

Original research

# Outdoor difficulties experienced by a group of visually impaired Iranian people

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Received 26 December 2015; revised 4 April 2016; accepted 5 April 2016

Available online 2 May 2016

## Abstract

**Propose:** A qualitative approach using semi-structured individual interviews was used to elicit common outdoor difficulties in individuals with visual impairment.

**Methods:** Interviews were recorded and then transcribed verbatim into text for thematic analysis. Twenty legally-blind individuals aged  $34.25 \pm 2.41$  years with different etiologies were included in this study.

**Results:** All participants had experienced some sort of difficulty in outdoor environments. The most important problems as perceived by the participants are installation of tactile ground surface indicators, unsafe sidewalks, existence of obstacles on sidewalks, difficulty reading bus numbers, disorientation, fear of falling, recognition of faces, inability to read street names, the presence of spaces between platforms and buses, walking into glass doors, crossing streets, and the risk of Aerial barriers.

**Conclusions:** As a visually impaired person might say, sidewalks can be the most dangerous of places. Appropriate urban modification can be very beneficial.

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**Keywords:** Visually impaired; Outdoors difficulty; Pedestrian; Accident; Urban modification

## Introduction

The task of Orientation involves environmental information regarding direction, locations, route, and positions. Mobility is about the ability of moving in an environment which has various objects, obstructions, holes, and stairs, as well as dangerous situations such as moving or stationary entities.

**Author disclosure statement:** The authors would like to disclose that there is no conflict of interest regarding this manuscript. In addition, no specific fund was provided for this study, and the authors paid for expenses personally.

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Peer review under responsibility of the Iranian Society of Ophthalmology.

One of the consequences of vision loss is being uncomfortable about safety while moving around or traveling independently.<sup>1,2</sup> Individuals with visual impairment have many difficulties in self-navigation in unfamiliar outdoor environments.<sup>2</sup> Safe navigation on sidewalks is the most important requirement.<sup>3</sup> There are many skills and aids considered by professionals working in the field of orientation and mobility to help visually impaired people go outdoors safely. These include the use of canes, guide dogs, and mobility training. There are many studies that consider outdoors problems as well as techniques conceived for safe navigation. The most advanced techniques include Radio-Frequency Identification (RFID),<sup>4</sup> Global Positioning System (GPS),<sup>5</sup> Infrared Light-Emitting Diode (LEDs),<sup>6</sup> wireless sensors,<sup>7</sup> Navigation (NAVIG) devices,<sup>8</sup> remote sighted guidance,<sup>9</sup> an aid to increase the independent mobility of blind travelers (MoBIC),<sup>10</sup>

infrared verbal guidance systems,<sup>11</sup> and computer vision modules.<sup>12</sup> It has also been shown that mobility performance improves with mobility training.<sup>13,14</sup>

User perspectives about existing problems in home environments also need to be considered.<sup>15</sup> In order to evaluate and understand the difficulties that people with visual impairment face indoors and at home, it is necessary to use a valid assessment tool based on client-centered perspectives.<sup>16–18</sup> It has been stated that using the subjects' perspectives regarding home environmental fit is helpful.<sup>19</sup> These perspectives are very important for practitioners who design training programs for people with visual impairment. A key to enhance information is involving people with visual impairment in the consultation process so that service providers have a better idea of what services should be included.<sup>15,16</sup> If their novel strategies are understood, people with visual impairment can be a good source of knowledge in designing a system in vision rehabilitation.<sup>20</sup> Consequently, to reach more accurate user needs, before starting any modification, it is best to involve the person who is the end-user of this modification.<sup>15,21–23</sup> This study aims to listen to people to provide evidence from the perspective of people with visual impairment.

This study evaluated outdoor difficulties and mobility experiences in detail of a group of Iranian individuals with visual impairment. To improve the quality of life for these individuals with vision impairment, it is important to listen to them and understand their difficulties.

## Methods

A qualitative approach using semi-structured individual interviews was used. This approach has been used previously to investigate the experiences of people with visual impairment related to housing needs,<sup>24,25</sup> and its advantages include that the two-way communication leads to a richness of data and deeper insight into the topic.<sup>26</sup> The lack of research on outdoor difficulties points to a need to understand in-depth the processes involved in managing environment strategies for navigation that may have been employed by these patients. In a qualitative approach, a sample target of 20–30 participants is selected as being the minimum number required.<sup>27</sup> In this study, thematic saturation was achieved at 20 participants. The interviewer asked about all the difficulties that had been experienced.

Interviews took place in the Bahman Cultural Center for the Blind. This centre is located in Bahaman Farhangsara in the southern part of Tehran, the capital of Iran, between February to July 2015 and was 20–40 min in duration. Interviews were audiotaped and transcribed verbatim into text authors. The transcripts were checked against the audiotapes for accuracy.

A set of open-ended questions were developed for this study. The questions were designed to investigate participants' experiences regarding the topic of study. Questions about different outdoor places were structured to distinguish relative difficulties. For example: "How often do you go out and for what reason? What is your main difficulty outdoors? What are your difficulties using tactile surface indicators? What are the possible hazards on the path of your usual routes? Do you ask

others for help? Are you using new technology for navigation? Have you experienced falling outdoors? Have you ever gotten lost? Have you had any accident? What do you think about a dog as a guide?" The final question asked of participants was: "Is there anything else that you would like to say with respect to your personal outdoor difficulties?"

Each participant was asked to read and sign a consent form. For those who were not able to see, consent was read by the interviewer. Interviews were recorded and then transcribed into text. The transcripts were then checked against the audiotapes for accuracy. All transcriptions were then deliberated with systematic examination in order to find themes. Key participant quotations were chosen to highlight the importance of specific findings.

## Results

There were 20 participants (10 men and 10 women) with a mean age of  $34.25 \pm 2.41$  years. Eleven were unmarried, and 9 were married. In terms of education, 7 had high school certificates, 12 had bachelor's degrees, and one had a M.Sc. degree. Eight people were unemployed, and 12 were employed. The causes of vision impairment (20 patients) were retinitis pigmentosa (7), optic atrophy (5), other retinal diseases (3), glaucoma (2), albinism (1), refractive error (1), and diabetes (1). All participants were legally blind.<sup>28</sup> The majority had light perception, and others had hand motion. All participants lived in Tehran.

Participants experienced a range of difficulties in their mobility performance. Similar themes, thoughts, and points of view were identified as follows:

### *The need to ask others for help*

All participants usually go out every day for various reasons such as performing personal activities, shopping, and working. In terms of asking others for help, some believe getting help from strangers is not desirable, and therefore asked a person such as a friend or family member to guide them. The majority of participants were unhappy asking others to guide them, "Because visually healthy people may not believe that we are visually impaired or blind, and this can be annoying". Therefore most participants had to think about how to express their needs. This was very common among participants that got lost in unfamiliar environments. A few participants said that they hire a private taxi to guide them when they go out. Although it is expensive, they believe this strategy is safer and minimizes difficulties.

### *Problems in identifying routes and using GPS*

Participants had different strategies in identifying routes such as keeping count of the places they passed, existence of stairs, shops, signs on the ground such as small stationary obstructions, types of terrain, bus stations, curb stones, overpasses, slopes, declivities, gas stations, recognizing bumps and counting them using their memory, buildings, signs of

underground stations, hearing and smelling clues from the environment, and getting help from others. Some participants stated that they could maneuver streets better at night because they could easily recognize vehicle lights. They also said that “*recognizing underground signs at night is easier than during the day because they have their lights on.*” Using escalators are problematic according to some participants because it is not always clear whether it is moving up or down. They do not have specific signs indicating their direction, so mistakes can be made, which can be dangerous.

The majority of participant never used GPS technology and had little information about it. A few participants had GPS programs on their mobile phones. They believed this was useful when traveling by car especially when taxis do not provide such facilities. This technology helps drivers find the destination. One participant said “*listening to the GPS from headphones also creates a problem as it masks environmental sounds which are essential to navigation.*”

#### *Potential risks for accidents*

Nearly all participants had experienced accidents because of their vision. It should be noted that motorbikes and bicycles may ride on footpaths and sidewalks in some areas in Iran. For this reason, many individuals with visual impairment have experienced accidents with these vehicles. Motorbike drivers also create many dangerous situations for everyone by not following traffic rules. Other causes of accidents were falling from stairs, falling into holes or pits, bumping into objects in footpaths, falling onto underground rails, falling into gaps between buses and their platforms and bumping into building scaffolds and glass doors. In Iran, there are canals between most sidewalks and streets for the purpose of passing water on rainy days as well as watering trees on sidewalks (Fig. 2). These canals may not be covered, and therefore may be a potential risk for falling and fracture. Some participants had experienced fractures due to falling into these canals.

One of the oddest problems causing accidents is aerial obstacles. It should be noted that transporting ironware, water pipes, and other such paraphernalia on the roofs of vehicles is not unusual in some areas in Iran. There can be 1 or 2 m of these materials protruding from the end of a vehicle at about 1–1.5 m height from the ground (Fig. 1) Sometimes these vehicles park in a way in which the end of a bar would be positioned on sidewalks, causing head injuries. Although not very common, some of our participant had actually encountered these types of accidents. Another possible source of aerial accidents is the existence of tree branches in the sidewalks. Installation of telephone booths and charity boxes on sidewalks are other obstructions which cause accidents. Some of our participants also had such experiences.

#### *Difficulties in using tactile ground surface indicators (TGSI)*

All participants were unhappy using TGSI for the same reasons. “*When walking on them, the main drawbacks are*

*getting foot and backaches.*” The participants believe the TGSI installed are not manufactured to correct standards. These indicators often lead to obstructions such as canals, trees etc (Fig. 2). A few participants said that sometimes they bumped into visually normal people walking on these indicators who were unaware that these indicators were intended for the visually impaired, not for them. One very interesting finding was the fact that the participants preferred walking in the streets rather than on the sidewalks. Many participants stated that this strategy was safer because there were more obstacles on the footpaths or sidewalks. For instance, shopkeepers stack their merchandise on the sidewalks. This is very common in Iran. Other reasons that make sidewalks unsafe are passing bicycles, motorbikes, parked automobiles, holes, etc.

#### *Inappropriate canes raise the risk of accidents*

One of the main complaints among all participants was the quality of currently available canes. They believe that these locally manufactured products are very fragile, bending very often, and are not sturdy enough against obstacles. Sometimes canes get stuck in small holes on the ground causing them to break. “*Many people are not familiar with white canes, so we are not comfortable using canes. Sometimes people who are walking around us crush our cane under their foot and cause it to bend.*”

Many participants said, “*We use canes not for orientation and mobility, but just to inform others that we are visually impaired, possibly making them more considerate.*” Two participants had experiences using canes from overseas, and they believe these canes were heavier than locals ones and did not break as easily. Also the presence of a round wheel at the end of these canes is very useful. Some suggestions were also raised in terms of requiring the use of a warning system in all canes helping in the detection of obstructions.

#### *Impediments of using guide dogs*

Although this facility is an unavailable one to the Iranian visually impaired, it was interesting to obtain their perspective about guide dogs. A few participants said, “*It may be a good idea to experience using a dog and find their abilities in helping visually impaired people.*” However, some participants expressed a fear of keeping dogs.

#### *Main concerns and related suggestions*

Unmodified floors and sidewalks were the most expressed concern among participants. The necessity of inserting some devices at cross sections to help individuals with visual impairment was emphasized. People who have normal vision should learn more about people with vision impairment.

Comments often made were: “*More education should be provided by the media to increase public awareness of how to treat visually impaired people.*” “*Drivers should learn more about individuals with visual impairment and pay more attention to people with white canes, carefully observing*



Fig. 1. Examples of obstacles that may cause accident for visually impaired people such as motorbike on the tactile surface indicator (left), a tree at tactile surface indicator and uncovered canal (middle), the whole area of the sidewalk is occupied by shop supplies (right).



Fig. 2. Examples of other obstacles such as arial obstacle on the sidewalk (top left), improper transport of the building material behind the vehicles (top right), Telephone station on tactile surface indicator (bottom left), tactile surface indicator that leads to a canal (bottom right).

traffic rules. Signs and print materials on boards are not properly modified so we cannot use them.” “Using ATMs at night is more comfortable because there is not much background light”.

“When we are shopping, there is unease in asking shopkeepers to help us because we are unable to see well, and we need to ask more. In these situations, many shopkeepers are not happy to answer.” It should be noted that in Iran, there are many small shops offering different products. Since many individuals with visual impairment do not use canes, there is the problem of people not believing that they cannot see when they ask for help. “Drivers do not know we are visually impaired.” “For shopping, the best strategy

that I found is to give the list of requirements to a shopkeeper and ask him to provide them.”

The majority of participants indicated that they were not able to detect bus numbers or their routes. To solve this problem, they usually asked others for help. Participants would like to have announcement systems on buses which would be helpful to inform them where they are. Many participants' concern was hailing taxis. “We are not able to recognize the facial expression of the taxi drivers while standing on the side of the road, so we aren't sure whether they are willing to pick us up. Also there may be other people waiting for a taxi, so we are unsure whether the taxi has stopped for us or for others.”



## Discussion

Using tactile ground surface indicators are common in many countries. It is believed that the visually impaired can use these facilities for safe navigation.<sup>29,30</sup> Surprisingly, none of our participants were using them because it caused them pain in their feet. Although there are different tactile indicators such as warning and directional ones, our visually impaired participants had no information about these types of facilities. They were generally not happy with the existence of tactile indicators on sidewalks. Unfortunately, some of the participants even experienced accidents using them. These installations not only do not provide safety, but are even dangerous and may cause crashes and accidents. For this reason, our participants never used them. However, it has been reported that tactile ground surface indicators are effective for navigation from the perspective of visually impaired people in many developed countries.<sup>29–31</sup>

This problem indicates that requirements of infrastructure such as culture and education have not been well met yet. On the other hand, the installers might not be familiar with these facilities and have just installed them anyway. There is no training for individuals with visual impairment on how to use such facilities. Any modification to surroundings should be in concurrence with the local user's culture, ideas, and perspectives. It should be noted that importing such facilities from developed countries into developing countries may not provide optimum results. However, there is much evidence showing that assistive devices and home modification is very effective in the prevention of falls and accidents.<sup>19,32,33</sup> This finding originates from this study; therefore, it may not be generalized to all developing countries.

All participants had experienced accidents in their environment. From the participant's points of view, sidewalks were not safe for navigation. It was interesting to hear from a few participants that, "I prefer to walk along the street rather than walking on sidewalks." The reasons are well understood because of passing bicycles and motorbikes through sidewalks and sometimes even the presence of parked vehicles on sidewalks (Fig. 1). The existence of holes and other impediments in the sidewalks are other causes of accidents. These obstacles are not expected to be seen on sidewalks.

The installation of uncovered canals between sidewalks and streets can cause falls not only for the visually impaired but also for visually normal people. It would therefore not be surprising that visually impaired people fall into these canals and fractures occur. Crashing into arial blockage is very shocking indeed for the visually impaired. However, these barriers are not surprising for visually normal people because they can see these obstructions and therefore are able to bypass them safely. As indicated in the results, these kinds of barriers are common and dissimilar. It is therefore likely that a visually impaired person may experience at least one type. Since individuals with visual impairment must pay careful attention to avoid bumping into impediments in front of their feet, they are often unaware of arial barriers. Comprehensive national programs for modification of the surroundings are necessary.

People with vision impairment need help to go from one place to another. Advanced technologies assist individuals with visual impairment to travel and navigate. There is a range of electronic devices such as laser canes, GPS, and ultrasonic canes that may assist blind people.<sup>34–38</sup> GPS technology is known as 'talking sign' devices. It provides environmental information for people with visual impairment who are not able to read signs and print information.<sup>39</sup> Using these kinds of devices showed that they can help individuals with visual impairment to be independent and avoid barriers while moving. Home environmental modification also prevents risk of hazards.<sup>40</sup> Unfortunately, our participants did not have much experience with such devices and standard modifications. One of the participants stated that using headphones to listen to the GPS information was problematic because it prevented hearing the surroundings easily. This issue has already been reported by another study.<sup>31</sup> It might be interesting to test these devices among different people with different cultures to see how they might be helpful. It should be noted that importing these kinds of technologies into developing countries may not be very useful because current infrastructures do not encourage the use of such facilities. The most important requirement to design environment is safety. It is not common to see running motorbikes on the sidewalk. An appropriate infrastructure would never allow such an occurrence. As it can be seen in figures which have been taken from Tehran, poor infrastructure leads to these difficulties for visually impaired people.

From the participants' perspectives, there are considerable difficulties and hazards outdoors. Difficulty seeing bus numbers or destinations, disorientation, fear of falling, dangers of walking on the sidewalks, problems with facial recognition, inability to read street signs, the spaces between platforms and buses or trains, and walking into glass doors are some of the main concerns. Environmental modifications outside the home may be necessary since they may reduce some of the difficulties experienced by people with visual impairment.<sup>41–43</sup> It has been suggested that the design of housing also needs to be improved to meet the needs of all people.<sup>44</sup>

In summary, from the perspective of individuals with visual impairment, sidewalks can be the most dangerous place that they have experienced in their lives. Appropriate infrastructures and modifications can provide protection for safe navigation.

## Acknowledgments

The authors would like to thank the participants for their time and patience. Special thanks to Dr. Aziz Rabie for his very helpful assistance in preparation of this manuscript.

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