

Pedestrian Knowledge, Attitudes and Practices in Urban Walking Environments Among Bahir Dar, Gondar and Dessie Towns, Ethiopia

Fesseha Hailu Mekonnen¹ and Fentanesh Haile²

Abstract

Even though walking is one of the most important modes of transport, it is often undervalued by urban planners and policy makers. This study aimed at assessing pedestrians' knowledge on sidewalk utilization and their attitudes toward sidewalk facilities. A cross-sectional data on pedestrians' knowledge, attitudes and practices were collected from three towns. Using population proportion sampling procedure the sample size for the study was determined to be 600. The 95% degree of confidence was also used. Respondents were asked to answer three groups of questions focusing on their knowledge, attitudes and practices related to sidewalks. Findings show that respondents have adequate knowledge on sidewalk facilities' utilization, but they are poor practical implementers. There was no statistically significant difference at the $p > .05$ level in attitude scores for three significances: $F(2,432) = 4.6$. Proper management of the available sidewalk facilities should be given priority by each city administrations. A more detailed study of each city's traffic management and planning could bring long term solutions for pedestrian problems.

Key words: Pedestrian knowledge; Bahir Dar; pedestrian attitude; zebra-crossing; Amhara region; pedestrian practice.

¹ Associate professor, Bahir Dar University, email: fesseha2005@yahoo.com

² Lecturer, Bahir Dar University.

Introduction

Pedestrians are people who travel on foot or who use assistive devices, such as wheelchairs, for mobility (World Bank, 2002). Sidewalks are integral components of streets and roadways where pedestrians need to experience safety, comfort, accessibility, and efficient mobility. A sidewalk is a pedestrian route, characteristically built of concrete or earth surfaces and parallel to a street that provides a means for pedestrians to travel within the public right-of-way physically-separated from vehicular traffic (United States Access Board, 2011). Like streets, sidewalks are ubiquitous and difficult to avoid. Standardized sidewalks increase pedestrian safety by separating pedestrians from vehicle traffic.

More people walk than use any other forms of transport. However, surprisingly more emphasis is given for roadways than walking in transport planning and transport engineering (Hass-Klau, 2003). The pedestrian is often the most vulnerable of all transportation system users, and frequently the most ignored (Ibrahim, Kidwai, 2005). Politicians consider driving as human rights rather than walking. Sauter (2003) states, “The inherent advantage of walking is exploited in order to narrow pavements, squeezing pedestrians between parked cars” (2003, p. 205). Walking is an undervalued mode of transport (Turner, Singh, Quinn, and Allatt, 2011; Schweizer, 2005). A 2013 review by WHO found 84% of roads with pedestrians in developing countries had no sidewalks (as cited in Getu, Washington, King, and Haque, 2013).

Even when sidewalks are available, they might be occupied by roadside vendors or lacking pedestrian facilities that can accommodate large volumes of pedestrians. Moreover, pedestrians’ volumes are very high in poor residential neighborhoods and pedestrians are forced to share roads with vehicles, which increase the risk of crash (Getu et al., 2005).

Pedestrians need to be able to walk in a safe and convenient way. Walking is a function of the physical characteristics of a road and the perception of different users of the street (Frank. and Engelke, n.d.). Streets that have adequate and safe pedestrian facilities are believed to facilitate and increase pedestrian traffic (Frank. and Engelke, n.d.; Ibrahim et al., 2005).

In many developing countries walking is overwhelmingly important for lower income groups (Hilling, 1996). In most of the larger urban centers of Ethiopia the transport mode is fully pedestrian. Many small and medium level urban centers have no pedestrian routes, except those parts lying on the national highway network systems. Due to the insufficiency of pedestrian facilities, the number of road accidents is frighteningly high (National Urban Planning Institute, 2006).

The vehicle and pedestrian flows in Ethiopia’s urban areas have increased drastically over the past two decades due to increase in population and economic growth. Researchers have explored the topic from a range of angles. For instance, Tsetargachew (2016) has analyzed the Road Transportation Networks of the Amhara Region; Getu et al., (2013) have reviewed the relevant factors in relation to the impact of pedestrian crashes in Ethiopia; Fesseha and Sileshi (2013) have studied road traffic accident in Amhara Region. However, these studies paid scant attention to pedestrians’ knowledge on sidewalk utilization, attitude toward sidewalk facilities and their challenges. Therefore, this study was aimed at bridging this gap through assessing pedestrians’ knowledge on sidewalk utilization and their attitudes toward sidewalk facilities and their practices.

Methods and materials

Description of the Study sites

Recently, the urbanization rate in Ethiopia is one of the highest in the world (4.89 percent per year, CIA, 2017). The country is also witnessing a rapid population increase and a huge expansion of infrastructure in urban areas (WB, 2013).

Bahir Dar

According to a recent estimate by the World Bank, the population of Bahir Dar is about 276,281 (WB, 2013). Bahir Dar is a compact town with a grid iron pattern of networks on the flat topography (Figure 1). The available sidewalks are more convivial and wider compared to sidewalks of Gondar and Dessie towns. Due to the tourist attractions of the monasteries in Lake Tana and the Tis-esat falls, thousands of international and domestic tourists visit Bahir Dar each year, increasing the demand for sidewalks.

Figure1. Google Earth Image of Bahir Dar town

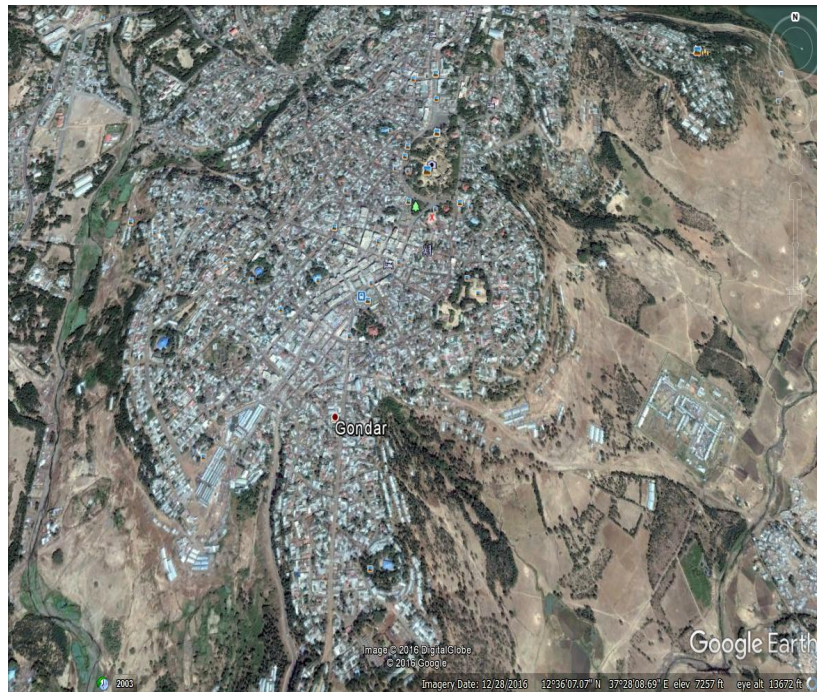


Source: Google Earth, 2017

Gondar

Gondar is believed to be home to about 264,964 people (WB, 2013). The town was established in the 18th century on undulating land surfaces with small hills (Figure 2). The streets and sidewalks in the town are old and have narrow plans. The castle of Fasiledes and the different annual cultural and religious ceremonies in the town attract many international and domestic tourists each year, and hence increases the need for standardized and furnished sidewalks.

Figure 2. Google Earth Image of Gondar town.



Source: Google Earth, 2017

Dessie

Dessie is home to about 153, 692 people (WB, 2013), and was founded in the second half of the nineteenth century. The town is located in between two mountains that seem to guard it as a defense (UN HABITAT, nd.). Figure 3 depicts the morphology of Dessie town.

Figure 3. Google Earth Image of Dessie town



Source: Google Earth, 2017

Research design

A descriptive study design with quantitative and qualitative tools was used. Cross-sectional data on knowledge, attitudes and practices of pedestrians' were collected from Bahir Dar, Gondar and Dessie towns. Structured questionnaires were prepared by the researchers. Observation checklist and photographing were also used to collect data. Descriptive data analysis was employed to analyze the data.

Sampling techniques

To determine the sample size, a population proportion sampling procedure was used. To get the maximum sample size, $p = 0.50$ was used as there are no previous estimates available. Due to time and budget constraints the researchers allowed the maximum errors to be $\pm 4\%$ of the population proportion. The 95% degree of confidence was used. Therefore, sample size was determined to be 600. However, only 450 question papers were properly filled in and used for analysis.

Pedestrians were selected as respondent who reported that their most frequent transport mode is neither passenger car nor motorcycle and who reported non-zero daily walking distance travelled in the town.

Measurements

Respondents were asked to answer three groups of questions focusing on their knowledge, attitudes and practices of sidewalks utilization. Respondents' understanding of facts on sidewalks was assessed through their responses to twelve statements. They were asked to assess the claim made in each statement and indicate whether they believe it to be true or false. Each respondent received one point for correct answer and the correct total was determined for each respondent. Higher scores indicate higher level of factual knowledge on sidewalks.

Attitudes toward sidewalks facilities were measured using 15 statements that were related to actions and beliefs that respondents might or might not hold toward walkway utilization. To evaluate the difference among respondents' attitudes each respondent was asked whether he/she strongly agreed, agreed, undecided, disagreed or strongly disagreed on each statement. The responses were coded for analysis, with 1 representing the most pro-walkway attitudes, 5 for most walkway unfriendly attitudes and 3 for walkway utilization neutral attitudes. Compound walkway utilization attitudes were calculated, and lower compound scores indicate that a respondent held more pro-walkway friendly attitudes.

Walkway utilization behaviors were assessed using 12 statements describing practices. Respondents were asked to categorize the frequency of their walkway-friendly behavior into three rates: always, sometimes and never. For each statement, a respondent's sidewalk utilization behaviors were scored as either always (1 point), occasionally (2 points) rarely (3 points) very rarely (4 points). Lower scores indicate that a respondent would practice more sidewalk responsible behaviors.

The internal consistency of the instrument was assessed by Cronbach's alpha. The reliability coefficient for respondents' knowledge was .74, for attitudes .82 and for practice .78 which was acceptable.

Results and discussion

Socio-demographic characteristics of respondents

The mean age of respondents was 27 years. Two hundred forty one (53.6%) of the respondents were males and the remaining 209 (46.4%) were females. Nearly 75 % of respondents had diploma or above; 17% had completed secondary school; 10% had completed primary school; and the remaining had no formal education. The majority of respondents were government employees (36.4% followed by students. Nearly forty-five percent of respondents earn less than birr 500 per month).

Table 1: Socio-economic and demographic characteristics of respondents

Variables	Counts	(%)
Sex	450	
Female	209	46.4
Male	241	53.6
Education	450	
No formal education	6	1.3
Elementary school	31	6.9
Secondary school	76	16.9
Diploma & above	337	74.9
Occupation	450	
State employee	164	36.4
Student	123	27.3
Unemployed	49	13.1
Private employment	104	23.1
Monthly income in birr	449	
Less than 500	201	44.8
501-1000	53	11.7
1001-2000	71	15.8
2001 -3000	64	14.2
More than 3000	60	13.3

Pedestrian facilities

Our field observation results revealed that in all the towns observed, the streets have some degree of sidewalks on both sides. These help pedestrians to check out the vehicles moving in opposite direction; and to minimize now and then street crossings and congestion of pedestrians on one side of the streets. In some parts of these towns attempts have been made to separate the streets from sidewalks by fences or hedges, which facilitate traffic flow, reduce road traffic accidents and enable safe movement of pedestrians. However, the narrowness of the streets, lack of proper management, poor quality of sidewalks, absence of sidewalk facilities and delayed maintenance are the major challenges for pedestrians.

The management of sidewalks in all the towns was poor. Sidewalks have also limited capacity to meet pedestrian volume-demands particularly in the downtowns; they are often occupied by street vendors and interrupted by poor maintenance; blocked by illegal encroachment by abutters that put fences beyond their frontage limits and by poor pedestrian refuges. The sidewalks are highly congested compared to the streets. Streets were designed without parking spaces and there is no rule that prohibit parking on unpaved sidewalks. As a result unpaved sidewalks are used for parking in many areas of the towns which aggravate the problem for

pedestrians. Sidewalks facilities such as lighting, streets zebra-crossings, toilets and road side benches were either scanty or absent.

Respondents' walking experience

The mean daily on foot trip by respondents was 3; 2.8; and 2.4 kilometers for Gondar, Dessie and Bahir Dar towns, respectively. Street networks which have grid pattern reduce walking distances due to their connectivity (Frank and Engelke, n. d.); this might be true for Bahir Dar that has a grid iron pattern of network on flat topography (Figure 1). The undulated topography and less interconnectedness of footways might have increased pedestrian travel distance in Gondar and Dessie towns. Inappropriate infrastructure, circuitous routes, and disconnected origins and destinations can increase pedestrians travel distance (Montgomery and Roberts, 2008).

The overall mean daily walking distance by respondents, in all the towns was 2.75 kilometers. A 1975 review by Pushkarev and Zupan found lower average walking distances than our findings, in central London (800 meters) and in New York (524 meters) (as cited in Zacharias, 2001). People in low-income households are twice as likely to walk, as are people in other income groups. Many more trips among low-income groups are on foot. Walking, is a function of culture, the physical characteristics of a street, and the perceptual characteristics of different users of the street (Frank and Engelke, n. d.).

Pedestrian Knowledge

Bahir Dar and Dessie towns' respondents in general have better factual knowledge on sidewalks utilization than that of Gondar. A closer inspection of the degree of correct responses to each of the statements reveals Gondar and Dessie towns' respondents have lower legal knowledge associated with street vending than that of their Bahir Dar counterparts (Table 2). All respondents have sound knowledge on sidewalk utilization as they indicated that pedestrians should walk on the side of the roadway facing traffic as well as responding to mobile calls while crossing streets is risky. They also recognize that watching left and right sides of streets before attempting to cross minimizes the risk of traffic accident. However, they seem to have little understanding with regard to the fact that street-crossings are hotspot areas for traffic accidents.

Bahir Dar respondents seem to have better knowledge of the jaywalk law than Dessie or Gondar respondents. In practice, however, pedestrians in all the towns did not use zebra-crossings and no law has been enacted or enforced in this regard. Most streets are not separated from sidewalks and this encourage people to cross streets at any point of their choosing. Nearly sixty percent of respondents have little knowledge about the law that prohibits fixing notice boards sidewalks.

Table 2 Statements used to assess pedestrian knowledge and response rates.

No	Statements	Percentage of correct response		
		B.Dar	Gondar	Dessie
1	Speeding cars cause more accidents than the slower ones.	88	81	90
2	The town has a jaywalk law	82	72	75
3	Trading or begging on sidewalks is forbidden by law.	71	54	54

4	Parking on sidewalks is forbidden by law.	82	79	88
5	There is law that prohibits the erection of notice boards on sidewalks.	62	62	42
6	Blocking sidewalks by any obstruction is forbidden by law.	85	83	88
7	To cross roads, it is important for pedestrians to watch both the left & right side of the street.	94	90	99
8	Traffic congestion is a major problem in urban centers.	82	75	74
9	Cleaning streets is the responsibility of the Municipality only.	83	90	96
10	The risk for accidents is higher on street crossings.	54	62	62
11	Responding to mobile calls while crossing streets is risky.	90	89	96
12	Pedestrians should always walk on the left side of the streets.	95	92	97

The average percentage of correct answers to all the statements for all respondents is 78. If the mean correct percentage is higher than 70 percent, it is taken to indicate that the sidewalks utilization knowledge of respondents is adequate (Makki et al., 2003). More factual knowledge questions might be related to experience of respondents. For instance, “Pedestrians should always walk on the left side of the streets” (“true”) and “Watching left & right while crossing streets minimize road traffic accident” (“true”) are answered by more than 90% of respondents. However, many pedestrians do not translate their knowledge into action; this might be due to limited sidewalks and poor pedestrian facilities. The available sidewalks are invaded by street vendors. In the absence of options, pedestrians share the roads with vehicles exposing themselves to road traffic accident (Figure 4).

Figure 4. Pedestrians at the center of Dessie town.



Source: Photo by the researchers, 2016

Pedestrians' attitudes

The average scores of respondents' attitude were 2.81; 2.78; and 2.86 for Bahir Dar, Gondar and Dessie, respectively. The mean value for the statement "Policy is required to make sidewalks suitable for users" is less than 2.0 for all towns, indicating that respondents in all towns have positive attitudes towards the need for policy issues (Table 3).

Respondents have unfriendly attitudes (mean score greater than 3.0) in all towns to statements "Sidewalks get maintenance timely", "Drivers always respect traffic regulations", "Using walkways in the town may expose pedestrians for attack/thieves" and "Drivers are always yielding for pedestrians". Dessie respondents have positive attitude regarding the conviviality of sidewalks (2.64), but this response contradicts with reality on the ground where the sidewalks are awkward (Figure 2). On the other hand these respondents have unfriendly attitude toward the cleanliness and standard of sidewalks (3.90).

The composite mean score of respondents attitude toward drivers yielding for pedestrians was 3.8 on a five point scale; indicating that pedestrians have to wait for a significantly long time before finding a driver who is willing to stop for them to allow them to cross. This finding is consistent with a study conducted in a University Campus in Malaysia where many motorists are not willing to stop because they would be losing travel time (Ibrahim et al., 2005).

Table 3. The mean values of respondents' attitudes towards pedestrian facilities

No	Items	Bahir Dar	Gondor	Dessie
	All issues	2.81	2.78	2.86
1	The town's sidewalks are convivial.	3.75	3.03	2.64
2	Policy is required to make sidewalks suitable for users.	1.78	1.86	1.70
3	Animals are obstacles on sidewalks in the town.	2.06	2.22	1.99
4	Sidewalks are clean and upto the standard for pedestrians.	2.82	3.37	3.90
5	Sidewalks get maintenance timely.	3.31	3.59	3.97
6	The town's sidewalks are highly congested.	2.42	2.39	2.34
7	The sidewalks I use need maintenance.	2.63	2.21	2.28
8	The streets have crossings within 50 meters distance.	2.86	3.32	3.42
9	The town's sidewalks are proportional to the volume of users.	2.23	2.14	2.03
10	Drivers always abide traffic regulations.	3.52	3.46	3.85
11	I am always concerned about traffic accident.	2.82	2.62	2.60
12	Using walkways in the town may expose pedestrians for attack/thieves.	3.32	3.43	3.61
13	Drivers always yield for pedestrians.	3.34	3.51	3.57
14	Drivers yield for pedestrians only when traffic police are present.	2.02	2.11	1.92
15	Pedestrians' fault is the main cause of traffic accidents in the town.	3.22	2.88	3.21

A one way between groups analysis of variance was conducted to determine the impact of significance on levels of attitudes, as measured in mean attitude score. Participants were divided into three groups of their significance (Bahir Dar, Gondar and Dessie). There was no statistically significant difference at the $p > .05$ level in attitude scores for three significances: $F(2,432) = 4.6$.

Pedestrians' practices

The mean score of respondents practice was 1.95; 2.01; and 2.03 for Bahir Dar, Gondar and Dessie towns, respectively. Respondents in all towns had sidewalk friendly practice on: using zebra-crossings while crossing streets; always using their left side of the streets; supporting children and the elderly when they cross streets; and observing signs for pedestrians at times of crossing streets, with mean score less than 2 on a 4 point scale. On the other hand, respondents had sidewalk unfriendly practice to the rest of the statements with mean score greater than 2 (Table 4).

Table 4. The mean values of the items used to measure respondents' practices

No	Items	Bahir Dar	Gondar	Dessie
	All issues	1.95	2.01	2.03
1	While crossing streets ,I use only zebra crossings.	1.58	1.62	1.70
2	I always use walkways on the left side of streets.	1.58	1.69	1.66
3	I support children & the elderly when they cross streets.	1.54	1.74	1.68
4	I make requests to authorities to remove harmful things from walkways.	2.21	2.21	2.38
5	I throw used plastics/papers/ near sideways.	2.10	2.25	2.29
6	When I use sidewalks, I carefully observe signs for pedestrians.	1.81	1.78	1.91
7	I carefully follow up traffic accidents report/news.	1.87	2.04	2.00
8	I clean some things from walkways, which may hurt pedestrians.	2.17	2.29	1.97
9	I respond to mobile calls while crossing roads.	2.12	2.11	2.06
10	I advise some pedestrians to use sideways properly.	2.12	2.16	2.28
11	I cooperate with road cleaners of the town.	2.38	2.27	2.48

The Ethiopian urban renewal process widens the streets for the increasing traffic in each town. However, the experience from developed countries showed that this approach could not solve traffic related problems of cities (Kashani 2011).

Approximately more than 80 per cent of the residents of the towns under consideration are pedestrians. However, the emphases given for sidewalks by road designers and authorities is low compared to the large volume of pedestrians. The law enacted in 2015, constitutes various articles and provisions regarding the rights and responsibilities of pedestrians in the country. With limited available zebra crossings and sidewalks, this law forces pedestrians to strictly use zebra crossings and footways while they travel in towns. In Addis Ababa (Getu et al., 2013) argues that infrastructure factors contribute to the illegal crossing behavior of pedestrians. Pedestrian facilities are very limited or absent in many parts of the towns

especially in Dessie and Gondar towns. As a result, the law is hardly being implemented with regard to the rights and responsibilities of pedestrians.

The rate of urbanization is high throughout the country, which will be demanding for policymakers and planners to provide affordable and environment friendly transport. City planners and administrations should give special emphasis to walkways, and ensure that it is affordable for the low-income people and that is an environment friendly mode of transport. Finally, it is important to note one potential limitation of this study; i.e. since the study is conducted on a small sample size compared to the target population; the results and findings may not be extrapolated or generalized to other towns of the country.

Conclusion

The study aimed at assessing pedestrian knowledge on sidewalk utilization, attitude toward sidewalk facilities and their challenges. Respondents had adequate factual knowledge on sidewalks utilization, but they have problems in actual practice.

Adequate pedestrian facilities can grant the opportunity not only to survive physically, but also to access basic services such as education, and facilitate economic development and social wellbeing. Therefore, city planners and administrators should give special emphasis to sidewalks and make sure that it is environment friendly and affordable for the low income people. Every city should develop and put in place a standard to ascertain comfortable, connected, conspicuous, convivial and convenient sidewalks to all pedestrians to improve their experience of walking. Due to the rapid rate of urbanization in the country, the existent limited pedestrian facilities cannot provide proper and sufficient service to the increasing number of users in the cities. Based on thorough investigation, pedestrian overpasses and underpasses should be constructed at the downtowns to allow for the uninterrupted flow of pedestrian movement separated from the vehicle traffic.

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