

Safety Audits in Alexandra, Johannesburg



A project by



Acknowledgement

For the successful completion of any project, it is essential to have a coherent team in place. We would like to thank CCI (Centre for Communication Impact) for undertaking this project and providing their all-round support throughout the course of the project. A special mention to Ms. Zanele Zwane, SBCC Program Manager, who has handled all the communications from the CCI team.

We understand that our work is incomplete without our local partners and the efforts they put in to ensure that the data we use is accurate. We would like to thank the ADAPT (Agisanang Domestic Abuse Prevention and Training) team for providing us with that support, especially Ms. Nomalanga Ngwenya who managed all the training sessions and mobilised volunteers for the same. We would also like to extend our gratitude to Mabotja Tebogo and Thapelo who collected data for us multiple times without any complaints, due to the unfavourable weather conditions. Our thanks also go out to all the volunteers who conducted safety audits on the My Safetipin app and provided insights which helped shape the project.

This report was prepared by a team from Safetipin comprising of Sonali Vyas, Ankita Kapoor and Shreya V. Basu, under the guidance of Dr. Kalpana Viswanath.

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Project Background

UNISDR (United Nations Office for Disaster Risk Reduction) defines vulnerability as *'the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard'*. When looking at this term in a social context, the effects extend to limitations in accessing opportunities, be it for livelihood or leisure. To understand the impact of vulnerabilities that women face, it is important to understand the ways in which they face it; including street harassment, patriarchal norms and beliefs that confine them to stereotypical roles, lack of opportunities based on gender, and many more.

Safetipin was engaged by CCI (Centre for Communication Impact) to conduct safety audits in selected communities of the Masiphephe Network Project to understand spatial vulnerabilities that women and girls face in these specified communities and how violence and fear impacts their freedom of access and movement. The aim of the study is to collect data to make public spaces safer and to use technology as an enabling tool for this. For the first phase of this study, the Alexandra township (Region E) of Gauteng province was selected.

The Site

Alexandra is a township established in 1912 in the Gauteng province of South Africa and it forms a part of Johannesburg city with a total area of 6.91 square kilometers. It is bounded by Wynberg on the west, Lombardy West and East on the south and Marlboro and Kelvin on the north. This township is situated on the banks of Jukskei River and consists of a number of informal dwellings. It is an informal settlement that suffers from various issues including overcrowding, an overloaded sewage system which affects the atmosphere of the township, lack of proper infrastructure for river water management and a high level of crime.

According to the 2011 census, the population of Alexandra stands at 179,624 with 48% identifying as women [1]. Out of the total population, approximately 40% of the population is aged between 20 and 40, implying a high youth population in Alexandra. Here, it should be noted that different age groups use public spaces differently and require specific types of design to create inclusive spaces for all.

[1] <https://census2011.adrianfrith.com/place/798014>

Safety Audit Methodology

Safetipin is a technology platform that uses data to make public spaces safer and more inclusive for women. To understand the safety in a place, we look at the physical infrastructure of a space along with its social usage, both of which are discussed further in this report.

At the core of Safetipin is the safety audit which is a participatory methodology for collecting data and assessing the perceptions of safety in public spaces. Safetipin collects data based on 9 parameters, namely: Lighting, Walkpath, Visibility, Openness, access to Public Transport, Security, presence of People, Gender Usage in a space and Feeling to assess a public space. Each parameter is rated on a scale of 0-3 where 0 is poor and 3 is good. Parameter rubric can be seen in Annex 1. Two apps were used to collect the data in Alexandra. These are explained in the next section.

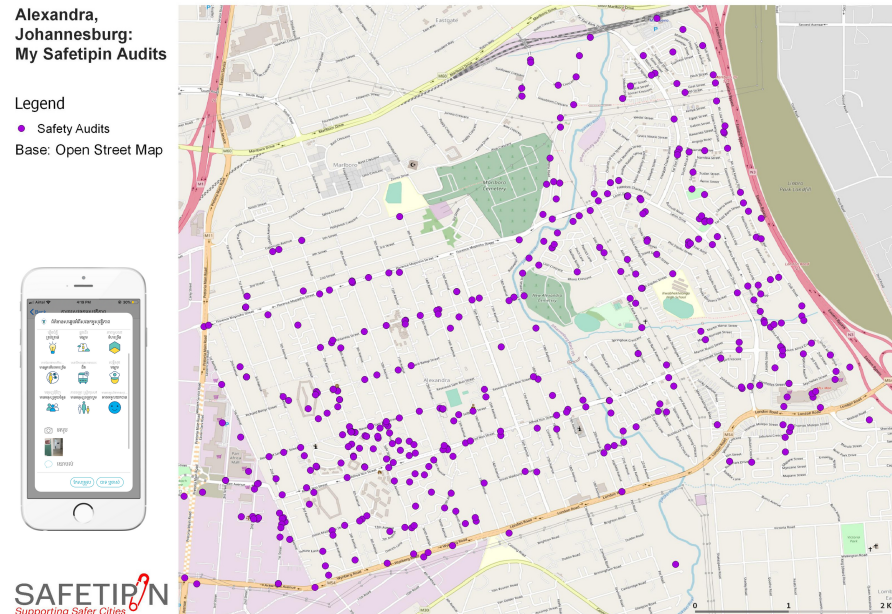
Lighting		<i>Availability of enough light to see all around you</i>
Walkpath		<i>Either a pavement or road with space to walk</i>
Openness		<i>Ability to see and move in all directions</i>
Visibility		<i>Vendors, shops or buildings from where you can be seen</i>
Public Transport		<i>Availability of any form of public transport</i>
Security		<i>Presence of police or security guards</i>
People		<i>Number of people around you</i>
Gender Usage		<i>Presence of women and children near you</i>

My Safetipin App

My Safetipin App is a free crowdsourcing app available on the Play Store and App Store. Using this app, users can do safety audits where they rate the 9 parameters introduced in the previous section. The data from the safety audits is used to generate a Safety Score. This data is used to help users make safer decisions for their mobility through the tracking feature and the safest route feature.

On 20th November 2020, the Safetipin team conducted an online training for the My Safetipin app with volunteers mobilised by the ADAPT team, an organisation working towards achieving a society free from GBV, through creative participation of all members of the community. The session began with an interactive discussion about safety in Alexandra with the participants actively providing their insights on the safety conditions of the township. The session continued with a detailed explanation of Safetipin, the My Safetipin app and the 9 safety audit parameters. At the end of the session, the participants conducted test audits around their neighbourhood. They collected data using the My Safetipin app from 25th November to 13th December, 2020 between 3-8 PM. A total of 405 audits were done on the My Safetipin app (seen in Map 1).

From the audits conducted on the app, a users' spatial understanding of an area is obtained and those insights, along with the comments, are supplemented to the data collected on the Safetipin Nite app, explained in the next section.



Map 1. Safety audits done on the My Safetipin app

Safetipin Nite

Safetipin Nite is a proprietary app which is used for large-scale geo-referenced image collection of a space or city. The phone with this app is mounted in a car and while the car is driven, images get clicked automatically. These images are collected to capture a pedestrian's safety conditions at regular intervals. Using Safetipin Nite, the entire city road network is mapped with images which are then assessed on the Safetipin backend technology platform.

The online training for Safetipin Nite was conducted on 23rd November, 2020 with 2 drivers. Post the training, the drivers went out for a test drive and feedback was provided by the Safetipin team. The data collection was delayed due to curfews for the global pandemic as well as unfavourable weather conditions. The image collection through the Safetipin Nite app was completed on 23rd February, 2021. A total of 314 points were audited using the images collected on Safetipin Nite between 5-8 PM. Map 2 shows the areas covered using Safetipin Nite. After the data collection, the Safetipin team started the visual analysis of the collected images.

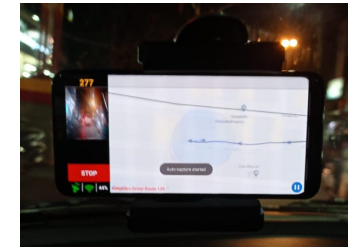
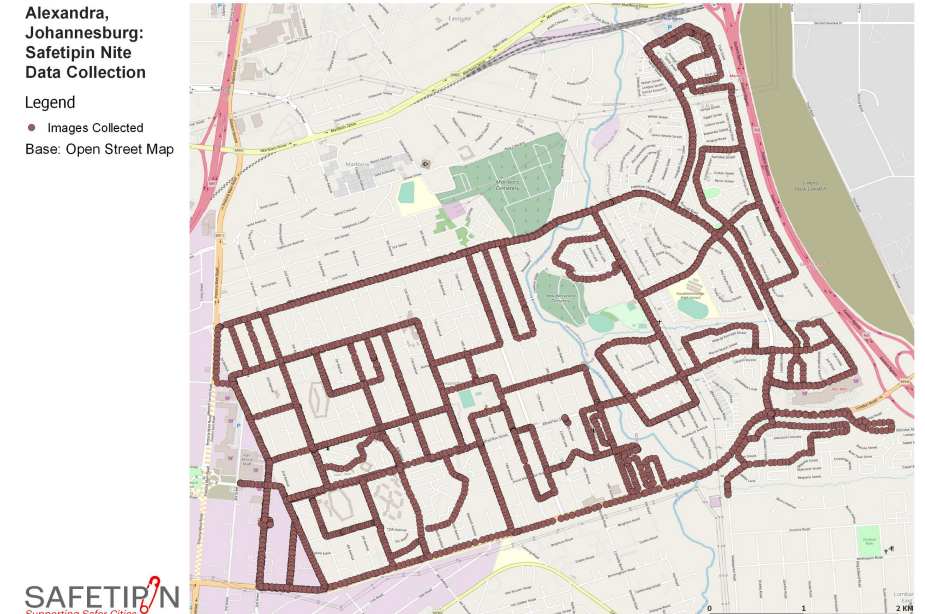


Image 1. A phone with the Safetipin Nite app in use



Map 2. Images collected on the Safetipin Nite app

Data Analysis and Representation

The photos collected through Safetipin Nite get uploaded onto the Safetipin server. These are then accessed on the Safetipin portal and analysed on a wide range of parameters linked to accessibility, safety and inclusivity of public spaces. For an in-depth analysis, a set of sub-parameters for the parameters of Lighting, Visibility, Walkpath, Security and Public Transport are used to record additional information. The complete list of parameters is shown in Figure 1. The portal for analysis is shown in Image 2.

Using the collected and coded (based on parameters) data, the Safetipin team analyses and produces maps and reports that can be used for actual on-ground responses and actions to improve the accessibility and safety on the streets and in public spaces in cities. Maps are produced for each parameter with geo-tagged location of audit points, supported with images. Data is also analysed in terms of correlations with other possible data sets which further support and reinforce the findings. Based on these analyses, a concrete set of recommendations are drawn out for key stakeholders for various city improvement programs.

The data is provided in various formats, including a csv file with all the data and links to the images (for csv data, refer Annex 2). This file can be imported onto any GIS platform for visual representation as done on Google maps in Image 3.

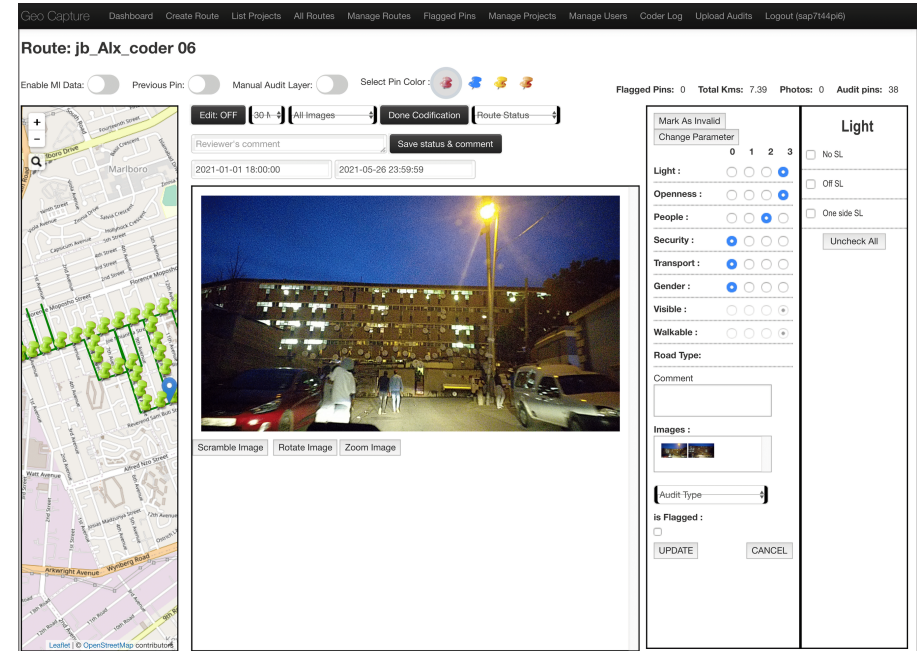


Image 2: Safetipin portal for analysis

Lighting	Visibility	Walkpath	Security	Public Transport
No Street Light	50% Boundary Wall	No Pavement	Private Guards	Rail
Off Street Light	100% Boundary Wall	Broken Pavement	Police	Bus/ Mini Bus
Dim Street Light	Unused Land	Unpaved Pavement	Police Van/ Bike	Auto/ Shared Auto
High Street Light	Road Side Vendors	Car Blocking	Police Check	Taxi
Too Far Street Light	Temporary Stalls	Vendor Blocking	Police Booth	Bicycle
Leaves Cover Street Light	Shops	Houses Extending	Other Govt.	
Other Cover Street Light	Houses upto 4 Floors	Trees Blocking		
One Side Street Light	Houses > 4 floors	Other Blocking		
		Walkable Road		
		On-Street Parking		

Figure 1: Sub-parameters for analysis

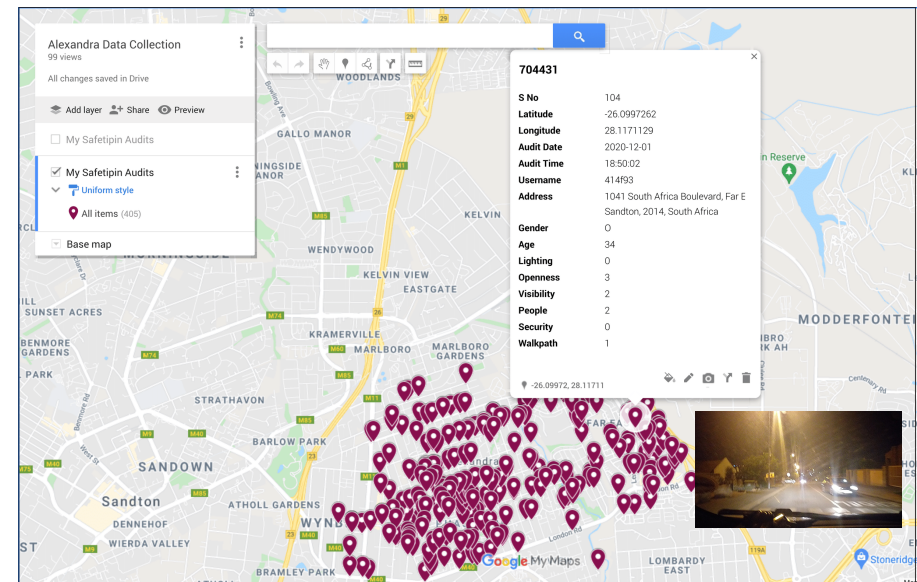


Image 3: Data as seen on google maps

Safety Audit Analysis

A total of 719 points were audited and the distribution of these points, based on the Safety Score, can be seen in Map 3. The Safety Score of a point is a reflection of the perception of safety at that particular location. For each audit point, a numeric value between 0 and 5 is provided where 0 is poor or very unsafe and 5 is good or very safe. The 9 parameters used to calculate the Safety Score are assigned varying weightages based on extensive research of the impact of the parameters on the perception of safety.

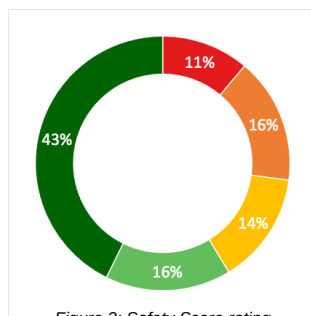


Figure 2: Safety Score rating

The range of the ratings can be seen in Figure 2. A score above 4 is represented by dark green, between 3 and 4 is represented by light green, between 2 and 3 is represented by yellow, between 1 and 2 is represented by orange and below 1 by red. The points in orange and red in the map below show the areas where there is poor physical infrastructure as well as poor usage of the public space. A thorough analysis of the individual parameters follow to further understand where there is a need for intervention to improve the safety in the city.

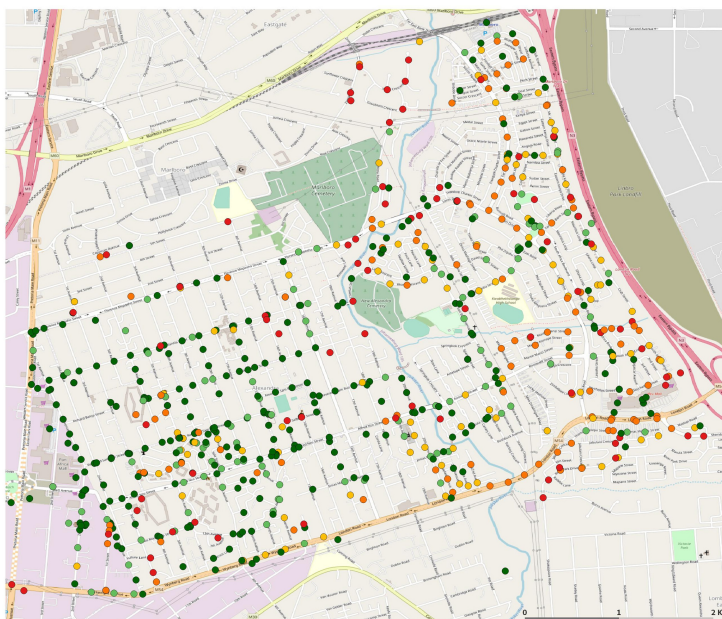
Alexandra, Johannesburg: Safety Score

Legend

Safety Audits

- Poor
- Below Average
- Average
- Above Average
- Good

Base: Open Street Map



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Map 3. Safety Score rating

Parameter Ratings

The average ratings of parameters (Figure 3) is shown to comparatively understand how each parameter has fared in the township of Alexandra. Each parameter is provided a rating out of 3. As shown in the graph, none of the parameters have a rating above 2 out of 3 which implies that there is ample scope for interventions to improve the safety conditions in the township.

The Openness, Walkpath and Visibility parameters have the highest ratings, followed by presence of People and Lighting. The lowest ratings were recorded for the Security and Public Transport parameters. The Security parameter has only measured the presence of police stations as police patrolling routes were not available for the study. There is a lack of formal public transportation stops which attributes to the low rating of the Public Transport parameter. Taxi ranks in the area were mapped for this parameter, however, only the ones which could be identified on google maps have been used.

Through the comparative representation below, the ratings for each parameter are clear. In the following section, the impact of each parameter on the feeling of safety is looked into.

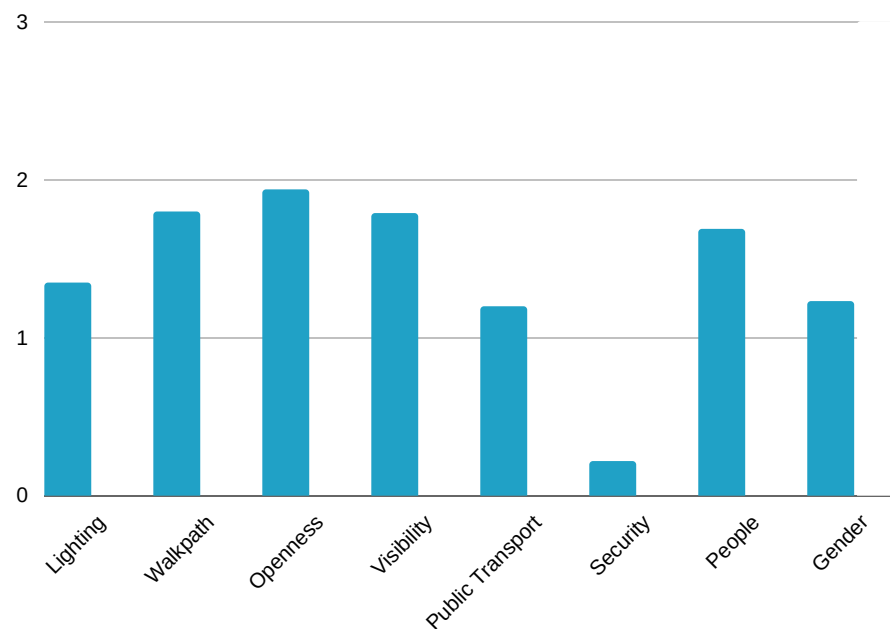
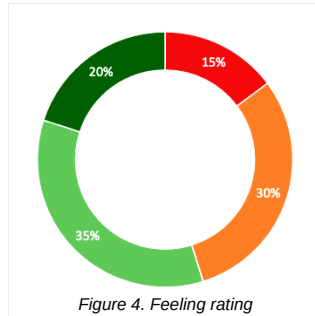


Figure 3. Average ratings of parameters

Feeling of Safety

The Feeling parameter is the only subjective parameter in the Safetipin analysis. All the other parameters measure either the built environment or the social usage of a space, while the Feeling parameter is to assess how safe or unsafe a user feels at the audit point. The rating for Feeling depends on many factors including gender, age, background, familiarity with location etc.

To measure this parameter, only the data collected on the My Safetipin app is considered. The distribution of points for the Feeling parameter are seen in Map 4.



From Figure 4, it is seen that users feel safe in 55% of the audited areas. In the remaining 45% of the audited areas, users have reported feeling unsafe and the reasons for this have been delved into in the following sections.

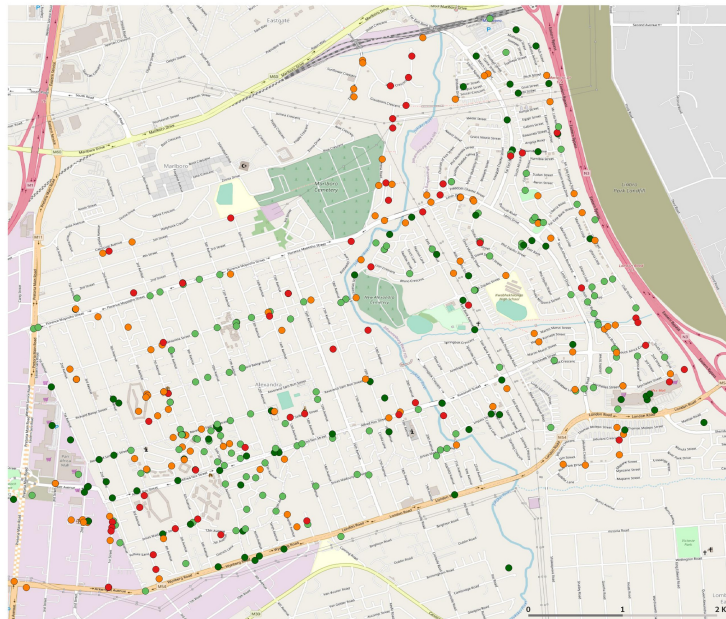
Alexandra, Johannesburg:
Parameter
Feeling

Legend

Safety Audits

- Frightening
- Uncomfortable
- Acceptable
- Comfortable

Base: Open Street Map



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Map 4. Feeling rating

To understand the impact of the other parameters on the Feeling parameter, a radar graph with correlations is generated (Figure 5). Through this graph, it can be seen that Gender Usage has the highest impact on the Feeling of safety, followed by Visibility, presence of People and Walkpath. The parameters with lowest correlation values to Feeling are Openness and Security. Each of the correlation values can be seen in Figure 6.

The findings from Figure 5, along with the average rating for each of the parameters (as shown in the previous section), can be used to identify the parameters for immediate intervention. The physical infrastructure parameters including Visibility, Walkpath and Lighting as well as the social environment parameters (including People and Gender Usage) are discussed in detail in the following sections. Recommendations for improving parameter ratings and overall perception of safety have also been included.

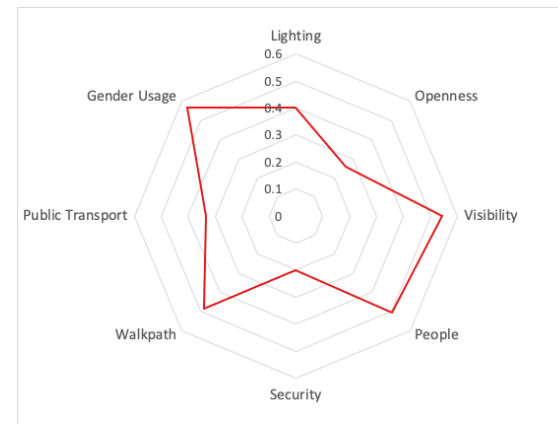


Figure 5. Parameters correlation to feeling of safety

Parameter	Correlation Value
Gender Usage	0.57
Visibility	0.54
People	0.51
Walkpath	0.48
Lighting	0.40
Public Transport	0.33
Openness	0.26
Security	0.20

Figure 6. Correlation values

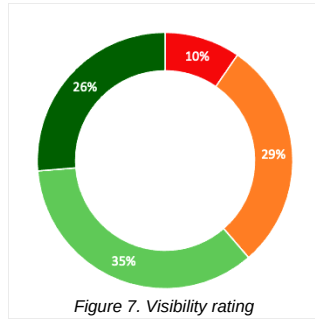
Comments by users of the My Safetipin app in areas where Feeling parameter was rated 0

13th Vasco, has power connection problems, as a result there is low visibility and lighting in the area when the sun sets, one has to be careful should they pass by.

Very dark and scary also stone obstructions on the walk path including cars parked on the pavements.

Visibility

The Visibility parameter is based on the principle of “eyes on the street”, which refers to the elements of the street that ensure there is a visual connection between the street and the built environment to provide natural surveillance to the pedestrians using the space. This includes windows and doors of shops or buildings that can provide natural surveillance. This parameter includes temporary vendors as well, as they contribute to the activity on the street. Pedestrians using the public space do not contribute to this parameter as they are fleeting users of space.



The distribution of points for the Visibility parameter can be seen in Map 5. As shown in Figure 7, 61% of audited points have a good rating. 10% of the audited points have a poor rating, indicating no eyes on the street. This can be attributed to the presence of boundary walls. Though fewer places have poor ratings for this parameter (as compared to the high ratings), the analysis shows that many points are located in the centre of the township, contrary to expected.

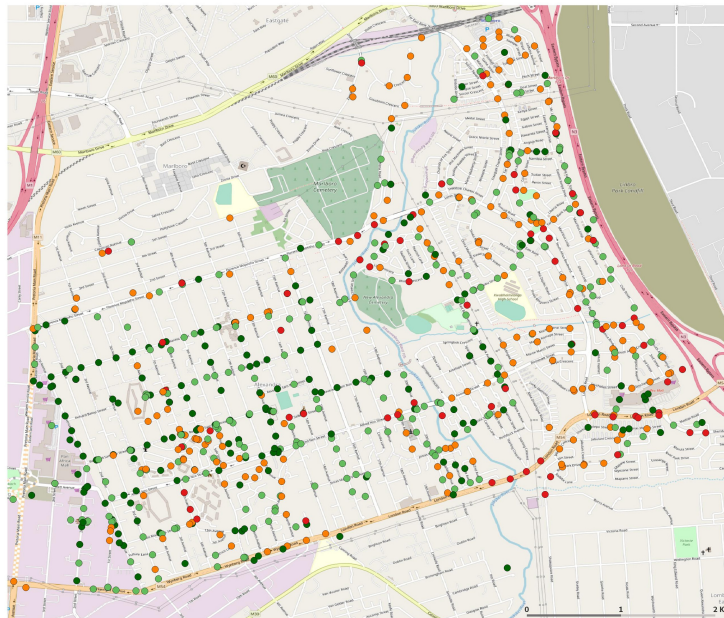
Alexandra, Johannesburg:
Parameter
Visibility

Legend

Safety Audits

- No Eyes
- Few Eyes
- More Eyes
- Highly Visible

Base: Open Street Map



Map 5. Visibility rating

Issues and Interventions

The presence of boundary walls reduces the eyes on the street (example in Image 4). When designing streets with boundary walls, it is suggested to keep the solid height of the boundary wall at a 1 metre height with fencing, wiring or spikes on the top portion. This serves the purpose of an effective boundary wall without hindering the natural surveillance.

Presence of vendors is likely to encourage more people to use a space thereby increasing the overall activity of the street (Image 5). However, lack of proper vending zones can prove to be a barrier to the walkability of the area (since vendors are generally occupy space on pavements). Places with a high rating for People parameter but low Visibility parameter rating can be prioritized to improve visibility of the area. These can be seen in Map 6.

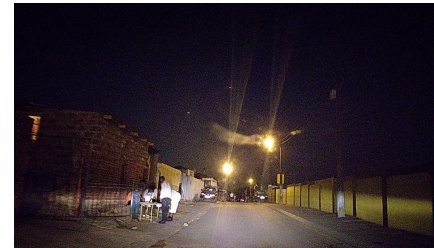


Image 4: Street with high boundary walls



Image 5: People surrounding a vendor

Alexandra, Johannesburg:
Parameter
People and
Visibility

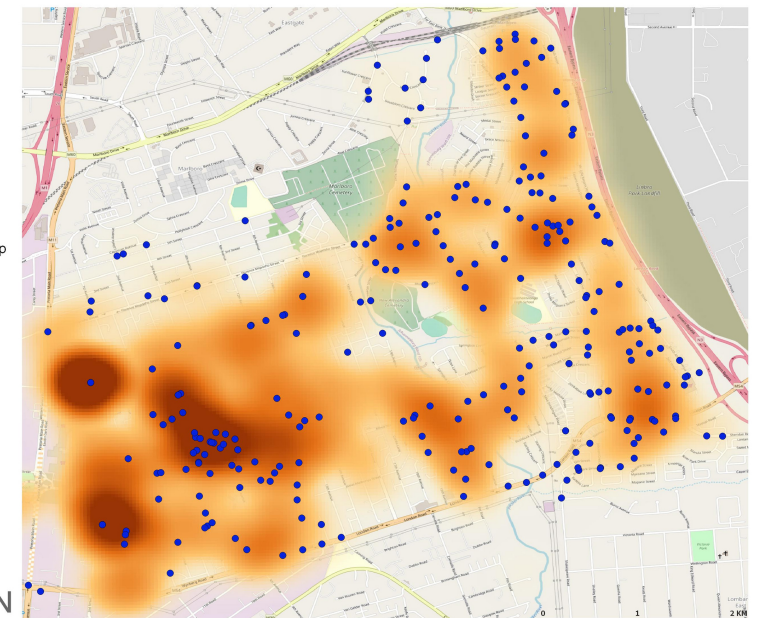
Legend

- Low Visibility

People

- Deserted
- Few People
- Some Crowd
- Crowded

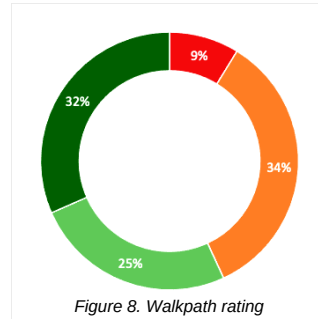
Base: Open Street Map



Map 6. Low visibility in crowded areas

Walkpath

The Walkpath parameter indicates whether or not a person can comfortably walk in a place. This includes the quality of the pavement or the space designated for walking along a road. If a pavement is present, its quality is assessed. If it is a residential lane, then the area for walking along with the condition of the road (broken or obstructed) is assessed. The walkability of an area or space is indicative of the activity on the street and the comfort people feel there. Streets with proper infrastructure for walking and crossings are essential for safe walking experiences for all user groups. Due to the varying angles of the images collected using the Safetipin Nite application, the width of the pavement is not measured or considered.



The distribution of points for the Walkpath parameter can be seen in Map 7. As seen in Figure 8, 57% of audited points (rating of 2 and 3 out of 3) have good walking infrastructure and 9% of the audited points have no walking infrastructure. The remaining 34% of points, which have a rating of 1 out of 3, have broken patches in the pavement or are shared roads with obstructions blocking the space for walking.

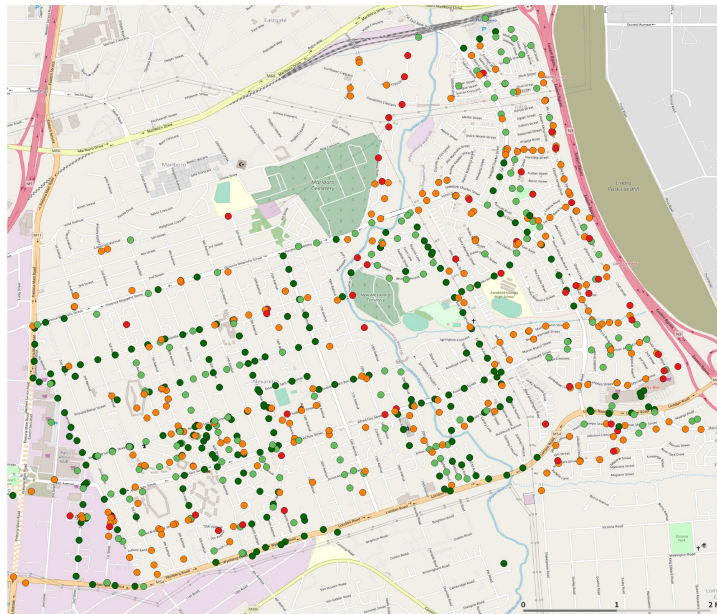
Alexandra, Johannesburg:
Parameter
Walkpath

Legend

Safety Audits

- None
- Poor
- Fair
- Good

Base: Open Street Map



Map 7. Walkpath rating

Issues and Interventions

49 points were identified with unpaved patches on the pavement. Various obstructions on the pavement were identified including cars parked on it, open garbage dumps (example in Image 7) and others. Map 8 shows a heat map of the People parameter with all the points mentioned. Broken patches should be taken up for repair and pavements should be built wherever needed. Designated spaces for parking should be provided clear of a pedestrian's path.

Audit points with a poor rating for the Walkpath parameter have been identified as shared streets. The idea of shared streets is to remove formal distinction between space for multiple users, however, it can lead to car dominant spaces which are impediments for pedestrians (example in Image 6).



Image 6: Street with people and no pavement



Image 7: Street with garbage blocking the pavement

Alexandra, Johannesburg:
Parameter
People and Walkpath

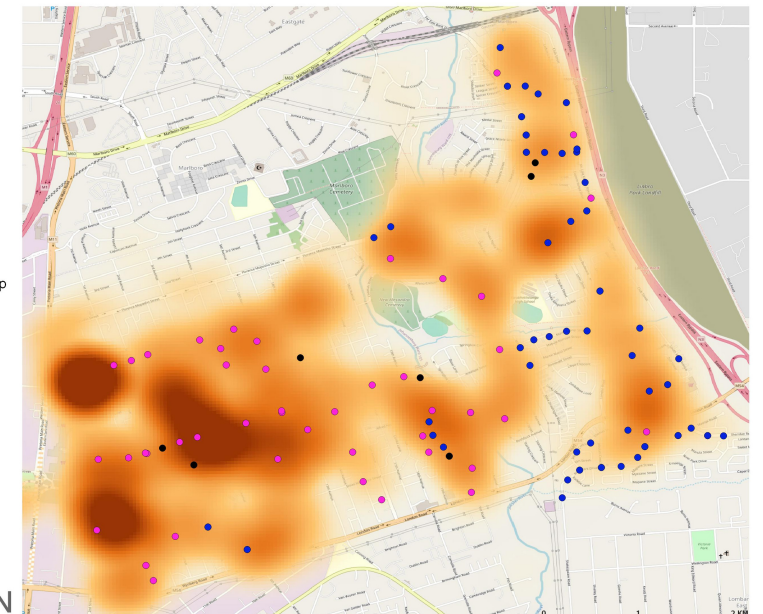
Legend

- Broken Pavement
- Unpaved Walkpath
- Vehicular Blocking

People

- Deserted
- Few People
- Some Crowd
- Crowded

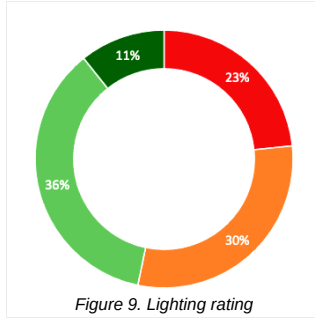
Base: Open Street Map



Map 8. Walkpath issues

Lighting

The Lighting parameter measures the amount of illumination at a place and ranges from dark to bright. For the rating of the Lighting parameter, the sources which are considered are street lights, light from houses, shops and street vendors. Temporary sources of light like the light from cars is not considered when rating this parameter. Images collected in the day time are also not considered for this parameter. Points which have a rating of 0 out of 3 are referred to as dark spots. These are places where there is either no lighting infrastructure present or where the existing lighting infrastructure is not functional at the time of the audit.



The distribution of points for the Lighting parameter can be seen in Map 9. According to Figure 9, 47% of audited points are well-lit. It is also seen that 23% of the audited points are identified as dark spots, where there is no lighting infrastructure present or where it is non-functional.

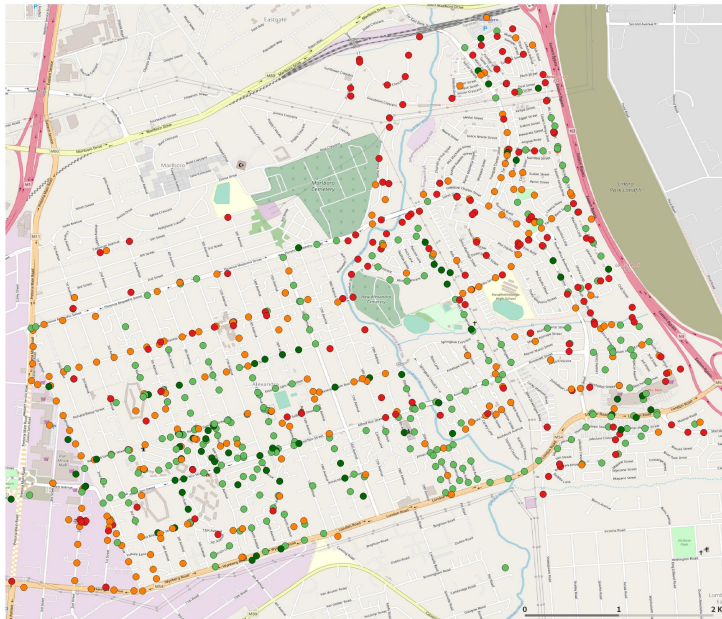
Alexandra, Johannesburg:
Parameter Lighting

Legend

Safety Audits

- Poor Light
- Some Light
- Enough Light
- Bright Light

Base: Open Street Map



Map 9. Lighting rating

Issues and Interventions

The data collected through the Safetipin Nite app has a level of sub-parameter analysis as explained before. Based on our analysis, 134 audit points with non-functional street lights (Image 8) and 9 points with no street lights were identified.

Lighting impacts how clearly one can see around and thus, it has an impact on the perception of safety. It was found that in audited areas where the rating for Lighting was 0 or 1, people were present at 52% (People rating of 2 or 3) of the points (example in Image 9). Map 10 shows the heat map of the People parameter with points with no street lights and non-functioning street lights. These locations should be taken up on priority for street light installation and maintenance, whichever applicable.



Image 8: Street with non-functional streetlights



Image 9: Street with people but no light

Alexandra, Johannesburg:
Parameter People and Lighting

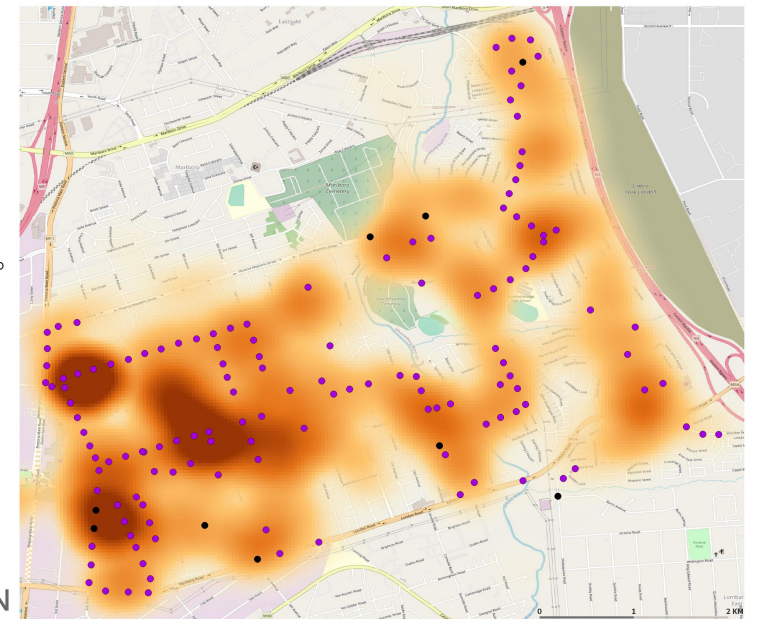
Legend

- No SL
- Off SL

People

- Deserted
- Few People
- Some Crowd
- Crowded

Base: Open Street Map



Map 10. Lighting issues

Public Transport

The Public Transport parameter measures the distance from the audit point to the nearest mode of public transportation. Through this parameter, the quality of the mode of public transport is not assessed but the accessibility to it is measured. Public transport includes both formal and informal modes of transport such as buses, trains, intermediate para-transit modes etc. The time taken to any form of public transport adds to the ease of mobility in a city. Through images, it can be difficult to accurately identify the closeness of public transport from a point, so google maps and street view are referred here. A rating of 0 indicates that the nearest mode of public transportation is over 10 minutes walking distance away. Ratings 1, 2 and 3 indicate between 5-10 minutes, between 2-5 minutes and under 2 minutes walking distance, respectively.

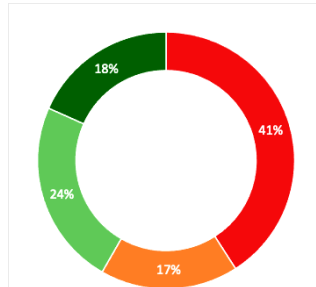


Figure 10. Public Transport rating

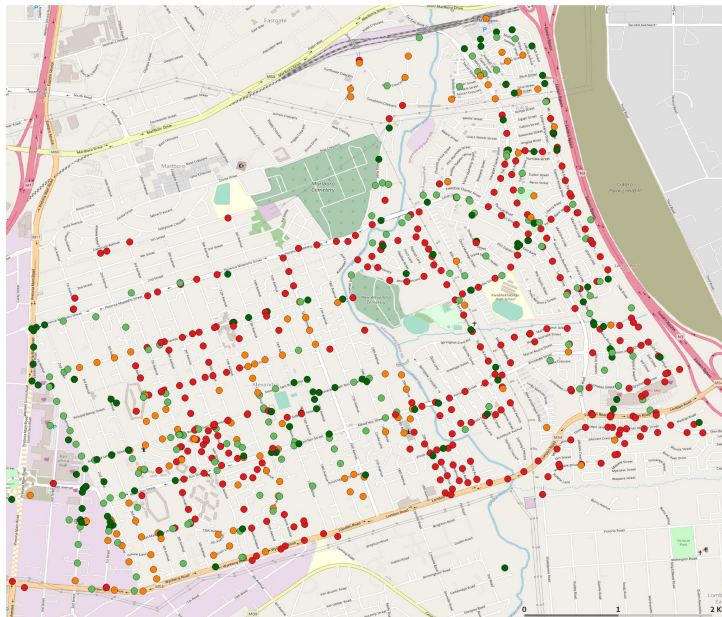
This distribution of points for the Public Transport parameter can be seen in Map 11. As seen in Figure 10, 41% of audited points have no access to any mode of public transportation within a 10 minute walk. 42% of the points have some form of public transport available within a 5 minute walk. At public transport stops, the infrastructure can be improved for increased inclusion of all user groups.

Alexandra, Johannesburg:
Parameter
Public Transport

Legend

- Unavailable
- Distant
- Nearby
- Very Close

Base: Open Street Map



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Map 11. Public Transport rating

Security

The security parameter refers to the presence of private security or police personnel in the nearby vicinity. It also includes any police stations that may be present nearby. Through the My Safetipin app, presence of private guards and police is easily captured. Safetipin Nite, however, only captures images at certain times and angles which limits the extent of accuracy of the information. Due to this, police stations are identified via google maps and ratings are provided based on the accessibility to them by walking. A rating of 0 indicates no police station in a 400m radius from the audit point. Ratings 1, 2 and 3 indicate radius between 200-400m, 100-200m and under 100m from the audit point respectively.

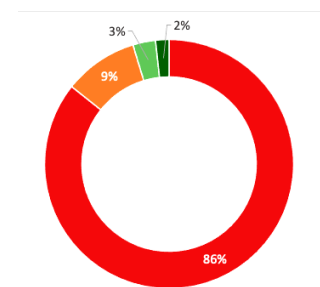


Figure 11. Security rating

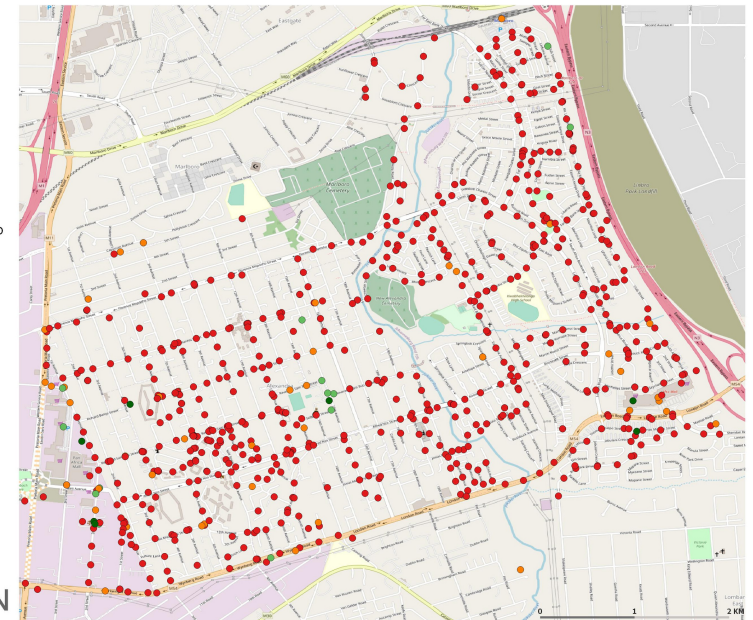
The distribution of points for the Security parameter can be seen in Map 12. According to Figure 11, 86% of the audited points did not have any form of security (police personnel/ police station or private security). The comments by the users of the My Safetipin app identified 'crime hotspots' as areas which had a poor rating for Security. It should be ensured that the crime hotspots are patrolled by police to instill public trust. Additionally, community awareness and engagement programs can be organized to educate the residents on gender equality and initiate conversations around safe and inclusive public spaces.

Alexandra, Johannesburg:
Parameter
Security

Legend

- None
- Minimal
- Moderate
- High

Base: Open Street Map



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Map 12. Security rating

Social Usage of Space

Safety audit measures the physical infrastructure in a public space (which includes parameters such as Lighting, Walkpath, Visibility, Public Transport, Openness and Security) and the social usage of a space (which includes the presence of People and Gender Usage parameters). When analysing this data, it is imperative to note that the presence of People and Gender Usage in a space is highly dependent on the surrounding built environment. This implies that improving the parameters associated with physical infrastructure will lead to increased activity in a space with people (of all genders) using it more and hence, making it an inclusive space for all.

The People parameter measures the number of people present in a space at the time of the safety audit. This includes pedestrians and others who are using the space. This parameter does not include shopkeepers (as they are counted in the Visibility parameter), people in houses/ balconies or people in vehicles. The distribution of points for this parameter can be seen in Map 13.

The Gender Usage parameter measures the gender diversity in a space, which calculates the presence of women in children in the total number of people present. If there are very few people present, but they are all women or children, it would be considered a high rating for the Gender Usage parameter, even though the rating for the People parameter will be low. The distribution of points for this parameter can be seen in Map 14.

Figure 12 shows the percentage distribution of points which have a rating of 1, 2 or 3 out of 3 for the People and Gender Usage parameters. It can be seen that 87% of the points have people present and of those, 61% of points have women and children present. This indicates that over 25% of spaces with people present have no gender diversity. This could be attributed to the lack of safe infrastructure and built environment for women or lack of amenities for children to safely play or interact.

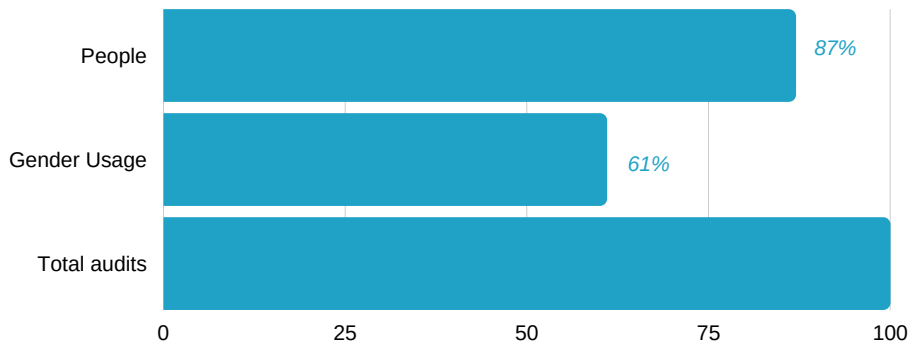


Figure 12. Comparison of people and gender usage

Alexandra, Johannesburg: Parameter People

Legend
Safety Audits
● Deserted
● Few People
● Some Crowd
● Crowded
Base: Open Street Map

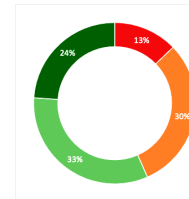
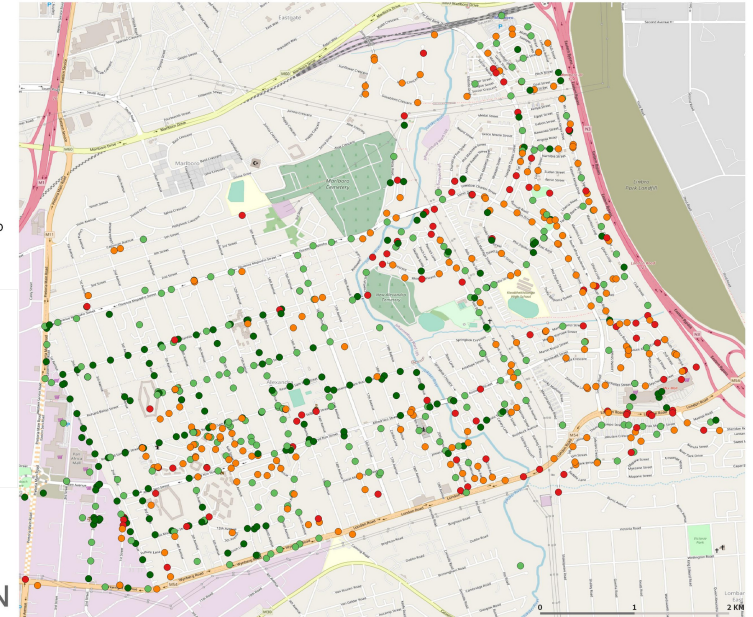


Figure 12. People rating

SAFETIPIN
Supporting Safer Cities
Map 13. People rating



Alexandra, Johannesburg: Parameter Gender Usage

Legend
Safety Audits
● Not Diverse
● Somewhat Diverse
● Fairly Diverse
● Diverse
Base: Open Street Map

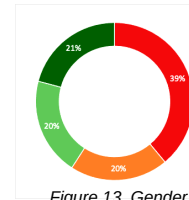
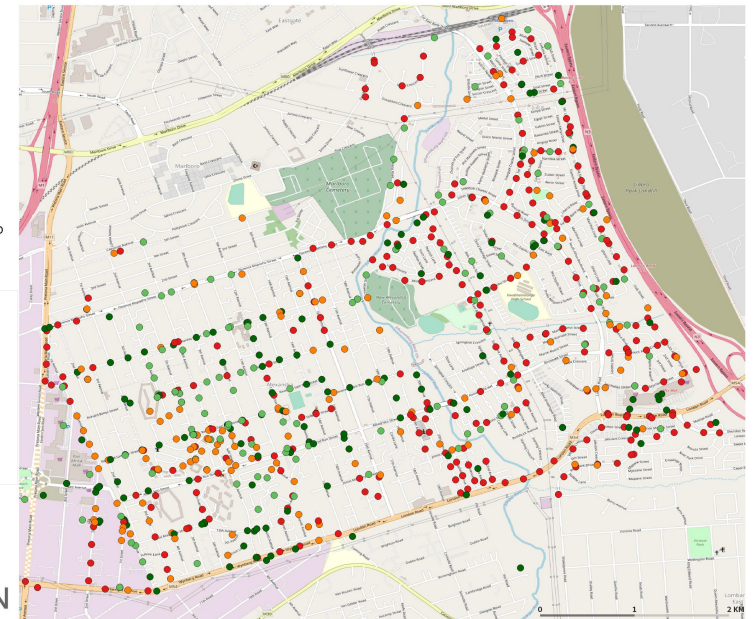


Figure 13. Gender Usage rating

SAFETIPIN
Supporting Safer Cities
Map 14. Gender Usage rating



Recommendations for Safe and Inclusive Streets

CREATE AND MAINTAIN WALKABLE SPACES

Unpaved areas of pavement, broken patches, cars blocking the pavement, garbage, improper vending locations, other blockings

The overall rating for the Walkpath parameter is average which indicates that majority of the spaces in Alexandra have the presence of pavements. However, through the sub-parameter analysis on the Safetipin portal, it was seen that some stretches on the pavement are broken or unpaved. Maintenance checks should be taken up in these areas and the material used to lay the pavements should be durable in its nature so as to not deteriorate with changing climate conditions or with the regular wear and tear of daily usage.



Image 10. Street with broken patch



Image 11. Street with broken patch

An ideal safe and inclusive city should be accessible in terms of walkability. Obstructions on the pavement interfere with seamless movement and impact how a pedestrian uses that space. There should be regular maintenance checks for the quality of the pavement. Garbage dumps should be removed and trash cans should be added at regular intervals for use. Dedicated parking areas for vehicles in and around popular market areas and public spaces should be set up so that cars are not parked on the pavement. Vendors who do not have dedicated space to set up, should be given that space so that they and the pedestrians can amicably use the area without disturbances. Images 12 and 13 show the different types of obstructions identified on the pavement hindering the seamless accessibility for pedestrians.

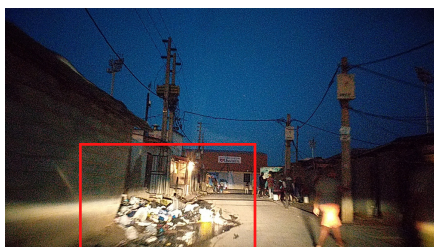


Image 12. Street with garbage obstructing pavement



Image 13. Cars parked on walkpath

UNIFORM LIGHTING ACROSS THE TOWNSHIP

Non-functional street lights, dark spots, non-uniform lighting

Lighting plays a crucial role in the perception of safety in a space. The ability to see your surroundings provides an impalpable feeling of comfort and security. It is for this reason that uniform lighting across the township should be taken up on priority. 134 points were identified having street lights which were not functioning (example in Image 14) at the time of the audit. This could be due to the lack of bulbs in the poles, lack of maintenance in changing the bulbs or poor monitoring the timings of when the street lights are supposed to be functional. The 134 points should be checked by the concerned departments for immediate repair. It was also noticed that 150 points had street lights on only one side of the road. If the roads are more than four-lanes wide, one side of the road gets limited illumination on the pavement. From the collected data, it has been noted that all the points with street lights on only one side were main roads and majority were on roads which are two or three lanes wide. 16 points were found to be on main roads with four lanes (as seen in Image 15), and these points need installation of street lights on both sides of the road.



Image 14. Non-functional street lights

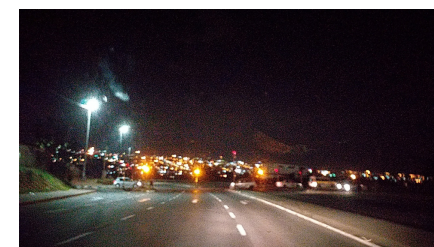


Image 15. Street with street lights on only one side

EASY ACCESS TO PUBLIC TRANSPORTATION

Informal taxi ranks, lack of signage for stops, unavailability of public information

Access to public transportation is essential to create an integrated commuting network in a city. In the section explaining the Public Transport parameter, it was mentioned that the rating of this parameter was done based on the layer of information available on google maps, which was limited. The tangible insights for this parameter were received through the safety audits conducted by the users of the My Safetipin app. To improve the information available about public transportation, there should be proper signage installed near taxi ranks and other stops as well as at some distances indicating where the nearest stop is. This will improve the access to public transportation and will benefit anyone who visits the township and does not already know the location and timings of the public transport.

Creating Safe Public Spaces in Alexandra

IMPROVE NATURAL SURVEILLANCE AND REDUCE PRESENCE OF HOTSPOTS

Hotspots are areas where some form of crime is likely to occur or has been witnessed

Through the Safetipin applications, the extent of crime is not specifically measured. During the training for the My Safetipin app, volunteers were asked to share stories and experiences of dangerous areas in Alexandra. From insightful conversations, it was learned that there are areas which are termed as *crime hotspots*. A total of 21 points were identified as hotspots through the comments given by users while conducting safety audits and this can be seen in Map 15.

On further analysis of the data at these points, it was discerned that while the rating for the Security parameter at all these points was low, at some points, it was rated high in terms of people's presence. At some points, lighting was also rated good. Strategies to reduce the level of crime in the township could be taken up in two parts. The first would be alerting the police about the situation and planning police patrolling routes accordingly. The second (a more long term approach) would include engaging the community through workshops, public forums and interactive media promoting safer streets and spaces. Multi-stakeholder partnerships could be built to proactively address the issues of public safety and make the streets active.

Another way to address safety and security is to improve the natural surveillance, which is based on the previously explained concept of *eyes on the street*. Streets with low visibility and low security create hubs for illegal activities and crime. Measures should be incorporated to increase the vibrancy on the streets, be it through street activities, dedicated vending zones or lowered boundary walls.

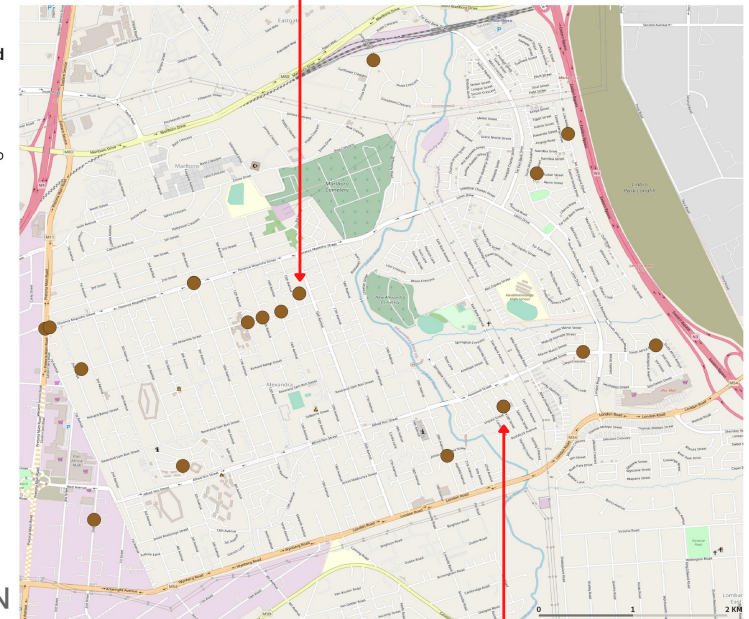
Access to formal security should also be taken up. This includes adding signage with distance to the nearest police station in all major public spaces, especially those which are regularly frequented by people. It not only provides access to information, but also provides a sense of additional security in the area.



"We are at the bridge, between 18th Johnbrandt and Westbank cemetery, which is a hot spot for crime, disturbing crimes occur in this bridge and especially the cemetery, there is no lighting security, the guys who do drugs occupy the cemetery making it easy for them to spot oncoming residents and thus target them. Interestingly, there is a park where children play, no fencing whatsoever to protect against juskei river, where they normally throw their victims and no one can tell where they came from or where they fled as there are a lot of passages and routes to different places around Alex."

Alexandra, Johannesburg:
Hotspots identified by users

Legend
● Hotspots
Base: Open Street Map



SAFETIPIN
Supporting Safer Cities

Map 15. Hotspots in Alexandra



"This is a bridge before East bank Clininc which is a crossover to and from the location and parks. It's a hotspot as there is a high crime rate, people get robbed and sometimes there is even cases of rape and attempted murders occurring. Women and children avoid this bridge whenever possible." -User of My Safetipin App

CREATING INCLUSIVE PARKS FOR ALL AGES

Places to play, seating infrastructure, walking tracks

From the safety audits done on the My Safetipin app, users have identified spaces where children are seen playing on the street due to the lack of proper playing spaces for them. Users have also identified parks in the township and highlighted the infrastructure lacuna that has led to creating parks which are unsafe and are used for illegal and criminal activities. This can be seen from the comments by the users.



shortage of street lights the park is dirty and there's a hole used as pass way it's a hub for crime



local toilets at this park are no longer working and some homeless people have made them their homes that makes them unavailable for use and people can get robbed trying to use them. and there was a recent rape and murder incident at this park.



the river in this area sometimes floods and making it hard for people to pass through the park and the cemetery next to the park has no fences and the bridge is still going through some constructions also it has no lights after sunset making it even more unsafe



This is a big park in Westbank, it has multiple entrances that allows access to residents from different sections of the location. It is crowded and busy most days and especially on weekends. Concern is that of safety in the dark and the vulnerability of women and children, especially girl children. There is no source of lighting but you do find people gathering even during night. There is a river still beside the park but has no fencing which protects children and there has been many cases involving children who drown accidentally.



not safe there are a lot of children playing in the streets of the park nearby



Create a walkable park; free of disturbances and obstructions

A uniform walking track should be created inside the park. This walking track should surround the entire park. This will also make sure that there are no parts in the park which are secluded or inaccessible. The track should be wide enough to accommodate people walking in both directions, with strollers and in wheelchairs as well. Ramps to get on and off the track should be constructed so that it can be easily used by all user groups. The track should be continuous without broken patches in between. Also, there should be no obstructions on the way. Trash cans should be set up for proper disposal of waste so that there are no open dumps of garbage in the park.

Uniform lighting across the park

Having spaces or points with no lighting leads to dark spots which are extremely unsafe and breeding grounds for criminal activities. Lights should be installed throughout the area of the park and should leave no part in darkness. Uniform lighting will encourage more people to use the park in the evening and night time for walks and other recreational activities.

Infrastructure for inclusion; seating, playgrounds and more

There should be proper space for children to play. A park is inclusive for all because it is a space where children can play and parents/ caretakers can feel comfortable letting their children move around. Setting up of seating infrastructure is another crucial aspect of inclusive design in a park. There should be seating infrastructure installed at regular intervals in the park, so that all the parts of the park are populated and contributing to the activity in it. It is also useful for the elderly, or people with children in strollers, to have a place to sit and enjoy the surroundings.

Maintained public convenience facilities

From the inputs by users, it was identified that some of the parks have public toilets present, however, they are poorly maintained and hence, unusable. Toilets should have regular maintenance work conducted so that they are safe for use. It is important to highlight here that the location of a public toilet in the park is very crucial. It should not be in a blind spot or very far away from the main area of the park. This will lead to more dangerous outcomes.

Clear demarcations of the park

Proper demarcations should be laid out for the area of the park. Some of the big parks in Alexandra are next to rivers and one of them is next to a cemetery. Boundaries through fencing should be established so that each space is used as intended. For the parks with rivers, measures for flood control should be undertaken so as to not ruin the property and infrastructure in the park.

Way Forward

Focusing on needs and experiences of women while planning and designing streets, not only benefits them, but everyone. This focus facilitates equitable decision-making and enables a much-needed change in the quest for gender equality and inclusive urban spaces.

Expanding the usage of safety audits to consistently map communities for safety, accessibility and inclusivity:

Cities are like living organisms, constantly evolving and steadily expanding. Hence, cities must be frequently evaluated to account for these changes. Regular collection of data and information is one of the effective ways of keeping track of cities and its growth. Safety audits is used around the world as a methodology of collecting useful information about public infrastructure as well as social usage of a public space. Safetipin was developed to make the safety audit tool widely available through technology. The two key premises of Safetipin are that large data collection can lead to change and that safety will ensue when more people become engaged in creating safer communities and cities. As more and more data is generated, it can be used to conduct advocacy and to inform urban service providers to work on initiatives and projects for improving safety. The geotagged data collected as part of this study is supported by images and could be easily imported on any GIS platform to map the problem areas. This data could be used by government and non-government stakeholders to improve physical infrastructure and address safety in public spaces. Local administration could also use the data to manage their resource allocation well in order to maintain and upkeep their infrastructure and services. It is always advised to measure the change regularly and seen as a way forward. Unless impact on women's lives is assessed, managing and improving urban infrastructure and services becomes short-sighted.

Annex 1

Safetipin parameter rubric.

Rubric	0	1	2	3
Light (Night)	None: No street or other lights	Little: Can see lights, but there is low visibility in the area	Enough: Lighting is enough for clear visibility	Bright: Whole area is brightly lit
Walkpath	None: No walking path available	Poor: Path exists but in very bad condition	Fair: Can walk but not run	Good: Easy to walk fast or run
Openness	Not Open: Many blind corners and no clear sightline	Partly Open: Able to see a little ahead and around	Mostly Open: Able to see in most directions	Completely Open: Can see clearly in all directions
Visibility	No Eyes: No windows or entrances of shops or residences overlook this point	Few Eyes: Less than 5 windows or entrances overlook this point	More Eyes: Between 5 to 10 windows or entrances overlook this point	Highly Visible: More than 10 windows or entrances overlook this point
Public Transport	Unavailable: No metro, bus stop or auto/ rickshaw within 10 minutes walking distance	Distant: Metro, bus stop or auto/ rickshaw within a 5 to 10 minute walking distance	Nearby: Metro, bus stop or auto/ rickshaw within a 2 to 5 minute walking distance	Very Close: Metro, bus stop or auto/ rickshaw available within a 2 minute walking distance
Security	None: No guards or police visible in the surrounding area	Minimal: Some private security visible in the surrounding area but not nearby	Moderate: Private security within hailing distance	High: Police/ reliable security within hailing distance
People	Deserted: No one in sight	Few People: Less than 10 people in sight	Some Crowd: Between 10-20 people in sight	Crowded: Many people within touching distance
Gender Usage	Not Diverse: No one in sight or only men	Somewhat Diverse: Mostly men and very few women or children	Fairly Diverse: Some women and children	Diverse: Balance of all genders or more women and children

Annex 2

Safety audit csv file.

S No	Latitude	Longitude	Lighting	Openness	Visibility	People	Security	Walkpath	Public Trans	Gender Usa	Feeling	Safety Score	Comment	Images
1	-26.112193	28.0882683	0	1	2	3	3	3	1	3	1	1	4.1 Seems that it's a high spot for cr	http://api-anc
2	-26.1125	28.090138	0	1	3	3	1	1	3	3	2	4.3 after sunset there are no streetl	http://api-anc	
3	-26.112346	28.08855	0	2	2	3	2	3	3	3	1	4.4 at magistrate court survey 3rd st	http://api-anc	
4	-26.11227	28.0886083	0	2	2	3	0	2	1	3	3	4.3 mostly crowded but dirty on stre	http://api-anc	
5	-26.107289	28.0939504	1	2	2	2	0	2	2	2	2	4.2 survey done at selborne 7th Aven	https://api-anc	
6	-26.101262	28.0854686	2	2	1	2	1	1	3	3	2	4.3 We are at 1st Avenue, Vasco	http://api-anc	
7	-26.10728	28.0939008	0	1	1	2	0	0	2	2	1	2 survey done between 7th selbor	http://api-anc	
8	-26.107022	28.0938396	1	0	1	1	0	1	1	2	2	2.6 not safe the are lot of children	http://api-anc	
9	-26.101183	28.0857305	2	2	2	3	0	2	3	3	2	4.4 This is our second spot for the	http://api-anc	
10	-26.107485	28.0934403	2	3	3	3	1	1	2	3	1	4.4 survey done at 7th hofmeyer Ma	http://api-anc	
11	-26.094801	28.1049751	1	1	1	1	0	1	2	1	1	2 it's two way street and there is	http://api-anc	
12	-26.093064	28.1051829	1	1	2	3	0	1	2	2	1	4 there is less diversity in terms	http://api-anc	
13	-26.105225	28.1055245	0	3	2	3	0	2	2	3	3	4.4 street lights not working	http://api-anc	
14	-26.104283	28.1046904	1	1	2	3	0	1	3	2	3	4.3 one side of the road may be dan	http://api-anc	
15	-26.106363	28.1057612	0	0	0	3	0	0	2	3	1	2 The street is dark. No pavement	http://api-anc	
16	-26.106025	28.1064103	1	0	1	1	0	0	2	1	1	1.3 only one street light working	and http://api-anc	
17	-26.105495	28.1072769	0	3	0	0	0	3	0	0	0	0.8 East bank park uncapped dark n	http://api-anc	
18	-26.105517	28.1087931	1	3	2	1	0	3	2	2	2	4.3 lots of traffic and shops open	n http://api-anc	
19	-26.107351	28.0941636	2	2	2	1	0	2	2	1	1	4 survey done at 7th selborne 7pm	http://api-anc	
20	-26.107351	28.0941636	2	2	1	1	0	1	2	1	1	3 few people not safe	http://api-anc	
21	-26.107327	28.0939705	3	2	2	2	0	1	2	2	2	4.3 survey done at 7th selborne dur	http://api-anc	
22	-26.085903	28.104258	0	2	2	1	0	1	0	0	1	1.3 the area is not safe and is comm	http://api-anc	
23	-26.086056	28.104271	0	1	0	1	0	1	1	0	1	0.8	http://api-anc	
24	-26.087539	28.1037536	0	1	1	1	0	1	1	0	1	0.9 the area is next to an informal	st http://api-anc	
25	-26.087997	28.1037705	0	1	1	1	0	1	1	0	1	0.9	http://api-anc	
26	-26.087364	28.1058531	0	2	1	1	0	1	2	0	0	0.9	http://api-anc	
27	-26.086883	28.106884	0	1	1	1	0	0	1	0	0	0.5	http://api-anc	
28	-26.085663	28.1070727	0	3	1	0	0	0	1	0	0	0.7 uts completely not safe and the	http://api-anc	
29	-26.084611	28.1077012	0	2	1	1	0	2	2	2	1	3 this area is not safe under sunse	http://api-anc	
30	-26.104999	28.0919365	1	2	2	2	0	2	2	2	1	4.1 survey done at 6th Avenue hofm	http://api-anc	
31	-26.10508	28.09199	2	3	2	3	1	2	1	3	1	4.3	http://api-anc	
32	-26.107334	28.09394	2	2	2	2	0	2	2	2	2	4.3 survey done at 7th street selbor	http://api-anc	
33	-26.108533	28.1084853	2	1	2	3	0	1	3	3	2	4.3 We are at 20th Rooth Khambule	http://api-anc	



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