Assessment Of Non-Motorized Transport Infrastructure In Addis Ababa, Ethiopia

(Case Of Pedestrian And Cyclists Infrastructure)

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General Introduction

The relationship between city expansion and non-motorized transport especially walking and cycling cannot be overemphasized in the world in general and in Ethiopia in particular. Cities in Ethiopia particularly Addis Ababa is vulnerable to transportation service, planning and management problem. The occurrence of transportation chaos in Addis Ababa has become an everyday event with severe consequences mostly felt by the urban poor. The above fact tells us that it is wise to invest in non-motorised transport (NMT) infrastructure especially walking and cycling that benefits the public mostly the urban poor.

According to the United Nation Environmental Program transport unit (UNEP) 2013, share the road report, the main area that needs to be considered in order to achieve sustainable transport system are classified in to five parts. One is accessibility which enhances equitable accessibility that comes from sustainable transport like walking, cycling and public transport for all road users, road safety that deals with reducing fatality, injuries and damage of properties. In addition it also takes into account the environment with less or no pollution and greenhouse gas emission. Health issue that reduces human risk of diseases due to air pollution also should have to be considered. Finally, traffic flow that reduce congestion, fuel consumption and spent of money and time.

The study evaluate the existing condition of three NMT road segment located on Bole sub-city Addis Ababa, in terms of variety of NMT characteristics like safety, accessibility and environment. Furthermore, inadequate NMT infrastructure has been also identified. Finally, crucial recommendation of improvement has been forwarded so as to solve the issues related to safety, accessibility and environment of NMT infrastructure issues.

The study has been done by defining important NMT variables under three categories. Variables like pedestrian walk way, bicycle lane and crossing facilities were classified under independent variable. Variables like policy, strategy, regulation, administration and management were considered as moderators. Variables like safety, accessibility and environment were classified under the dependent variable.

Motivation and problem Statement

Non-motorized transport mode particularly walking has the same age with the evolution of the human being. At the time of human being evolved or created, the only means of transport were only by foot. As a

result of the human nature walking is an inevitable means of transport and the general truth is that every trip begins and ends with walking.

Before talking about pedestrian in general, it is wise to define what pedestrian means in this study. According to World Health Organization (WHO, 2013) road safety manual for decision makers and practitioners, "A pedestrian is any person who is travelling by walking for at least part of his or her journey. In this study the word walking has a meaning like stated by the WHO (2013) manual. This is because there is no clear explanation for walking or pedestrians in Ethiopia. Correspondingly, the word cycling (cyclist) is bounded to the definition set by the International Organization for Standardization (ISO 4210-1) which is "two-wheeled vehicle that is propelled solely or mainly by the muscular energy of the person on that vehicle, in particular by means of pedals".

In Ethiopia in general and in the capital Addis Ababa in particular, the dominant public transport system are taxies and buses. The city has many buses and buses lines, taxies and in recent year (2015) city train in two directions. Car ownership among residents is very low and majority of people depend on walking, buses and taxis to move from origin to destination. The fee for taxis is relatively higher than buses or train fees. The cheapest mode of transport in the city is walking followed by bus transport. Walking is the main means of transportation for a number of residents in Addis and there is no bicycle or shared lanes even though the city is recognized as the political capital of Africa. Based on the study done on 2007, buses take 40% of the public transport share in the city and the remaining 60% share is covered by taxis (Mintesnot & Shin, 2007).

In general the traffic in Addis Ababa is characterized by very high proportion of pedestrian trips, small number of public transport vehicles compared to the population, relatively less number of bus running lines and large number of medium size private taxis, with almost no bicycle path or lane and poor side walk. Currently, the transport system in Addis Ababa which mainly consists of the city bus and shared taxi is facing significant challenge due to fast urban expansion. This research will focus on assessment of the non-motorized (pedestrian and cycling) transport infrastructure on three selected road segments in Addis Ababa sub-city Bole.

Research Objectives

The general objective of the research is to assess the current non-motorized (walking and cycling) transport infrastructure on three road segments (CMC Square to Semmit soft drink factory, Imperial square to Atlas Hotel and Ayat Square to Chefe) in Addis Ababa, in terms of their accessibility, safety and environment. The research will also identify the risk factors for walking and cycling traffic injuries, analyze the current laws and policies governing the non-motorized transport infrastructure, assess and

compare the current physical state of pedestrian infrastructure with different pedestrian and cyclist design guide lines and manuals.

Conceptual Framework

Walking and cycling modes of transport are where relatively unprotected road users interact with traffic of high speed and mass. This situation makes pedestrians and cyclists more vulnerable to traffic fatality, injury and damage. The probability of suffering severe consequences during collisions with other type of road users (motorized) is higher because they have less opportunity to protect themselves against the speed and mass of the other type of road users.

Vulnerability of NMT users depends mainly on the physical condition of NMT infrastructure. This includes; Security, continuity, connectivity, coherence, homogeneity, directness, visibility, safety, topography and accessibility. Therefore, characteristics of NMT infrastructure has to be evaluated at least according to the factors mentioned above because such factors plays an important role in defining the situation and status of existing or/and proposed NMT infrastructure.

Figure 1: Conceptual Framework
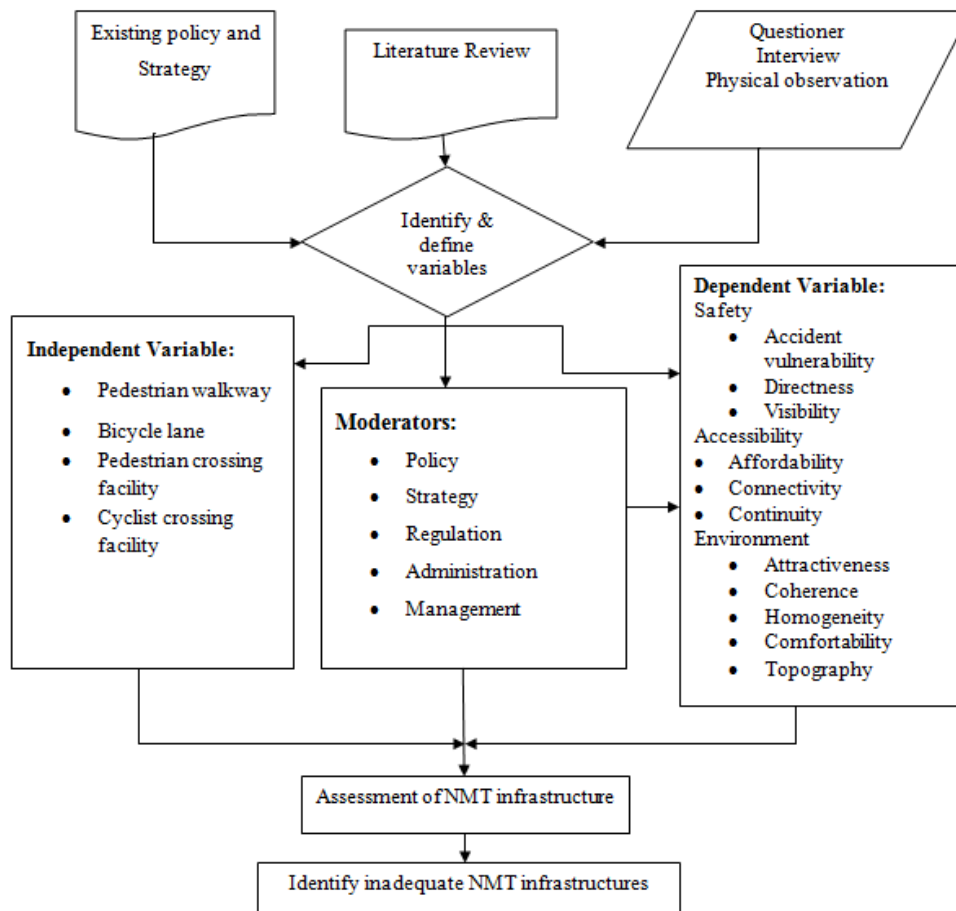
Study Area

The research was carried out on selected three roads in Addis Ababa (see Figure 2) which is the diplomatic center of Africa and the seat for many international organizations including the African Union (AU). Because it is the capital of the country it has a great role in economic, social, political and administrative areas. Based on the 2007 census conducted by the Ethiopian national statistics authorities, the population of Addis Ababa is 2.7 million. It is located at an altitude of 2000 to 2500m above mean sea level (MSL).

Figure 2: Addis Ababa city Administration map
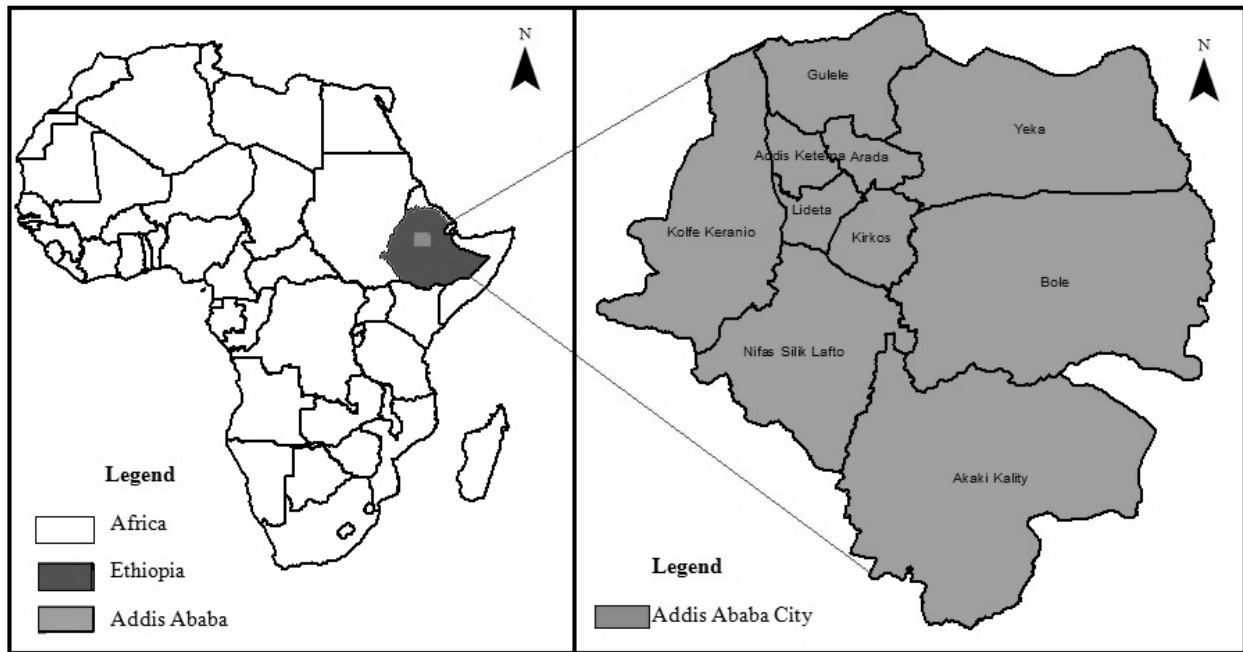
Methodology and Material Used

In advance to that of research field work, data's required for the research work, data type and availability of the data have been evaluated and checked. Basically two types of data have been used in this research work, primary data and secondary data.

After collecting all the necessary data the important first step required is to prepare the data for analysis. The data are collected from different sources and variety of questions. Thus it is important to group similar questions in to one category and convert the open ended questions in to closed on (not all) so as to make the analysis and interpretation of the result smooth. This was done by coding different questions in Statistical Package for the Social Sciences (SPSS) software. Moreover, ArcGIS, soft ware has been used to prepare the Addis Ababa map and map of the roads under study. MS Excel, soft ware were also used to prepare and visualize results and MS word has been used to organized and complete the masters research study.

Sampling Method

In the research study, 147 road users and 35 from policy formulators, regulators, funder and promoters have been responded. In total 182 responders. Out of the total respondents, 22 were policy regulators, 8 were policy formulators, 4 NMT promoters and 1 funder. Correspondingly, out of the 147 road users, 134 were pedestrians and 13 were cyclists.

Data collection methods

Questionnaire; based on intensive literature review and research objective, questionnaires were prepared and distributed to road users (pedestrian and cyclists), policy regulators, formulators, promoters and financers. The questionnaires are comprised of close and open ended questions. This type of data collection method was used because large amounts of information can be collected in a short period of time and in a cost effective way.

Interviews; an interview was carried out with NMT expertise from Addis Ababa transport program office, bicycle service providers and policy formulators. This was done in order to answer questions that are not included in the questioner and to get back ground information regarding the existing NMT infrastructure especially that of bicycle lane.

Physical observation; physical observation of the existing NMT infrastructure situation along the three road segments has also been carried out using a checklist. The check was prepared according to selected dependent variables: safety (accident vulnerability, directness, and visibility), accessibility (affordability, connectivity, continuity) and environment (attractiveness, coherence, homogeneity, comfortability and topography).

Result and discussion

Based on the physical observations and experience, the road users' behavior in Addis Ababa can be described as irresponsible and careless. All type of road users are only concerned on their own movement and many of the users don't follow the traffic rules and regulation either deliberately or unknowingly or both. Nobody cares about speed limit signs, intersection traffic lights, roundabout priorities, crossing facility priorities like painted zebra crossings with no other speed reducing device which definitely increase accident risk for pedestrians and cyclist by giving them a false sense of security. It is very common to see that people park their cars and "Bajajs" on walkways or sideways

In addition to this, the lack of appropriate infrastructure, no or poor pedestrian and cyclist crossing facilities and the existence of different obstructions along the way forces especially pedestrians and cyclists to use the carriageway and this situation definitely make the users more vulnerable to accidents. Furthermore, it is very difficult and risky for pedestrians and cyclists to use the available infrastructure at night because of no street light.

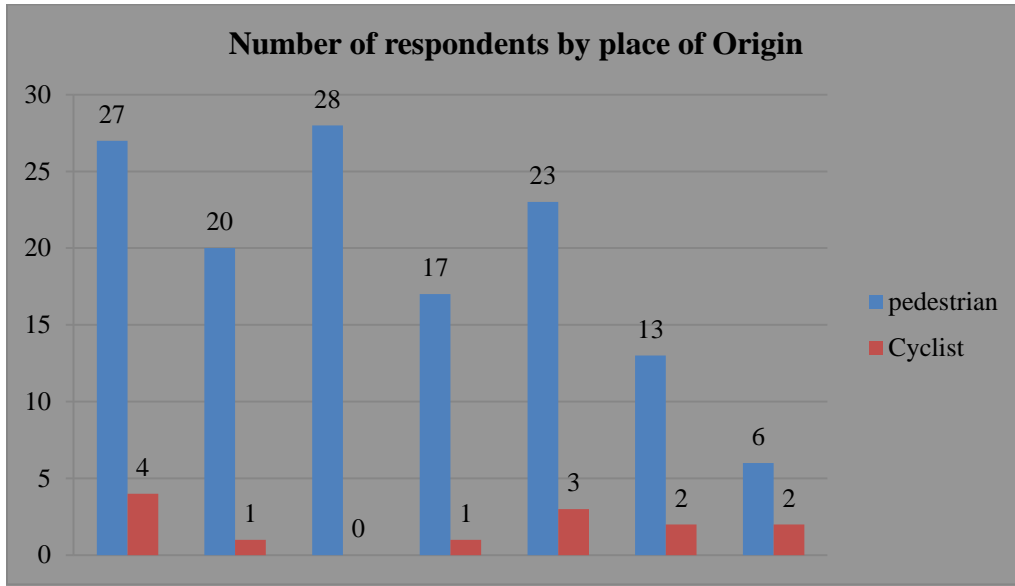Figure3: Number of respondents by road user and place of origin

Number of respondents by place of Origin

Table 1: Road users, sex and age of respondents

Type of road users and sex of respondents

Type of road user		Male	Female	Total
Pedestrian	Count	94	40	134
	%	63.90%	27.20%	91.20%
Cyclist	Count	12	1	13
	%	8.20%	0.70%	8.80%
Total	Count	106	41	147
	Total (%)	72.10%	27.90%	100.00%

Age of respondents

Age group	Frequency	Percent
Below 18	27	18.4
18 to 36	82	55.8
37 to 55	34	23.1
Over 55	4	2.7
Total	147	100

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Table 2: Type of employment * purpose of trip (cross tabulation)

Type of employment		Purpose of Journey					Total
		School	Work	Shopping	Exercise or recreation	Other	
Government	Count	0	23	2	0	0	25
	%	0.00%	15.60%	1.40%	0.00%	0.00%	17.00%
Self	Count	0	72	1	4	0	77
	%	0.00%	49.00%	0.70%	2.70%	0.00%	52.40%
Non-governmental	Count	0	14	0	0	0	14
	%	0.00%	9.50%	0.00%	0.00%	0.00%	9.50%
Other	Count	18	3	7	2	1	31
	%	12.20%	2.00%	4.80%	1.40%	0.70%	21.10%
Total	Count	18	112	10	6	1	147
	%	12.20%	76.20%	6.80%	4.10%	0.70%	100.00%

Table 3: State of the current pedestrian walkway

Road Name	Road side	Current Pedestrian count (per hour)	Predicted pedestrian count (2030, rate 2.5%	Recommended Width based on Africa NMT design guide	Actual Width	Comment
Summit to CMC	Left	832	1175	2 m	4.6 m	Good
	Right	1038	1466	2 m	4.6 m	Good
Ayat to Chefe	Left	564	796	1.50m	4.95 m	Good
	Right	956	1350	2 m	4.95 m	Good
Imperial to Atlas hotel	Left	1016	1435	2 m	2.5-4	Good
	Right	486	686	1.5 m	2.5-4 m	Good

Table 4: State of current bicycle way

Road Name	Road side	Typology	Current cyclist count (per hour)	Recommended Width based on Africa NMT design guide	Actual Width	Comment
Summit to CMC	Left	Cycle path	4	Min. 1.5 m	2 m	Good
	Right	Cycle path	12	Min. 1.5 m	2 m	Good
Ayat to Chefe	Left	Cycle	8	Min. 1.5 m	2.8 m	Insufficient
	Right	Cycle	12	Min. 1.5 m	1.1 m	Insufficient

Imperial to Atlas hotel	Left	Cycle l	4	Min. 1.5 m	1.1 m	Insufficient
	Right	Cycle	16	Min. 1.5 m	1.1 m	Insufficient

Figure4: Pedestrian walkways

A = Security and safety problems due to lack of street light along (CMC – Summit road), **B** = Walkway obstruction due to use of pedestrian walkway for private purpose (Imperial – Atlas hotel road), **C** = No walkway (Imperial – Atlas hotel road), **D** = Accident vulnerability due to pedestrian walkway used by cars (Imperial – atlas hotel road**), E** = Environment issue. Walkways were not attractive due to availability of garbage materials (Ayat square- chefe road), **F** = Blocked walkway due to construction materials (Imperial – atlas hotel road).

Figure5: Bicycle ways

1 = Bicycle lane used by people (Ayat square – chefe road), **2** = Bicycle road blocked by unfixed concrete bollards and construction material (Ayat square – chefe road), **3** = Conflict between bus stops and bicycle lane ((Ayat square – chefe road), **4**= Environment issue. Garbage container on bicycle lane (CMC – chefe road), **5** = Cars parked along the bicycle lane (Imperial – Atlas hotel road), **6** = lack of crossing facility at intersection points (Imperial – Atlas hotel road).

References

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