arkan plaza

**Figure 12. Example of spatial indicator map produced by GIS for tahrir
and downtown district.**

Socio-economic indicator

The Tahrir Square and Downtown District, known for its diverse land uses, encompasses governmental, educational, cultural, and commercial sectors alongside residential and touristic areas. The district features travel agencies, electronic shops, and a range of commercial outlets. Unfortunately, this district is marked by frequent incidents of verbal harassment. Street beggars are noticeable, and youth fighting is also reported, although street vendors operate at a moderate level here.

In contrast, the Al Azhar District stands out for its commercial and residential zones, as well as government and entertainment spaces. Commercial activities mainly revolve around clothing and cooking utensil shops. Similar to the Tahrir Square area, the Al Azhar District faces numerous incidents of verbal harassment and sees the presence of street beggars. Additionally, reports of youth fighting exist, and street vendors are notably more prevalent compared to the Tahrir Square area.

Moving to the Maspero Triangle and Mamsha Ahl Masr district, it exhibits a blend of commercial and administrative spaces along with entertainment hubs. The commercial sector, particularly represented by Alwekala shops, defines this district. It is also home to various entertainment centers like cafes and restaurants concentrated in Mamsha Ahl Masr. While verbal harassment is frequent in this area, street beggars are observed, but reports of youth fighting are limited. Interestingly, street vendors are visible only in the Wekala area within this district.

Lastly, the Alsheikh Zayed Most Lively District portrays a bustling landscape defined by its dynamic commercial and administrative ventures along with a rich array of entertainment options. This district stands out for its thriving mix of diverse commercial establishments and robust administrative centers that actively operate within its bounds. Unlike the other districts under consideration, this area exhibits a relatively lower occurrence of verbal harassment incidents. Reports of youth fighting are infrequent, contributing to a more peaceful environment compared to the other locations. While street beggars are noticed in this vibrant area, it is notable that street vendors are conspicuously absent, making this district distinct in this aspect. Overall, this district presents a lively and multifaceted atmosphere, thriving with various commercial activities and administrative endeavors, while maintaining a relatively lower incidence of certain social issues like verbal harassment and youth conflicts.

In summary, while the Tahrir Square and Downtown District and the Al Azhar District showcase mixed land uses, the Maspero Triangle and Mamsha Ahl Masr districts lean towards commercial and entertainment zones, and the Alsheikh Zayed Most Lively District is known for its diverse commercial and administrative establishments. These districts exhibit varying levels of social issues like verbal harassment, street beggars, youth fighting, and the presence of street vendors, influencing the local social atmosphere.

Table 2. Socio-economic analysis

| Socio-economic	Tahrir square and downtown district	Al Azhar district	Maspero triangle and mamsha ahl masr	Alsheikh Zayed most lively district
Land uses	Governmental Educational Cultural Resi-commercial "	Commercial Touristic and historical Residential Educational	Commercial Governmental Entertainment	Commercial Administrative entertainment
Economic activities	Travel agencies and electronic shops and many diverse commercial shops in down towns.	Diverse commercial shops mainly cloths and cooking utensils	Commercial shops "Alwekala" Entertainment "mamsha ahl masr "	Mainly cafes and restaurants hubs
Informal Street Vendors	Exists in Side streets	Heavily existed , even in touristic places	Exists in Wekala area only.	Don't exist
Verbal harassment	A lot of verbal harassment happened	A lot of verbal harassment happened	A lot of verbal harassment happened " except in mamsha ahl masr"	Slightly happened
Street beggars	Exists	Exists	Exists	Don't Exist
Youth fighting	Exists	Exists	Exists	Don't Exist
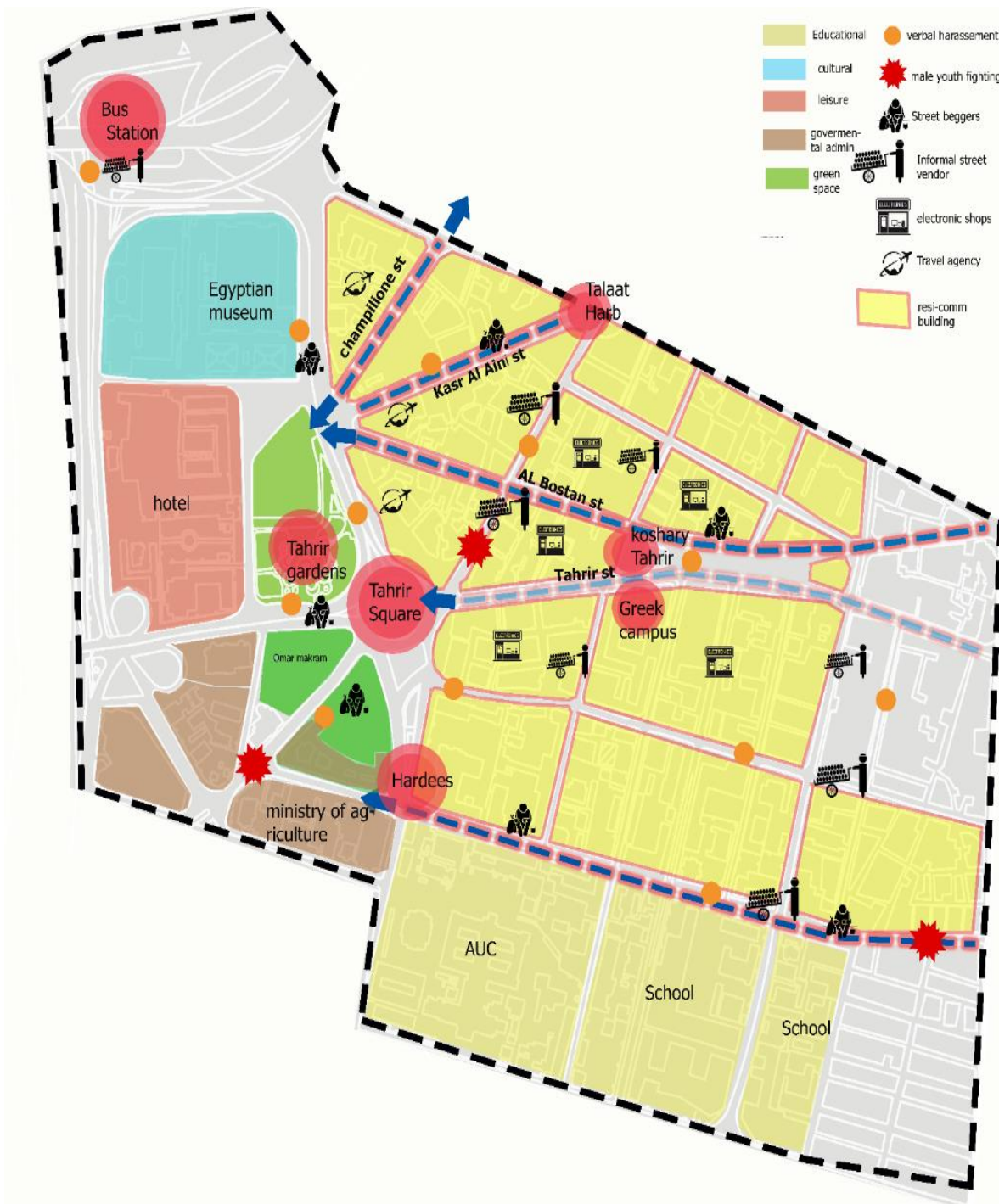
Figure 13. Example socio economic land use map of tahrir zone produced by GIS

Users' indicator analysis

The utilization of public spaces in those four districts involves diverse gender and age groups, reflecting various social dynamics. Women of different ages engage in public spaces, although the degree of their presence may vary based on social norms, safety concerns, and cultural expectations, Usually, Young girls and women don't go out after 10 pm. Typically, women aged 18 to 25 make up a substantial portion of public space users, comprising approximately 60% of this demographic group. This age range often represents young adults and students who frequent public areas for socializing, studying, or leisure activities.

Simultaneously, men in the same age bracket (18-25) also demonstrate significant presence, amounting to about 65% of this age category's public space users. These young men might engage in public spaces for various reasons, including social gatherings, sports, or community interactions.

Moving to the next age group, both men and women between the ages of 26 and 35 continue to maintain an active presence in public spaces, constituting around 65% of users within this category during the daytime. These individuals might include working professionals, parents, or individuals seeking recreational opportunities, thereby contributing significantly to the diversity of public space utilization.

Similarly, individuals aged 36 to 60, both men and women, demonstrate a consistent presence in public spaces, contributing around 65% of users in this age range. This demographic might include professionals, parents, or elderly individuals engaged in various activities such as shopping, socializing, or leisurely pursuits.

Additionally, young men and women aged 11 to 17 also participate in public spaces, representing roughly 50% of this age group's presence in these areas. This demographic may include school-going teenagers engaged in social activities, education-related ventures, or leisurely pursuits in public spaces.

Youthful Dominance
The graph clearly showcases a youthful presence in the public space. The highest percentage of users falls within the 18-25 age group, with both men and women significantly outnumbering older individuals. This suggests a vibrant and energetic atmosphere fueled by young adults seeking social connection and exploration.

Shifting Demographics
As we move beyond the 18-25 category, a noticeable shift occurs. User percentages decline across most age groups, indicating a possible decrease in engagement as people transition into different life stages. Interestingly, women in their 26-35 and 36-60 age ranges maintain a more consistent presence compared to their male counterparts.

Inclusivity for All Ages:
While the younger generations dominate, the graph also reveals a heartwarming testament to inclusivity. Children, both boys and girls, contribute their youthful energy to the space, while adults in their prime (26-35 and 36-60) find their niches, adding to the diversity of users.

A Space for Elderly Women

In a surprising twist, elderly women (61+) surpass elderly men in terms of public space usage. This suggests that the spaces offers a welcoming and supportive environment for older women to connect, socialize, and engage in activities that enhance their quality of life in the four districts.

This analysis is vital as the absence of these groups often signals a sense of insecurity or unease within that specific space. Public areas that foster a diverse blend of age ranges and genders are often perceived as secure and appealing locations. The graph shows that there is quite large existence of females with different ages using the public spaces. Females tend to be in groups rather than being alone , not like solo men who usually visits the space regularly
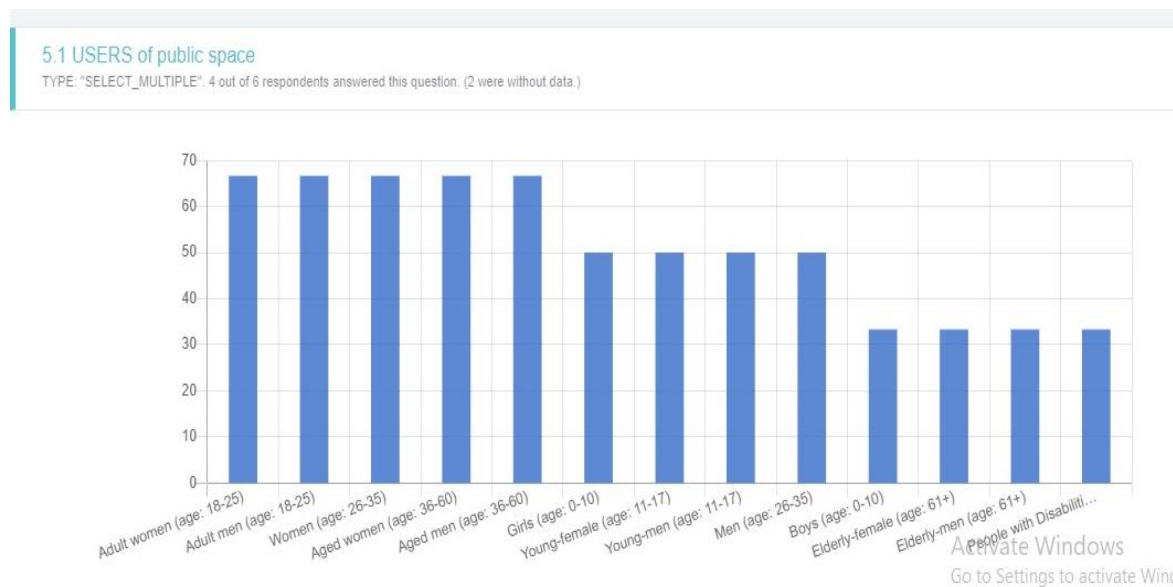
Figure 14. the graph shows the type of users in the space produced by Kobo toolbox.

Urban infrastructure

As shown in (table 3) Tahrir Square and the Downtown District demonstrate commendable standards in pedestrian pathways, characterized by wide and well-maintained walkways. The area displays a conscientious effort in nurturing greenery, especially in Tahrir Plaza, with an installation of multiple trees and flower beds. However, the presence of greenery in downtown Cairo is inadequate. Parking facilities primarily rely on Tahrir Garage, albeit requiring fees for usage. Notably, drainage systems are missing in this zone, posing potential challenges. The provision of cycling racks ensures accessibility for cyclists, a thoughtful feature lacking in some other districts. Overall, building conditions in this region are generally satisfactory, with structures being well-maintained.

In stark contrast, the Al Azhar District depicts a contrasting urban infrastructure scenario. Pedestrian pathways suffer from severe limitations, being narrow, poorly maintained, and, in several areas, are even broken. Greenery is virtually absent, with negligible presence, and parking lots are notably absent. Drainage systems are present only in certain narrow streets, while cycling racks are altogether missing. The condition of buildings varies, with moderate status in touristy and commercial zones but significantly deteriorating in residential streets.

The Maspero Triangle and Mamsha Ahl Masr zones present a mixed picture regarding urban infrastructure. Pedestrian pathways exhibit a contrasting status; the pathways in Wekala and Maspero exhibit severe deterioration, while those in Korniche and Mamsha Ahl Masr maintain satisfactory conditions. Greenery is predominantly concentrated in Korniche, with new flower beds installed, whereas its existence in other areas is moderate or negligible. Parking lots are non-existent, drainage is sporadically present, and cycling racks are limited to specific areas. Building conditions are moderately maintained throughout the region.

Conversely, the Alsheikh Zayed Most Lively District showcases commendable urban infrastructure. Pedestrian pathways enjoy wide spaces and are well-maintained, ensuring ease of mobility. Although greenery exists in moderate amounts in residential streets, the region boasts lush greenery in social commercial hubs like Arkan Plaza and Capital. This district excels in providing ample parking spaces and boasts excellent building conditions. However, drainage systems are not in place, hindering its infrastructure completeness.

Overall, the disparity in urban infrastructure among these districts underscores the need for comprehensive improvements in various areas such as pedestrian pathways, greenery, parking facilities, drainage systems, and cycling amenities to enhance the overall quality and functionality of these spaces.

The broken sidewalks were often a result of various factors, including wear and tear due to heavy foot traffic, weather conditions like heat and moisture, inadequate maintenance, or underlying issues with the infrastructure's foundation. Some ongoing construction or renovation projects might have also contributed to temporary disruptions or damages to sidewalks. Local authorities and municipal bodies were typically responsible for sidewalk maintenance and repairs. Efforts were made intermittently to address these concerns, with periodic repairs carried out to fix damaged sections. However, due to the extensive nature of the areas and the volume of foot traffic, complete resolution of sidewalk issues could sometimes be challenging and time-consuming. These issues could pose obstacles and safety concerns for pedestrians, especially individuals with mobility impairments or those using strollers or wheelchairs.

Table 3 shows Urban infrastructure comparative analysis between four districts.

Spatial Indicator	Tahrir square and downtown district	Al Azhar district	Maspero triangle and Mamsha ahl masr	Alsheikh Zayed most lively district
Pedestrian pathways	Very good status And wide	Very narrow and in bad condition and broken	In wekala and Maspero building was in very bad status and very narrow but korniche and mamsha ahl masr was in very good status	Very good status
Greenery	Sufficient in tahrir plaza (many trees and flower beds newly installed) but not sufficient in down town cairo	Barely existence	Only exits in korniche area (new flower beds were planted)	Moderate existance in residential streets , very sufficient existence in the social commercial hubs like arkan plaza and capital
Parking lot	Tahrir garage exits with fees	No parking lots at the zone	No parking lot in the zone	Lots of parking lots and garages avaiable
Drainage	No drainage was found	Drainage was found in narrow streets of al moski	drainage found in one of the substreets of wekala	No drainage found
Cycling racks	Exists	Don't Exists	Exists only at the nile kornich promenade	Exists
Buildings Conditions	Good status	At the touristic and the commercial areas has moderate status but in residential streets a lot of residential buildings has poor status	Moderate status	Excellent status

Photos taken during data collection process of the status of the Pedestrian pathways in tahrir and downtown zone.

Broken pathways in al Azhar zone

Pedestrian paths of Al-wekala in bad status" zone

Very good status of street status in al Zayed zone

Residential building and side streets in very bad status Alazhar / gamlya"zone

Safety concerns and women perception for the usage of public space

Accessibility and Public Spaces:

- Tahrir Square & Downtown: The high accessibility and open square layout can foster a sense of security during the day. However, narrow backstreets, poor lighting in side streets, and dense crowds, especially at night, can increase vulnerability.
- Al Azhar: Narrow, poorly lit streets, and limited entrances create a sense of enclosure, potentially increasing the risk of harassment or assault. The lack of public spaces also reduces safe havens for women.
- Maspero Triangle & Mamsha Ahl Masr: Similar concerns as Al Azhar apply in Wekala and older areas. However, Mamsha Ahl Masr offers a more open and well-lit environment.
- Alsheikh Zayed: Wide, well-lit streets and ample green spaces enhance security. However, limited public transportation options might discourage women from accessing the area independently at night.

Lighting and Visibility:
- Districts with insufficient lighting in residential areas (Al Azhar, Maspero, parts of Downtown) could pose higher risks in low-light conditions.
- Well-lit areas like Mamsha Ahl Masr and Alsheikh Zayed offer better visibility and potentially deter perpetrators.

Amenities and Support:
- Lack of public bathrooms in most districts' limits access to safe and private facilities, especially for women with limited mobility.
- Presence of public cameras and security personnel in busy areas like Tahrir Square can offer a sense of safety.
- Access to support networks like women's groups or safety hotlines in specific districts can provide crucial assistance in case of incidents.

Social Concerns:

- Verbal harassment: This unfortunate reality reported in several districts can affect anyone, including girls. Promoting awareness, bystander intervention training, and establishing accessible reporting mechanisms can create a more supportive environment for all.

- Street presence: The presence of street vendors and beggars, while a complex issue, can sometimes raise concerns regarding potential interactions. Fostering inclusive community initiatives and addressing underlying social issues can contribute to a safer and more dignified environment for everyone.

In the various districts examined, women often express a profound sense of unease and insecurity when navigating the streets, particularly after dark. The prevailing lack of adequate lighting in numerous areas contributes significantly to their discomfort, exacerbating feelings of vulnerability and fear. Insufficiently lit pathways and dimly lit corners amplify concerns about personal safety, as these conditions create conducive environments for potential harassment or unwanted encounters. The absence of visible security measures compounds these worries, leading women to feel exposed and anxious while moving through these spaces during nighttime. Addressing these issues of inadequate lighting and the implementation of visible security measures are pivotal steps

toward fostering a safer and more reassuring environment for women navigating these districts after sunset.
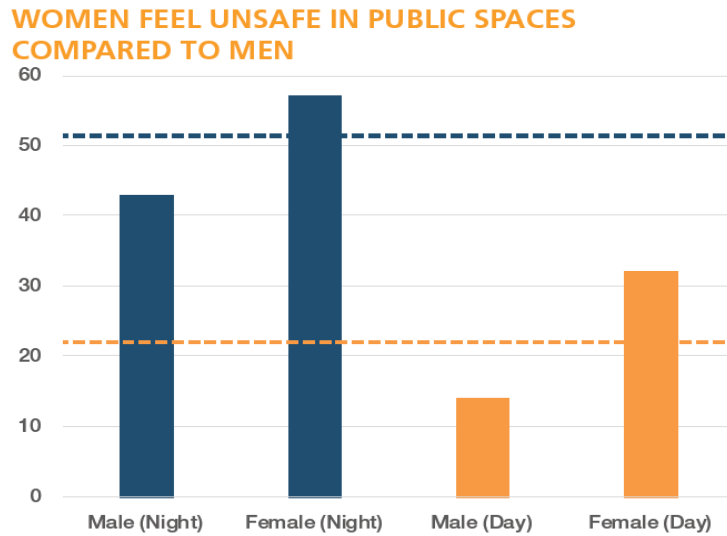
Figure 15. the graph shows the percentage of women who feel unsafe in public space to men produced by Kobo toolbox.

Overall:

- Open layout, good lighting, and public spaces: Districts like Mamsha Ahl Masr and Alsheikh Zayed offer a safer environment for women due to their openness, visibility, and amenities.
- Accessibility and connectivity: Good public transport options and well-connected streets in Tahrir Square can facilitate movement and support, minimizing reliance on isolated routes.
- Addressing vulnerabilities: Narrow streets, poor lighting, and lack of safe havens in Al Azhar and parts of Maspero highlight the need for targeted interventions to improve women's safety.

According to safetipin Application, each district got a safety score according to the parameters given before" lighting, accessibility, security, traffic and crowd , pedestrian path condition and vegetation status"

The upcoming table (see table 4) provides safety scores from the Safeti Pin application for four different districts: Tahrir Square and Downtown, Al Azhar District, Maspero Triangle, and Alsheikh Zayed Most Lively District. These scores are derived from assessments and user inputs in the Safeti Pin app, focusing on various parameters like lighting, accessibility, visibility, security, and overall safety perception within these areas.

Relating these safety scores to the previous analysis of urban infrastructure elements in these districts reveals certain correlations. The high safety score of Alsheikh Zayed Most Lively District (9.2/10) aligns with the presence of good urban infrastructure elements such as sufficient lighting,

well-maintained pedestrian pathways, greenery, adequate parking, and excellent building conditions. Conversely, the lower safety score in the Al Azhar District (5.6/10) coincides with poor infrastructure elements like narrow, broken pathways, minimal greenery, lack of drainage, and moderate building conditions.

Maspero Triangle received a relatively high safety score (7.0/10), which aligns with moderate to good infrastructure elements observed, such as good drainage in some areas, sufficient greenery in certain zones (Korniche ,mamsha ahl masr) see fig 18, and overall moderate building conditions. However, The Wekala district presents a distinctive blend of commercial vitality and cultural heritage, yet its safety landscape poses concerns, particularly for women. This bustling commercial zone, characterized by an array of shops and businesses, often grapples with safety challenges that can impact women's comfort and security. Narrow streets coupled with insufficient lighting create pockets of darkness, fostering an environment that might trigger feelings of vulnerability among women. Instances of harassment, albeit sporadic, have been reported, affecting the sense of safety for female visitors and residents alike. The absence of visible security measures and inadequate surveillance adds to these concerns, making it imperative to address these safety gaps to ensure a more secure and inclusive environment for women navigating the Wekala district. Efforts aimed at improving lighting, deploying effective surveillance, and fostering community engagement are crucial steps toward creating a safer and more gender-sensitive space within Wekala. Moreover, the safety score for Tahrir Square and Downtown (6.4/10) indicates slightly lower safety levels, corresponding to varying urban infrastructure elements - wide pedestrian pathways but inadequate greenery, lack of drainage, and mixed building conditions.

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Figure 18. the Photo of Mamsha ahl masr showing excellent public space features

In essence, the Safeti Pin safety scores seem to reflect the overall quality of urban infrastructure in these districts. Higher safety scores correspond with districts that have better infrastructure elements, while lower scores coincide with areas having inadequacies or deficiencies in infrastructure. This emphasizes the significance of well-maintained urban infrastructure in enhancing the safety and security of public spaces within these districts.

Table 4. Shows the Safety score produced by safetipin application.

Spatial Indicator	Safety score from Safeti pin Application
Tahrir Square and downtown	6.4/10
Maspero triangle zone and mamsha ahl masr	7.0/10
Al Azhar	5.6/10
Alsheikh zayed	9.2/10
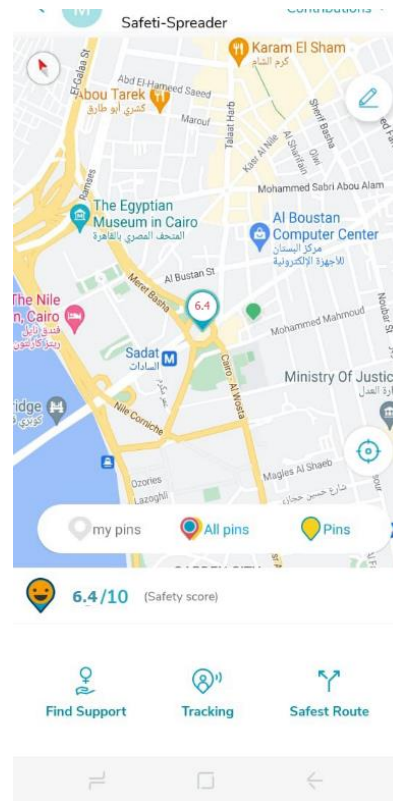
Figure. 19 Screenshot of safety pin application "Safety Scoring part"

Conclusion

This study examined the issues surrounding women's and girls' safety and inequality in public spaces within Cairo, Egypt. It delved into the factors influencing design considerations necessary for establishing safer built environments in public areas and explored gender-sensitive planning approaches. The primary goal was to comprehend gender-specific issues, concerns, and safety measures. The study included an analysis of selected public spaces in Cairo and proposed urban design guidelines to enhance the safety of women and girls within these areas.

This study reveals a tapestry of urban life across four distinct districts, each with its unique blend of infrastructure, amenities, and social dynamics. While accessibility, greenery, and safety vary significantly, each district offers its own charm and potential.

Tahrir Square & Downtown: Bustling hub with strong accessibility and diverse offerings, blessed by relatively wide streets, inadequate lighting at side streets, and safety concerns. Requires strategic urban planning and targeted interventions to unlock its full potential.

Al Azhar: Densely populated residential area with limited accessibility and amenities. Lack of open spaces and safety concerns highlight the need for infrastructure improvements and community support initiatives.

Maspero Triangle & Mamsha Ahl Masr: Contrasting mix of commercial vibrancy and serene Mamsha. While older parts share Al Azhar's challenges, Mamsha ahl masr stands out as a safe and well-lit haven. Balancing development and preserving Mamsha's charm is crucial.

Alsheikh Zayed: Modern district boasting excellent infrastructure, ample green spaces, and a peaceful atmosphere. Limited public transportation might hinder inclusivity. Maintaining this high standard is key for sustainable growth.

Overall, understanding the nuances of each district is crucial for informed urban planning and creating inclusive, safe environments for all residents. Recognizing the need for tailored solutions while fostering community involvement will pave the way for a vibrant and flourishing city that caters to the needs of its diverse population.

The provided analysis sheds light on various aspects crucial to creating gender-sensitive public spaces in urban environments. Understanding the dynamics of different districts, their infrastructure challenges, safety perceptions, and prevalent concerns lays the foundation for crafting gender-sensitive approaches.

1. **Infrastructure Improvement:** Addressing infrastructure challenges, such as poor lighting, damaged pathways, and inadequate amenities, is vital. Enhancing infrastructure not only ensures accessibility for all genders but also contributes significantly to improving safety perceptions, particularly for women.
2. **Safety and Security:** The identification of feelings of insecurity among users, especially women, underscores the need for creating safe environments. This involves targeted measures like increased surveillance, better lighting, and visible security measures to mitigate instances of harassment and ensure a sense of safety for all genders.
3. **Women's Safety Concerns:** Specific concerns related to women's safety, including instances of harassment, emerged as a significant focus. Crafting strategies to address these concerns involves community engagement, encouraging diverse activities, and fostering an environment where women feel comfortable and safe using public spaces.
4. **Recommendations and Solutions:** The proposed solutions, such as improving street lighting, enhancing infrastructure, and diversifying the use of public spaces, are pivotal to creating gender-sensitive environments. These measures not only aim to improve safety perceptions but also foster inclusivity and community involvement.

By addressing these concerns and implementing suggested measures, the districts can work toward creating safer and more inclusive public spaces that cater to diverse users, foster community engagement, and mitigate safety risks effectively.

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