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PUBLIC ATTITUDE TOWARDS ENVIRONMENTAL AND HEALTH BENEFITS OF NON-MOTORIZED TRANSPORT SYSTEM; EVIDENCES FROM LEBU-JEMO INTERIM CYCLING CORRIDOR

A THESIS SUBMITTED TO CENTER FOR ENVIRONMENT AND SUSTAINABLE DEVELOPMENT IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF MASTER OF ART IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

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This is to certify that the thesis conducted by **Habiba Hussen** entitiled **"Public Attitude Towards Environmental And Health Benefits Of Non-Motorized Transport system; Evidences From Lebu-Jemo Interim Cycling Corridor"** Submited in partial fulfilment of the requirements for Degree of Masters of Arts in Environment and Sustainable Development compilies with the regulation of the university and meets the accepted standards with respect to originality and quality

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Declaration

I Habiba Hussen declare that this thesis entitiled “Public Attitude Towards Environmental and Health Benefits Of Non-Motorized Transport System; Evidences from Lebu-Jemo Interim Cycling Corridor” is a result of my original research work and has not been submitted or presented in any other university for a degree, diploma or other academic qualifications. I have obtained the relevant ethical considerations and all sources of materials used for the thesis have been duly acknowledged.

Declared by;	**Confirmed by;**
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Abstract

Non-motorized transportation presents an auspicious approach not only to address problems of urban traffic congestion, environmental pollution and climate change, but also to provide extensive health benefits. Attitudes are an important term to evaluate people's perception towards a certain phenomenon, research to date have been vague in their definitions and inconsistent in their methodologies for measuring and analyzing attitudes. This research aimed to explore public attitude towards environmental and health benefits of non-motorized transport system. The study also analyzed practices and challenges of non-motorized transportation in Lebu-Jemo interim cycling corridor. In doing so, the research employed qualitative research design. Data were gathered from respondents through survey questioner, key informant interview and observation. The gathered data analyzed through descriptive statistics. When we see the findings of the study, It intails that majority of the trips commuted by non-motorized transportation is for the purpose of maintaining livelihood. The study also indicated that people whose age group lays on adulthood, married and having a university degree had a better practice of non-motoried transportation than others. Women participation on the practices of non-motorized transportation is minimal while male counterparts had a better understanding on the benefits of consideration of the environment before chosing travel mode. Inline with this, the survey also found that a positive relationship between personal health condition and cycling culture. Similarly, the existance of crime in the area, the presence of street vendors on the non-motorized infrastructure, low community awareness about non-motorized infrastructure and cycling infrastructure damage are among the key findings of the survey that attribute for less involvement in non-motorized transportation. As a remidial of the above mentioned findings the research recommend, close colabration of traffic management agency, health office and environmental protection office in bringing attitudenal change and awareness rising towards non-motorized transportation utilization and benefits. Inaddition continuous followup and maintainace of non-motorized infrastructure along with construction and allocation of public parking space to avoid parking of motorized vehicles on cycling and pedestrian walkway are among the major recommendations.

Key Words: Attitude, Environment, Health, Non-Motorized Transport practice, Non-Motorized Transport benefit, Non-Motorized Transport challenge

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Acronym and Abbrevations

CO2	Carbon Dioxide
CO	Carbon Monoxide
CSA	Central Statistical Agency
GHG	Greenhouse Gas Emission
HC	Hydro carbons
ITDP	Institute for transportation and development policy
KM	Kilometer
LRT	Light rail Transit
NCD	Non-Communicable Diseases
NMT	Non-Motorized Transport
NO_x	Nitrogen Oxide
PM	Particulate matter
SDG	Sustainable development goal
SSATP	Sub-Sahran Africa Transport policy program
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UNEP	United Nations Environment program
UN	United Nations
WHO	World Health Organaization
^0C	Degree Celicious

CHAPTRE ONE

INTRODUCTION

1.1. Background of the study

Non-Motorized Transport is also called active transport and human powered transport, refers to walking, cycling, and variants such as wheelchair, scooter and handcart use. While thinking of the various uses of this transport mode, we find a cart full of benefits people acquire from. It provides basic mobility, affordable transport, access to motorized modes, physical fitness, and enjoyment (Litman, 2012). Promoting active travel and public transport has both health and environmental benefits due to increased physical activity, reduced air and noise pollution, and decreased greenhouse gas emissions (Pérez et al., 2017).

Active transport can provide relatively large energy savings if it substitutes for short urban trips that have high emission rates per mile due to cold starts (engines are inefficient during the first few minutes of operation) and congestion. As a result, each 1% shift from automobile to active travel typically results in a 2–4% reduction in fuel consumption (Litman, 2010).

Living in an era where scientists advise 30–60 minutes of aerobic exercise three to four times a week to promote cardiovascular fitness, physical inactivity persists as a significant public health problem in most regions of the world, which is unlikely to be solved by classical health promotion approaches alone. The promotion of active transport (cycling and walking) for everyday physical activity is a win-win approach; it not only promotes health but can also lead to positive environmental effects, especially if cycling and walking replace short car trips (WHO, 2017).

In car-oriented countries like Australia, Canada, and the United States, about one-tenth of daily travel is made by foot or bike, whereas in the Netherlands, more than half of all daily excursions are made by walking or cycling. The majority of European countries fall somewhere in the middle, with active travel accounting for 25% to 35% of daily journeys (Bueheler R., Pucher J. 2012).

In sub-Saharan Africa, Pedestrian's account for over half of all daily travel. Despite this, and unlike in European cities, pedestrian and non-motorized transport segregated traffic facilities are almost non-existent.

According to a Sub-Saharan Africa transport policy program and world bank study conducted on 2008, Walking is the most common means of transportation in sub-Saharan African cities. The

study portrayed walking and public transport accounted for 81 percent of all visits in Dakar, 85 percent in Addis Ababa, 70 percent in Douala, 81 percent in Kigali, 83 percent in Nairobi, 87 percent in Dar es Salaam, and 42 percent in Ouagadougou.

According to the Ethiopian Federal Road Transport Authority (2019), Ethiopia had about 1,071,345 vehicles at the end of June 2019, 56% of which were registered in Addis Ababa. Tulu G.,Hadgu m., Tarekegn A. (2019), illustrated public transport and walking are the predominant modes of transport in Addis Ababa.

Despite the presence of huge number of users of non-motorized transportation, the most basic non-motorized infrastructure is lacking and pedestrian safety is frequently neglected in favor of car flow design. Indeed, it is important to know and observe the opinions of the public about non-motorized transportation systems' environmental and health benefits in order to promote sustainable transport system however it is rarely investigated. The silver lining is that understanding public opinion helps to transform transport service delivery, promote non-motorized transportation strategy in particular and global sustainability goals in general.

Currently Addis Ababa city has invested in the development of three cycle corridors: the 2.8km Lebu-Jemmo interim corridor, 10.9km Kality-Tuludimtu corridor and 4.5km Garment–Jemmo corridor. Inaddition, Entoto Park development also included the construction of cycling routes. Furthermore, the plans of the Traffic Management Agency call for the redevelopment of the existing cycling corridor and creation of a wider cycling corridor network in the future (Women4climate, 2022). Among the three existing corridors, Lebu-Jemo cycling corridor inaugurated in February 2020. This path was selected due to showing high cycle traffic density on car-free days and because it links well the other two major cycling routes that are under construction and will feed to the future Bus Rapid Transit corridor (C40 cities, 2019).

Lebu-Jemo cycling corridor is a demonstration project to kickstart transportation investments in safer and more sustainable in Addis Ababa thus the intent of magnifying the residents attitude towards environmental and health benefits of non-motorized transportation would have an impilication for future non-motorized transport investment in the wider Addis Ababa.

1.2. Statement of the problem

People's mobility and accessibility demands must be met by providing safe and ecologically friendly forms of transportation in a sustainable transportation system. Non-motorized transportation satisfies these sustainability goals because it primarily relies on walking and cycling, which are non-polluting, safe, economical, user-friendly, and cost a fraction of the capital required for motorized transit (United Nations. 2021).

Non-motorized transportation, such as cycling and walking, helps to promote a healthy lifestyle while reducing carbon emissions and environmental impacts. Despite poor non-motorized transportation supply in Addis Ababa, roadway network lacks pedestrian walking routes while the number of non-motorized users remained increasing (Ethiopia non-motorized transport strategy. 2020).

Although attitudes are an important term to evaluate people's perception towards a certain phenomenon, research to date have been vague in their definitions and inconsistent in their methodologies for measuring and analyzing attitudes (Fishman, Yang, Mandel. 2021). Attitudes can help us organize and structure our experience. Knowing a person's attitude helps us predict their behavior. For instance, knowing that a person is physically active will help us predict that he may have regular physical exercise. By the same fashion knowing public attitude helps indicate possible gaps, way outs and adjustments for a certain phenomenon.

There are quite a few studies conducted in Ethiopia related to non-motorized transportation. Nuriye et al., (2014); Trends and factors affecting the use of Non-Motorized Transportation in Hawassa city, found out that the changing treand of non-motorized transportation is due to presence of dominant public mode of transportation called bajaj.

Mequanint (2019); challenges and opportunities of Non-Motorized Transportation in Bahirdar city, the study found out walkways are occupied by physical barriers and illegal driver behaviour are discussed as challenges . Yeshitela (2020); On the other study called "The role of bicycling lane project for improving mobility in Addis Ababa" found out that,the main issues that encourage a rider to use bicycle as transport mode are environmental design safty and destination density design.

Aregawi (2018); Non-Motorized Transport infrastructure in Addis Ababa; this study indicated that the road user behaviour described as irresponsible and careless what concerns them is their own movement that they don't follow the traffic rules. Tulu G., Hadgu M., Tarekegn A., (2019); "Bicycling in Addis Ababa Ethiopia: opportunities and challenges", discussed lack of cycling infrastructure, planning and excursion of transportation projects has neither integrated nor transcended the economic safty reliability and environmental accounts of the transport infrasturucture service provision which includes non-motorized transportation are discussed. Nonetheless, despite the maturity level of the concept and its significance, there has not been any study conducted on the public attitude towards health and environmental benefits of non-motorized transportation. Accordingly, this study will fill the gap or problem by assessing public attitude towards the phenomena.

Lebu- jemo interim cycling corridor is a three-kilometer stretch found in the south-west fringe of the city connects the mid-density residential neighborhoods of Lebu to the small and mid-sized industries in jemo (AARTB and CSA,2015; Global Designing Cities Initiative,2020). This corridor is the first pilot project in Addis Ababa as part of safe cycling program which promotes the road is not only for motorized vehicles. As the development of Infrastructure promote the use value of the beneficiaries, knowing the knowledge and attitude of the public towards environmental and health benefits of Non-Motorized Transportation found crucial and a turning input in integrating development goals in general and promote the use value of Non-Motorized Transportation in particular.

Although researches are undertaken for a given purposes, however we barely find studies undertaken on the level of public attitude towards Non-Motorized Transportation therefore given knowledge and attitude contribution towards the promotion or demotion of development strategy found to be ice breaking. This research will address gaps that are barely assessed by academia about Public Attitude towards Environmental and Health Benefits of Non-Motorized Transportation System.

1.3. Research Questions

The study aimed to answer the following questions:

1. What did the practices of Non-Motorized Transportation in Lebu-Jemo corridor look like?
2. What did the public attitude towards environmental and health benefits of non-motorized transportation look like in Lebu- Jemo corridor?
3. What are the challenges to Non-motorized transportation in Lebu-Jemo cycling corridor?

1.4. Significance of the study

Non-Motorized transportation has its own multidimensional benefit interms of keeping the environment clean from pollution, energy conservation and congestion. At the same time, it will engage in physical activity that results in a healthy lifestyle. The results of the study perhaps will provide important information to decision-makers both at national and local level, inform gaps to academia for further research, indicate input for policy makers and identify attitudinal level gaps for sensitization of non-motorized transport system benefits for the public. This study had three main significances namely, development, policy and academic significances.

1.4.1 Development Significance

The findings of this research have different development significances. As it has been acknowledged, Air pollution is becoming a major environmental and health problem. People exposed to poor air quality experience decreased respiratory health, increased cases of pneumonia, cancer and other diseases. Studying people's attitude towards environmental and health benefits of non-motorized transportation can be considered as traveling half way to the solution in order to promote healthy lifestyle and keeping the environment safe from pollution. This can be used as to prepare a tailored made strategy which can be used as a mitigating factor for an ever-increasing pollution from the transport sector in prioritizing transport investment in to cycling and walking in particular and achieving sustainable development goals in general.

1.4.2 Policy Significance

Ethiopia's transport sector is expanding to keep up with the rising demand however the main obstacle to achieving low carbon emission target is decoupling economic growth and greenhouse gas emissions from the transportation sector or at the very least reducing the greenhouse gas intensity of future transport growth. This will necessitate departing from business-as-usual scenarios in the transportation sector is required to maintain the expansion of pollution free

transportation systems. The findings of this research can serve the policy makers as a pilot to improve the existing non-motorized transport strategy related to practices of the public, behavioral prospects and challenges the public face while using non-motorized transport.

1.4.3 Academic Significance

The findings of this research have different academic significances. This research is one of its kind conducted studing public attitude towards environmental and health benefits of non-motorized transportation and it can be used as a baseline for those researchers who want to conduct further research on the problem. Thus, it can be used as a reference mataerial for academia who seek to do their study in the area.

1.5. Scope of the study

The scope of the study seen interms of geographical area, time frame of the study and unit of observation.This study was conducted in the area where the first interim cycling corridor in Addis Ababa city was piloted named Lebu-jemo cycling corridor. This area is also the destination for the car free day initiative. As a demonstration project to kickstart sustainable transporation investment attitude, practices and challenges of the corridor are assessed on this study. On the way of investigating the problem the research consulted primarily the residents of Lebu-Jemo cycling corridor particularly pedestrians and cyclists and government body at different levels. The data collection process started on mid May,2022 and streached until July and the data analysis streached until the mid October 2022.

1.6. Objectives of the study

General Objective

The general objective of this study was to assess public attitude towards environmental and health benefit of non-motorized transport system in Lebu-Jemo interim cycling corridor.

Specific Objectives

1. To assess practices of non-motorized transportation in Lebu-Jemo interim cycling corridor
2. To assess public attitude towards environmental and health benefits of non-motorized transportation in Lebu-Jemo interim cycling corridor
3. To assess challenges of non-motorized transportation in Lebu-Jemo interim cycling corridor

1.7. Limitation of the study

The study manifested several limitations such as conceptual and methodological. Among the conceptual limitation, the presence of literature on the subject is thought to serve as a baseline for a certain study to buildup on however in this case it was difficult to find recent studies that intail about the subject matter thus the researcher forced use literatures that are not recent. Inaddition, Taking the nature of sampling technique this research utilized in to account “accidental sampling” the researcher could have had greater sample size however due to time and budget constraints forced to limit to smaller size.

1.8. Organization of the thesis

This thesis is organized in five chapters. Chapter one deals with background of the study, statement of the problem, research questions, research objectives, significance of the study, scope and limitations of the study. Chapter two deals with review of related literature while chapter three deals with the research methodology. The fourth chapter entails data analysis and presentation and the final chapter discusses conclusion and recommendations of the research. References and annexes of the study are also attached at the end part of the paper.

CHAPTR TWO

LITERATURE REVIEW

Introduction

This chapter of the study contains different literatures that relate to non-motorized transportation benefit and attitude particularly focusing on operational definitions, conceptual reviews, theoretical reviews, empirical reviews, and conceptual framework of the study will be discussed respectively.

2.1. Operational definition of words

2.1.1 Non-motorized transport

Non-Motorized Transport is a sustainable mode of transport (Massink et al.,2011). Further defined Nonmotorized transport (NMT, also called active transport and human powered transport) includes walking, cycling, and variants such as skating, and use of wheelchairs and handcarts (Litman,2010).

2.1.2 Attitude

Despite the long history of research on attitudes, there is no universally agreed-upon definition. Influential theorists variously define attitudes primarily in terms of evaluation (e.g. "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor," Eagly & Chaiken 1992), affect (e.g. "the affect associated with a mental object," Greenwald 1989 p. 432), cognition (e.g. "a special type of knowledge, notably knowledge of which content is evaluative or affective," Kruglanski, 1989), and behavioral predispositions (e.g. "a state of a person that predisposes a favorable or unfavorable response to an object, person, or idea" Triandis, 1991). Attitude in this research ment to peoples perception and understanding towards non-motorized transportation practices, benefits and challenges.

2.1.3 Practice

Practices or behaviors are the things that can be seen such as actions taken by a person in response to a stimulus. This is something that deals with the concrete, through means of acts. Practice also can be explained as repetition of an activity to improve skills. People also use words such as

rehearsal, exercise, training, workout, habit, routine in exchange of practice. Practice in this reaserch refers to the habit people develop in utilizing non-motorized transportation.

2.1.4 Corridor

A corridor is a belt of land linking two areas, typically one which follows or spans a major transportation route such as a road, railway, or river. Currently, Addis Ababa city has invested in the development of three cycle corridors: the 2.8km Lebu-Jemmo interim corridor, 10.9km Kality-Tuludimtu corridor and 4.5km Garment–Jemmo corridor. Additionally, the plans of the Traffic Management Agency call for the redevelopment of the existing cycling corridor and creation of a wider cycling corridor network in the future(C40 Cities, 2019).

In this study corridor refers to cycling pathway connects the mid-density residential neighborhoods of Lebu to the small and mid-sized industries in jemo. This cycling road it built to serve as a corridor to connect cycling road the begins from Hile garment condominium to Jemo 3 condominium and from Jemo 3 to that of Jemo 1 condominium.

2.2. Conceptual Reviews

2.2.1 Non-Motorized Transport Global Context

Non-motorized transportation in cities usually constitutes pedestrian and bicycling (Rietveld, 2001). According to World Bank research, cities account for over 75% of worldwide economic productivity, with the percentage of developing countries quickly expanding. However, the world's 20 largest cities consume 80% of the world's energy, and metropolitan regions produce 80% of global greenhouse gas emissions (IFS, 2010).

According to Rode, P., Floater, G., Thomopoulos, N., Docherty, J., Schwinger, P., Mahendra, A., and Fang, W., (2014), urban transportation is currently the greatest single source of global transport-related carbon emissions and the largest local source. Under a business-as-usual scenario, urban transport will increase by 50% by 2035 and nearly double by 2050 (Dulac, 2013; IPCC, 2014). Recent studies implicate, source of air pollution in cities related to transportation emissions are expanding faster than any other sector and are expected to continue to do so in the future.

Besides climate change (SDG 13), urban transportation is critical for achieving other SDGs, particularly in developing countries, such as good health and wellbeing (SDG 3), Affordable and clean energy (SDG 7), and sustainable cities and communities (SDG 11).

Transportation authorities and planners around the world are becoming more aware of the threat of climate change and are taking bold steps to reduce emissions from the sector and improve the climate resilience of transportation systems and infrastructure to current and future climatic events (Word Bank, 2015). Singapore, for example, has built covered access paths to offer comfort from the intense heat and protection from torrential rain as part of its "Walkt2Ride" program, which aims to improve public transportation use by improving connectivity between transport nodes. There are almost 200 kilometers of covered pathways connecting mass rapid transit stations to nearby residential, commercial, and public amenities.

The city of Rotterdam is greening its tramways to minimize heat stress through vegetation's cooling effect and to allow rainwater to penetrate the soil, which provides a better buffer capacity for heavy rainfall (Kleerekoper L. (2011).

Nonmotorized vehicle use is influenced mostly by transportation investment and policy, which can affect the level and extent of motorization. Despite the rising motorization, bicycle use has expanded dramatically in Japan, Germany, Denmark, and the Netherlands, thanks to measures that include extensive cycling pathways, bicycle parking at and high taxes for motor vehicle use.

For decades, China has provided employee commuter subsidies to cyclists, nurtured a domestic bicycle manufacturing industry, and dedicated large amounts of urban street space to nonmotorized vehicle traffic. While addressing the majority of mobility needs, this policy limited the rise of public transportation subsidies. Bicycles now account for 50 to 80 percent of all urban vehicle trips in China, and average journey times in Chinese cities appear to be comparable to those in many other more motorized Asian cities, with positive implications for the environment, petroleum dependency, transportation system costs, and traffic safety (ITDP, 2014).

According to Healthy Streets for London; Prioritizing walking, cycling and public transport to create a healthy city, Mayor of London and Transport for London, February 2017; the Mayor of London has a vision of making London the World's most walkable city. Health is one of his major arguments. According to the findings of the study, if all Londoners walked or cycled for 20 minutes

a day, this would save £1.7 billion in National Health Service treatment costs over 25 years and would contribute in reduction of 85,000 hip fractures, 19,200 dementia cases, 18,800 depression cases, 16,400 cardiovascular diseases, 67,00 stroke cases, 4,800 type 2 diabetes cases, 1,500 colorectal cancer cases, and 1,300 breast cancer cases.

2.2.2 Non-Motorized Transportation in Africa

As Africa urbanizes rapidly and car ownership increases, its cities are facing the familiar problems of massive congestion, air pollution and crashes. Growing urban transportation emissions are also contributing to climate change which adds more vulnerability and risk, including to transport systems themselves (Shirvani, T., Losos, A., Mehndiratta, S. 2017).

Walking and cycling facilities are quite difficult to come by in African cities. For many years, infrastructure was solely centered on automobiles, leaving no room for cycling or walking. Improved walking and cycling settings will not only encourage more urban inhabitants to walk, but they will also enhance city air quality as more automobile owners choose non-motorized transportation. Some of non-motorized transportation system experience from African coutires displayed as follows;

Table 1; African countries experience on non-motorized transport system

Country	Non-motorized transport system experience
Kenya	According to United Nations Environment Program 2020, A majority of trips in Kenya are made by walking and cycling, with only 15 percent made by private cars, most of which take place in the capital, Nairobi. According to the JICA Study on Master Plan for Urban Transport in Nairobi (2006), over 47% of Nairobi residents walk for their daily trips. Despite the fact that Non-Motorized Transportation is Kenya's most popular mode of transportation, it is rarely recognized in transportation planning and investment. In Kenya, the majority of road infrastructure investments are directed toward developing roads that support efficient automobile movement rather than the movement of the majority of road users, walkers and cyclists. As a result, many roads are designed without provisions for Non-Motorized Transportation, and even where there has been some, they are often of low quality and vulnerable to invasion by activities such as automobile parking.
Rwanda	Many urban residents in Rwandan cities walk, cycle, or use public transport to go to work, shopping, or recreational centers. By redoubling efforts to promote walking and cycling as part of a comprehensive sustainable mobility agenda outlined in the new National Transport Policy, Rwanda can become a model for sustainable urbanization in the region (UNEP 2020).

Uganda	Despite Uganda's increasing motorization, non-motorized transport modes remain the country's primary form of transportation. For their basic livelihoods and access needs, the majority of Ugandans rely on walking and cycling. According to the Multi-Modal Transport Master Plan for Greater Kampala, approximately 2.5 million non-motorized transport journeys are made daily in the metropolitan area, with the figure predicted to rise to an incredible eight million walking-cycling trips daily by 2040. Furthermore, rural communities rely on walking and cycling to go to water, fuel, wood, fields and animals, education, health, and work.
South Africa	The experience from South Africa shows that the nation initiated non-motorized transport use project named Shova Kalula as part of transport policy for primary and secondary-level students. Shova Kalula comprises of low-cost, new and used bicycles and a delivery chain that includes a container-based shop, a cycle repair training course and light engineering modifications to produce load carrying work-cycles (Gwala 2007:20).
Egypt	In Egyptian cities number of private vehicles are increasing tremendously and this is due to the government gave less attention to public transport and moreover despite the huge number of benefits NMT provide the infrastructure for cycling and walking poorly managed. Not to mention that there is almost an absence of cycling lanes and inadequate infrastructure for cycling and sidewalks, this makes cyclists and pedestrians neither safe nor satisfied. Moreover, pedestrians are discouraged to choose walking and cycling as a usable alternative, where most of the sidewalks are not leveled, with broken pavement that causes many injuries for pedestrians and cyclists (El Saied H., El Sayad L. 2018).

Source; Existing literature

2.2.3 Non-Motorized Transportation in Ethiopia

In spite of the widespread use of non-motorized modes, transport planning and the provision of infrastructure in Ethiopian cities has been largely car-centered, underestimating the importance of non-motorized transportation (World Bank. 2016).

The use of non-motorized modes of transportation has been negatively influenced by the growth of motorized transport systems, and non-motorized modes of transportation are on their way to being completely replaced by motorized transport. Motorized vehicles were developed as a result of advancements in the transportation system, which led in a decrease in the usage of non-motorized modes of transportation. The advancement of transportation infrastructures and services has significantly assisted human progress by substantially reducing the effect of physical distances bringing closer. These benefits of motorizations, however, were not without drawbacks.

Motorized transport was one of the responsible factors for deaths of many and for the prevailing degraded natural environment at world scale (Nuriye G. et.al, 2014).

In Ethiopia, medium sized cities are the most bicycle-friendly places but in Primate City, Addis Ababa, and tertiary cities there is shortage of Non-Motorized Transport mode (Mequanint 2019). Hawassa is one of the emerging secondary cities in Ethiopia that has been enjoying walking and bicycling as the preferred mode of transport for several years. However, the current situation of Hawassa has been changed and as a result walking and the use of bicycling have been steadily decreasing (Nuriye G. et.al, 2014).

In Bahirdar the city municipality gave less attention to NMT therefore huge number of people are showing the modal shift (Mequanint 2019). Horse drawn carts are very important to transport goods and commodities from surrounding rural areas to the urban center in Bahirdar city.

Non-motorized transport (NMT) particularly dominates the modal split for daily trips in Addis Ababa, making up approximately 62% of total trips (Mequanint 2019). The public transport, which includes bus, blue minibus taxis, and Light Rail Transit (LRT) covers 31 percent of city transportation, which are not easily available due to the long waiting time and overloading of passengers (Tulu G. et.al (2019).

Although Addis Ababa city administration has made some efforts to improve the environment for non-motorized transportation (NMT), bicycling and walking infrastructures have received absolutely little attention. This is manifested through lack of bicycle infrastructure, dangerous intersection or crossing for bicycle riders and poor maintenance as most transport investment in the past has gone for building of motorized traffic infrastructure (Ministry of Transport, 2011).

2.2.4 Health benefits of Non-motorized Transportation

Active transportation presents a promising strategy to not only address problems of urban traffic strain, environmental pollution and climate change, but also to provide substantial health co-benefits (De Hartog, J., Boogaard, H., Nijland, H., Hoek 2010). Despite associated risks of exposure to traffic and to a lesser extent air pollution, active transportation may best overcome car dependence while simultaneously increasing physical activity levels (Lindsay, G., Macmillan, A., Woodward, A., 2011).

Many studies imply that lack of physical activity is one of the major causes of an alarming increase in obesity. More walking and cycling for everyday commute have been expressly urged in several papers and in leading medical and public health publications as the most economical, realistic, and dependable option for people to receive the additional exercise they need.

Cycling plays a major role in personal mobility around the world, but it could play a much bigger role. Given the convenience, health benefits, and affordability of bicycles, they could provide a far greater proportion of urban passenger transportation, helping reduce energy use and CO2 emissions worldwide (Kuster ,2015).

2.2.4.1 Health benefits of walking and cycling

Physical activity is an important lifestyle component of improving long-term health. Public health recommendations emphasize the need to accumulate physical activity of at least moderate intensity on most days of the week, including walking and cycling (Saelens B., Sallis J., Frank L. 2003).

Walking and cycling are two of the most practical and effective ways to stay physically active, especially for inactive and overweight people. Non-communicable diseases, particularly cardiovascular diseases, diabetes, cancer, hypertension and respiratory diseases are the main causes of morbidity and mortality globally (Mensah, 2016). Noncommunicable diseases (NCDs) are one of the most significant health and development concerns of the twenty-first century in terms of the social and economic effects they have in all countries, but they are more devastating among poor and vulnerable populations.

According to World Health Organization noncommunicable diseases progress monitor, 30% of total annual deaths in Ethiopia can be attributed to NCDs (WHO, 2015). According to Ethiopian Ministry of Health, currently the number reached 52 percent of annual mortality rates. The epidemiological transition that is happening in Ethiopia has made transition from predominantly infectious diseases to non-communicable diseases.

Despite the numerous health benefits of physical exercise, and it is one of the essential approaches to maintaining good public health, more than 60% of the global population do not reach the recommended level of activity (WHO,2017). Even small increases in physical activity can improve public health (Sallis,et. al. 2004). Experts recommend that adults spend at least 150 minutes

weekly (22 minutes daily) in moderate physical activity, with additional health benefits achieved through increased rigorousness and duration (National center for health statistics, 2019).

2.2.5 Environmental benefits of Non-motorized Transportation

The environment is changing and people are becoming more aware of the possible dangers that this presents. Our historical weather patterns are already being altered, ice caps are melting, and sea levels are rising, as evidenced by floods and droughts, storms, and heatwaves (Sonia I. Seneviratne, Neville Nicholls, 2021). The conditions we've grown accustomed to, and on which most of our urban constructions have traditionally been built, are swiftly fading away. To succeed in the future, urban development and design must be able to adapt to changing climates. The backbone of a sustainable urban life and economy is a climate-resilient transportation system. Climate change resilience and adaptation are critically needed in our cities and working out how best to do this is a challenge (World Bank;Transport & ICT. 2015).

The planning of the transport system in cities is entirely affected by climate change concerns. A fundamental transformation will be needed in the transportation sector, such as decarbonization of the fleet through clean technologies and non-motorized transport, besides clean power generation for electric cars, if governments worldwide, particularly in developing countries, aim to achieve the Paris Agreement targets and the Sustainable Development Goals (World Energy Council, 2014). More walking and cycling would yield further public health benefits by reducing the use of automobiles, thus diminishing air and noise pollution and the overall level of traffic danger.

2.2.5.1 Air and noise pollution reduction

Air pollution is the result of gas and particle emissions, and the chemical reactions they have in the atmosphere while noise pollution is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms (Manisalidis L., Stavropoulou E., Stavropoulous A., Bezirtzoglou E. 2020). Air pollution can be caused by natural sources like volcanic eruptions, sea spray and lightning but the majority of the causes happen by anthropogenic factors such as transportation, industry, agriculture and waste. It has been estimated that air pollution is responsible for the death of 3.1 million people in the world every year (Franco V., Kousoulidou M., Muntean M., Ntziachristos L., Hausberger S, Dilara P. (2013). Among the sources of air pollution motor vehicles movement in transport network is known as the main cause

of air pollution to such an extent that it has obtained a share of 60 to 90% of total emissions (Afandizadeh S, Mostoufi K (2005).

2.2.5.2 Energy conservation

The exponential growth of the number of cars in metropolitan cities will have serious implications on energy, air pollution and road safety. Over 90 percent of the fuel used for transportation is petroleum based, which includes gasoline and diesel (Kahn Ribeiro, S., S. Kobayashi, M. Beuthe, J.Gasca, D.Greene, D.S.Lee, Y.Muromachi, P. J. Newton, S. Plotkin, D. Sperling, R. Wit, P. J. Zhou (2007).

Diesel engines are considered as one of the largest contributors to environmental pollution caused by exhaust emissions, and they are responsible for several health problems as well. The four main pollutant emissions from diesel engines are carbon monoxide-CO, hydrocarbons-HC, particulate matter-PM and nitrogen oxides-NO_x (Resitoglu I., ik K., Keskin A. (2014). Health studies show that diesel exhaust has a negative impact on the respiratory system, worsening asthma, allergies, bronchitis, and lung function (Sibanda E.,Makanza N.,2019). Diesel exhaust exposure has been linked to an increased risk of heart disease, early death, and lung cancer.

Many approaches to the problem of conserving energy in urban passenger transport followed the energy crises of the 1970s; these included improving automotive technology through smaller cars and other changes, reducing congestion and lowering speed limits to achieve better fuel economy, while other changes stressed modal shifts to walking, cycling and public transport, as well as changes in urban development towards higher densities and more mixed land use to reduce the need to travel, especially by car (Kenworthy J., Svensson H. (2021). Non-motorized transport provides multidimensional benefits in terms of energy conservation compared to motorized vehicles.

Despite the fact that individuals who take up walking and cycling would need to consume more food if they were to compensate for the increase in energy expenditure. The GHG emissions associated with food intake required to fuel a kilometer of walking range between 0.05kgCO2e/km in the least economically developed countries to 0.26kgCO2e/km in the most economically developed countries (Mizdrak A.,Cobiac L., Cleghron C., Woodward A.,Blakely T. (2020).

2.2.5.3 Congestion

Congestion is the situation where the introduction of an additional vehicle into a traffic flow increases the journey times of the others (Thomson and Bull, 2001). A study by organization for economic co-opertation and development and the European Conference of Ministers of Transport identifies strengthening of non-motorised modes of transport, public transport and the implementation of traffic management as effective ways to reduce congestion (OECD/ECMT 2007).

Traffic congestion disrupts the environment as well as personal health for non-motoried transport users in away while vehicles stranded for a certain time the fuel consumption is high and the pollution level as well and this will create stressful and unhealthy environment for those people who cycle and walk on the side of the street.

2.3. Empirical review

A study conducted by Nuriye G. et.al. (2014); on trends and factors affecting the use of non-motorized modes of transportation in Hawassa city Ethiopia; indicated the changing trend of non-motorized transportation is due to the presence of dominant public mode of transportation called bajaj (auto rickshaw) and also the result indicated modes of transportation and reasons for walking and cycling are not independent.

A study conducted by Yeshitela (2020), on the role of bicycling lane project for improving mobility in Addis Ababa; indicated that the main issues that encourage a rider to use bicycle as transport mode are environment design, safety issues and destination density design.

A study conducted by Mequanint (2019), on challenges and opportunities of non-mororized transportation in Bahirdar city; indicated that walkways are occupied by physical barriers such as construction materials, holes, illegal vendors and absence of segregated walkway, absence of streetlight at night, lack of adequate side walk width, absence of segregated cycling lane and illegal driver behavior are discussed as a finding.

Aregawi (2018), In his research called “non-motorized transport infrastructure in Addis Ababa, Ethiopia, the case of pedestrian and cyclists’ infrastructure”. The findings of the study show, the road user’s behavior described as irresponsible and careless. What concerns the road users is their own movement that they don’t follow the traffic rules and regulation either deliberately or

unknowingly. In addition, parking encroachments on walkways or sideways and poor infrastructure are among the major findings.

Tulu G. et.al (2019); "Bicycling in Addis Ababa, Ethiopia; opportunities and challenges", discussed lack of cycling infrastructure, planning and excursion of transportation projects has neither integrated nor transcended the economic, safety reliability and environmental accounts of the transport infrastructure service provision which includes NMT are discussed. On the other hand, the presence of NMT strategy and city planning is believed to ensure improvements made on cycling environment.

Muller N. et.al. (2015), "Health impact assessment of active transportation; systemic review" discussed effects of increased physical activity contributed to the most estimated health benefits which strongly outweighed detrimental effects of traffic incidents and air pollution exposure on health.

Mmanake Maria Mokitimi, Marianne Vanderschuren (2016), "The significance of Non-Motorized transport interventions in South Africa- A rural and local municipality focus" found out that, awareness of the role of non-motorized transport modes, minimal funding and other basic transport infrastructural needs take preference over non-motorized transport. among other reasons about non-prioritization, results in high rates of pedestrian accidents take a lion share.

A study conducted in Rio de janeirio by L. Basto & N. Moraes (2010), about "The benefits of non-motorized transport in the city of Rio de Janeiro" indicated that Increasing bicycle use in Rio de Janeiro would be socially inclusive and would soon eliminate car-related external negative factors, Apart from restoring and maintaining the physical and mental wellbeing of the population.

In another study conducted by Mansoor U. et.al. (2021) about "A review of factors and benefits of non-motorized transport: a way forward for developing countries" illustrated that the built environment, geography and weather, and socioeconomic factors significantly affect the use of NMT as a travel mode in developing countries context.

Dispite the presence of different studies on non-motorized transportation, we barely find studies undertaken on the level of public attitude towards non-motorized transportation therefore given the knowledge and attitude contribution towards the promotion of healthy way of transport modes,

this research will address gaps that are barely assessed by academia about public attitude towards environmental and health benefits of non-motorized transportation.

2.4. Theoretical Review

2.4.1 The Theory of Reasoned Action and Planned Behavior (TRA and TPB)

TRA was developed to better understand relationships between attitudes, intentions, and behaviors (Fishbein, 1967). Perceived behavioral control can be explained as follows: when a person believes that an action is beyond his or her control, the likelihood of not doing it increases (Terry & O'Leary, 1995). The theory of reasoned action and planned behavior focuses on theoretical constructs concerned with individual motivational factors as determinants of the likelihood of performing a specific behavior (Montano D, &Kasprzk D. (2008).

Behavior is driven by beliefs about the likely consequences of an action (favorable or unfavorable), Perceived social pressure or subjective norms and perceived behavioral control over the action therefore the stronger these factors are, the more likely someone is to form a behavioral intention to do the action and consequently, act (Ajzen, I. (1985).

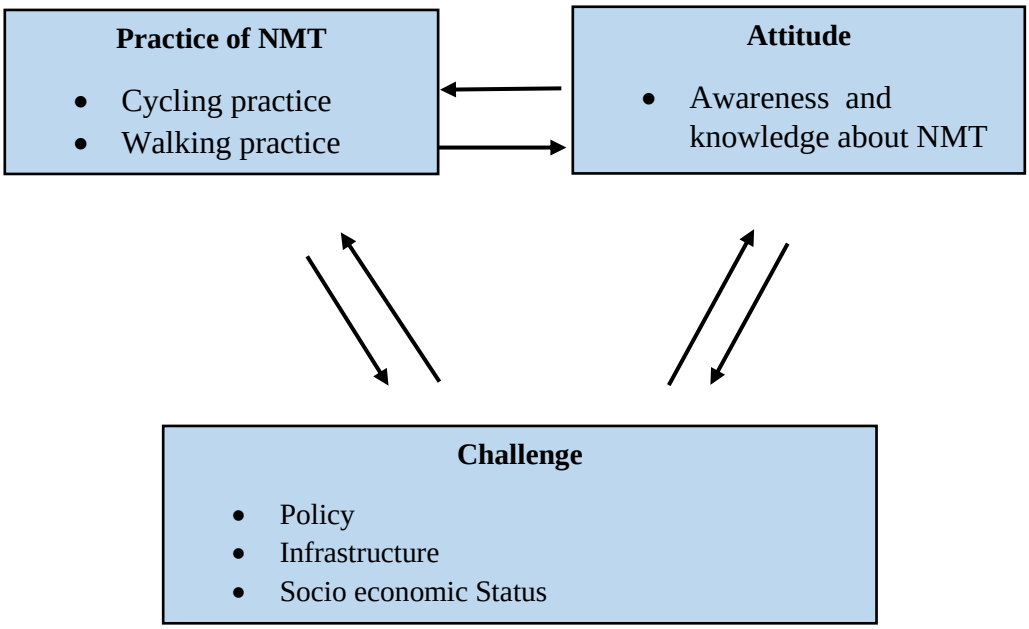
This theory operated on the assumption that people behave in a sensible and rationale manner. Although TRA and TPB have been criticized, based on whether correlational results can explain behavior (Weinstein, 2007), many published interventions study reports show that changing TRA or TPB constructs leads to subsequent change in behaviors.

This theory intails that the relationship between attitude, behaviour and intensions. Behavior is driven by beliefs about the likely consequences of an action, in this research the practices of non-motorized transportation are being altered by the existance of challenges related to infrastructure, socioeconomic, policy awareness and enforcement challenges. According to the theoretical construct, the accumulated effect of the above mentioned challenges interfused with personal attitude and affect the Practices of non-motorized transportation.

2.5. Conceptual Framework

The conceptual framework in a research is a diagrammatical presentation of the different variables being analysed in the research study. The below figure 2.5.1 illustrates the detail of the framework.

Figure 2.5.1 Conceptual framework



Source; own source 2022

Figure 2.5.1; conceptual framework of the research entails how the independent variable interacts with the dependent variables and how it can be cause for the effects on dependent variable. In this case the independent variable is the challenges of non-motorized transportation and the dependent variable are practices of non-motorized transportation and attitude towards non-motorized transportation. The interaction entails how the presence of the challenge such as policy, infrastructure and socioeconomic status on non-motorized transportation system affects the cycling and walking practice and public attitude; awareness and knowledge about NMT and vise versa.

CHAPTER THREE
RESEARCH METHODOLOGY

Introduction

This section of the study covers research methodology, which includes a description of the subject area, the research design, data sources, data collection methods, sample size and sampling techniques, and data analysis methods.

3.1. Geographical location and administrative division

Nifas Silk Laphto sub city is one of the eleven sub cities found under Addis Ababa city administration. According to CSA 2007 report, It has a total surface area of 5876.25 hectares and It is located in Addis Ababa's southwestern outskirts, bordered on the south by the Oromia Special Zone, on the north by Kolfe Keranio, on the east by Bole and Akaki Kality, and on the north by Lideta and Kirkos. Currently, the sub city divided into 15 woredas.

The case study area named “Lebu- jemo cycling corridor” is one of the pioneer and pilot area for safe cycling program located in woreda one. According to the study undertaken by institute for transportation and development policy (ITDP), safe cycling program in the area is bringing tremendous change in terms of promoting Non-Motorized Transportation.

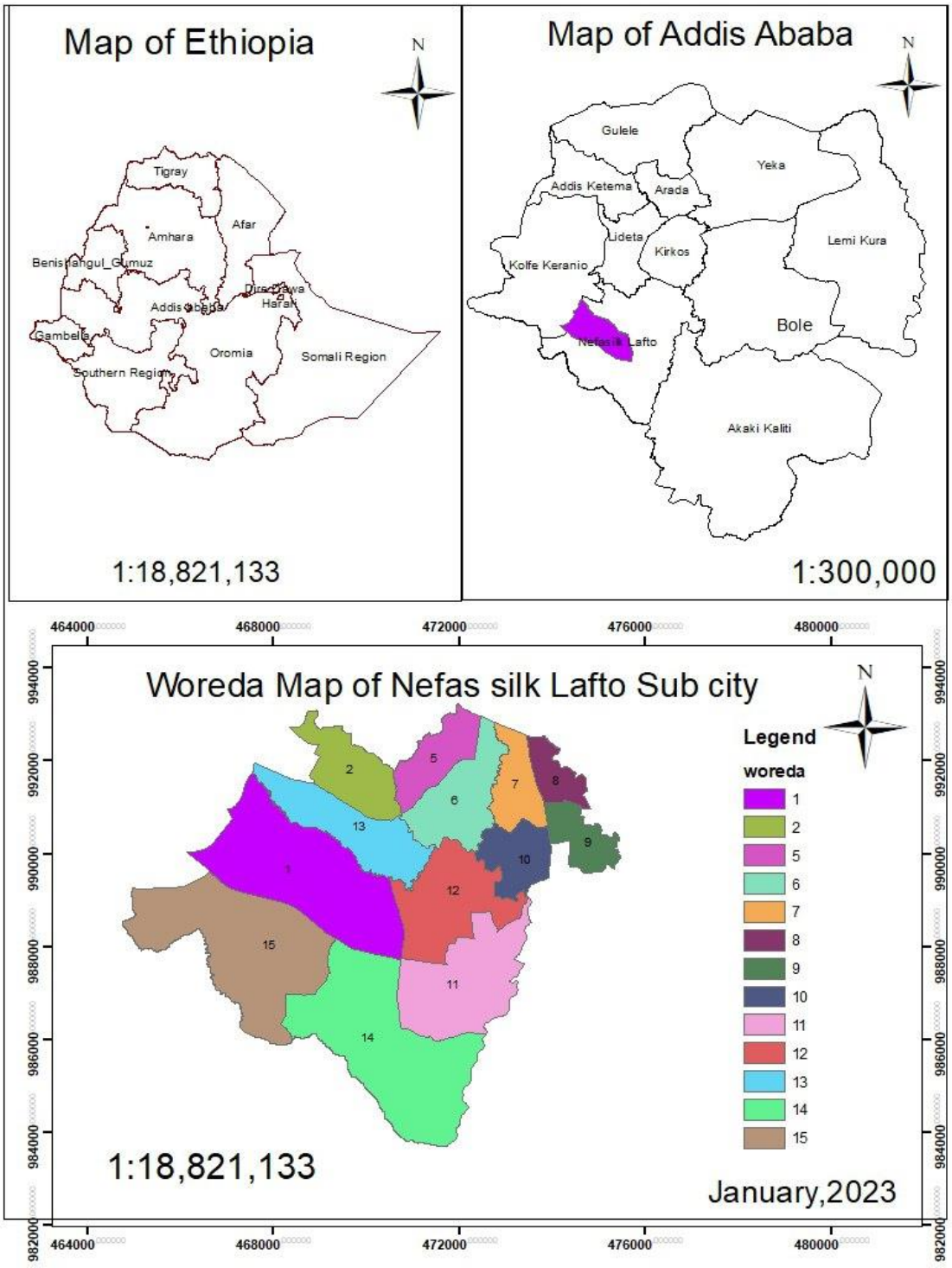
Population size and density

According to the 2007 census, the total population with in this sub city is 285,457 which is 10.42% of the entire population of the city. Lots of people live in woreda 01 with population number of 39,512. Average of 48.58 people live in each hectare area of the sub city which makes Nifas silk lafto the 7th densely populated sub city in Addis.

Topography

Topography Nifas silk lafto sub city is characterized by moderately steep type of topography with noticeable elevation difference and steep land scape around river gorges. Generally speaking, in the sub city, the altitude ranges from 2074 to 2485 meters above sea level which has a range of 411 meters. The highly elevated land exists in the south west while relatively lower elevation exists in south.

FIGURE 1; WOREDA MAP OF NIFAS SILK LAPHTO SUB CITY



Source;

3.2. Research approach and design

The research employs a descriptive research design in order to achieve the study's goal. Descriptive research is distinguished by the lack of control over variables and the ability to describe the current state of circumstances (Kothari, 2004). It is more vital to understand the community's perspective of the environmental and health benefits of non-motorized transportation in the case study region using a qualitative research approach to access attitudes and knowledge towards non-motorized transport and the challenges and practices of it. The study also adopts both qualitative research approach and analyzed the data using descriptive statistics.

Generally, the purpose of selecting research design and method depends on the extent it satisfies reliability, validity and representativeness. These three parameters can be reached to the maximum by using mixed research methods. Mixed research method gives the researcher freedom to use whatever data collection and analysis techniques from both qualitative and quantitative to present his work. In addition, mixed research methods are preferable than using a single method because the researcher can triangulate data. Descriptive research deals with the relationships between variables, the development of generalizations and surveys are also used in descriptive research studies (Best, 2003:115-116).

3.3. Data source and type

It is important to decide the tools for data collection because research is carried out in different ways and for different purposes. The objective behind data collection is to capture quality evidence that allows analysis to lead to the formulation of convincing and credible answers to the posed questions. In order to collect data from data sources the researcher required a lot of data collection techniqes and tools. Tools may vary in complexity, interpretation design and administration. Each tool is suitable for the collection for the collection of a certain type of information (Prabhat P., Meenu M. 2015). This research recrited both primary and secondary source of data to achieve its objectives.

3.3.1 Primary data

The primary data is gathered through field survey at Woreda 1 of Nifas silk laphto sub city at different sites of the study area and from different target informants like purposely selected Woreda administration specialists such as environmental protection officers, health officers, Addis Ababa

city traffic management agency district office, traffic police and accidentally selected pedestrians and cyclists.

3.3.2 Secondary data

Secondary data is consumed in the form of literature review, published & unpublished sources, web access.

3.4. Methods and Procedures of Data Collection

3.4.1 Interview

According to Mikkelson B. (2005), key informant interview are interviews aimed at obtaining special knowledge and key informants are respondents, who are assumed to have special knowledge on a given issue. Interview is fundamentally a conversation that involves a face-to-face verbal exchange and the interviewer attempts to draw information or expressions of opinions and belief from another person(s). This method is important for additional information with greater possibility of flexibility. In this case, semi-structured interviews used to gather information from key informants such as officials from Addis Ababa city traffic management agency debub district, Nifas silk laphto sub city land management office (urban planning experts), Nifas silk laphto Sub City health office and Nifas silk laphto sub city environmental protection office are interviewed. These key informants are chosen based on their knowledge, competence, experience, responsibility, and involvement in the sector along the study area. In other words, they were chosen based on their ability to contribute to the study's overall research goals.

3.4.2 Survey Questioner

A questionnaire is defined as a document containing questions and other types of items designed to solicit information appropriate to analysis (Babbie, 1990). In this research survey questioners that can evaluate the attitudinal and knowledge of the participants is prepared and administered by the researcher. The tool had questions on socio-economic, demographic, environmental and health attitude questions. In order to avoid errors that may occur due to language barriers, the questionnaires are translated into “Amharic language” prior to data collection.

3.4.3 Observation

Gorman and Clayton (2005), define observation studies as those that involve the systematic recording of observable phenomena or behaviour in a natural setting. In this study, observation conducted in order to gain additional information in the field of the study area. Areas that gain observation are cycling lane, parking encrochments, infrastructural damage on pedestrian walkway, car free day non-motorized transportation practices.

3.5. Target Population, Sampling Technique and Sample Size Determination

3.5.1 Target population

- Pedistrians and cyclists who reside in the nighborhood of Lebu-Jemo corridor
- Government body from woreda, sub city, city administration (Addis Ababa city traffic management agency debub district office, Nifassilk Lafto sub city urban planning office, Nifasilk Lafto subcity environmental protection office, Nifasilk Laphto sub city health office)

3.5.2 Sampling techniques

Plays (2008), there is no one best sampling strategy because which is best will be depends on the objectives of the research as well as the context in which research is being undertaken. Sampling techniques can be grouped into two broad categories: probability sampling and non-probability sampling. In this study the researcher used non-probablity sampling technique. Among these sampling technique convinence also called accidental sampling is used to select participants based on the engagement of practices of non-motorized transport system.

3.5.3 Sample size

Perhaps the most frequently asked question concerning sampling is, “what size sample do I need?” the answer to this question is influenced by a number of factors, including the purpose of the study, population size, the risk of selecting a “bad” sample and the allowable sampling error (Israel G. 2003).In this study the researcher engaged convienence sampling to collect data. In doing so, time and costs the sample size incur are taken into account to determine the study sample size.

Table 2 Sample Size Summary

Questioneer respondants	Key informants	Total number of respondants
• 100 (Pedistrians and cyclists who reside in the nighborhood of Lebu-Jemo corridor)	• 8 key informants (2 from every office), (Addis Ababa city traffic management agency debub district office, Nifassilk Lafto sub city urban planning office, Nifasilk Lafto subcity environmental protection office, Nifasilk Laphto sub city health office)	108

Source; Own survey 2022

3.6. Data Analysis Method

The data was analyzed quantitatively and qualitatively using descriptive statistics; frequency, percentages and graph. Data collected through questioners , responses of interviewees and personal observation were considered during data analysis. The researcher entered the data obtained through questioner into the computer using the Statistical Package for Social Scientists (SPSS) software version 23 to produce different tables, frequency and percentages which were used to illustrate the various aspects of the study.

The qualitative data generated from key informants' interview is analyzed and described through Interpretative methods of data analysis techniques after sorted out, grouped and organized either to support or refute results gained from other sources of data such as survey and secondary sources.

Generally, the processes of analysis included coding questionnaire responses, data tabulation and statistical computation. The method of data analysis and presentation of findings followed an approach of describing qualitative and quantitative data. Moreover, different tables, graphs, and maps are utilized to illustrate the various features of the study.

3.7. Validity and Reliability

Validity explains how well the collected data covers the actual area of investigation (Ghauri and Gronhaug, 2005). When we see Reliability, It concerns the extent to which a measurement of a

phenomenon provides stable and consist result (Carmines and Zeller, 1979). Reliability is also concerned with repeatability. For example, a scale or test is said to be reliable if repeat measurement made by it under constant conditions will give the same result (Moser and Kalton, 1989). The primary purpose of validity is therefore to increase the accuracy and usefulness of findings by eliminating or controlling other conditions, which allows for greater confidence in the findings of a given study. The data gathered from Key informat interview, Questioneers and through personal observation and followed scientific analysis through software and triangulated the data using secondary sources can be an indicator for the valid findings of this research.

3.8. Ethical Consideration

According to Collegian (2018), research ethics serves to protect the right so participants and ensure they are not exposed to unnecessary harm, and ensure that methodological approaches are appropriate to the study aims. In line with this, while conducting a research, the respondents' comfort is a major priority. Otherwise, all of our efforts will be in vain. With this in mind, the researcher payed close attention and respect to the respondents' cultural, economic, social, and political ideologies, which will enable to be more cautious during the interview. On the other hand, informants are informed of the study's specific objective in order to avoid response exaggeration and distortion.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

Introduction

This chapter contains the findings of the study organized and presented using charts, figures, pictures accompanied by word-based discussions. The data presentation and analysis chapter contain four sub-sections. The first sub-section contains demographic characteristics of respondents. The second section entails practices of non-motorized transportation. The third sub-section deals with attitude towards environmental and health benefits of non-motorized transportation. Finally, the last section deals with the challenges of non-motorized transportation in the study area.

Response Rate

A total of 100 respondants participated in this research and all questions were answered by the participants. In addition, 8 key informant interviews undertaken with government organs namely, Nifas silk laphto sub-city Environmental protection office, Nifas silk laphto sub-city Health office, Nifas silk laphto sub-city debub region traffic management agency office, Nifasilk laphto sub city urban planning experts, are managed.

4.1 Demographic Characteristics of Respondents

Demographic analysis is the study of a population-based on factors such as age, race, and sex. Demographic data refers to socioeconomic information expressed statistically, including employment, education, income, marriage rates, birth and death rates, and more (Adam H. 2021). According to Susan (2012), When designing a survey, the research needs to assess who to survey and how to breakdown overall survey response data into meaningful groups of respondents based on demographic considerations.

In this section of the analysis the demographic characteristics of respondents such as sex, age, education status, marital status and occupation is analyzed and interpreted as follows.

4.1.1 Sex of the respondents

Sex is one of the essential variables while analyzing demographic characteristics of the study population. Table 2 displayes disaggregated data of respondents by sex.

Table 1; Sex of respondents

Sex of respondents

Sex of respondents	Frequency	Percent
Male	58	58.0
Female	41	41.0
Total	99	99.0

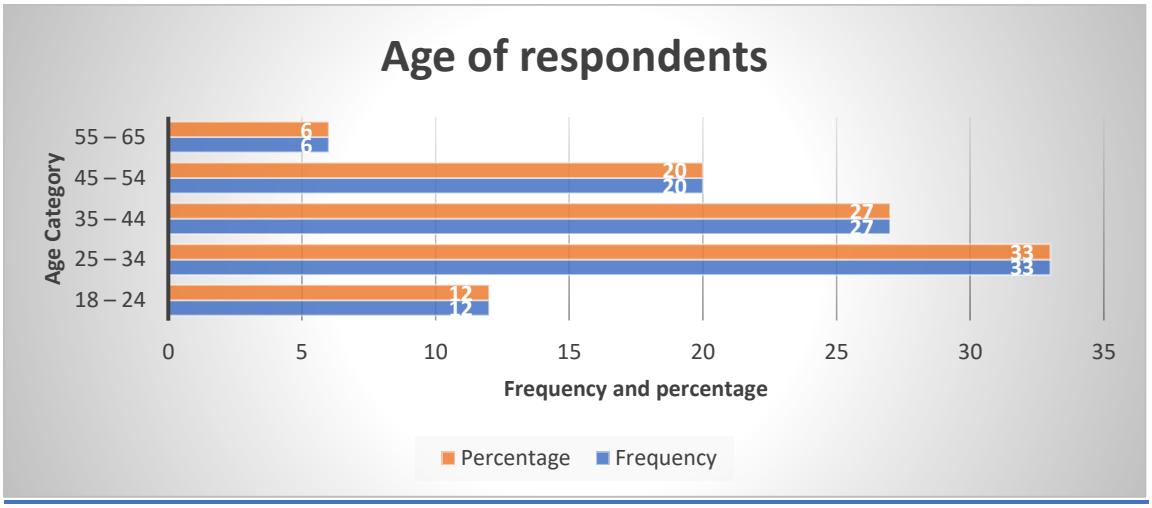
Source; Field survey, May, 2022

In this study, out of the total of 100 respondents, 58% of them are male and 41% of them are female.This indicates that more male respondents were around practicing walking and cycling during the data collection period and willing to participate on the survey.

4.1.2 Age of the Respondents

It has been observed that people of different age groups participated in the survey.

Figure 2; Age of respondents



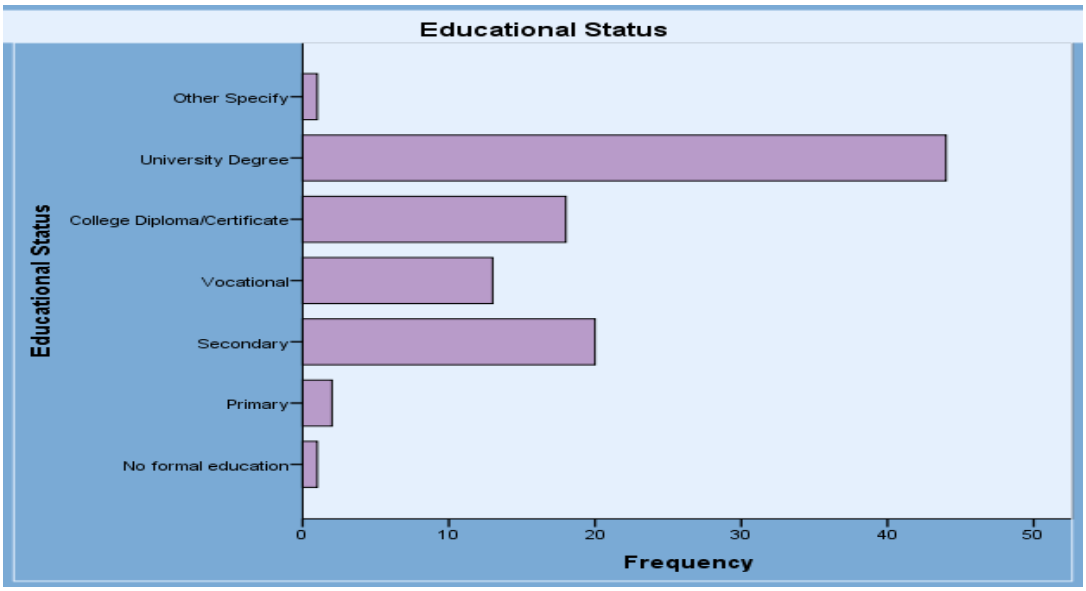
Source; Own Field survey, May, 2022

The age distribution of respondents indicated that 12% of respondents were in the age range of 18 to 24. 33% of the respondents lay in the age range of 25 to 34. 27% of respondents lay on the range of 35 to 44. 20% of the respondents were aged 45 to 54 years. Finally, 6% of respondents were among the age group of 55 to 65 years. Majority of respondents lay among adulthood thus this indicates that people are more contious about their health and the surrounding environment during this chapter of their age and practice walking and cycling.

4.1.3 Educational Backgrounds of Respondents

In reference from the educational level of respondents 1% (1) respondent were with no formal education or illiterate, 2% (2) respondents were in a level of primary education, 20% (20) respondents educational level depicts in a level of secondary education, 13% (13) respondents attended vocational education, 18% (18) respondents were holders of college diploma/ certificate, the largest percent of respondents 44% (44) had a university degree and 1% (1) respondent responded out of the category meaning he knows how to write and read and engaged in a business however he didn't get formal education. educational background of the respondents is presented in the below figure. This data implies university degree holders practice non-motorized transportation than other respondents on different academic level. This can tell us academic progress and awareness had a direct relationship with the choice we made.

Figure 3; Educational Status of respondents

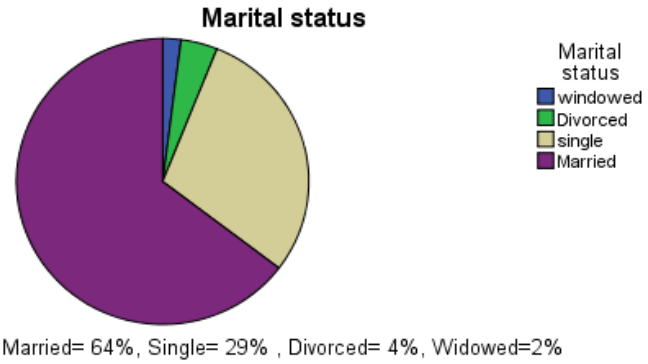


Source;Own Field survey, May, 2022

4.1.4 Marital Status of Respondents

Marital status of respondents is presented in the below figure 4.

Figure 4; Marital status of respondents



Source; Own Field survey, May, 2022

In reference from the data found from the marital status of respondents, the majority 64% (64) respondents are married, 29% (29) are single, 4 % (4) of the respondents were divorced and 2% (2) responded as they were widowed. This data distribution implies majority of the survey respondents are in a lawful relationship called marriage and this impiles married people practice non-motorized transportation than others.

4.1.5 Occupational Status of Respondents

Occupational status of the respondents is presented in Table 2.

Table 2; Occupational status of respondents

Occupation

		Frequency	Valid Percent
Valid	Manager	6	6.1
	Professional (science and engineering, health, teaching, legal, ICT, business and administration	30	30.3
	Technician and associate professional	1	1
	Clerical support worker	5	5.1
	Service and sales worker	15	15.2
	Skilled agricultural forestry and fishery worker	2	2
	Craft and related trade worker	6	6.1
	Plant and machine operator and assembler	5	5.1

	Elementary occupation (Laborers, street vendors, cleaners)	7	7.1
	Other	22	22.2
	Total	99	100
Missing	System	1	
Total		100	

Source; Own survey, June and July 2022

The occupational classification that has been used in this study is adhered from central statistical agency occupation classification 2013. Accordingly, the majority of respondents are in the professional category accounting for 30% (30) of the respondents fall on this category. This category encompasses science and engineering, health professionals, teaching professionals, business and administration professionals, information and communications technology professionals, legal social and cultural professionals. This implies that among other occupation classifications, professionals take the lion share in practicing non-motorized transportation. This can tell us when people are exposed to better knowledge their tendency to evaluate the benefits of Non-motorized transport system improves and promote uses accordingly.

The second category encompasses technicians and associate professionals having 1% (1). The third category encompasses clerical support worker 5% (1). The fourth category holds service and sales works, this category had 15% (15) respondents. The fifth category holds skilled agricultural forestry and fishery workers having a respondent of 2% (2). The sixth category craft and related trade worker encompasses 6% (6) respondents. The seventh category is plant and machine operator and assembler, this category encompasses 5% (5) respondents. The eighth category is elementary occupation among this category laborers, street vendors, cleaners having 7% (7) respondents. The final category encompasses 22% (20) respondents. This category encompasses those people out of the eight categories and those people who are still students and without occupation.

4.2 **Non-motorized Transport practices; Cycling and Walking**

Concerns about how to encourage people to use more environmentally friendly modes of transportation, like walking and cycling, are growing in the fields of transport studies research however in huge metropolitan city like Addis Ababa majority of the people commute their trip through walking. Almost every jorney starts and ends with walking. This survey question asks

pedistrians the most common purpose of their daily commute and the below table and narration captured the responses.

There are multiple reasons for people to walk and cycle, however it is very difficult to say people can only rely on those methods of transportation. This section starts asking respondents of cycling and walking transport means users; what their common purpose trip as a daily routine and goes to time it takes to reach their destination from their home and opinions of travel choice as well as benefits of cycling and walking. Responses are also summarized and presented as follows.

4.2.1 Cycling and walking practices

Table 3; Common pupose of trip for cyclists and pedistrians as a daily routine in Lebu-Jemo cycling corridor

Question	Possible answer	Cyclists (%)	Pedistrians (%)
What is the most common purpose of your trip as a daily routine?	School	2%	10%
	Work	31%	75%
	Shopping and business	0%	2%
	Recreational	0%	0%
	Sporting/Exercise	0%	0%
	Others	0%	1%

Source; Own survey June and July, 2022

Table 4; What is the most common purpose of your trip as a daily routine? * sex Crosstabulation

Question	Response	Sex distribution of response	Total

		Male	Female	
What is the most common purpose of your trip as a daily routine?	School	2	0	2
	Work	24	6	30
Total		26	6	32

According to the survey, among the total of thirty three cycle users who participated in this survey 31% of them responded as work is their common purpose trip they commute for. 2% of respondents responded as school is their common purpose trip they commute for. When we see practices of pedistrians, 75(75%) choase work as common purpose trip, 10 (10%) choase school as common purpose trip, 2(2%) chose shopping and bussiness, 1(1%) other. This implies that majority of the trips conducted by cyclists and pedistrians is for the purpose of work. This tells us people choose non-motorized transportation to satisfy their livelihood and this inturn benefits their health and the environment.

Source; own survey June and July 2022

When we see this distribution through sex, out of the participants who practice cycling for different purposes only 6 of them are female while 27 of them are male.This shows that men practice cycling better than women. As per the information the researcher got from key informant interview from Addis Ababa city traffic management agency;

> *Indeed the cycling lane appreciates people to cycle to and fro their destinations however its not widely practiced across the board due to different challengs that arise from the area such as parking encrochments on the cycling lane, poor maintainance effort and bussiness centers entruption. However in comparision to cycling, more people walk often despite the challenges. When we see this in terms os sex,let alone to use cycling as transportation it is rare to see females cycle even on car free days.*

This implies that the presence of mulitiple challenges in the area alter women to practice cycling less often than men.

4.2.2 Transport mode frequently used by cyclists and pedistrians

The transport mode we choose to utilize depends on the trip we comute in our daily life. The following table entails the mode of transport frequently used by pedistrians and cyclists.

Table 5; Transport mode frequently used by cyclists and pedistrians

Question	Possible answer	Cyclists(%)	Pedistrians(%)
Which type of transport mode do you mostly use	Walking	3%	33%
	Cycling	8%	1%
	Motorbike	1%	-
	Public Transport	3%	30%
	Personal vehicle	11%	19%
	Autorickshaw	7%	3%
	Others	-	-

Source; own survey June & July 2022

Among the possible choices for transport mode,11(11%) Cyclist respondents chose personal vehicle as mode of transportation they rely frequently, 8(8%) chose cycling, 7(7%) chose autorickshaw,3(3%) chose walking and public transport respectively and 1(1%) chose motorbike.

When it comes to pedistrians 33(33%) chose walking as a mode of transportation they rely frequently, 30(30%) chose public transport, 19(19%) chose personal vehicle and 3(3%) chose autorickshaw as a frequently use transportation.

When we see how long it takes cyclists and pedistrians to reach their common purpose trip place from where they live, the below table holds the picture.

4.2.3 Time interval utilized by NMT practitioners

Time is the important component people consider while choosing transport mode. The below table entails the time interval it takes cyclists and pedistrians toreach their common pupose trip.

Table 6; Time it takes for cyclists and pedistrians reach their common purpose trip place from where they live

Question	Possible answer	Cyclists(%)	Pedistrians(%)
Howlong does it take you to reach your common purpose trip place from where you live	10-20 Minutes	7	18
	21-40 Minutes	16	30
	41-60 minutes	7	20
	Over one hour	3	18

Source; own suvey June& July 2022

Among the survey participants who practice cycling most of the respondents 16(16%) of them take them 21-40 minutes to reach their destination from where they live, 7(7%) take them 10-20 minutes and 41-60 minutes respectively, 3(3%) of participants take them over one hour.

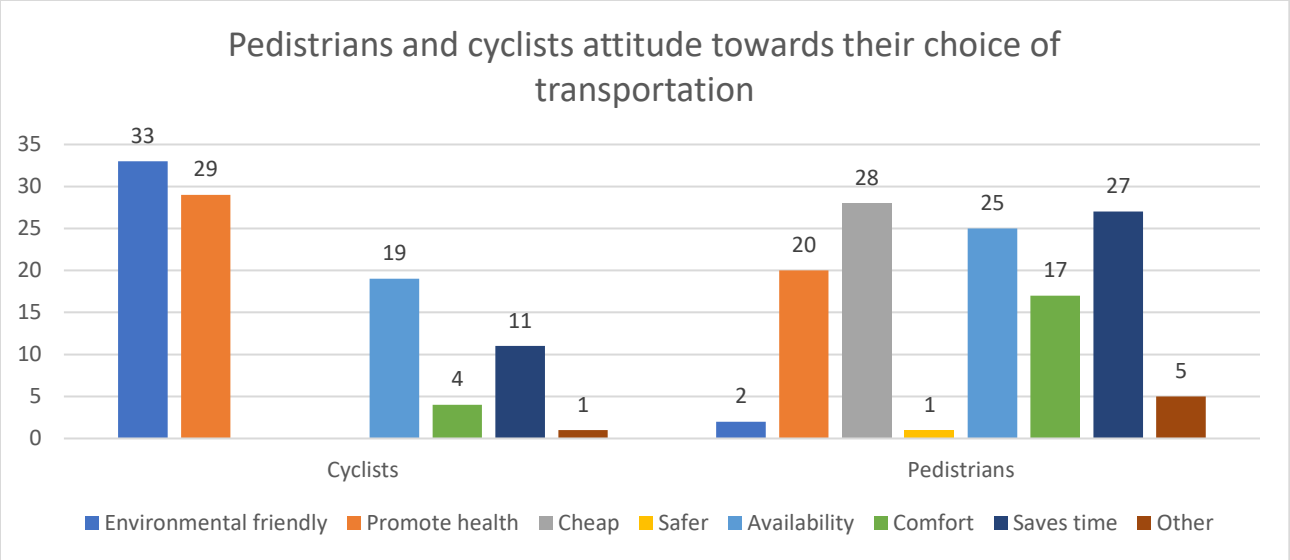
When we see the survey result for respondents who practice walking, 30(30%) of the respondents took them 21-40 minute, 20(20%) of the respondents took them 41-60 minutes, 18(18%) of the respondents took them 10-20 minutes and over an hour respectively.

The survey shows that average of the trips commuted by cyclists and pedistrians lied between 21-40 minutes with the mean result of 2.1 and 2.4 respectively. This entails that most of the trips conducted by cyclists and pedistrians requires a 21 to 40 minite commute and this means according to the study published on American journal of clinical nutition (2015), 20 minutes of walk every day could reduce your risk of death significantly.

4.2.4 Attitude towards choice of transportation

Our attitude towards a certain object determines the choice we are making; the theory works for our daily life and this part of the survey analyzes attitude towars choice of transportation among cyclists and pedistrians. Studies by various scholars have demonstrated that the quality of environment depends critically on the level of knowledge, attitude, values and practices of people (Schulitz and Oskamg, 1996; Mansary and Abijoye, 1998 cited in Said M. et al., 2003).

Figure 5; Cyclists and Pedistrians attitude towards their choice of transportation



Source; Own survey June and July 2022

The survey explored through pedistrians and cyclists attitude towards their choice of transportation and found out that, the total of 33 cycling practice respondents were asked to choose the reason for their choice of transportation and 33(33%) chose the reason of environmental friendliness, 29(29%) chose the reason of promoting health, 19(19%) chose availability as a reason, 4(4%) comfort, 11(11%) chose the reason of saving time and 1(1%) other.

When we see pedestrian responses, 2(2%) of respondents chose environmental friendliness as a reason for their choice of transportation, 20(20%) of respondents chose the reason of promoting health, 28(28%) chose the reason as cheap or affordability, 1(1%) chose the reason as being safer, 25(25%) chose availability, 17(17%) chose comfort, 27(27%) chose the reason of saving time and 5(5%) chose other.

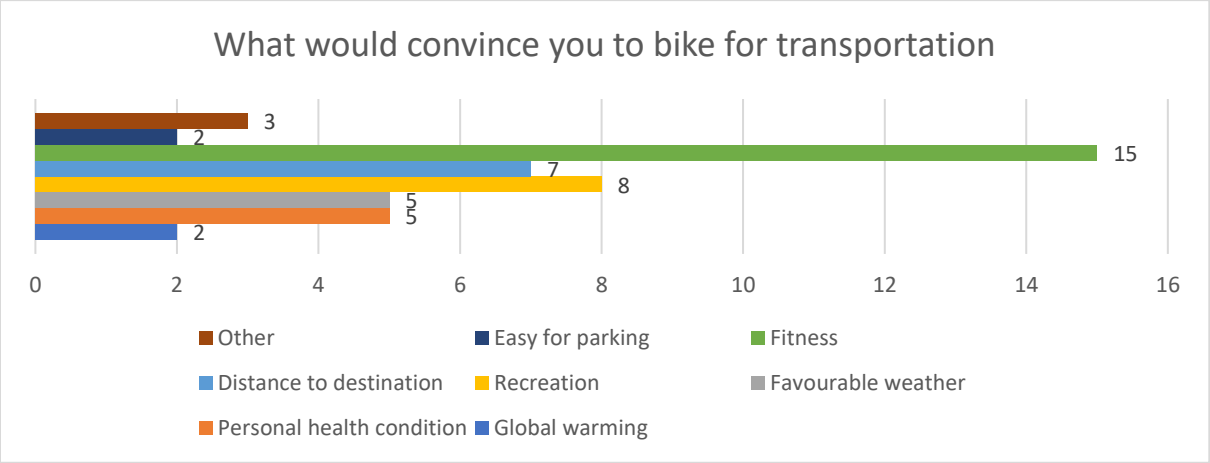
This shows that among those survey participants who walk and cycle, cyclist respondents take environmental friendliness as priority before choosing transport modes than pedistrians 33% and 2% respectively. When we see promoton of health as a reason for choosing transportation, both pedistrians and cyclist respondents consider promotion of health as important component and the reason for choice of transportation. This implies that cyclists are more aware of the environmental damage caused by transport so that they prioritize environment . By the same fashion pedistrians doest take the environment in to consideration while choosing transport mode rather what cocerns them is the price they pay and the time they save while they commute.

Interms of considering health, both pedistrians and cyclists consider health as a critical point they take to decide their choice of transportation. This shows that non-motorized transport users had a better awareness about the benefits of non-motorized transportation to health condition and less awareness about environmental benefit non-motorized transportation could have brought.

4.2.5 Covincing factors to bike and walk for transportation

Figure 6 and 7 displays respondents attitude towards what would have convince them to bike and walk for transportation. The questioner allowed multiple responses to obtain detail information from respondents towards the convincing factors towards biking and walking practices.

Figure 6; Respondents attitude towards what convinces them to bike for transportation

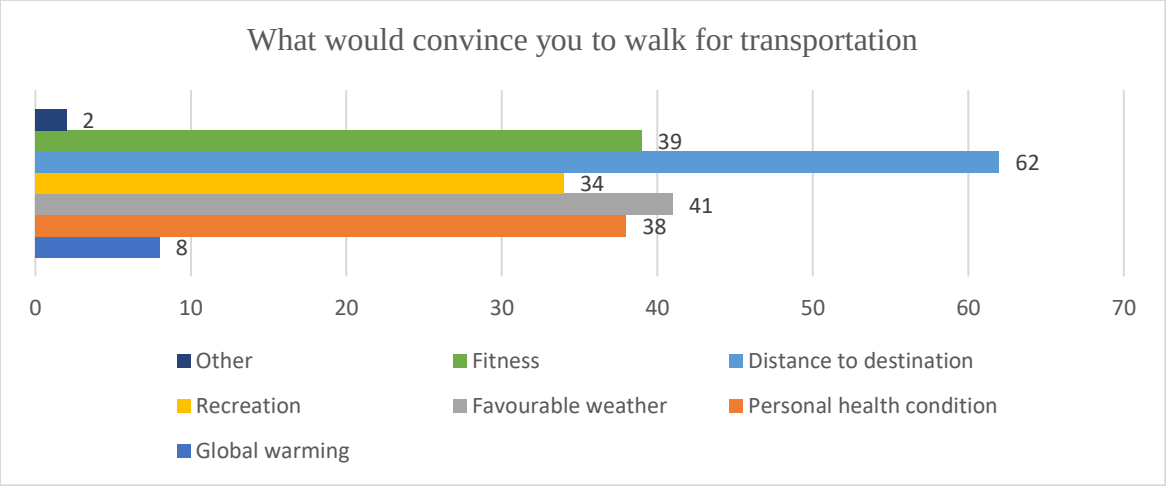


Source; own survey June and July 2022

Accoding to the survey, among respondents of cycling practice 15(15%) of them cycle for fitness purpose, 8(8%) for recreation,7(7%) due to distance to their destination from where they are, 5(5%) due to favourable weather and personal health condition respectively, 2(2%) due to global warming and easy for parking respectively and 3(3%) due to other reason. Thus,the survey result shows that most of respondents commute cycling trips due to fitness purpose.

In support to the survey findling, many studies on active commuting combine walking and cycling (Nakanishi & Suzuki, 2005; Wennberg et. al., 2006; Abu-Omar & Rutten, 2008; Gordon-Larsen et. al., 2009) have shown that active commuting reduces the risk of cardiovascular events, type-2 diabetes, hypertension and adiposity, and improves fitness.

Figure 7; Respondents attitude towards what convinces them to walk for transportation



Source; own survey June &July 2022

When it comes to pedistrians attitude towards what would convince them to walk for transportation the survey found 62(62%) take distance to destination as a priority to walk for the purpose of their trip, 41(41%) are convinced by the weather condition to walk for transportation, 39(39%) for fitness purpose, 38(38%) make their decision thinking of personal health condition, 34(34%) for recreational purposes,8(8%) in consideration of global warming and 2(2%) are convinced by other reasons.

According to the survey result pedistrians get convinced to walk taking the distance they travel into consideration, weather condition, for fitness purpose, thinking of personal health condition, for recreational purpose and inconsideration of global warming respectively.

The survey showed that global warming is among the least to be chosen by respondents next to recreational purposes. This shows that survey respondents give least attention for global warming and the contribution they made towards climate change while choosing walking for transportation.

According to key informant interview with Nifassilk Lafto Sub City environmental protection office, dispite the mandate of awareness rising, monitoring and evaluation, the office is excluded from participating in car free days with no reason. The key informant said,

> *"Awareness rising about climate change and encouraging people to make healthy choices of transportation is belived to start from creating healthy environment for healthy citizes and in return this will reduce the health costs incure at individual as well as country level. So when people walk they also need to think of the positive contribution they made to the environment. We have no Idea why we are excluded on such a big event, it could have been a great platform to dissiminate key messages*

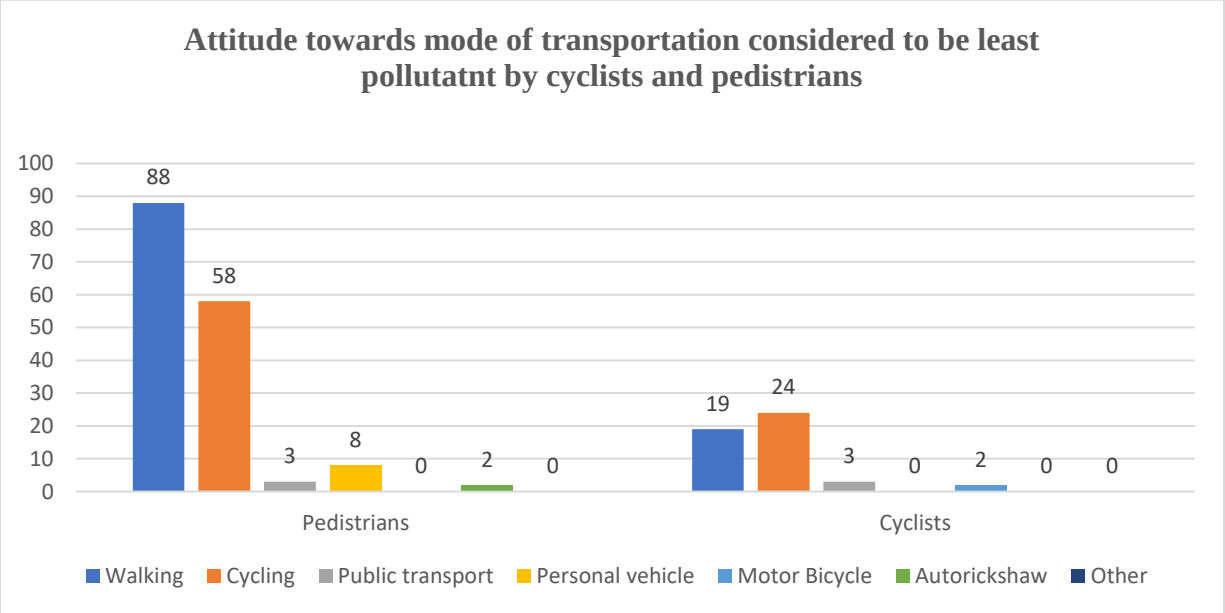
and awareness rising among the community about transport related tradeoffs and the benefit of practicing non-motorized transportation to the environment."

4.2.6 Attitude towards mode of transportation by pollution level

Studies addressing the 1.5–2 ◦C climate mitigation target clearly suggest that not only radical technological change is needed, but also significant behavioural change needed to address climate change and sustainable transportation issues (Gota et. al., 2019). Citizens attitude towards low-carbon transportation modes and utilization is vital in addressing global targets in general.

This survey questioner allowed multiple responses obtain detail information from respondents on their attitude towards mode of transportation considered to be the least pollutant by cyclists and pedistrians. Figure 8 illustrates the data and interpretation as follows;

Figure 8; Respondents attitude towards mode of transportation considered to be leaset pollutant by cyclists and pedistrians



Source; own survey June and July 2022

According to pedestrian survey respondents 88 (100%) of them think walking is the least pollutant mode of transport, 58 (66%) Cycling, 8 (3%) chose personal vehicle, 3 (9.1%) chose personal vehicle, 2 (2%) chose autorickshaw. When we see the survey result to cycling respondents, 24 (83%) chose cycling as least pollutant mode of transportation, 19 (65%) chose walking, 3(10%) chose public transport, 2 (7%) chose motor bicycle as a least pollutant mode of transportation.

The survey result shows that both pedistrians and cyclist respondents understand and think walking and cycling are least pollutanat transportation modes.

4.2.7 Respondents attitude towards cycling facilities and cycling culture

Although Addis Ababa city administration has made some effort to improve the Non-Motorized Transport environment, the attention given to bicycling and bicycle infrastructures are almost neglected (Eshetu, 2015). This include lack of bicycle infrastructure, dangerous intersection and poor maintenance. Table 8 illustarates repondents attitude towards weather there is a relationship between cycling facilities and cycling culture.

Table 8; Respondents attitude towards the relationship between the presence of cycling facilities and cycling culture

Do you believe presence of cycling facilities promotes cycling culture

		Frequency	Valid Percent
Valid	Strongly agree	23	79.3
	Agree	5	17.2
	Disagree	1	3.4
	Total	29	100

Source; own survey June and July 2022

According to the survey result, among the total of 33 cycling respondents, 23 (79.3 %) Strongly agree, 5 (17.2%) agree and 1(3.4%) disagree for the question weather the presence of cycling facilities promotes cycling culture. With the mean score of 1.27 and in reference to the scaling of one to five majority of respondents believe the presence of cycling facilities promote cycling culture.

4.2.8 Personal health and cycling & walking culture

Using the bicycle as a primary or complementary mode of transportation is acknowledged to have multiple benefts both in terms of people's health and wellbeing (Götschi et al., 2016). as well as achieving cheaper costs both for the individual and the community and less environmental

pollution(Macmillan et al. 2014). When we see walking and personal health, studies indicate that walking about 150 min a week reduces morbidity and extends the life span as well as the health span (U.S. Department of Health and Human Services, 2018). Table 9 illustrates that weather personal health can be moderated by cycling and walking culture.

Table 7; Attitude towards personal health and walking and cycling culture

	Yes	No
Do you think personal health can be moderated by cycling culture	24 (86%)	4 (14%)
Do you think personal health can be moderated by walking culture	87 (99%)	1 (1%)

Source; own survey June and July 2022

Among the total of 33 cyclist survey respondents 24 (86%) believe personal health is moderated by cycling culture while 4 (14%) doesn't buy the concept. When we see pedestrian participants among the total of 88 participants 87 (99%) believe personal health can be moderated by walking culture and the rest 1(1%) doesn't agree with the concept.This shows that the survey proved personal health condition and cycling and walking culture had a positive relationship. Non-motorized tratransport modes are human powered transport modes that intake energy from us to move from place thus the exercises our body made improves our health condition.

4.3 **Environmental and health benefits of non-motorized transportation**

Haq and Schwela (2012) in their study stated that urban air pollution in sub-Saharan Africa is on the increase, due to rapid economic and population growth and rise in motorization. It is now estimated to cause roughly 49,000 deaths per year in the region.

Non-motorized transportation had a wide range of benefits because they use human power with zero emission. To mention among those benefits environmental and health benefit take a lion share. Africa's transportation-related greenhouse gas emissions are increasing at a pace of 7% per year. The deteriorating transport emissions were caused by poor fuel quality, an aging fleet of vehicles, and a lack of legally required roadworthy emission tests.

Replacing short trips with walking and cycling and staying physically active not only reduces emission but also helps us improve our tendency to be caught by diseases. This section discusses

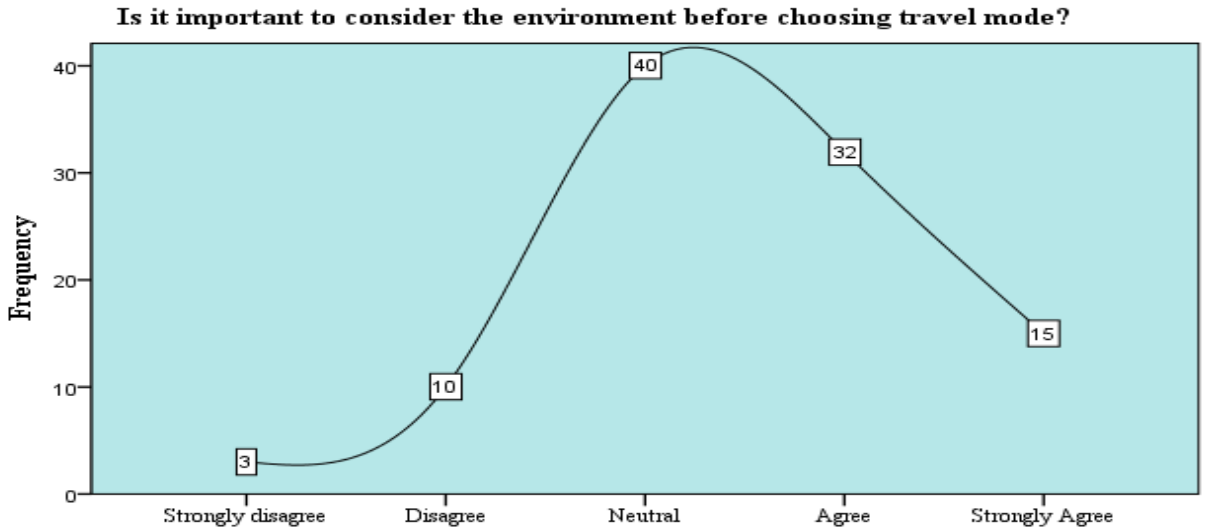
respondents' attitude towards environmental and health benefits of non-Motorized transportation. Respondents rated the extent of their perception towards environmental and health benefits of non-motorized transportation using five-point Liket scale. This five- point Liket data has the lowest value from “Strongly disagree” to highest value “Strongly agree”.

In addition to survey questioner gathered from participants, qualitative data is gathered from key informant interview and it is analyzed with the quantitative data accordingly.

4.3.1 View of respondents towards consideration of environment before choosing travel mode

As it is displayed on figure 9, respondents view towards consideration of the environment before choosing travel mode, the survey result implies 40% of respondents responded neutral while 32% of the respondents agree 15% of the respondents chose strongly agree and 10% and 3% of respondents responded disagree and strongly disagree respectively.

Figure 9; Respondents view towards consideration of environment before choosing travel mode



Source; Own survey, June and July 2022

Table 8; view of respondents towards consideration of environment before choosing travel mode and sex crosstabulation

Is it important to consider the environment before choosing travel mode? * Sex Crosstabulation

		Sex		
		Male	Female	Total
Is it important to consider the environment before choosing travel mode?	Strongly disagree	1	1	2
	Disagree	6	4	10
	Neutral	18	22	40
	Agree	19	13	32
	Strongly Agree	14	1	15
Total		58	41	99

Source; own survey June and July 2022

As it is displayed on figure 10, When we see the view of respondents towards consideration of the environment before choosing travel mode interms of sex composition, 14% of male and 1% of female respondents strongly agree, 19% of male and 13% of female agree, 18% of male and 22% of female stayed neutral, 6% of male and 4% of female disagree and 1% of male and 1% of female strongly disagree. This analysis entails majority of male respondents strongly agree and agree for the importance of considering the environment before choosing travel mode than female respondents. This shows that male respondents had better understanding on benefits towards consideration of the environment before choosing travel mode than female counterpart.

Table 9; View of respondents towards consideration of environment before choosing travel mode and educational status crosstabulation

Is it important to consider the environment before choosing travel mode? * Educational Status Crosstabulation

		Educational Status							
		No formal education	Primary	Secondary	Vocational	College Diploma/Certificate	University Degree	Other Specify	Total
Is it important to consider the environment before	Strongly disagree	0	0	0	0	1	1	0	2
	Disagree	0	1	2	1	2	4	0	10
	Neutral	1	0	12	8	7	11	1	40
	Agree	0	0	6	2	7	17	0	32

choosing travel mode?	Strongly Agree	0	1	0	2	1	11	0	15
Total		1	2	20	13	18	44	1	99

Source; own survey, June and July 2022

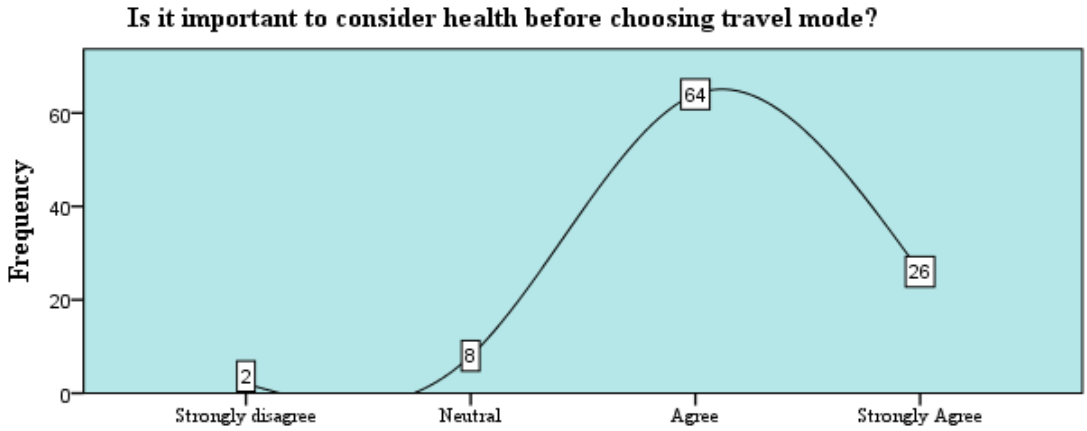
According to survey result displayed on Table10, when we see the view of respondents towards consideration of the environment before choosing travel mode interms of educational status, 11%of respondents who hold university degree, 1% college diploma/certificate holders, 2% vocational college graduates and 1% primary education level respondents strongly agree. 17% of university degree holders, 7% college diploma/certificate holders, 2% vocational college graduates, 6% secondary education level respondents agree. 11% of university degree holders, 7% of college diploma holders, 8 % of vocational graduates, 12% secondary education level respondents and 1% of respondents with no formal education responded as neutral. Whereas 4% of university degree holders, 1% of vocational graduates, 2% of secondary education level respondents and 1% of primary education level respondents chose disagree. Lastly, 1% of university degree holder and 1% college diploma/ certificate holder chose strongly disagree.

This narration entails majority of the respondents who are on the level of university degree strongly agree and agree for the importance of considering the environment before choosing travel mode than none of the respondents agree or strongly agree for the concept in those respondents who had no formal education. this shows that there is a relationship between education level and environmental awareness because education serves as a bridge between knowledge and actions (TOJET, 2017).

4.3.2 Consideration of Health before choosing travel mode

Figure 10 entailes consideration of health before choosing travel mode was another question set to evaluate respondents' attitude accordingly, 64% of respondents agree, 26% of respondents strongly agree, 8% of respondents responded as neutral and 2% responded as strongly disagree.

Figure 10; Respondents view towards consideration of health before choosing travel mode



Source; own survey June and July 2022

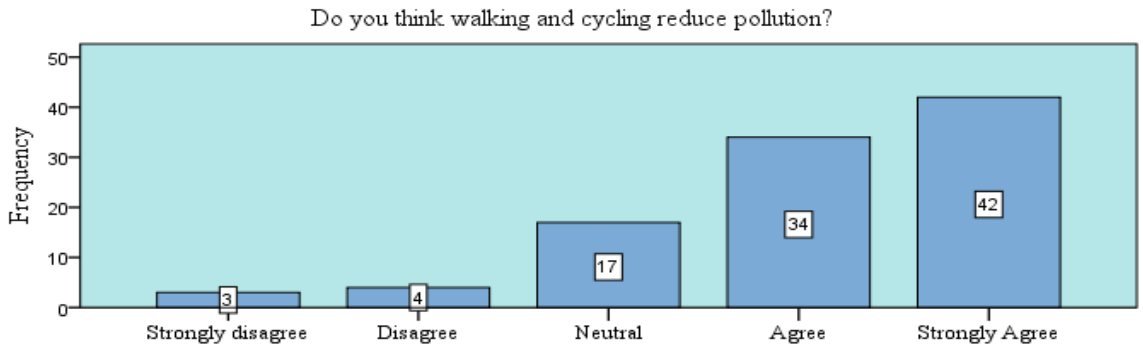
The findings of the survey shows that, 90% of respondents support the idea of consideration of health before making a preference of travel mode.

4.3.3 Respondents attitude towards weather walking or cycling reduce pollution

According to a new WHO publication (June 2022), active transport helps to reduce air pollution that claims more than half a million deaths every year. Evidence shows that investments in policies that promote safe cycling and walking can play a crucial role in shaping health, mitigating climate change and improving the environment.

According to the report "Walking and cycling: latest evidence to support policymaking," which was presented at the Bonn Dialogue on Environment and Health and hosted by the WHO European Centre for Environment and Health, significant shifts toward walking and cycling can address issues brought on by current transportation patterns, such as emissions of air pollutants, greenhouse gases, and noise; traffic injuries; and limited opportunities for physical activity and use of public space. Figure 11 indicates that respondents attitude towards contribution of walking and cycling in reduction of pollution.

Figure 11; Respondents view towards whether walking or cycling can reduce pollution



Source; own survey June and July 2022

As displayed on Figure 11, 42% of respondents strongly agree, 34% of respondents agree, 17% of respondents responded as neutral, 4% of respondents agree and 3%strongly disagree. This analysis shows that the majority of the respondents of this survey strongly agree and agree walking and cycling can reduce pollution. This implies that apart from utilization of non-motorized transportation users are aware of the benefits cycling and walking brought to the environment in terms of pollution reduction. Table 12 below illustrates the finding of the survey interms of educational status.

Table 10; Respondents view towards the pollution reduction capacity of walking or cycling through educational status crosstabulation

Do you think walking and cycling reduce pollution? * Educational Status Crosstabulation

Count

		Educational Status							Total
		No formal education	Primary	Secondary	Vocational	College Diploma/Certificate	University Degree	Other Specify	
Do you think walking and cycling reduce pollution?	Strongly disagree	0	0	0	0	1	1	0	2
	Disagree	0	0	0	0	3	1	0	4
	Neutral	1	1	8	2	4	1	0	17
	Agree	0	0	12	5	3	14	0	34
	Strongly Agree	0	1	0	6	7	27	1	42
Total		1	2	20	13	18	44	1	99

Source; own survey, June and July 2022

As it is shown in Table 12, when referring to educational status of respondents interms of their view towards pollution reduction ability of walking and cycling, those respondents who had university degree, college diploma and vocational college graduates, secondary education level agree and strongly agree. Academic progress had a huge contribution towards factors that contribute for environmental pollution.

4.3.4 Respondents view towards relationship between personal health and air pollution and congestion

Air pollution is known for the risk of early death, cancer, lung and heart diseases. It contributes to the deaths of almost seven million people annually around the world, and the associated medical expenses are enormous. The World Health Organization declared air pollution an unequivocal carcinogen (Loomis et al. 2013). According to the World Health Organization department for public health, environmental and social determinants of health;

> *The risks from air pollution are now far greater than previously thought or understood, particularly for heart disease and strokes," says Dr Maria Neira, Director of WHO's Department for Public Health, Environmental and Social Determinants of Health. "Few risks have a greater impact on global health today than air pollution; the evidence signals the need for concerted action to clean up the air we all breathe.*

Table 11; Respondents attitude towards disruption of personal health due to air pollution and congestion

		Frequency	Valid Percent
Valid	Strongly disagree	4	4.0
	Neutral	2	2.0
	Agree	53	53.0
	Strongly Agree	41	41.0
	Total	100	100.0

Source; own survey, June and July 2022

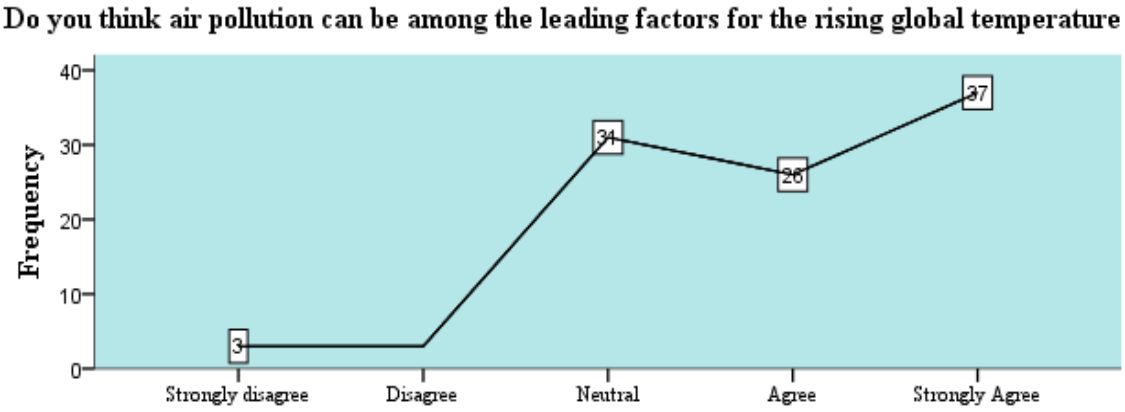
The findings of the Survey show that 41% of respondents strongly agree, 53% respondents agree, 2% neutral and 4% strongly disagree. Thus, Majority of the respondents believe air pollution and congestion can be disastrous reasons disrupting personal health.

4.3.5 Respondents view on the association between air pollution and rising global temperature

Air pollution is contamination of the indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere. The whole world is facing critical air pollution as a result of industrialization, population growth, construction for housing and infrastructure, vehicular traffic, congested roads, poorly maintained motor vehicles, less acess to clean fuel and deficiency of effectictive pollution control programs(WHO 2016).

Global warming on the other hand is the slow increase in the average temperature of the earth's atmosphere because of an increased amount of heat energy reaching the earth from the sun is being traped in the atmosphere and abstain radiating back in to the space. With each passing year, it becomes more and more obvious how air pollution contributes to both global warming and climate change. Awareness of our environment and the choices we make now will have far-reaching consequences for our future. Figure 12 displayes the survey result as follows;

Figure 12; Respondents view on the association between air pollution and rising global temperature



Source ; Own survey, June and July 2022

When we see the survey result about respondents attitude towards relationship between air pollution and the rising global temperature, 37% of the respondents strongly agree, 26% agree,

34% neutral, 3% disagree and 3% agree. Thus, Majority of respondents believe air pollution is the leading factor for the rising global temperature.

4.3.6 Respondents view on walking and cycling contribution for greenhouse gas emission

Though the manufacturing of bicycles does emit carbon dioxide and other pollutants, as does the production and transportation of the extra food cyclists and pedestrians consume, cycling and walking are the modes of transportation with the least production of carbon emissions from fossil fuels. However, the production of automobiles and other means of transportation has been released much more.

One of the more promising ways to reduce transport carbon dioxide (CO_2) emissions is to promote and invest in active travel (i.e. walking & cycling) while "demoting" motorized modes that rely on fossil energy sources (Woodcock et al., 2018; Castro et al., 2019). Much of the work on climate change emissions impacts of active travel has been based on analyses of the potential for emissions mitigation (Yang,Wang and Liu, 2018) or the generation of "what if" scenarios that explore the likely impacts of hypothetical increases in active travel(Woodcoak et al.,2018).Table 14 holds the survey result as follows;

Table 12; Respondents view on walking or cycling contribution for greenhouse gas emission

		Frequency	Valid Percent
Valid	Strongly disagree	40	40.0
	Disagree	29	29.0
	Neutral	15	15.0
	Agree	8	8.0
	Strongly Agree	8	8.0
	Total	100	100.0

Source; Own survey,June and July 2022

The survey shows that 40% of respondents strongly disagree, 29% disagree, 15% neutral, 8 % agree and 8% of respondents strongly agree as walking and cycling can be contributors of greenhouse gas emission. Thus, the majority of respondents believe that walking and cycling doesn't contribute or less contribute for greenhouse gas emission.

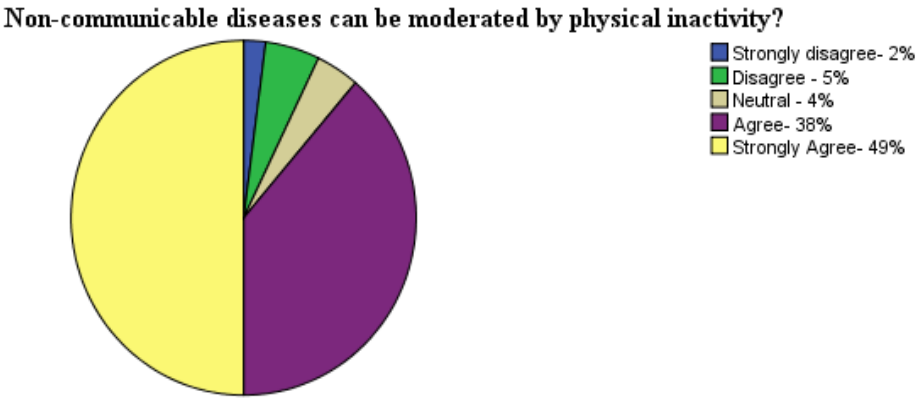
4.3.7 Respondents view on the association between physical inactivity and the chance of being cought by noncommunicable diseases

According to the World Health Organization, the first indicator of health is physical activity at the community level. The risk of many chronic diseases such as cancer, cardiovascular condition and diabetes (Type 2) reduce through regular physical activity (Warburton DE, 2006). The sedentary lifestyle is the leading cause of the increased mortality rate globally and WHO stated that about 3.2 million deaths per year are occurring due to physical inactivity across the world (WHO, 2020).

In Ethiopia there is no recent data on physical activity because there is no routine monitoring framework in place. The most recent data indicates that, in 2016, 14% of adults were insufficiently active according to WHO standards (Noncommunicable diseases country profile, 2018).

According to Ethiopian NCD STEPS survey 2016, showed that 13.6% of the population aged 15–69 years had low physical activity, with a significant difference between sexs (8.6% of men and 19.4% of women). Figure 13 entails the survey results as follows.

Figure 13; Respondents view on the association between physical inactivity and the chance of being caught by noncommunicable diseases



Source; Own survey June and July 2022

Among this distribution when we categorize it through sex, 37% of male and 12% of female strongly agree, 19% of male and 19% of female agree, 4% of female and none of male respondents chose neutral, 4% of Female and 1% of male disagree, 1% of female and none of male respondents chose strongly disagree. This shows that more of male participants of the survey had awareness about how physical inactivity leads to noncommunicable diseases than female counterparts.

4.3.8 Respondents view on whether cycling and walking are time consuming transport modes

Many studies have investigated which determinants are important in active mode (walking and cycling) choice. These determinants are divided into six categories (Hunt and Abraham, 2007; Heinen et al., 2010). These are individual characteristics, household characteristics, trip characteristics, built environment, season and weather and work conditions.

Among the six, trip characteristics is the most investigated interms of distance and time. People usually calculate their travel time and distance as parameters to choose their travel while other determinants remain constant. Cycling and walking are slower modes of transport in comparison to motorized modes. In this survey, respondents are requested their view whether they consider cycling and walking as time-consuming transport modes. Table 16 displays the survey findings as follows.

The survey result on respondents view on either Noncommunicable diseases can be moderated by physical inactivity shows that 49% of respondents responded as they strongly disagree, 38% agree, 4% neutral, 5% disagree, 2% strongly disagree. Table 4.13 below illustrates the survey result interms of sex.

Table 13; sex * Respondents view on the association between physical inactivity and the chance of being caught by noncommunicable diseases? Crosstabulation

		Non-communicable diseases can be moderated by physical inactivity?					
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Sex	Male	0	1	0	19	37	57
	Female	1	4	4	19	12	40
Total		1	5	4	38	49	97

Table 14; Respondents view on wheather cycling and walking are time consuming transport modes

		Frequency	Valid Percent
Valid	Strongly disagree	5	5.1
	Disagree	23	23.2
	Neutral	28	28.3
	Agree	34	34.3
	Strongly Agree	9	9.1
	Total	99	100.0
Missing	System	1	
Total		100	

Source own survey, June and July 2022

As it is depicted in the below table, 9% of respondents Strongly agree, 34% agree, 28% neutral, 23% disagree, 5% Strongly disagree. The majority of the respondents believe cycling and walking as time-consuming transport modes.

4.3.9 Respondents view on the association between understanding rules and regulations of the road in promote appropriate utilization

The rules of the road are for all road users; drivers, pedestrians, motorcyclists, horse riders, cyclists and those in charge of animals. Having a satisfactory knowledge about the rules and regulations of the road not only benefits the road user but also the third party who shares the road with.

According to the World Health Organization global status on road safety, 2018, Middle- and low-income countries only account for about half of the world's total vehicle population however they account for more than 90% of road traffic deaths. It is well highlighted that among the escalating causes of road traffic deaths appropriate utilization and following rules and regulations of the road make undeniable contribution. The below table illustrates statistical figure of respondents about the subject.

Table 15; Respondents view on the association between understanding rules and regulations of the road in promote appropriate utilization

		Frequency	Valid Percent
Valid	Strongly disagree	1	1
	Disagree	1	1
	Neutral	3	3
	Agree	33	33.3
	Strongly Agree	61	61.6
	Total	99	100
Missing	System	1	
Total		100	

Source; Own survey June and July 2022

The survey result on respondents' views on either understanding rules and regulation of the road promote appropriate utilization shows that 61% of the respondents strongly agree, 33%Agree, 3% neutral, 1% disagree, 1% strongly disagree. The majority of the respondents believe understanding the rules and regulations of the road promotes appropriate utilization.

4.3.10 Respondents view on Importance of community discussion and awareness rising to adhere traffic rules and regulation for nonmotorized transport user

Road traffic accidents have emerged as a major global public health problem of this century and are now recognized as neglected pandemic (Dandona R., Mishra A., 2014). According to the WHO report, it is estimated that about 13 million people die every year and about 50 million are injured in road traffic accidents (Pden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E, et al., 2017). What makes the situation worse is that, Sharing of the same road by large and small vehicles, pedestrians, and animals and cyclists. However, it is human factor that contributes significantly to increasing number of road accidents.

For instance, According to Dandona R., Mishra A., 2014, Most road traffic accidents are due to poor awareness of road traffic rules because unawareness could result in poor attitude and practices while using the road. For instance, in the study area (Lebu-Jemo cycling corridor), there is a cycling corridor that is meant to serve cyclists. However, it is seen that vehicles are parked on it, the road concrete is purposely moved by different commercial centers. By the same fashion the pedestrian way is also being used as vehicle parking, petty trade hotspot.

Table 16; Community discussion and awareness rising is important to adhere traffic rules and regulation for non-motorized transport user

		Frequency	Valid Percent
Valid	Strongly disagree	2	2
	Neutral	2	2
	Agree	39	39.4
	Strongly Agree	56	56.6
	Total	99	100
Missing	System	1	
Total		100	

Source; Own Survey June and July 2022

Figure 14; parking encroachment on pedestrian way and cycling lane

Source; own survey, July 2022

The survey result shows that 56% of the respondents strongly agree on importance of community discussion and awareness rising to adhere traffic rules and regulation for non-motorized transport user, 39% agree, 2% neutral and 2% of the respondents strongly disagree. Thus, the majority of respondents believe awareness rising and community discussion importance to adhere traffic rules and regulation for nonmotorized user. In Addition to awareness rising there should also be enforcement mechanism for those people who abuse non-motorized transport infrastructure.

4.4 Challenges of Non-motorized Transportation System

Despite the huge number of non-motorized transportation user in Ethiopia, less attention is being given for non-motorized transportation mode thus different challenges aggravated different problems for the public. Road infrastructure is primarily dedicated for motorized vehicles and in those road networks that allocate for cycling gets less attention interms of maintenance and monitoring to serve their meant purpose is neglected. The challenges doesn't end with the above-mentioned problems rather they can be put as policy challenge, infrastructure challenge, traffic accidents, socio economic.

As it is narrated in different literatures walking is the dominant mode of transportation for low-income groups. In Addis Ababa 54% of transportation is by walking. Though Ethiopia developed non-motorized transport strategy in 2020, a lot needs to be done either to enforce the strategy and tunning the attention to majority of the road uses.

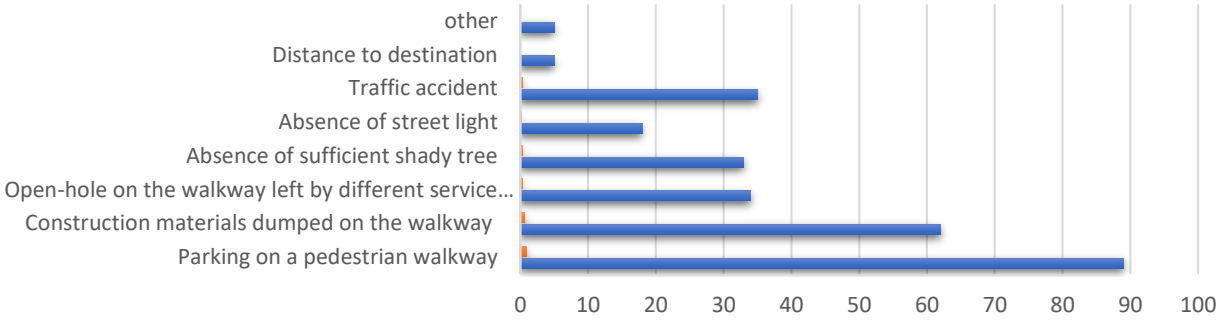
According to key informant interview with Addis Ababa city debub district traffic management agency, the information found abou he corridor narrated as follows;

> *Lebu-Jemo cycling corridor is built deducting from the road that has been built before for motorized traffic. This has been decided because at a time there was less flow of motorized vehicles however through time now, vehicle flow increased exponentially and opening of different commercial centers aggravated the need for parking and utilization of the cycling and pedestrian walk way for unintended purposes such as parking encroachment, petty trade and traffic accidents are becoming common.*

4.4.1 Challenges for pedestrians in Lebu-jemo interim cycling corridor

A pedestrian friendly environment plays a vital role in encouraging walking as mode of travel and this will prove environmental and health benefits (Tanweer, H., Ashfia, S., Sarder, R. 2015). The below figure 15 illustrates challenges for pedistrians in Lebu-Jemo cycling corridor.

Figure 15; Challenges for pedestrians in Lebu-Jemo interim cycling corridor



	Parking on a pedestrian walkway	Construction materials dumped on the walkway	Open-hole on the walkway left by different service providers	Absence of sufficient shady tree	Absence of street light	Traffic accident	Distance to destination	other
Percentage	89%	62%	34%	33%	18%	35%	5%	5%
Frequency	89	62	34	33	18	35	5	5

Source; own survey, June and July 2022

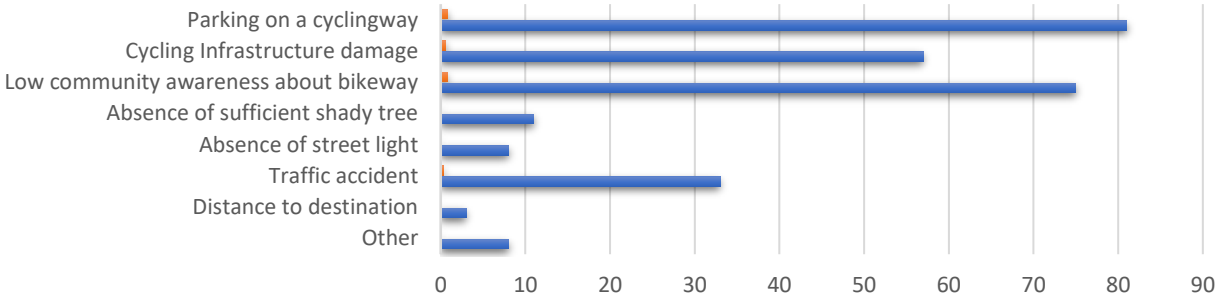
According to the survey, respondents were asked to choose among challenges that are mainly seen on Lebu-jemo cycling corridor accordingly 89(89%) of respondents chose parking on a pedestrian walkway as a challenge, 62(62%) chose construction materials dumped on the walkway as a challenge, 34(34%) chose open- hole on the walkway left by different service providers, 33(33%) chose absence of sufficient shady tree as a challenge,18(18%) chose absence of street light as challenge, 35(35%) chose traffic accident as a challenge, 5(5%)of respondents chose distance to destination as a challenge and 5(5%) chose other. This implies that there is a high demand parking on the area that disturb non-motorized transport system, followed by improper utilization of non-motorized transportation user space by buildings under construction. This will have a discouraging effect for non-motorized transport user.

The survey result tells that all listed challenges exist in the area however interms of frequency and percentage of responses; parking on pedestrian walkway, construction materials dumped on the walkway, Traffic accident, open hole on the walkway left by different service providers, absence of sufficient shady tree, absence of street light, distance to destination and others are put sequentially as major challenges for pedestrians in the area. This implies there is a significant absence of law enforcement that keeps non-motorized transport infrastructure for the intended reasons.

4.4.2 Challenges for Cyclists in Lebu-jemo interim cycling corridor

Cycling is a sustainable, environmentally friendly nonmotorized transportation that does not pollute the environment and requires less land use than other motorized transportation (Balkamar 2020). Despite the wide range of benefits, there are inherent challenges with adopting and implementing cycling in many developing countries(Mogaji 2020). Many of these challenges as reported from different countries like Addis Ababa (Tulu et.al. 2019 & Mequanint, 2019) and Nigeria (Adejumo, 2010), Ghana (Acheampong, 2018), includes infrastructure, policy and socioeconomic challenges are the major ones. Table 4.16 entails challenges for cyclists in Lebu-Jemo cycling corridor.

Figure 16; Challenges for cyclists in Lebu-Jemo interim cycling corridor



	Other	Distance to destination	Traffic accident	Absence of street light	Absence of sufficient shady tree	Low community awareness about bikeway	Cycling Infrastructure damage	Parking on a cyclingway
percentage	8%	3%	33%	8%	11%	75%	57%	81%
Frequency	8	3	33	8	11	75	57	81

Source; Own Survey; June and July2022

According to Tulu et.al (2019), the use of cycling for mobility is still negligible in Addis Ababa despite its numerous significant benefits. The survey result about challenges for cyclists in Lebu-jemo interim cycling corridor shows that, 81(81%) chose parking on cycling way as a challenge, 75(75%) chose low community awareness about bikeway, 57(57%) chose cycling infrastructure damage as a challenge, 33(33%) chose traffic accident, 11(11%) chose absence of sufficient shady

tree, 8(8%) chose absence of street light, 3(3%) chose distance to destination and 8(8%) chose other.

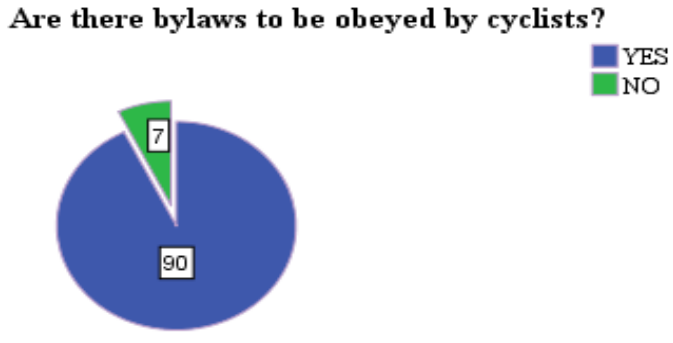
The survey result tells that all listed challenges exist in the area however interms of frequency and percentage of responses; parking on cycling way as a challenge, low community awareness about bikeway, cycling infrastructure damage, traffic accident, absence of sufficient shady tree, absence of street light, distance to destination, others are put sequentially as major challenges for cyclists in the area.

4.4.3 Are there bylaws to be obeyed by cyclists

Ethiopia developed non-motorized transport strategy on 2020 which can serve the country for ten years. This strategy is a binding strategy for the country and cascaded accordingly for cities and towns across. According to the Ministry of transport the strategy developed during Covid-19 period where the majority of travelers avoided using public transport and most urban travel was replaced by walking and cycling. Indeed, this is a major move for a country that had an ambitious plan of zero-net emission by 2025.

According to the interview with Addis Ababa traffic management agency, non-motorized transport strategy is one of the live documents that the agency is working towards cascading awareness session for the public during major road events such as “Car free day”. During this day different sensitization events such as community awareness regarding health, environment, international events is being carried out. Figure 17 dipicts respondents attitude towards weather there are bylaws to beobeyed by cyclists.

Figure 17; Are there bylaws to be obeyed by cyclists



Source; own survey June and July 2022

According to the survey result, 90% of the respondents know bylaws that needs to be obeyed by cyclists and 7% have doesn't know whether there are bylaws to be obeyed by cyclists.

4.4.4 How do you know bylaws to be obeyed by cyclists

According to Table 19, among the respondents who know the presence of bylaws to be obeyed by cyclist's majority of them 48(48%) got the information from signboard on the area, following by 28(28%) through public lecture, 25(25%) through mainstream media, 14 (14%) through words of mouth and through social media, 4(4%) respondents through other sources, the least number of respondents accounting 3(3%) found document and got the chance to read it.

Table 17; ways respondents know about the existence of bylaws to be obeyed by cyclists

Column1	Through social media	Through mainstream media	Found a document and got a chance to read it	Through signboard	Words of mouth	Through public lecture	Other
How do you know about bylaws to be obeyed by cyclists	14%	25%	3%	48%	14%	28%	4%

Source; own survey; June and July 2022

The survey data indicates that visibility materials, public lectures and mainstream media play an indispensable role in disseminating information for the public.

4.4.5 Relation between parking encroachment and congestion

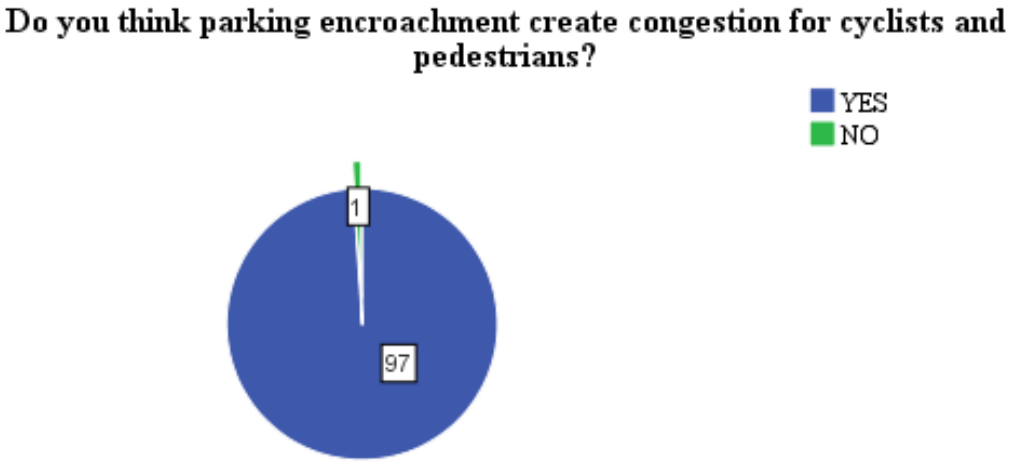
According to the Federal transport authority 2020, the number of vehicles registered in Addis Abeba during 2019 amounts to over half of the cars registered in the entire country. This is clearly displayed on the congested roads of the city.

Despite an ever-increasing growth in the number of vehicles, parking spaces all over the city seem to be very few. As essential parking infrastructure is, it requires huge investment thus Addis Ababa city administration in partnership with private, public and government sectors adapted building

parking infrastructure on areas with high traffic volume as part of a policy. This is being implemented in areas such as Megenagna and Meskel square. The effort is thought to continue on the selected sites of the city for the coming period.

Despite the efforts being made, business as usual scenario continued. people park their vehicles on the side of the street or in an area like Lebu-Jemo corridor. They park on pedestrian paths as well as on cycling paths. Figure 18 tells the survey respondents attitude about the relation between parking encroachment and congestion.

Figure 18; Respondents attitude towards whether parking encroachment creates congestion for cyclists and pedestrians



Source; Own survey; June and July 2022

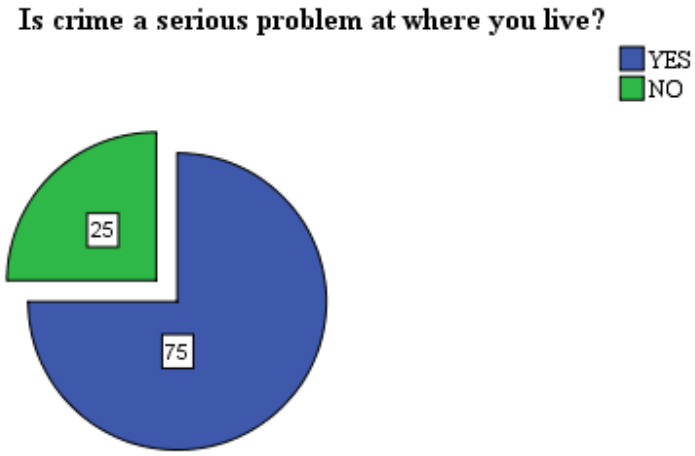
Among the survey respondents 97(97%) agree on the question whether parking encroachment creates congestion for cyclists and pedestrians while 1(1%) disagree on the concept. This implies that parking encroachments are barriers that create congestion for non-motorized transport users in a way discouraging practices of walking and cycling which directs people to avoid making healthy choices.

4.4.6 Crime in the woreda

The Oxford dictionary of law defines crime as "An act (or sometimes a failure to act) that is deemed by statute or by the common law to be a public wrong and is therefore punishable by the state in criminal proceedings."

According to the key informant interview with Addis Ababa city Traffic management agency debub branch office, there are frequent theft incidents happening in Lebu-jemo road using motor bike and there are also reported incidents on bike theft during car free days; especially children who are biking on the event got targeted on the theft. This implies that there is a crime incident happening in the area which can discourage people practice and developing a habit of walking and cycling.

Figure 19; Respondents attitude towards whether or not crime could be a serious problem where they live



Source; Own survey; June and July 2022

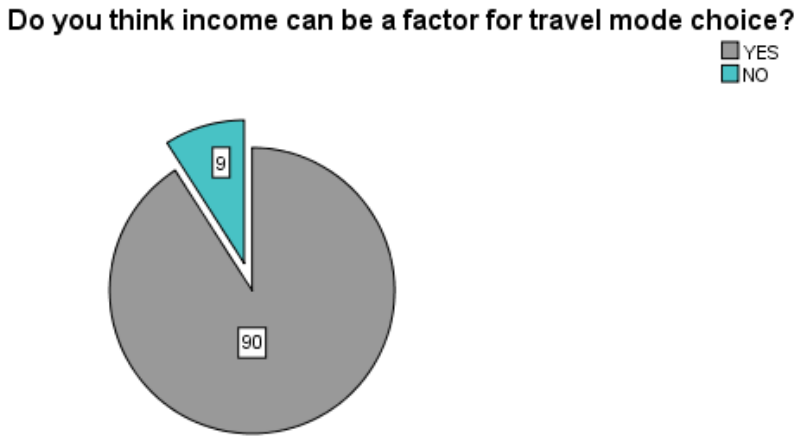
The survey found out that among 100 respondents 75(75%) responded that crime is a serious problem at where they live and 25(25%) responded as it is not.

4.4.7 Income and travel mode choice

People are highly concerned with the choice of travel modes that are convenient and suitable for their trips (Joe et.al 2015). Decades ago, there were limited types of travel modes that existed. However, currently, there are diversified modes starting from the cheapest to the most expensive

ones. According to Shete 2020, Income level, travel cost, travel time, accessibility are the most determining factors of travel modes choice.

Figure 20 Respondents attitude towards whether income can be a factor for travel mode choice



Source; own survey; June and July 2022

According to the survey result, out of 99 respondents, 90 (90%) of respondents think income as a major factor for them to choose travel choice while 9 (9%) doesn't consider income as a factor that determines travel choice. Thus, the majority of survey respondents consider income play an indispensable role in choosing our travel modes.

4.4.8 Influence of distance on travel mode choice

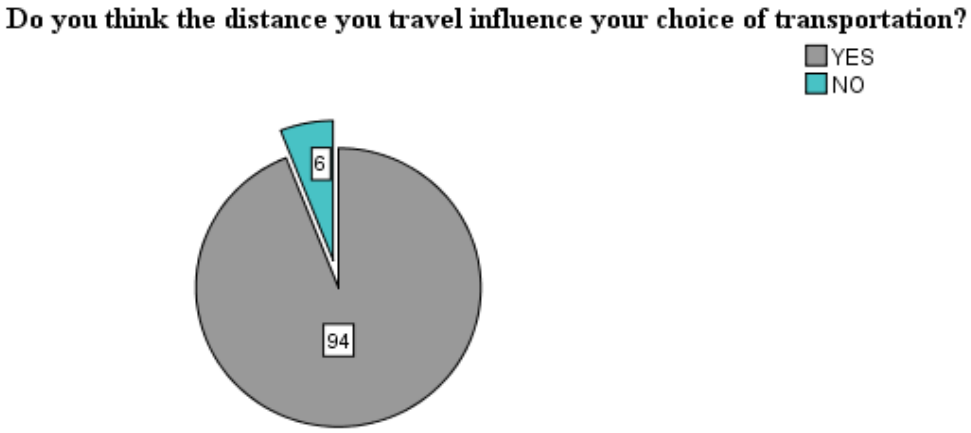
Among the range of factors that influence travel choices distance is one of them. Whenever people think of their travel, they calculate how far they are going and which mode of transport they utilize to satisfy their needs. Mintesnot and Takano (2007) found out that travel mode choice is affected by perception. Indeed, some people prefer to walk short distances than using a vehicle while others use motorized transportation whether the distance they travel is far or near.

According to the Key informant interview with Nifas Silk Lafto sub city Health office, the respondent said,

> *The sub city health office is using its mandate in awareness among the community in substituting short trips by walking and cycling. After the presence of Bajaj(three wheel veicles) people avoided walking even for a very short less than two-minute travel tributes. The sub city health office is using the chance of car free days to*

sensitize health benefits of walking in combating non-communicable diseases in this regard. Free tests of blood suger level, hypertension and cancer awareness sessions conducted frequently. The subcity health extension workers dissiminated on different areas of the cycling lane and use the car free day sensitizing about non-communicable diseases and the promotion of non-motorized transportation takeling those."

Figure 20; Respondents attitude towards whether the distance they travel influence travel choice



Source; own survey; June and July 2022

According to the survey result, 94(94%) of respondents think the distance they travel influences their travel choices while 6(6%) didn't get influenced by the distance while choosing their travel mode.

4.8.9 Street vending role in affecting walking and cycling practice

Vending in the street continued to be a challenge for the non-motorized transport user, it is very difficult to walk and cycle in places where vending takes place. When it comes to persons with disability the situation is worse. According to Yetnebersh Nigussie (Lawyer and Disability Rights activist), 2014, "Small effort towards accessibility makes a big difference in people's life". Table 20 illustrates the survey result as follows;

Table 18; public attitude towards wheather street vendors affect walking and cycling practice

		Frequency	Valid Percent
Valid	YES	86	86.0
	NO	14	14.0
	Total	100	100.0

Source; own survey; June and July 2022

According to the survey, out of 100 respondents 86 (86%) of respondents believe street vendos affect walking and cycling practice and 14 (14%) of respondents believe street vendors doesn't affect walking and cycling practice. Thus street vending is a potential challenge for cyclists and pedistrians to practice walking and cycling.

4.8.10 Physical health condition and ability to walk/cycle

No matter how we wish to walk or cycle, our physical health condition is the main precondition to meet what we wish to do. Physical health condition is any illness or dysfunction of or injury to human body. According to (Haskell et. al., 2007), physical health condition can be moderated by regular physical exercise. Some of the longterm physical health conditions; diabetes, cardiovascular, cronic respiratory illnesses are among the list.

This survey tried to find out if respondents had a physical health condition that might affect their ability to walk or cycle and what are those physical health conditions manifested among the participants. The below table and narration holds the description.

Table 21; Respondents physical health condition that affects their ability to walk/cycle

		Frequency	Valid Percent
Valid	YES	14	14.0
	NO	86	86.0
	Total	100	100.0

Source; Own survey; June and July 2022

According to the survey, out of 100 respondents, 86(86%) of respondents do not have a physical health condition that might emped them to walk or cycle while 14(14%) had a physical health

condition that emped them not to walk/ cycle. Among those respondents who had a physical health condition, 6(6%) had respiratory illness, 2(2%) had cardiovascular illness, 5(5%) had other physical health problems.

4.8.11 Street infrastructure timely maintenance

Street infrastructure maintenance plays vital role in assuring safty for non-motorized transport users. As it is observed in different parts of Addis Ababa, street infrastruction gets a rare maintenance. Diches left open by different service providers, walkways get broken due to parking on the street and street vending activities push pedistrians leave the path and walk on the main road vehicles use. This left pedistrians vulnerable for various injuries and road accidents.The below table and narration intails wheather street infrastructure get timely maintenance or not.

Table 21; Respondents awareness towards weather street infrastructure get timely maintainance in Lebu-Jemo Interim cycling corridor

		Frequency	Valid Percent
Valid	YES	10	10.0
	NO	90	90.0
	Total	100	100.0

Source; Own survey may 2022

According to the survey, out of 100 respondents 90(90%) of them responded as street infrastructure is exempted from timely maintenance in Lebu-Jemo interim cycling corridor to assure safty for cyclists and pedistrians while 10(10%) of respondents believe the street infrastructure in the area gets timely maintenance.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

Introduction

This chapter is the final chapter of this study. It contains three parts summery, conclusion of the study and recommendations of the study. The conclusion encompases the summery and major findings of the study and the recommendation part holds wayforward and possible remedies for the findings of the study.

5.1 Summary

People's mobility and accessibility demands must be met by providing safe and ecologically friendly forms of transportation in a sustainable transportation system. non-motorized transportation presents an auspicious approach not only to address problems of urban traffic congestion, environmental pollution and climate change, but also to provide extensive health benefits. As explained in chapter one of this study, in the context of non-motorized transportation environmental and health benefits and the general public attitude towards it is being rarely investigated not only in Ethiopia but also at the global scale.

Living in an era where world is at boling point due to climate change and non-communicable diseases sustained as a public health treat, scenario shift is undeniable in transport sector. Thus non-motorized transportation satisfies sustainability goals because it primarily relies on walking and cycling, which are non-polluting, safe, economical, user-friendly, and cost a fraction of the capital required for motorized transit. In a nut shell, studying public attitude towards environmental and health benefits of non-motorized transport system is found essential to identify challenges, evaluate practices and visualize attitudenal level of understandings of the public.

This section of this study included key findings of the study which contain; looks of the practices of non-motorized transport system in the study area, public attitude towards environmental and health benefits of the non-motorized transport system and key challenges of non-motorized transportation that deter the practices and attitudenal gaps are studied.

Among the key findings on non-motorized transport practices, the study tried to examine cycling and walking practices and found out that majority of the trips conducted by cyclists and pedistrians

is for the purpose of meeting livelihood and among those commuters whose age group lays on adulthood and having a university degree had a better practice of non-motorized transport system. Apart from this when we see practice of cycling interms of gender, it is very rare to find female who cycle to meet journey purpose.

The survey found out that cyclists consider the environment and their health condition before choosing travel mode while pedistrians give priority to the time it takes them to reach their destination and cost effectiveness as a parameter. By the same fasion, cyclists are convinced to bike for the purpose of maintaining fitness and personal health while pedistirans are convinced to walk because of the distance to their destination this attitudenal level gap came from the awareness created for cyclists in the Lebu-Jemo cycling corridor during Car-free days.

The survey also proved personal health condition and cycling and walking culture had a positive relationship in a way as non-motorized transport is human powered transport it takes a full body exercise and the exercise we made improves our health condition. When we see attitude of the respondents interms of understanding consideration of the environment before choosing travel mode and pollution reduction capability of NMT, the research learnt as there is a relationship between education level and environmental awareness. This can be manifested through those respondents who had a university degree had a better understanding than the others.

The suvey found out that dispite the good awareness towards the relationship between physical inactivity and the chance of being cought by non-communicable diseases, when we see the finding interms of sex, male participants had a better understanding than female counterparts. Finally, when we see the key findings of challengs that moderate the practices and attitude of the public, the major challenges that encounter cyclists and pedistrians are parking encroachment on NMT infrastructure put a heavy duty on users among the other challenges this implies that there is a high demand parking on the area that creates congestion to the NMT user . Additionaly the survey found out that the existance of crime in the area, the distance people travel, the presence of street vendors, low community awareness about non-motorized infrastructure and cycling infrastructure damage, income lavel are among the key findings of the survey under the challenges that can discourage non-motorized transport users from commuting and alter their practices.

In Lebu-Jemo case there is a huge gap in working together between sector offices especially most of the initiatives of undertaking car freedays inline with awareness rising activities are politically driven. At a time where some politicians showup the all sector offices want to showcase their effort interms of giving physical examination by subcity health office and awareness rising session using mirophone about road safty and illegal activities by Addis Ababa city debub branch traffic management office however either awareness rising seassions or physical examination need to be undertaken when ever the event is organized.

Generally, inaddition to the mentioned challenges the survey found out that visibility materials, public lectures, mainstream media play an indispensable role in dissiminating information for the public.

5.2 Conclusion

Ethiopia's transport sector is expanding to keep up with the rising demand however the main obstacle to achieving low carbon emission target is dissociating economic growth and greenhouse gas emissions from the transportation sector. This will necessitate departing from business-as-usual scenarios in the transportation sector is required to maintain the expansion of pollution free transportation systems. Speaking of pollution free we mean non-motorized transportation having its own multidimensional benefit interms of keeping the environment clean from pollution, energy conservation and congestion. At the same time, it will engage in physical activity that results in a healthy lifestyle.

This study analyzed public attitude towards environmental and health benefits of non-motorized transport system in Lebu-jemo interim cycling corridor and found out that there is better understanding about the benefits of non-motorized transportation for health and for environment among those respondents whose academic achivemnet is high than those who are less educated.

Dispite wide range environmental and health benefits of walking and cycling, the practice is being tested and challenged by several obstacles such as; socio economic challenge, infrastructural and policy awareness problems are among the major to mention. Lebu-Jemo cycling corridor manifested several crime incidents, inappropriate use of non-motorized infrastructure, less awareness about non-motorized transportation infrastructure stayed bottleneck discouraging cyclists and pedistrians from the habit of using bicycle and walking as a means of transportation.

In addition to this, cycling and pedestrian walkway damage and abcence of timely maintainanace, parking on pedestrian and cycling lane and street vending on non-motorized transportation infrastructure is drowning people from developing a healthy habbit. Finally implementation of policies inline with rule and regulation manifests vacum in the implementation of transport polices across the study area in general.

5.3Recommendations

- Addis Ababa city administration need to have consultation with community before planning and implementing development projects because in the case of the construction of Lebu-jemo interim cycling corridor community members were not consulted as a result the cycling lane is being damaged and improperly utilized by the residents who occupy the area especially the commercial places.
- Stakeholder coordination and collaboration in this case Addis Ababa city debub branch traffic management office and law inforcemnet offices need to work together in managing challengs for nonmotorized transport users such as parking on cycling lane and street vending on the pedestrian walkway need to be monitored and appropriate action need to be taken.
- Stakeholder collaboration and participation need to be encouraged because dispite having a lion share Nifas silk laphto sub city environmental protection office is less consulted by Addis Ababa city debub branch traffic management office while undertaking car free days and this created abcence of accountability in awareness creation process about environmental benefits of those days while people enjoy walking and cycling.
- Strong followup and timely maintainance of pedestrian and cycling lane by Addis Ababa city trassport bureao is expected which encourages people build a healthy habit thus in the study area as the survey indicates the cycling lane is barely maintained
- Nifas silk Laphto subcity environmental protection and health offices need to promote continious awareness rising sessions about environmental and health benefits of nonmotorized transportation on car free days and on public places
- Addis Ababa city administration transport bureo need to give due attention for the expansion of nonmotorized transportation infrastructure as it gives to motorized infrastructure so that more people can walk and cycle freely with out making confict with

motorized vehicles this will significantly decrease medical expenses allocated for citizens and improve air quality, and positively contribute for the changing climate.

- Traffic management offices need to work on promoting awareness rising seassions about appropriate road utilization and adherence to traffic law
- Addis Ababa city administration transport bureo need to give due attention construction and allocation of public parking space to avoid parking of motorized vehicles on cycling and pedestrian walkway.

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Annex

Questioneers

ADDIS ABABA UNIVERSITY

COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES

Dear participants,

My name is Habiba Hussen. I am conducting research entitled "Public Attitude towards Environmental and Health Benefits of Non-Motorized Transportation System; Evidences from Lebu-Jemo Interim Cycling Corridor." This research aims to examine practices of Non-motorized Transportation, knowledge and attitude towards environmental and health benefits of non-motorized transportation and challenges in the study area.

The data collected will be solely utilized for academic purposes alone. Therefore, you are kindly requested to answer all items.

The total time to participate in the study will be approximately 20 to 30 minutes. All information collected in the survey will be strictly confidential.

Should you have any questions about the study, you can reach me through; Tel:+251913165156 or email: habibti960@gmail.com

Sincerely,

Consent to participate

I have understood the terms and condition to participate in the study entitled "Public Attitude towards Environmental and Health Benefits of Non-Motorized Transportation System; Evidences from Lebu-Jemo Interim Cycling Corridor."

Do you agree to participate in this study: Yes ☐ No ☐ Date: _____

Part 1

I. Socioeconomic and demographic questions

	Questions	**Possible answers (Put tick mark or encircle)**
1.	Sex	☐Male ☐Female
2.	Age	☐18 – 24 ☐25 – 34 ☐35 – 44 ☐45 – 54 ☐55 – 65
3.	Educational Status	☐No formal education ☐Primary ☐Secondary ☐Vocational ☐College Diploma/Certificate ☐ University Degree ☐Other Specify _____
4.	Marital status	☐Single ☐Married ☐Windowed ☐Divorced
5.	Occupation	☐Manager

		☐ Professional (science and engineering, health, teaching, legal, ICT, business and administration) ☐Technician and associate professional ☐Clerical support worker ☐Service and sales worker ☐Skilled agricultural forestry and fishery worker ☐Craft and related trade worker ☐Plant and machine operator and assembler ☐Elementary occupation (Laborers, stree vendors, cleaners) ☐other

Part 2

2.1 Listed below are questions related to practices of Non-motorized Transportation for cyclists

Question	**Possible answer**	**code**
1. Which type of transport mode do you mostly use?	☐Walking ☐ Cycling ☐ Motor Bike ☐Public transport ☐ Personnel vehicle ☐ Autorickshaw ☐ Others please _____	
2. For question number 1 answer, what is the reason for your choice? (you can	☐Environmentally friendly ☐ Promote health ☐ cheap	

choose multiple responses)	☐ Safer ☐ Availability ☐Others_____	
3. What is the most common purpose of your trip as a daily routine?	☐ School ☐ Work ☐ Shopping and business ☐ Recreational ☐Sporting/Exercise ☐ Others	
4. How long does it take you to reach your common purpose trip place from where you live?	☐10 -20 minutes ☐ 21 to 40 minutes ☐ 41-60 minutes ☐ Over one hour	
5. Do you own a bicycle?	☐ Yes ☐ No	
6. If your response for question number 5 is no, how do you access bicycle for your needs?	☐ Rent ☐ From other family members ☐From an employer ☐Borrowing from others ☐I do not want to have bicycle	
7. Which mode of transportation is considered to be the least pollutant? (you can choose more than one)	☐Walking ☐Cycling ☐Public transport ☐Personal vehicle ☐Motor bicycle ☐Autorickshaw ☐Other	

8. Do you believe presence of cycling facilities promotes cycling culture	☐ Strongly agree ☐Agree ☐Neutral ☐Disagree ☐Strongly disagree	
9. Do you think personal health can be moderated by cycling culture?	☐ Yes ☐No	
10. What would convince you to bike for transportation? (You can choose multiple responses)	☐ Global warming ☐Personal health condition ☐Favorable weather conditions ☐ Recreation ☐Distance to destination ☐Fitness ☐ other_____	

2.2 Listed below are questions related to practices of Non-motorized Transportation for pedestrians

Question	**Possible answer**	**code**
1. Which type of transport mode do you mostly use?	☐Walking ☐ Cycling ☐Motor Bike ☐ Public transport ☐Personnel vehicle ☐Autorickshaw ☐Others please _____	

2. For question number 1 answer, what is the reason for your choice? (you can choose multiple responses)	☐Environmentally friendly ☐Promote health ☐cheap ☐Safer ☐Availability ☐Others_____	
3. What is the most common purpose of your journey?	☐ School ☐Work ☐Shopping and business ☐ Recreational ☐ Others	
4. For question number three answer, how long does it take you to reach your common purpose destination place from where you live?	☐10 -20 minutes ☐ 21 to 40 minutes ☐41-60 minutes ☐Over one hour	
5. Does the presence of shady pedestrian walkway promote the walking culture?	☐Yes ☐No	
6. Do you think personal health can be moderated by walking culture?	☐ Yes ☐No	
7. Which mode of transportation is considered to be the least pollutant? (You can choose more than one)	☐Walking ☐Cycling ☐Public transport ☐Personal vehicle ☐Motor bicycle ☐Autorickshaw ☐Other	

8. What would convince you to walk for transportation? (You can choose multiple responses)	☐ Global warming ☐Personal health condition ☐Favorable weather conditions ☐ Recreation ☐ Distance to destination ☐Fitness ☐Other_____	

Part 3

Listed below are attitude questions towards environmental and health benefits of non-motorized transportation. For each one, please indicate whether you strongly agree, Agree, Neutral, Disagree, strongly disagree where ***1=strongly disagree and 5*= strongly agree**

	Description of items	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1.	Is it important to consider the environment before choosing travel mode?					
2.	Is it important to consider health before choosing travel mode?					
3.	Do you think walking and cycling reduce pollution?					
4.	Do you think investing in cycling and pedestrian infrastructure promote pollution free environment?					
5.	Do you think air pollution and congestion disrupt our personal health?					
6.	Air pollution can be among the leading factors for the rising global temperature					

7.	Walking and cycling can be contributors of greenhouse gas emission					
8.	Non-communicable diseases can be moderated by physical inactivity?					
9.	Cycling and walking are time consuming transport modes					
10	Does understanding rules and regulations of the road promote appropriate utilization?					
11	Community discussion and awareness rising is important to adhere traffic rules and regulation for non-motorized transport user					

Part 4

Listed below are challenge questions of non-motorized transportation in Lebu-jemo interim cycling corridor

Question	**Possible response**	
1. From your own experiences, what are the major challenges for pedestrians in Lebu- Jemo interim cycling corridor? (More than one response is possible)	☐Parking on a pedestrian walkway ☐ Construction materials dumped on the walkway ☐ Open-pit on the walkway left by different service providers ☐Absence of sufficient shady tree ☐ Absence of street light ☐ Traffic accident ☐ Distance to destination ☐ Petty trade on the street ☐other_____	

2. From your own experience, what are the major challenges for cyclists in Lebu-Jemo interim cycling corridor? (More than one response is possible)	☐Parking on cycling way ☐ Cycling infrastructure damage ☐ Low community awareness about bikeway ☐ Absence of sufficient shady tree ☐ Absence of street light ☐Traffic accident ☐ Distance to destination ☐Other _____	
3. Are there bylaws to be obeyed by cyclists?	☐ Yes ☐No	
4. If your answer to question number three is yes, how do you know about it?	☐ Through social media ☐ Through mainstream media ☐ Found the document and got a chance to read it ☐ Through signboard ☐Words of mouth ☐Through public lecture ☐ Other_____	
5. Do you think parking encroachment create congestion for cyclists and pedestrians?	☐Yes ☐No	
6. Is crime a serious problem at where you live?	☐Yes ☐No	
7. If your answer for question number six is yes, does it affect your walking/cycling habit?	☐Yes ☐No	

8. Do you think income can be a factor for travel choice?	☐Yes ☐No	
9. Do you think the distance you travel influence your choice of transportation?	☐Yes ☐No	
10. Do you think street vendors affect walking and cycling practice?	☐Yes ☐No	
11. Does street infrastructure get timely maintenance in Lebu-Jemo interim cycling corridor to assure safety for cyclists and pedestrians?	☐Yes ☐No	
12. Do you have a physical health condition that affects your ability to walk/ cycle?	☐Yes ☐ No	
13. If your answer to question number five is yes, what was it?	☐Respiratory illness ☐Cardiovascular illness ☐Other _____	

Interview with key informants

Interview with key informants (Addis Ababa city traffic management agency, Nifasilk Lafto sub city urban planning office, Nifasilk Lafto sub city environmental protection office, Nifasilk Lafto sub city health office)

Name of interviewee _____

Sector office_____

Position _____

Compilation Date_____

1. Tell me about practices of Non-motorized Transport System (walking and cycling) look like in Lebu-Jemo interim corridor?
2. What kind of effort is your office making to support those practices of walking and cycling?
3. What benefits and challenges does car free days bring to the community?
4. What benefits does substituting short trips with walking and cycling would have?
5. What are the challenges for pedestrians and cyclists in Lebu-Jemo interim cycling corridor?
6. What benefits does walking and cycling bring for personal health?
7. What benefits does walking and cycling bring to environment?

Plajarism Test

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