

ANALYZING BARRIERS TO UNIVERSAL ACCESSIBILITY IN CITY CENTRE, PUNE

Amruta Kakirde*¹, Prof. Dr. Gouri Desai²

¹ Research Scholar, Ajeenkya D Y Patil University, Pune.
amruta.kakirde@adypu.edu.in

² Head, Centre for Learning & Teaching, Ajeenkya D Y Patil University, Pune,
gouri.desai@adypu.edu.in

Abstract

Pedestrians are most neglected mode of transportation. They seem to be less important in terms of safety and have very less space of the total right of way to walk, move or access places. The Universal Accessibility includes pedestrians with disabilities, women, children and senior citizens who often face problems while moving or accessing in crowded cities of India. This Research will focus mainly on senior citizen and disabled which includes deaf and blind citizens because these are the one's who are less in number and that's the reason there are absolutely less or no design considerations for them on the core part of streets in Pune. The aim of this research is to study the pedestrian infrastructure in context of universal accessibility in city core of Pune. Mixed method approach including Qualitative and Quantitative Analysis will be used for data collection. Data will be collected through Primary survey including Visual survey, pedestrian volume count (Senior citizen and disabled) on each street, hawkers count on each street, along with user survey. Secondary data includes data, maps from reports. The result of this study demonstrates the need to understand the complexities of providing universal mobility in city core areas. Street design should give sufficient space for mobility, accessibility and walkability on such busy commercial street at City Centre by analyzing existing condition.

Keywords: Universal Accessibility, Pedestrian Infrastructure, Walking, Pedestrian, City Centre.

Introduction

Pedestrian movement is primary mode of transportation which is getting neglected; therefore planning for walking is an important tool for promoting public health and social equity. Our development strategies for urban mobility have failed to incorporate sustainable modes of transportation such as pedestrians, non-motorized transport which includes cycles, cycle-rickshaws, horse-carts, hand carts etc. Since streets are the common public spaces and most widely used by all people, it is necessary to consider the principles of barrier free environment providing safety and support for people of all ages, genders, disabilities etc.

According to the 2011 Census of India, 2.21% of the Indian population, or 26.8 million people, are disabled (Ministry of Statistics and Programme Implementation, National Sample Survey, 2016). “Due to the ever-increasing population of India and high density in its historically-developed organically-planned core cities, “accessibility” becomes more complex than most of the countries abroad. “Accessibility” refers to the provisions for people including both able-bodied and differently-abled for accessing the urban facilities without discrimination. Thus, dealing with accessibility in old city parts of India is an interesting as well as an important domain of urban infrastructure.” (Mahapatra et al., 2021). “In these times of globally changing demography, both the UN-CRPD and UN-SDG suggest the concept of Universal Mobility for enabling movement within a city without discrimination on the basis of physical or mental limitations. India, being a member nation, is required to act on these similar lines of action towards a “Universally Designed” built environment. Furthermore, goal 11 of Sustainable Development Goals specifies that the aforementioned developments should be carried out with special/distinctive attention to the needs of (a) those in vulnerable situations, (b) women, (c) children, (d) persons with disabilities, and (e) older persons. (Sustainable & Goals, 2016) According to the data from World Population Prospects (the 2019 Revision), one in six people (16%) in the world will be over age 65 (16%) by 2050; in comparison to the ratio of one in eleven people (9%) in 2019.” (Mahapatra et al., 2021)

India is a UN member state and one of the eighty-two signatories to the Convention on the Rights of Persons with Disabilities, India has a policy gap in implementing Universal Design. However, the authors also propose to fill this gap by strategically interpreting the latest disability data and taking into account the needs of Indian citizens. The core areas in individual cities are even denser. In the case of the Pune municipal corporation, the density is over 5600 people per square km. compared to the national number of only 382 people per square km. With India's ever-growing population and high population density in its historically developed and organically planned major cities, "accessibility" becomes more difficult than in most other countries. Accessibility means ensuring people, including able and disabled people, have access to urban facilities without discrimination. Buildings "universally designed" and "universally designed" premises / precincts create accessible urban spaces. (Mahapatra et al., 2021)

“Universal Mobility”, in contrast, is a policy level intervention at the city scale ensuring a minimum standard of mobility for all members of society. Urban reforms in India particularly focusing on improving the quality of life in an inclusive way has substantially increased in recent years. One of such initiatives has been the “Accessible India Campaign” (launched in December 2015 by Ministry of Social Justice and Empowerment, Government of India) in consonance with Article 9 of UN-CRPD. “Accessible India Campaign” has a number of components which promote accessibility in (a) built environments, (b) transportation systems, and information and communication eco-systems.

Research Components

This section includes: (a) aims, (b) objectives, (c) research questions, (d) limitations, and (e) hypothesis.

The aim of this research is to study pedestrian infrastructure in context of universal accessibility for core city of Pune. The objectives to strengthen the aim are

1. To identify the need for a new dimension in India's accessibility scenario.
2. To identify the issues in pedestrian mobility in the study area
3. To evaluate perspective of people towards Universal Mobility in the study area.

The principal research question is to find out whether core area in the city is comprehensive in terms of accessibility. However, the research shall be limited to core urban areas of the Pune city in India, and the study shall be undertaken at street level. The hypothesis considered in this study is that core cities in the Indian context must be made accessible through planning and design measures. This Research will focus a mainly on senior citizen and disabled which includes deaf and blind citizens because these are the one's who are less in number and neglected in street design process.

Methodology

To achieve first objective, various research papers, articles, various street design guidelines, reports, case study papers etc. are referred in order to understand the need for universal Accessibility. After studying these publications it was necessary to focus on area which has urgent need to incorporate this idea of 'Universal Accessibility of pedestrians'. Therefore the delineation for study area was done and the core city area of Pune was chosen. The highly commercial streets of core area namely; Laxmi road, Bajirao road, Shivaji road and the Mandai area was selected as the study area for this research. These streets are some of the busiest streets in Pune. They have commercial value, heritage value as well as religious value. Authors used mixed method approach for conducting this research. Due to these pedestrian generating elements it was necessary to think upon the difficulties they face while walking and accessing places. Second objective was achieved by qualitative approach. Visual survey are undertaken in the study area. Primary data consisted of pedestrian volume count on four streets of study area focused on Senior citizen and Disabled, hawkers count on each street, pedestrian questionnaire survey, walking choice and purpose of visit and photographic documentation was done. Stratified random sampling method was used for sample survey of senior citizens and disabled. For secondary data existing land use map of Pune was collected. Third and fourth objective was achieved by doing analysis of data based on the requirements of people and their level of difficulties that they face through pedestrian surveys. After analyzing the data on the basis of primary and secondary data, observations and feedback from citizens, issues of each street were identified. Recommendations are suggested to incorporate indicators of Universal Accessibility.

Literature review

The literature review was done by referring various research papers, articles, various street design guidelines, reports, case study papers from different sites such as Elsevier, web of science, Google scholar, Research Gate. Keywords used for searching relevant literature was Pedestrians issues, universal Accessibility, Pedestrian Infrastructure, Pedestrian Accessibility in city centre. Best

Practices in India and abroad were covered as a part of literature, few to be named as Bhadra Plaza, Ahmedabad, Copenhagen, Denmark.

Indicators of Accessibility

- The indicators of accessibility of which some have been used in the thesis for study.

Indicators are as follows:

- Safety - indicates the pedestrian safety from traffic while crossing the road
- Connectivity- indicates the street connectivity, public transport coverage and integration of which only street connectivity is focussed upon which will show the pedestrian network continuity that is important for universal accessibility
- Convenience- indicates the width of sidewalk availability that is if the pedestrian path is sufficient for a pedestrian to walk freely and feel convenient to walk on it instead of walking on street.
- Comfort –indicates presence of amenities, lighting, trees and climate protection which are used for the accomplishment of the objective for pedestrians comfort while accessing and walking in core area of the city.
- Space- width of footpath as per footfall and adjacent landuse (Cambra, 2012)

Guidelines and standards for barrier free built environment for disabled and elderly persons-

This report has described about various guidelines which are framed for benefit of non-ambulant (chair bound), semi-ambulant (lower limb impairments), visual, and hearing disabled persons. These guidelines should be incorporated in all types of buildings and public places so that the disabled could perform their activities independently and without any obstacle while reaching at workplace, while doing daily activities, while shopping and have an safe, accessible and free environment for all including this group. Another purpose is also that elderly citizens and disabled citizens should be integrated fully into the society which will help in creating a universal accessible environment. These guidelines and design standards has helped in understanding each groups requirements be it visually impaired, ambulatory or semi-ambulatory, hearing disability and elderly citizens and accordingly design commercial streets of city core of Pune.(India, 1998)

Study Area Delineation

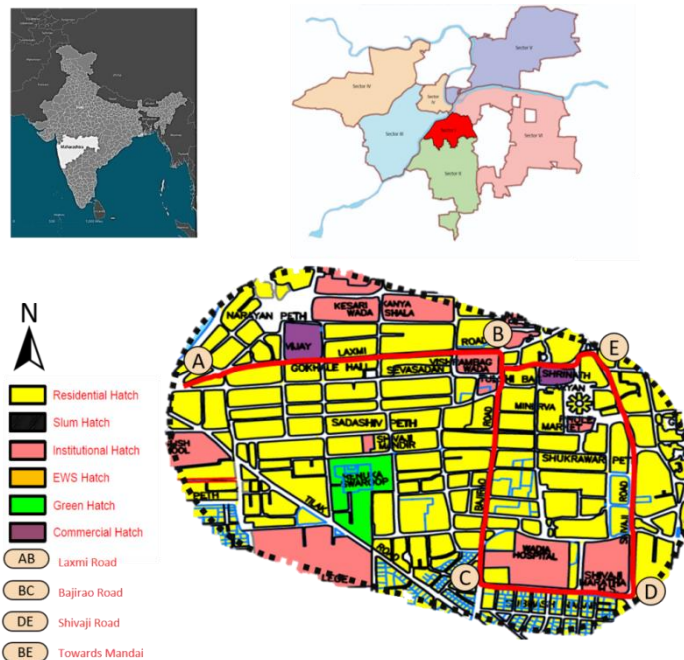
The delineation for study area was done and the core city area of Pune in Maharashtra, India was chosen. The highly commercial streets of core area namely; Laxmi road, Bajirao road, Shivaji road and the Mandai area was selected as the study area for this research. These streets are some of the busiest streets in Pune and have commercial value, heritage value as well as religious value. Due to these pedestrian generating elements it was necessary to think upon the difficulties pedestrians face while walking and accessing places. This area is located in centre of Pune, therefore can also be called a commercial city centre of the Pune city. Though the core area is the oldest and consists

of great valued historic monuments there is no development due to limitations like narrow streets, less space and mixed land use.

This area was mainly chosen for following reasons:

- i. Commercial area
- ii. Has maximum pedestrian footfall especially in the evening
- iii. Has heritage value
- iv. City Centre and oldest part of Pune
- v. Has poor pedestrian infrastructure

Figure 1 – Map (Landuse Map Source- PMC)



Location map is shown in figure 1 . In the following map , sector 1 of Pune is highlighted. Selected streets are the part of this highlighted area. Landuse map Below show surrounding landuse along selected streets. The highlighted streets in the map above were selected for following reasons:

- **Laxmi road** - Has maximum pedestrian footfall especially in the evening as it has diversified commercial areas. It has poor pedestrian infrastructure and major issues regarding universal accessibility on the street.
- **Bajirao road**- Has poor pedestrian infrastructure and also has high footfall. Maximum vehicular traffic and has heritage value.
- **Shivaji road** –Has heritage and religious value, has scope for pedestrian infrastructure and also has high pedestrian footfall.
- **Mandai**- It is the market yard and one of the oldest markets in Pune. Maximum jaywalkers and commercial activities take place. Has poor pedestrian infrastructure and major issues regarding safety and accessibility of pedestrians are observed.

Survey Strategy

The following steps were taken to collect the primary data. Very first step was preparation of Landuse map followed up with Visual survey including length and width of footpath, surface of footpath, connectivity and continuity of footpath, infrastructure like street lights, signages, ramps, railings along footpath etc were checked, condition of bus-stop, and other utilities that create obstacle for pedestrian movement were noted. Pedestrian (Senior citizen and disabled) volume count was taken from 9 am 8 pm on study area. Hawker's counts were taken of each street in study area. Questionnaire was made based on site observations and Visual survey. Pedestrian Surveys were undertaken in order to understand issues faced.

The Visual survey was conducted on four major pedestrian generating streets mentioned above. The Visual survey was conducted on the selected streets.

Findings from survey

Authors carried out different surveys in order to understand difficulties faced by pedestrians, pedestrians and hawker count, walking preference.

Findings from Visual survey

Focus of Visual Survey is to find out hindrances in universal mobility in city core. Below table shows the width of the footpath on selected streets.

Table 1 Footpath Details in the study area (Source- Author)

Name of street	Laxmi road	Bajirao road	Shivaji road	Mandai
Footpath width and availability	Footpath is on both sides of street having a width of 2m on left hand-side and 1.5 m on right hand-side	Presence of only footpath on both sides of street having a width of 1.5m on left hand-side and 1.2-1.5 m on right hand-side.	Footpath is on both sides of street having a width of 1.5m on both sides	Footpath is on both sides of street having a width of 1.5m on both sides.

Below table explains existing condition of study area on the basis of visual Survey

Table 2 – Learning from Visual Survey (Source- Author)

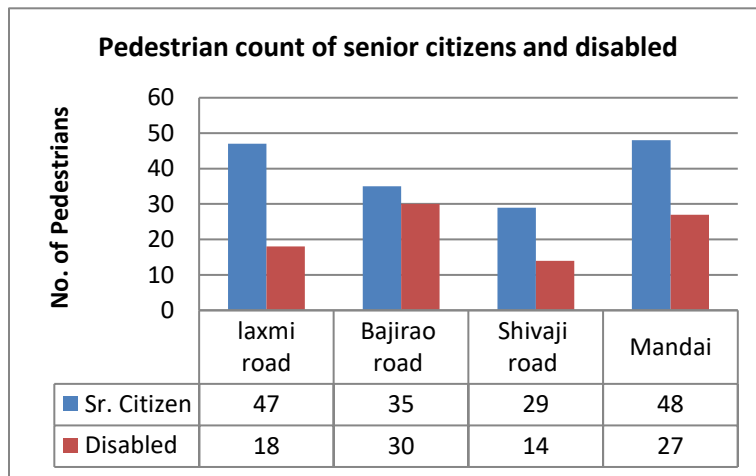
Sr. No.	Topic	Inference
1.	Predominant building use Heritage	The mixed land use and informal markets is the reason for increasing footfall in city centre. Diversified activities such as market, religious places, educational, business and others generate multiple “peak hour traffic” which current infrastructure is not adequate to cater.

3.	Informal vending Encroachment	Informal Vendors are hindrance to pedestrian mobility. Encroachment is a policy failure. Illegally occupied spaces on the footpath create severe problems during peak hours.
4.	Informal Settlement	Beggar/homeless/child labour is a social issue. Only sociopolitical intervention can facilitate the process of emptying the streets of these user groups.
5.	Religious Spaces	Pedestrian Footfall increases especially to religious places during Festivals. Insufficient space to cater the peak hour rush is observed at religious places.
6.	Kerb	The Kerb provides gradation in street level mobility, is neglected condition in some part of study area. As a result, neither disabled pedestrians nor abled people can move freely on the footpaths.
7.	Resting Places , Public Toilets, Drinking water Facility,	Lack of Resting areas found in study area. Eight public toilets were observed but not maintained well and no drinking water facility was present in study area. Lack of resting places for senior citizen and disabled.
8.	Street Lights	Street lights on Footpath are another hindrance. The fact that this site is frequently visited by pedestrians and sometimes poor lighting makes it even more susceptible to the problems of users with cognitive disabilities.
9.	Footpath	There is no provision of ramps for disabled and senior citizens to footpath. Discontinuous railings along footpath, protruding objects like hangers or statues on footpath, absence of tactile pavement for visual impairment citizens in some area. Thin railings along footpath, illegal parking of bicycles and motorcycles, dustbins of shops kept outside on footpath causing hindrance to walking.
10.	Signages	Some informatory signages understandable location maps are also present in study area, but are depicted in regional language.
11.	Bus Stops	Bus-stops have no ramps and no proper space for disabled to sit or stand. Absence of information regarding buses rather it is used more for advertising purposes.
12.	Footfall generating Activities	Shopping centres, schools and institutes, bus-stop, Bank of Maharashtra, Tulsi-baug, Chitale Bandhu Sweet Shop, Vishram Baug Wada, Bank of Maharashtra, Lal Mahal, Kasba Peth Ganpati, Dagdusheth Halwai Ganpati, food stalls, Mandai , Grossary shops, Jewelry shops, Informal shops,restaurants, two off-street parking complexes and other shops are responsible for generating more pedestrians footfalls.

Walking Preference- Senior Citizen

The figure 3 shows the walking preference of senior citizens on and off the footpath. Some senior citizens walk off the footpath (Jay walkers) because of unsafe pedestrian path, encroachment, congestion and other obstacles on the footpath. More footfall of senior citizens is observed in Mandai for vegetable purchasing. The Mandai area does have footpath but it is not for the purpose of pedestrian use. These pedestrian path are fully occupied by hawkers and vendors which is the main reason for jaywalking of senior citizens.

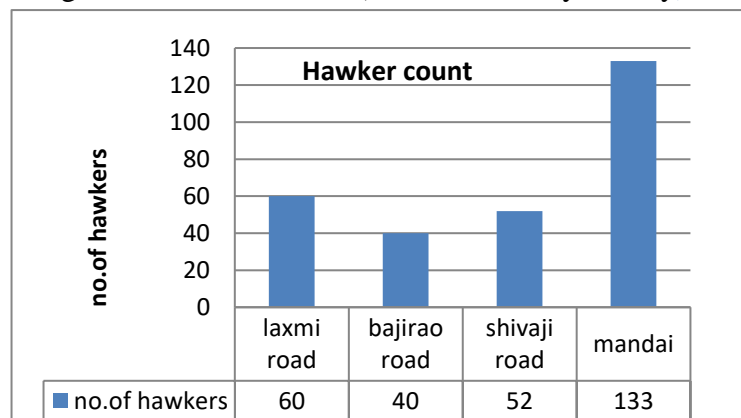
Figure 2 Pedestrian count of senior citizens and disabled (Source- Primary Survey)



Hawker Count in study area

The hawkers count was taken on all four streets of study area on different days. These counts were taken for whole day and the maximum count of hawkers per day has been presented in the graph below. Maximum hawkers count was taken at Mandai and lowest on Bajirao road.

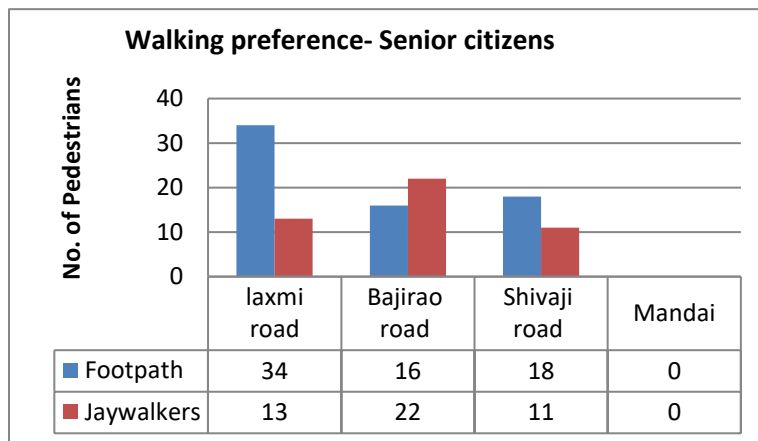
Figure 3- Hawker Count (Source- Primary Survey)



Pedestrian count of senior citizens and disabled in the study area

The figure 4 shows the total number of senior citizens and disabled citizens walking on the selected streets in the study area. We have already seen listed obstacles faced by pedestrians. Figures in the bargraph show substantial count of senior citizens and disabled. The situation insists on provision for universal accessibility design to be implemented on busy streets of Pune.

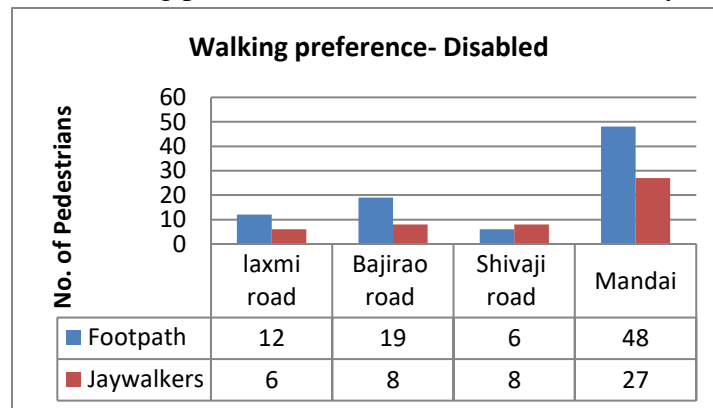
Figure 4 - Walking Preference- Senior Citizen (Source- Primary Survey)



Walking Preference- Disabled

The figure 5 shows walking preference of disabled on and off the footpath in study area. Due to obstacles such as encroachment, parking, extension of shop, electric boxes Disable people are forced to walk from carriage way (Jay walkers) with moving traffic.

Figure 5 Walking preference- Disabled (Source- Primary Survey)



Photos of Senior Citizens and disabled is study area facing issues while walking



Photo 1 Sr. Citizen finding way through encroachment on footpath



Photo 2 Jay walkers near Mandai



Photo 3 - Blind person walking on Footpath on Bajrao Road



Photo 4 Disabled person on Wheelchair at Mandai



Photo 5 Handicapped Sr. citizen at Shivaji Road



Photo 6 Handicapped Beggar crossing busy street of Shivaji Road



Photo 7 Homeless sleeping on the footpath



Photo 8 Informal Settlement on Footpath

Obstacles faced by pedestrians while walking in study area

The graphs below show obstacles faced by pedestrians while mobilizing on laxmi road, Bajirao road, mandai and shivaji road. The major obstacles faced by pedestrians are presented in the photographs ahead.

Figure 2 Obstacles faced by pedestrians while moving on Laxmi Road (Source- Primary Survey)

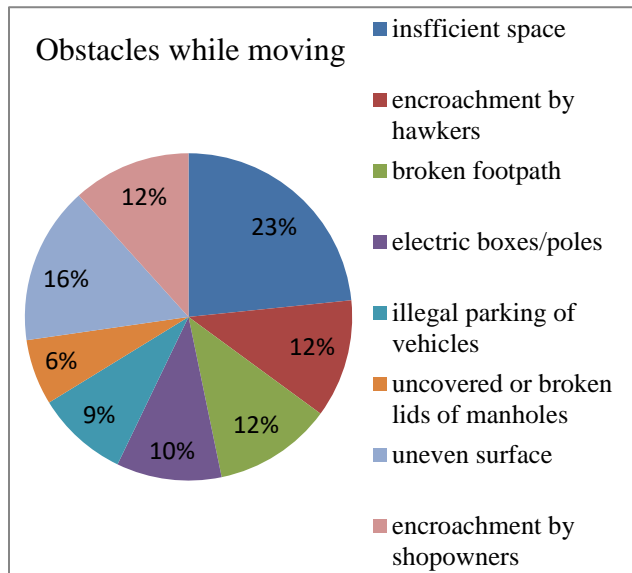


Figure 3 Obstacles faced by pedestrians while moving on Bajirao Road (Source- Primary Survey)

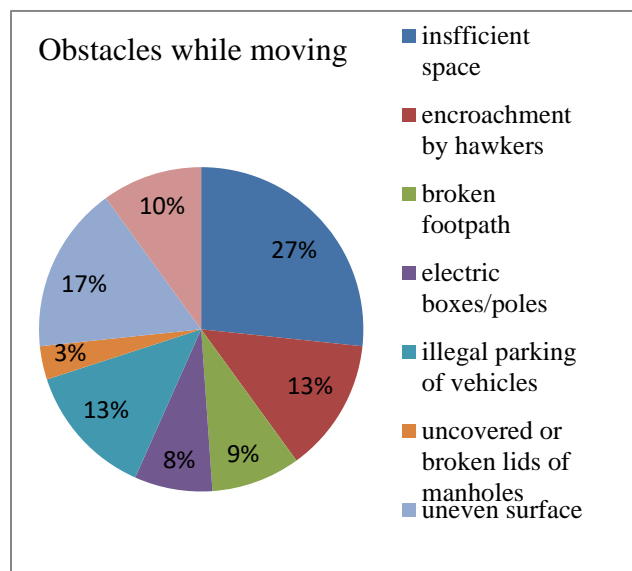


Figure 4 Obstacles faced by pedestrians while moving Shivaji Road

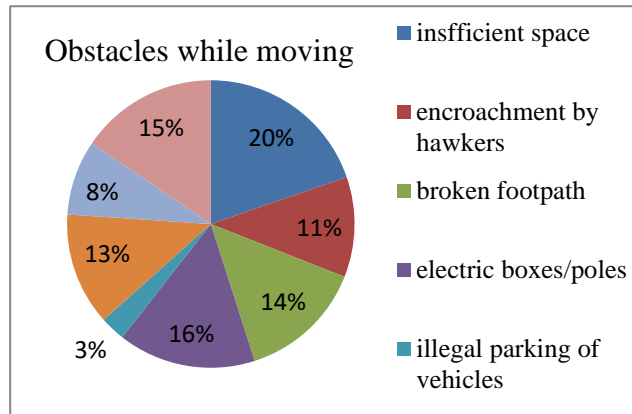
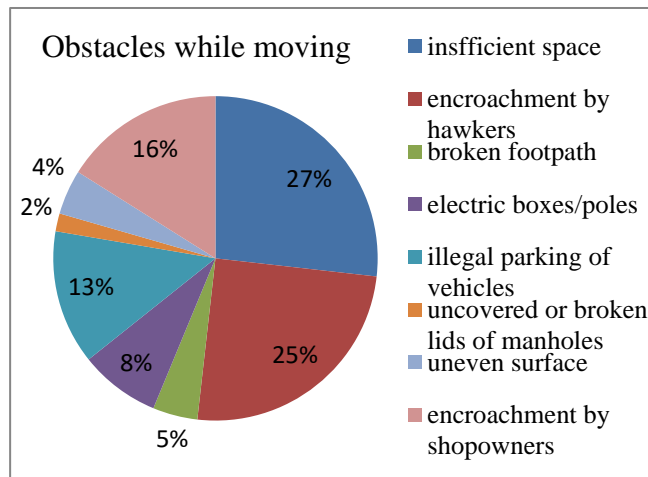


Figure 5 Obstacles faced by pedestrians while moving in Mandai Area



Obstacles faced by Pedestrians

The highlighted streets in the map above were selected for following reasons:



Photo 9 Encroachment by Hawkers



Photo 10 Tree on the Footpath



Photo 11 littering on footpath



Photo 12 People waiting on bus stop hindering pedestrian



Photo 13 Broken Footpath on Shivaji Road



Photo 14 Person sleeping on footpath near Mandai



Photo 15 Construction material on footpath at Bajirao Road



Photo 16 Electric Pole on Footpath at Bajirao Road



Photo 17 Illegal parking on the Footpath on bajirao Road

Core areas of cities are generally congested and needs attention. The paper thus made an attempt to analyze congested streets of city core in terms of universal accessibility by carrying out various surveys and through visual documentation. Major findings are obstacles faced by pedestrians while walking on the footpath, width of footpath, encroachments by hawkers, vehicle parking, and extension of shops. Policy initiatives regarding vendors, unauthorized Parking will help to reduce encroachments. Along with this to make it accessible for disabled, we need to incorporate tactile paving, “textured tiles with metallic finishes will allow the walker to get a sense of direction, railings for support while walking and proper Braille signage on crossings are inevitable for a city to become accessible in the true sense.” (Nayak, 2014) Capacity building and research on Universal Design is an effective tool for creating global awareness about the need of Universal Design in Architecture and Planning (Ostroff, E, 2003) Thus, the answer to the research question for this paper, i.e., “to find out whether core areas of the city is comprehensive in terms of accessibility” is “No”. Thus, paper suggests need for universal accessibility in city core.

Below table suggests suitable recommendation across each indicator of accessibility.

Table 3 - Indicators of Accessibility (Source- Author)

Indicators of Universal Accessibility	Suggestions
Safety	<ul style="list-style-type: none"> • Bollards across the footpath • Railings along ramps for climbing up and down the bus-stop and footpath • Table-top crossing at every intersection with embedded tactile pavement • Leveled footpath with uniform pavements
Convenience	<ul style="list-style-type: none"> • Construction of footpath should be completed on time • Manholes should be covered with concrete lids • Ramps at bus-stops and at starting and ending point of footpath constructed.
Connectivity	<ul style="list-style-type: none"> • Continuous footpath along the streets connecting each street with one another • Edge to edge table-top crossing at intersections with clear zebra crossing.
Comfort	<ul style="list-style-type: none"> • On-street parking can be removed and width of footpath can be increased • Separate hawker's zone can be given to reduce encroachment on footpath • Embedding tactile pavement in centre of footpath and on table-top crossing
Space	<ul style="list-style-type: none"> • Footpath width is increased by removing on street parking • Hawkers may be relocated which will increased pedestrian space.

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