



**UHASSELT**

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## School of Transportation Sciences

Master of Transportation Sciences

### **Master's thesis**

***The acceptability and impact of the use of the mobility assistive technology Viamigo among people with intellectual disability in Ethiopia***

**Amanuel Nigatu Regassa**

Thesis presented in fulfillment of the requirements for the degree of Master of Transportation Sciences, specialization Transport Policy and Planning

### **SUPERVISOR :**

Prof. dr. An NEVEN

### **CO-SUPERVISOR :**

dr. Veerle ROSS



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**2020**  
**2021**



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## **Disclaimer**

This master thesis was written during the COVID-19 crisis in 2021. This global health crisis has impacted the (writing) process, the research activities, and the research results that are at the basis of this thesis because the recruitment of the respondents was challenging, and libraries were closed during the literature study.

## **Preface**

This thesis is submitted for Master of Transportation Sciences at Hasselt University. This thesis described herein was conducted under the supervision of promoter Prof. Dr. An NEVEN and Co-supervisor Dr. Veerle ROSS in the School of Transportation Sciences, Hasselt University. The thesis focused on the acceptability and impact of the mobility assistive device Viamigo among people with intellectual disability in the African context, more specifically in Ethiopia. People with intellectual disabilities regularly face troubles in developing autonomous mobility. They are usually dependent on family and caregivers to travel from one place to another.

In addition, due to individual limits and financial factors, people with intellectual and other cognitive disabilities are significantly less liable to acquire a driver's permit or own an individual vehicle than the public. This dependency, together with the lack of inclusive transportation, is one of the hindrances to the social inclusion of people with intellectual disabilities in Africa. The mobility assistive device Viamigo promotes social inclusion and contributes to more independent living of people with intellectual disabilities by facilitating their movement in and around the community and eliminating transportation barriers. However, research findings indicated that, mobility assistive devices among people with intellectual disabilities in Africa are relatively uncommon. By considering this gap, this thesis attempted to evaluate the potential impact and acceptability the mobility assistive device Viamigo will have if used among people with intellectual disabilities in Ethiopia.

## **Acknowledgments**

Without the support of some individuals, this thesis would not have progressed to this point. In this regard, I would like to recognize the invaluable assistance of Prof. Dr. An NEVEN and Dr. Veerle ROSS for their close supervision. I thank them for their research interest and immense knowledge, ample experience and continuous feedback that have encouraged me in my academic research. I'd also like to express my gratitude for all the people who helped me collect the data. Especially, I want to give my regards to all the respondents for their willingness to contribute to the thesis's success by giving their precious time and valuable information. I would also like to thank all my sponsors in Belgium for helping me start this master's program as a self-sponsored student. Finally, my appreciation also goes out to my family and friends for their encouragement and support throughout my studies and stay in Belgium.

## SUMMARY

The study aimed to evaluate the level of acceptability and the possible impact of using the mobility assistive technology Viamigo in the African context. The purpose of the study is to test the transferability of Viamigo to other regions, more specifically Ethiopia. The study participants were in groups of six, including parents of a person with intellectual disability, family members of a person with intellectual disability, educators of person/persons with intellectual disability, caregivers of person/persons with intellectual disability, special need teachers, and Doctors/nurses. The study employed nonparametric tests and regression methods to analyze survey data. The survey data showed that the acceptability of Viamigo was strongly associated between the travel behavior and transport problem of people with intellectual disabilities. Moreover, the impact of the mobility assistive device Viamigo was strongly associated with the acceptability of Viamigo and the travel behavior and transport problems of people with intellectual disabilities. And looking at the strength of the association Cramer 's  $v$ , there exists a very strong association between the variables.

Furthermore, the survey result implies that the acceptability and impact of Viamigo show variation and similarity according to the different roll of the participants. An analysis of variance showed no significant differences in response between the respondents representing male and female person/persons with intellectual disability, as well as respondents representing male and female people with intellectual disability together. The results imply that the transport problem and travel behavior concerning gender show no variation. Regarding the potential impact of the mobility assistive device Viamigo, there is no significant variation in response according to the different groups of respondents. The SWOT analysis to test the transferability of Viamigo in the African context showed the strength of Viamigo on contribution to a more independent living, on offering independent trips through learning and mastering routes and enhanced safety and security of Viamigo during trips through real-time monitoring, GPS, and geofences. The weakness showed lack of awareness on assistive devices, lack of knowledge on the felt need for assistive devices, affordability of the mobility assistive device Viamigo and not being tailored to local context. The opportunity was shown through the high prevalence of intellectual disability in Africa;

current trends include increasing of the number of special needs classes in schools and increasing of the number of care centers for people with intellectual disability in Ethiopia. In addition, the threat showed that usage of smartphones among people with intellectual disability was not common, and the research result indicates infrequent usage in Ethiopia, moreover, very low internet penetration rate compared to other African countries and absence of inclusive and accessible transportation. Based on this recommendation was given on, inclusive transportation system design, improving attitudes from the community, knowledge, and awareness to identify assistive technology need, assistive technology training and instructions to support the user and care network, and general recommendation for stakeholders for successful transferability Viamigo in Ethiopia.

**Keywords:** People with intellectual disabilities, assistive technology, transferability, Viamigo, acceptability, Impact, mobility, Transport problem, Travel behavior, Ethiopia.

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# CHAPTER ONE

## 1. BACKGROUND

### 1.1 INTRODUCTION

As defined by Foulke, E. (1971), mobility is the capacity to travel safely, comfortably, gracefully, and autonomously. Mobility is regularly firmly connected to one's autonomy, prosperity, and personal satisfaction (Spinney et al, 2009) and is fundamental for the maintenance of life fulfillment and prosperity since it permits one to meet the wide range of various life needs more promptly. (Lawton and Nahemow, 1973; Carp, 1988). Transport mobility gives expanded freedoms to people to embrace major tasks past the home environment, like going to work and buying essential goods. In addition, transport mobility may likewise assume a significant part in assisting with fulfilling inherent psychosocial needs which are considered significant for well-being, for example, relating admirably with others, sensations of capability and authority, and elevated autonomy. (Vella-Brodrick, 2013). However, not everyone can fully benefit from traveling independently and benefit of transport mobility consider, for example, people with an intellectual disability, elderly people with (starting) dementia, people with a congenital brain injury or school-age children who are still insecure in traffic have a problem traveling independently. They therefore usually travel accompanied by a family member, friend, or volunteer.

With intellectual disability mobility becomes more and more limited and complex. (Neven, 2017). Being able to move autonomously is a skill that appears to be important for social inclusion and participation, Persons with intellectual disabilities regularly face troubles in developing autonomous mobility. (Letalle et al., 2020). One of the transport issues encountered by people with intellectual disabilities is being dependent on family and care givers to travel from one place to another (Alanazi. A, 2020). Compared with the non-disabled person or other disabled persons, people with intellectual disabilities may encounter problems when navigating the public transportation system, because they are often impaired in the very area that public transportation most often requires. Navigating the public transportation system may require understanding, memory, attention, time management, literacy, multitasking, and problem-solving skills (Blais and El-Geneidy, 2014; Carmien et al., 2005; Kvas,

Stöppler, Havenman and Tillmann, 2013); Sherman & Sherman, 2013; as cited in Friedman., 2016). Research conducted by Wasfi et al. (2006), found that 49% of participants with intellectual disabilities had difficulty understanding timetables, 35% had trouble understanding bus announcements and Fifty-five percent were also the victims of crime on public transit. Difficulties to accessing and utilizing transport for individuals with intellectual disabilities increase their risk of exclusion and loneliness. (McCausland, 2019).

In addition, Findings from a study conducted by Davies et al, (2010) also shows, although public transit systems might be accessible around the world in enormous metropolitan zones, utilizing transports presents a remarkable arrangement of boundaries for people with intellectual disabilities, counting complex routes and timetables, transfer prerequisites, furthermore, unfamiliar destinations. Furthermore, due to individual limit and financial factors, people with intellectual disabilities are significantly less liable to acquire a driver's permit or own an individual vehicle than the public. Other standard transportation options, for example, taxis, can likewise introduce financial hindrances. (Nind & Seale, 2009, as cited in Stock et al., 2011).

So far, several assistive devices and smartphone applications are developed to support persons with intellectual disabilities fulfil their mobility requirements. Some of the assistive devices developed includes Assist-OUT, wayfinding apps, en route assistance, and the mobility assistive device Viamigo etc. Previous research regarding adaptation of assistive technology shows when, issues like privacy, costs, stigma, and factors related to usability and a need of training can hinder uptake (Yusif et al., 2016). Research findings on impact of using smartphone applications for transportation on people with intellectual disabilities includes increasing mobility, boosting confidence to travel more, expanding admittance to jobs, education, shopping centers which helps in affecting their inclusion in the community etc. (Alanazi. A, 2020). The mobility assistive device Viamigo offers passive monitoring of trips by a remote coach. the geographic information system-based application "Viamigo" was first developed, to both support the independent outdoor mobility of persons with intellectual disabilities themselves and reduce the caregivers' burden, which allows a personal coach to monitor an individual in real time from a distance.

Viamigo is developed and currently implemented in Belgium. The aim of the study is to evaluate the level of acceptability and possible level of impact of the use of the mobility assistive technology Viamigo in African context. The practical relevance of the study is to test the transferability of Viamigo to other regions more specifically in Ethiopia.

## **1.2 PROBLEM STATEMENT**

Despite the advancement of new technologies and changing pattern of activities mobility is a vital requirement for participation and contribution in social and economic activities. Mobility is a fundamental ability for social participation. Realizing how to explore the environment permits us to get to school or work, visit our families and companions, have recreation exercises, and so on. (Letalle et al., 2020). According to (Neven et al., 2018) mobility has a scope of positive results, not just for people themselves (medical advantages, decreased disconnection, expanded prosperity and improved personal satisfaction through new encounters and memory-building); yet additionally for the more extensive network and economy (e.g., more utilization, reduced social insurance costs). As indicated by Neven (2017), With intellectual disability mobility becomes more and more limited and complex. Researchers have recognized transport mobility problems as an obstruction to participation in or admittance to self-advocacy activities (McNally, 2003). An investigation by Davies et al., (2010 shows the absence of accessibility of or admittance to transportation as a barrier to community inclusion is a never-ending issue for some people with intellectual disability, furthermore the study shows, transportation constraints influence all parts of an individual's life and comprise a critical hindrance to more prominent community incorporation and, apparently, a superior personal satisfaction for many individuals with intellectual and developmental disability.

Assistive technology are any external products (devices, equipment, instruments, or software), particularly created or by and generally available, the essential motivation behind which is to keep up or improve a person's working and autonomy, and accordingly, advance their independence. Assistive technology is the application of coordinated information and abilities identified with assistive technology, including systems and services (WHO 2013; Khasnabis et al. 2015., as cited in Boot et al.,

2018). People with intellectual disabilities may benefit from admittance to assistive technology. In any case, the utilization of assistive technology for individuals with intellectual disabilities is still a neglected territory in research and practice (Boot et al. 2017). The gap is considerably more extensive in low-and middle-income countries, where little is known about access and utilization of assistive technology for individuals with intellectual disabilities even though the frequency of intellectual disability is essentially higher in low-income nations contrasted and high-income nations (Durkin 2002, as referred to in Boot et al. 2021). Viamigo is an assistive technology used to encourage and assist the independent traveling of people with intellectual disability and elderly with early dementia that will help people with decreased mobility to continue to be active contributors to the economy and society. Viamigo works using a personal coach monitoring the user in real-time at a distance through the Viamigo website or a smartphone. Coaches are alerted of unexpected occurrences and can act when they deem it necessary. To improve the assistive technology Viamigo, identifying the acceptability by end users and identifying the impact it will have to the user is necessary to evaluate the existing system of the assistive technology, and to modify if there is an existing problem in the system for future use. This research focuses on the acceptability of the use of the assistive technology Viamigo and the impact of the use of the mobility assistive technology Viamigo among people with intellectual disability in Ethiopia.

### **1.3 RESEARCH QUESTIONS**

The main research question of the study is: What is the level of acceptability of the use of the assistive technology Viamigo and to what extent the use of Viamigo possibly impacts the travel behavior of people with intellectual disability? In addition, what is the level of transferability of Viamigo to other developing countries such as Ethiopia?

The research sub-questions include.

1. What are the transport problems and travel behavior of people with intellectual disability in Ethiopia?

2. If Viamigo is offered for use for people with intellectual disability, what is the expected acceptability by the user?
3. If people with intellectual disability uses Viamigo, what are the expected positive effects on their travel behavior?
4. What are the factors that promote and hinder the use of Viamigo in developing countries such as, Ethiopia?

#### **1.4 RESEARCH OBJECTIVE**

The overall goal of this study is three-folds.

1. Identifying the level of acceptability of the use of mobility assistive technology Viamigo among people with intellectual disability?
2. Impact evaluation of the mobility assistive technology Viamigo from representative sample of people with intellectual disability?
3. SWOT analysis of the acceptability and impact of the mobility assistive technology Viamigo to test its transferability to other regions.

#### **1.5 SCOPE OF THE STUDY**

This study was delimited basically in terms of content firstly in identifying the travel behavior and transport problems of persons with intellectual disabilities, secondly in evaluating the acceptability of the mobility assistive device Viamigo through investigating the multiple dimensions of acceptability more specifically usefulness, effectiveness, usability, affordability and social acceptability (Horberrry, T et al, 2014) which are revealed as the multiple dimension of acceptability in previous studies., and attribute of assistive technology that includes efficiency, reliability, simplicity, safety, and aesthetics (McCREADIE et al, 2005)., which are revealed as the attribute of assistive technology in previous studies. Thus, the multiple dimensions of acceptability and the attribute of assistive technology identified from previous studies was investigated using a detailed questionnaire to evaluate the acceptability of the mobility assistive device. In addition, Impact of mobility assistive devices more specifically increasing mobility, boosting confidence to travel more, expanding admittance to jobs, education, shopping centers which helps in expanding social

inclusion, time saving and helping to accomplish higher social consideration (Alanazi. A., 2020)., which are revealed from previous studies as the impact of mobility assistive devices was investigated. Thus, based on the previous literatures mentioned above as a mobility assistive device the possible impact of Viamigo on the factors mentioned above was evaluated using hypothetical scenarios. For example. If using Viamigo by the persons with intellectual disabilities increases their mobility, boosts their confidence to travel more, expands their admittance to jobs, educations, and shopping centers or not was evaluated using a detailed questionnaire. Moreover, in terms of the sample and geographical location, the study was delimited on caregivers, parents, special need teachers, NGOs who work in intellectual disability and relevant stakeholders in Ethiopia.

## **1.6 LIMITATION OF THE STUDY**

A paucity of published literature on people with intellectual disabilities in Ethiopia was one of the limitations of this study. To compensate for these drawbacks, further research was done for people with intellectual disabilities in low- and middle-income countries. Regarding the data instrument, the six items that are not satisfactory were deleted from the questionnaire's third section (Travel behavior and transport problems) due to missing items in the third part of the questionnaire. In addition, the 6 optional Skype Interview questions prepared to be used if the researcher was successful in setting up an online interview session with directors of special need schools, directors of care centers, therapists, and relevant stakeholders are not conducted due to reluctance and non-responsiveness of selected participants the planned skype interview question and only the collected survey data was used for analysis.

## **1.7 CONCEPTUAL FRAMEWORK**

The framework is proposed by considering the findings of studies which indicated the multiple dimensions of acceptability, attribute of assistive technology and impact of mobility assistive devices (McCREADIE et al, (2005), Horberry, T et al, (2014), Alanazi. A, (2020), & Davies et al, (2010)). The conceptual framework shows the



transport condition of the city and user characteristics have a direct effect on felt need for assistance whereas the felt need for assistance have a direct effect on access and availability of the assistive technology and the access and availability of the assistive technology. The attributes of the assistive technology and multiple dimensions of acceptability have a direct effect on the acceptability of the assistive technology. In addition, the conceptual framework shows the impact of assistive technology previous studies. Moreover, the conceptual framework shows SWOT analysis was done on the impact and acceptability of the mobility assistive device to test its transferability to Ethiopia.

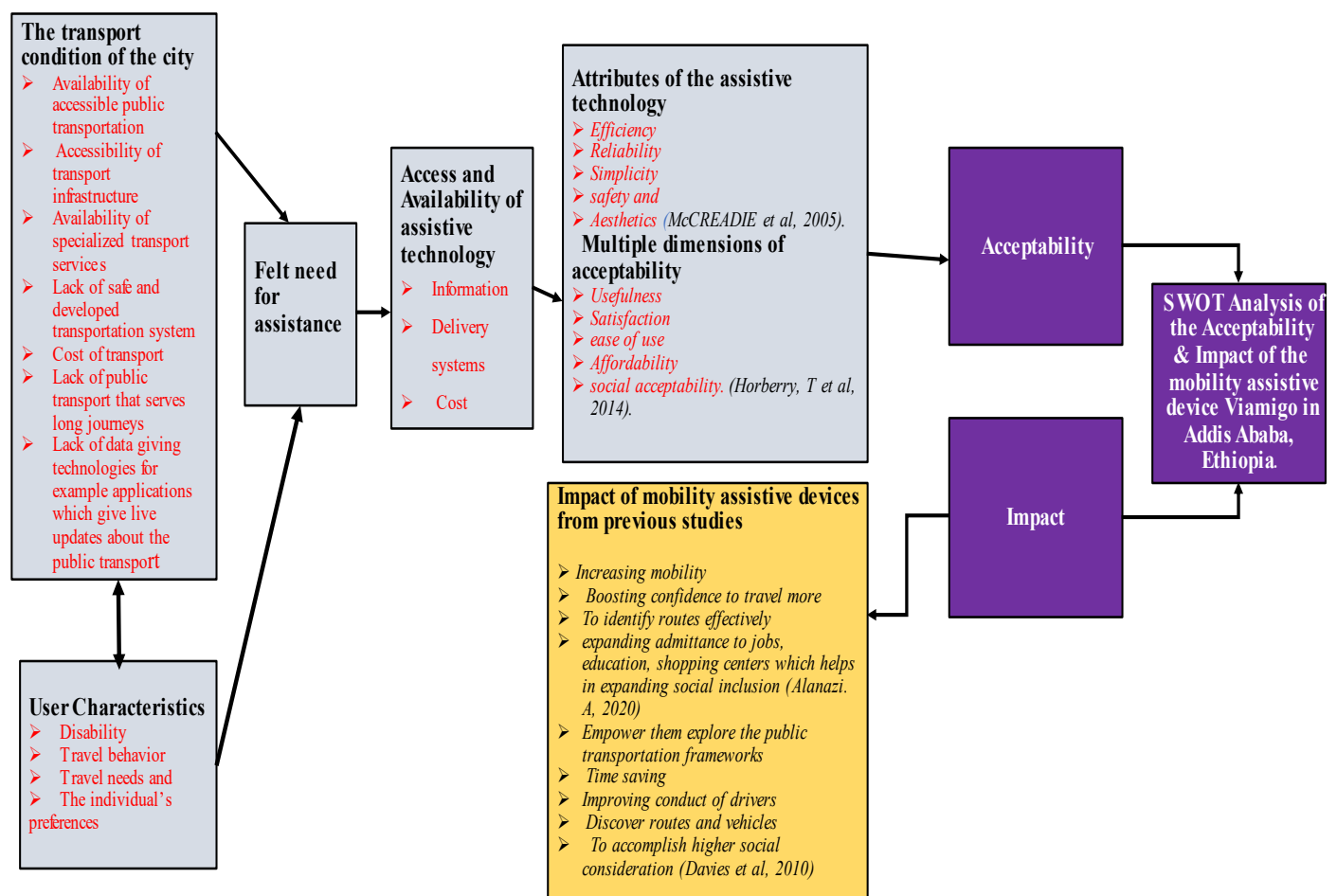


Figure 1: Conceptual framework: multiple dimensions of acceptability, attribute of assistive technology and impact of mobility assistive devices

## **CHAPTER TWO**

### **2. LITERATURE REVIEW**

The literature review aims at creating background knowledge for acceptability and impact of mobility assistive devices among people with decreased mobility by exploring acceptability and impact of technologies used for independent mobility of people with decreased mobility in previous studies. And the mobility problems of people with intellectual disability, tools used to support these problems, different organizations working on this and findings of studies in developing countries also reviewed.

#### **2.1 Transport problems of people with intellectual disability in Ethiopia.**

The term intellectual and developmental disabilities (IDD) can be perceived as a complete or umbrella term that incorporates all sort of deep-rooted physical, intellectual or both sorts of handicaps among individuals. Individuals encountering these disabilities tend to experience various difficulties in satisfying their ordinary necessities. (Alanazi. A, 2020). As indicated in the World Health Organization (1992). Intellectual disability (ID) or mental retardation is characterized as "a state of arrested or incomplete development of the mind, which is particularly portrayed by debilitation of aptitudes showed during the developmental period, which add to the general degree of insight, i.e., intellectual, language, engine, and social capacities". In the American Association on mental retardation 2002 definition an intellectual disability is characterized as a incapacity portrayed by huge restrictions both in intellectual working and in versatile conduct as communicated in applied, social, and functional versatile aptitudes and that the reason for the inability has been present preceding age 18. Schalock & Luckasson. (2004). Harris (2006) reported the prevalence of intellectual disability to vary between 1% and 3%, globally. On the other hand, a research by Maulik et al (2011), indicates the predominance of intellectual disability over the world is around 1%. Furthermore, the predominance is almost two times more in low- and middle-income countries contrasted with high

income countries. The (2007-2008) survey of Central Statistical Agency of Ethiopia shows the total population of Addis Ababa is 2,739,551 from this the survey indicates there are 4,310 persons with intellectual disability in Addis Ababa which means 0.157% of the total population of Addis Ababa, Ethiopia.

According to Neven (2017), With intellectual disability mobility becomes more and more limited and complex. Due to individual limit and financial factors, people with intellectual and other cognitive disabilities are significantly less liable to acquire a driver's permit or own an individual vehicle than the public. Other standard transportation options, for example, taxis, can likewise introduce financial hindrances. (Nind & Seale, 2009, as cited in Stock et al., 2011). The absence of accessibility of or admittance to transportation as a hindrance to community inclusion is an unending issue for many persons with intellectual disability. (Davies et al., 2010). Researchers have distinguished transportation issues as a hindrance to participation in or admittance to self-support exercises. (Mcnally, S., 2003). The hindrances to social inclusion as seen by individuals with intellectual disability includes Location, Lack of available and reasonable transport and no company to go 'out' with (Abbott & Mcconkey, 2006). The Committee on Disability in America, Field and Jette (2007) as cited in Alanazi, A. (2020) stressed the outrageous absence of accessible transportation as an exceptionally basic issue for individuals with disability, it fills in as a significant hindrance that influences their life. From a research conducted by Alanazi. A, (2020) to find out transportation issues encountered by people with intellectual disabilities the results of the research shows that people with intellectual disability avoid public transport because the infrastructure is not adopted for them, being dependent on family and care givers to travel from one place to another, restricted exercises because of challenges in using public vehicle and poor transportation, Undeveloped, not supportive and unsafe but costly bus transportation system for people with intellectual disabilities in cities and fear of traveling alone due to difficulties caused by unsupportive people as well as social stigma.

To accommodate the problem of paucity of published literature on people with intellectual disability in Ethiopia, Further research is made in other developing and developed countries to get some inspiration and more information about common

transport problems of people with intellectual disability. Findings from Davies et al, (2010) shows, albeit public transit systems might be accessible around the world in enormous metropolitan zones, utilizing transports presents a remarkable arrangement of boundaries for people with intellectual disabilities, counting complex routes and timetables, transfer prerequisites, furthermore, unfamiliar destinations. Related to the issue of transportation itself, certain inner variables are additionally boundaries to by and large wayfinding for certain individuals with intellectual disabilities. To access independent public bus travel for some people with intellectual disability require certain aptitudes: time management, proficiency, critical thinking, and support of capacity to focus (Davies et al., 2010).

The findings on the transport and mobility problems of people with intellectual disability in low and middle income countries by Kett et al (2020), indicates lack of research in patterns of travel behavior and experiences of disabled people, lack of accessible and inclusive transport infrastructure, lack of public transport that serves long journeys specially journeys for educational or income-generation purposes, affordability and subsidies for individual journeys, measuring access to services, lack of availability of special transport services, holistic approaches that includes subsidies and accessible public transports, lack of data giving technologies, applications which give live updates about planes, trains, transports and other (usually public) transport, just as live trackers, advanced guides, and so on.

In Ethiopia, research findings from Weldeab & Opdal, (2007) shows that parents face emotional, social, financial, material difficulties raising youngsters with intellectual disability. Further the research findings show Insufficient data and preparing identified with intellectual disability, inadequate formal/casual backings, horrible perspectives with respect to the public towards youngsters with intellectual disability, stresses over the future, monetary issues, and absence of materials. In addition, In Ethiopia, it was a typical practice that individuals living with intellectual disability were not permitted to go out from their home and it was not possible for them to visit the health facilities (Tejeji et al, 2017).

## **2.2 Tools to support the mobility problems of people with intellectual disability.**

The rise and progressions in information and correspondence technology and current media gadgets can assume a huge function in helping people with intellectual disability improve their quality of life furthermore, approach higher social consideration. (Price. R, 2018). An investigation by Alanazi (2019) as cited in Alanazi. A, (2020) proposes that individuals with intellectual disabilities can be sufficiently prepared to utilize mobile applications for transportation, for example, Uber and Careem, to improve their physical mobility and give them better admittance to places for work, relaxation, and schooling. Furthermore, Findings from a research by Alanazi. A, (2020) uncover huge help for the utilization of the Careem and Uber smart phone applications. From the discoveries, it can likewise be recommended that these applications are popular among individuals with intellectual disabilities and that they use them as often as possible to address their issues of transportation. According to United States Federal Highway Administration. Technological innovations in transportation (2011), Technology can assume a valuable part in helping individuals with disabilities. Remote technologies, mobile computing furthermore, data innovation, can assist them with picking up information on the traffic conditions, general climate, foundation and indeed, even on-going vehicles. Artificial intelligence, object detection innovation and mechanical technology can be valuable instruments for route, direction, way finding and offering assistive route arrangements. Technology had a major impact on the ability to travel. There are two classifications: technology which gives data and technology which offers a support. A few, yet not all, of these are principally utilized in developed countries, however all have the potential for adaptation and transfer. (Kett et al, 2020). A research conducted by Boot et al. (2021), on perspectives on access and utilization of assistive technology by people with intellectual disabilities in the Western Cape province of South Africa discovered important components that impact assistive technology access and use for people with intellectual disabilities were (1) attitudes from the community, (2) knowledge and attention to distinguish assistive technology need and (3) assistive technology training and guidelines to help the user and care organization. So far

different tools have been developed to help the individual movement of people with decreased mobility such as.

### **Smart Transportation/Tracking Technology**

Smart transportation system can help people with cognitive disabilities with mass transportation by using remote advancements and individual computerized help gadgets like the Global Positioning System (GPS). (Fischer & Sullivan, 2002 as referred to in Braddock et al. 2004). Travelers can be alarmed when their GPS-equipped bus is showing up, and caregivers can be told if the traveler has boarded the wrong bus. (Braddock et al. 2004). Tracking technology is also a conceivably valuable assistive care system procedure to address wandering. More than half of respondents in an overview by the (National Down Syndrome Society, 2001 as referred to in Braddock et al. 2004), recognized wandering as a huge issue. A considerable lot of the respondents showed that wandering conduct happened around evening time. Organizations have created both individual gadgets and locally situated frameworks to address this need (Digital Angel, 2002, as cited in Braddock et al. 2004). Using GPS or nearby following information, monitoring devices can likewise caution caregivers in case of a fall or uncommon movement or help find people who wander. (Braddock et al. 2004).

**Wayfinding apps** assist people with physical and intellectual disabilities in exploring roads and pathways between their homes and travel stops and different objections. Such applications are intended to give enough data to permit a person with a disability to travel alone, giving them uncommon opportunity. One investigation illustrated, for instance, that when guided by an exceptionally planned, cognitively accessible GPS-based WayFinder application, 73% of the people with a intellectual disability engaged with the investigation could travel a new transport line and exit at the right stop. (National Center for Mobility Management, 2013). Other wayfinding applications includes an application created for Temple University helps wheelchairs clients recognize available pathways over the grounds and joins works that help people with visual or hearing hindrances. (Temple University, 2014). Trekker Breeze, a handheld, talking GPS-empowered gadget, verbally declares names of roads, convergences, and tourist spots and can give bit by bit travel guidance and

in Germany, an individual utilizing a wheelchair can get to Wheelmap.org, an iPhone application and site to see a guide of wheelchair-available spots. The guide recognizes available bistros, libraries, pools, and other public spots with a symbol and permits clients to shading code areas that are available, somewhat open, or not open. Spots that are not yet checked show up in dark and can undoubtedly be refreshed. Most of the areas are in Germany, yet clients can likewise look through urban areas in the U.S. what's more, somewhere else. (National Center for Mobility Management, 2013).

**Training of a route (Memoride):** Memoride is an indoor cycling arrangement created by Activ84Health. The innovation consolidates a customary wellness gadget with hearty, easy to understand programming to give an exceptional encounter to clients. Clients can follow cycle courses recognizable to them from youth, subsequently turning out to be energetic members in a significant physical movement, along these lines improving their personal satisfaction and that of everyone around them. Memoride has customized programming where each new client gets an individual record custom-made to their necessities. Inside this record, boundless client profiles can be made, in full consistence with the protection enactment. For instance, if a client makes a profile for every office, per network or even per occupant or patient. This makes it valuable to sort customized courses by profile from one perspective, and to gather intriguing information on the development conduct of clients on the other. Memoride is easy to use and have automatic updates. Memoride has a basic and adaptable equipment arrangement (touchscreen tablet - tablet holder - rhythm sensor) which fits for all intents and purposes on any wellness device ([www.memoride.eu](http://www.memoride.eu)).

**En Route Assistance:** Intends to help dynamic route. It gives indoor and outside route, gives course data (impediments, lifts, bathrooms) and thinks about close to home inclinations and qualities while exploring (giving the most limited course, or one without steps). It can flag help (e.g., to a transport driver when an individual should be supported to land), and it likewise gives an assistance button, which enacts an association with a preselected individual and passes on the voyager's area and arranged course. (Van Velson, L. et al., 2019).

**AssisT-OUT:** A mobile framework system intended to assist individuals with cognitive disabilities to travel through metropolitan conditions like towns. Course estimation, guidance conveyance, and user interface are adjusted to address clients' issues. AssisT-OUT utilizes clients' cell phones with two targets: first, to find and track clients during their movements and, second, as a show apparatus to show the proper directions. The direction cycle, as per (Fallah et al., 2017 as referred to in Gomez et al., 2015) can be isolated into four stages: environment portrayal, client area, was arranging, and client association. Aside from the mobile application, the framework incorporates a composing instrument that permits parental figures to deal with their clients and destination points, just as for breaking down their exhibition regarding time required and course followed contrasted with the course initially determined. (Gomez et al., 2015).

### **2.3 Acceptability of mobility assistive devices from previous studies**

According to Schade & Schlag, (2003) technology acceptability is one's perception of a system before use and acceptability refers to an imminent judgment toward an innovation or measures to be presented later. The target group will not yet have experienced the new measures, or the new technology. While various conventional meanings of acceptability exist, basic to most is that acceptability establishes a multidimensional construct. Review of the literature on technology acceptability indicates the multiple dimensions of acceptability including usefulness, satisfaction, ease of use, affordability, and social acceptability (Horberry, T et al, 2014). Mitsopoulos, E (2002) Mentioned that these dimensions too, should be operationally defined. Having at the beginning clear, unambiguous, operational meanings of precisely what it is that one is attempting to survey will guarantee that the design of the data collection tool and its composition stay engaged, and that the device incorporates just those inquiries that are thought of integral to the evaluation of the worthiness of the specific framework under study. It will likewise assist with guaranteeing that questions are unambiguous and do not need any mystery to reply; and those reactions, once examined, can be dissected, and deciphered straightforwardly.



Acceptability was characterized as including five constructs: usefulness, effectiveness, usability, affordability, and social acceptability. To be useful, the user should see the system to serve some objective or reason. To be effective, the user should accept that the framework does what it is intended to do. To be usable, the user should see the system to be anything but difficult to utilize. Affordability concerns such issues as whether users can stand to buy and keep up the system, while social acceptability is concerned about the more extensive social issues that may be considered by users in deciding whether the device is acceptable. (Mitsopoulos, E., 2002). In addition, social acceptability is a pivotal factor in deciding if assistive technology is adopted and (fears of) derision may prompt non-use or relinquishment. Experts may accept the utilization of suitable assistive technology will uphold consideration and support acknowledgment of disabled youngsters, while guardians might be worried that gadget use will stigmatize them. (Smith-Lewis, 2002 as cited in., Hersh, 2013).

Moreover, from model of the acceptability of assistive technology developed by (McCREADIE et al, 2005) the attributes of assistive technology include efficiency, reliability, simplicity, safety, and aesthetics. Further the model suggests that the acceptability of assistive technology relies upon the cooperation between a 'felt need' for help, the acknowledgment of 'Product quality' – the efficiency, dependability, straightforwardness and safety of the technology or device, and its availability and cost. Moreover, regarding acceptability of assistive technology previous research's shows older adults cannot envision utilizing or buying an assistive technology when there is no immediate individual need (Peek et al., 2017as cited in van Velson, L. et al., 2019). and when there is a need, issues like privacy, costs, stigma, and factors identified with convenience and a need of training can block take-up. (Yusif et al., 2016). Adoption of assistive technology necessitates collaboration between four groups: the user, those who support and interact with him/her daily, such as family members, friends, educators, therapists, doctors, and employers, and assistive technology specialists who are knowledgeable about a variety of tools and who fosters a collaborative decision-making process and assistive tool developers. (Kintsch, et al., 2002).

## **2.4 Impact of mobility assistive devices from previous studies**

People with intellectual disabilities are a particular group who can profit with assistive technology. Assistive technology can improve day by day working, local area living and incorporation in the public arena for individuals with intellectual disabilities. (Owuor et al. 2017). Assistive technology can assume a significant part to keep up or improve a person's working and wellbeing to empower individuals to live freely and to improve participation in society. (Boot et al., 2021). However, without admittance to assistive technologies, individuals with intellectual disabilities can be secluded from the community. They can be prohibited and "left behind"; conceivably with even less help and access than they would have had in organizations. Assistive technology is an arbiter for individuals with intellectual disabilities to accomplish their privileges as well as the most elevated conceivable personal satisfaction and feeling of interest and having a place in the society. (Owuor et al. 2017). A research discoveries drawn from a focus group discussion led with nine individuals with moderate to mild intellectual disabilities in Riyadh, by Alanazi (2020) identifies the impact of using assistive smartphone applications for transportation on people with intellectual disabilities, some of the benefits experienced by the people with intellectual disability when using smartphone applications transportation purpose includes increasing mobility, boosting confidence to travel more, to identify routes effectively, expanding admittance to jobs, education, shopping centers which helps in affecting their inclusion in the community, on turning out to be free and empower them explore the public transportation frameworks, discover the vehicles they need and spare significant time without waiting be reliant on others application of anti-discrimination policies on drivers associated with the organizations operating smartphone applications helps improve the conduct of drivers this gracious disposition of drivers has added much incentive to the transportation openings gave by smartphone applications, particularly for individuals with intellectual disabilities. However, the focus group discussions by Alanazi (2020) further indicates that the absence among persons with intellectual disability of imperative abilities like using time productively, intellectual skill, fixation, problem-solving skills, and different abilities which are needed to use assistive smartphone applications, make these applications less

significant for this target group in terms of diminishing their reliance on family members for transport. Literature finding states that to oblige the transportation prerequisites of persons with intellectual disability, the public authority can make a forward stride through getting sorted out inclusive training projects to guarantee that individuals in this bunch make the most of their privileges. (Katzmann, 2010).

From a study conducted to assess the perspectives on access and usage of assistive technology by people with intellectual disabilities in the western cape province of South Africa, Interview with persons with intellectual disability shows mobility devices were positively impacting the users to undertake physical activities, which they would not be able to do without it. Most of the participants explained that the assistive technology they used made them happy. One participant did not like the pill organizer because it was too complicated to use. Others struggle with new assistive technology but feel better over time. Especially the use of mobile phones made many participants very happy. (Boot et al., 2021).

Furthermore, Davies et al, (2010) accentuates that the use of GPS innovation can viably uphold individuals with developmental and intellectual disabilities to explore public transportation systems, discover routes and vehicles and make significant cuts in holding up time without any need to be dependent on someone else. Discoveries from this examination directed utilizing a PDA-based programming framework with a coordinated GPS-based Way Finder application by individuals with intellectual disability demonstrated that 73% of the people with intellectual disability taking an interest in the investigation had the option to go on a new transport route and exit at the correct stop without human help. The utilization of such applications gives a promising occasion to assist individuals with intellectual disability in transportation and to accomplish higher social consideration.

## **2.5 The mobility assistive device Viamigo**

**Route Monitoring (Viamego):** Viamigo offers passive monitoring of trips by a remote coach ([www.viamigo .be](http://www.viamigo.be)). According to Neven (2017), Viamego was first evolved to both help the free outdoor mobility of Persons with intellectual disabilities themselves and decrease the parental figures' weight. Elderly is shown an individual

course, which they can achieve freely subsequently, while nonintrusive being observed by an individual mentor (parental figure, relative or companion), who deals with this individual while making the outing. Viamigo decides the area of the client by GPS and thinks about this in existence inside a foreordained range, with the goal that deviations from the arranged highway, an off-base speed, entering a perilous zone, among others, can be identified. If Viamigo recognizes an irregularity, it naturally imparts a sign to the mentor and the specific area of the client can be distinguished progressively. Other than this 'on course' usefulness, Viamigo additionally permits to make geofences around goals (to screen if the client remains inside a predefined zone) and to begin crisis following (to distinguish the area of the client progressively).

The use of Viamigo contributes to more independent living of people with intellectual disability in the community because it facilitates their movement in and around the community by eliminating transportation barriers and the underlying outcomes from few pilot clients demonstrated guarantee; Viamigo was utilized for a heterogeneous arrangement of outings: trips performed by a few travel modes (transport, cycling, and strolling trips), trips performed for a few movement purposes (both day by day repetitive excursions to the day place and excursions for shopping, social, and recreational purposes), and excursions with various separations (both short and longer excursions). (Neven. A, 2017).

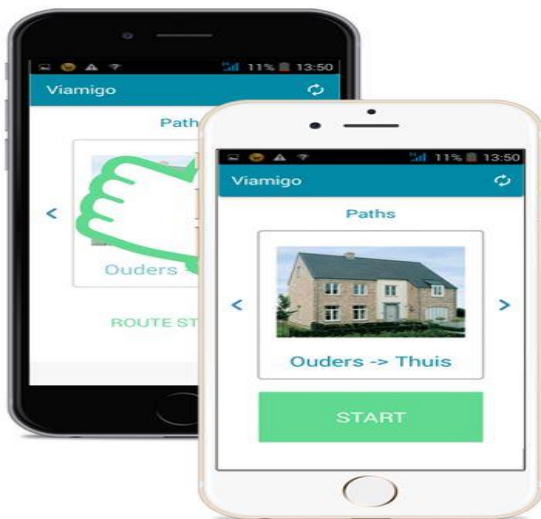


Figure 2 Viamigo mobile application user interface.

## **How does Viamigo work?**

### **Step One: Learn Route**



The Viamigo client investigates the routes he consistently takes, for example, an excursion to the store, to the day community, to companions or family. An individual coach will control him through this until he has mastered the route and can travel it freely.

### **Step Two: Register Route**



The coach enrolls the rehearsed courses on the Viamigo site and appoints explicit properties to each route. He shows the purposes of interests (eg start and end focuses, transitional stops), distinguishes sheltered and perilous zones and decides the client's transport modes for each part of the route. The coach likewise sets the alerts here (eg caution when the client goes astray 100 m from the route or stays stationery for over 10 minutes).

### **Step Three: Select Route**



Before the client ventures out from home, he chooses the excursion he needs to make in the application. The coach gets a notification when the client chooses a route on his cell phone and accordingly needs to leave.

### **Step Four: Wait for Approval**



The coach can affirm or decline the trip. If he affirms the trip, a green thumb shows up on the client's screen with the going with message: "alright! You can leave ". If he doesn't affirm the excursion, the client will see an admonition image with "No coach available. Try not to leave! " . There is a 'network of coaches' good to go, which the client forms from partners from his nearby climate. It is therefore rather exceptional that no one can guide the client.

### **Step Five: Departure**



The coach would now be able to follow the client's direction progressively utilizing the GPS directions of the cell phone and make a move if there should be an occurrence of issues. He can at that point, for instance, call or text the client to control him through the circumstance.

Thus, the mobility assistive device Viamigo notifies the coach when there is a start and end of movement, deviation from route, inappropriate speed, safe or dangerous zones, empty battery and standing still for too long to protect the users from danger ([www.viamigo.be/](http://www.viamigo.be/)).

## **CHAPTER THREE**

### **3. METHODS**

#### **3.1 STUDY DESIGN**

Survey research is utilized to respond to questions that have been raised, to tackle issues that have been presented, or noticed, to evaluate needs and put forward objectives, to decide if explicit goals have been met, to set up baselines against which future correlations can be made, to break down patterns across time, and by and large, to depict what exists, in what sum and in what setting. (Isaac and Michael, 1997, P.136). A hypothetical survey research design was used to evaluate the acceptability and impact of the mobility assistive technology Viamigo in Ethiopia. This was done by using a questioner based on hypothetical scenarios to predict the level of acceptability and impact the mobility assistive technology will have if used among people with intellectual disability in Ethiopia. The scenarios in the questionnaire for example was If the number of trips performed will increase if Viamigo is used? After analyzing the acceptability and possible impact of Viamigo in Ethiopia. A qualitative SWOT analysis was performed using the quantitative research findings to evaluate the possible use of Viamigo in Ethiopia and to test the transferability of Viamigo towards other regions. The analyzed survey data was used as an input for the SWOT analysis. A combination approach of qualitative method and quantitative method was used to produces a comprehensive understanding acceptability and impact of the use of Viamigo.

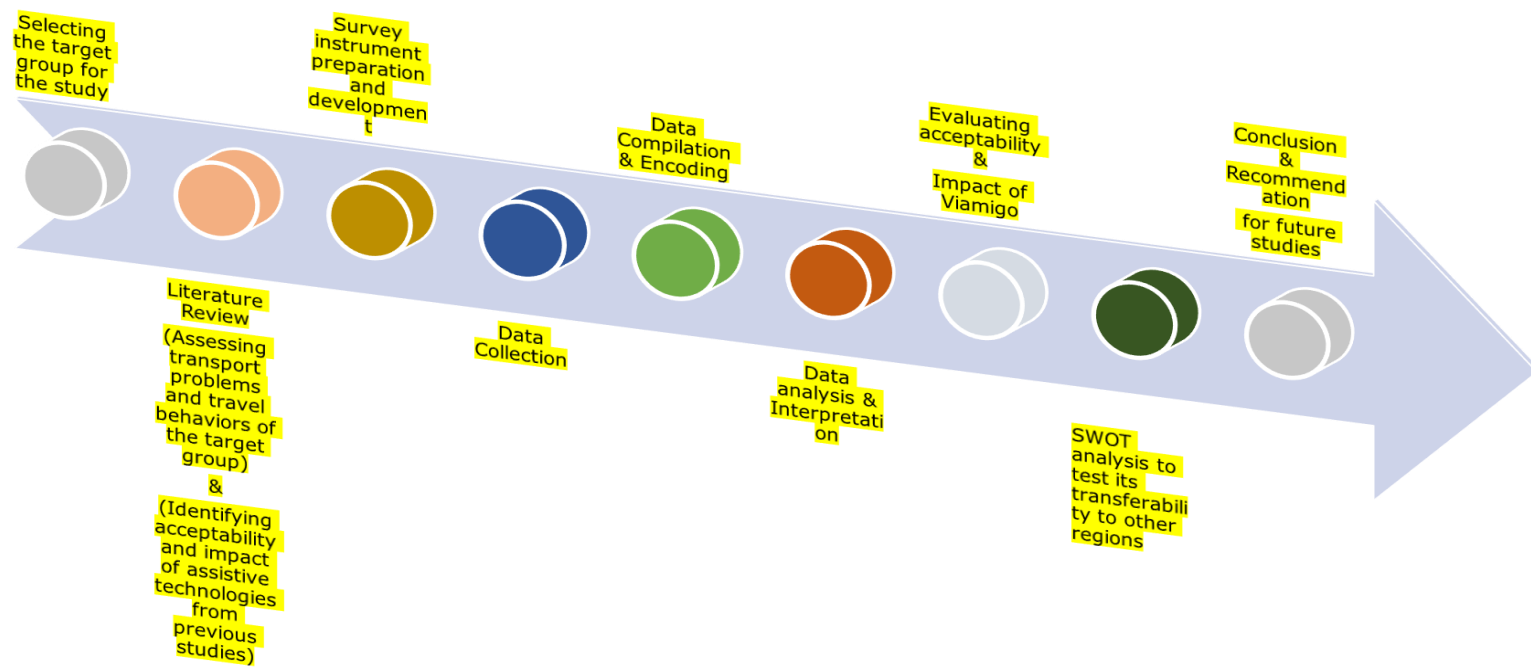


Figure 3: Study design flow chart



### **3.2 STUDY AREA & SAMPLE SIZE DETERMINATION**

The 2007 population and housing census have showed that, Ethiopia is Africa's second most populated country, with a population of 77.1 million people. (Harris, 2006, as cited in Maulik, 2011) reported that the prevalence of intellectual disability varies between 1% and 3%, globally. Based on this worldwide estimate intellectual disability roughly is estimated to be approximately from 771,000 to 2,313,000 people in Ethiopia. The participants of the study were selected using a heterogeneous or maximum variation purposive sampling technique. This technique will help to gather data from as many groups of people as possible to construct a robust view of the issue from the public's perspective. The thought behind maximum variation purposive sampling technique is to look at a subject from every available angle, consequently accomplishing a more prominent understanding. Also known as "Heterogeneous Sampling", it includes choosing applicants across an expansive range identifying with the subject of study. This sort of sampling is valuable when a random sample is not taken, for example, if the random sample is excessively small. (Etikan et. al., 2016). The prevalence of caregivers, special need teachers and NGOs who work in intellectual disability in Ethiopia is very small and no population information is available. That is also additional reason maximum variation sampling is used. As referenced in List, (2004) the two fundamental occasions for utilizing maximum variation sampling are the point at which the sample size is exceptionally small or when no populace data is available (and it is not hard to track down populace members with the chose attributes). For a single-stage sample, or at the grassroots level of sampling, it is best to limit a maximum variation sample to no more than about 50 units or 50 sub samples. (List, 2004). In this study a total of 250 respondents grouped into 5, i.e., 50 caregivers for persons with intellectual disabilities, 50 parents of person with intellectual disabilities, 50 special need teachers who work in intellectuals' disabilities and 50 NGOs who works in intellectual disabilities and 50 relevant stakeholders who works in intellectual disabilities were selected using purposive sampling techniques. A total of 300 questionnaire papers were distributed and a total of 214 questionnaire papers were returned.

### **3.3 INSTRUMENTS**

The relevant data for the study was collected using a detail questionnaire survey in the form of sequential data gathering (sequencing) which is gathering of quantitative data first and then using this quantitative data for qualitative analysis. The questionnaire was divided in to three parts and consisted of a total of 32 questions, from these the first 12 questions were focused on identifying the transport problems and travel behavior of people with intellectual disabilities, the second 10 items were focused on acceptability and the third 10 items were focused on impact of the mobility assistive device Viamigo. There were also 6 optional Skype Interview questions prepared to use if the researcher was successful to set up an online interview session with directors of special need schools, directors of care centers, therapist, and relevant stakeholders but due to reluctance and non-responsiveness of selected participants the planned skype interview question was not conducted and only the collected survey data was used for analysis.

The first section deals with the roll of the participant, relationship with the person with intellectual disability and demographic characteristics of the person/persons with intellectual disability such as gender, age, and care center. Part one of the questionnaire focused on acceptability. Multiple dimensions of acceptability include usefulness, satisfaction, ease of use, affordability, and social acceptability (Horberry et. al., 2014). From model of the acceptability of assistive technology developed by McCREADIE et. al. (2005), the attributes of assistive technology include efficiency, reliability, simplicity, safety, and aesthetics. Further the model suggests that the acceptability of assistive technology relies upon the cooperation between a 'felt need' for help, the acknowledgment of 'Product quality' – the efficiency, dependability, straightforwardness and safety of the technology or device, and its availability and cost. Based on this literature for the first part of the questionnaire a total of 10 items were prepared to assess the acceptability of the mobility assistive technology device. From this the first five items assessed the multiple dimensions of acceptability including usefulness, satisfaction, ease of use, affordability, and social acceptability and the remaining five items were prepared based on the attribute of the assistive technology such as efficiency, reliability, simplicity, safety, and aesthetics to assess

the acceptability of the mobility assistive technology Viamigo among people with intellectual disability in Ethiopia.

The topic of the second part of the questionnaire focused on the identifying the impact of Viamigo. From a research conducted by Alanazi. A, (2020) the impact of using smartphone applications for transportation on people with intellectual disabilities includes increasing mobility, boosting confidence to travel more, to identify routes effectively, expanding admittance to jobs, education, shopping centers which helps in affecting their inclusion in the community, on turning out to be free and empower them explore the public transportation systems. Based on this literature the second part of the questionnaire was focused on assessing the impact of Viamigo by formulating questions based on hypothetical scenarios to identify the possible impact the mobility assistive technology Viamigo will have among people with intellectual disability in Addis Ababa, Ethiopia. The third and final part of the questionnaire focused on identifying the transport problems and travel behavior of people with intellectual disabilities from parents, care givers, coaches, special schoolteachers, and relevant stakeholders in Ethiopia.

### **3.4 PROCEDURE**

The data collection recruitment strategy was by selected local people (comprised of 2 friends, 2 family members and 2 volunteers) who will go in to care centers and selected organizations. The data collectors prior to the commencement of the data collection work they were briefed about the research by the researcher. Furthermore, the data collection strategy targeted coaches, care givers, doctors and relevant stakeholders and the questionnaires were detailed to gather detail and extensive data. Prior to the distribution of the questioner to participants brief presentation of the mobility assistive device Viamigo using text and pictures prepared by the researcher was given to participants. Only participants who attend the presentation could participate in filling the questioner. The questionnaire was prepared using English language by the researcher and the translating process of the original questionnaire was conducted by the researcher with the assistance of English language proficient. The translation process comprised both forward and backward

process at keeping up what could be compared to a word or expression with the original tool. At that point after, the last Amharic instrument was first pilot tried on other parents, educators, caregivers, and relevant stakeholders not participants of the current study. The Cronbach's Alpha was used to examine the indicative inter-item consistency reliability of all the items of the data collection instrument. An elegantly composed informed consent form were attached as a cover page on every poll that clarified the genuine reason and, nature of the survey, and it obviously pronounced the intentional cooperation of members. The desires of those participants who would prefer not to partake were completely regarded. To guarantee the obscurity and privacy of members, there was not any event that expects respondents to refer to their own profiles or names

### **3.5 Data Analysis**

#### **3.5.1 Transport Problems of People with Intellectual Disability**

According to Visser, P (2000), Survey research is a sort of field study that includes the collection of information from an example of components drawn from a well-defined populace using a questionnaire. In this study a questionnaire paper was used to identify the transport problems and travel behavior of people with intellectual disabilities from parents, care givers, coaches, special schoolteachers, and relevant stakeholders in in Addis Ababa, Ethiopia. In addition, a Likert scale was applied to each set of questionnaires to inspect how solid the subjects concur or differ with articulations of five-point scale with the accompanying anchors:(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree. Descriptive statistics are the mathematical and graphical techniques used to sort out, present and analyze data. (Fisher & Marshall, 2009). In this study descriptive statistics (using SPSS software) was used to organize and analyze the data collected from the questioner paper. In addition, One-Way ANOVA ("analysis of variance") was also used to organize and analyze the survey data collected from the questioner paper.

### **3.5.2 Expected Acceptability by the User**

In this study a questionnaire paper designed in the form of a hypothetical scenario coupled with quantitative analysis was used to examine the expected acceptability of the use of the mobility assistive technology Viamigo among people with intellectual disability in Addis Ababa, Ethiopia. In addition, a Likert scale was applied to each set of questionnaires to inspect how solid the subjects concur or differ with articulations of five-point scale with the accompanying anchors:(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree. Logistic regression analysis is a statistical technique to assess the connection between different indicator factors (either categorical or continuous) and a result which is twofold (dichotomous). Logistic regression analyzes the relationship of a double (or dichotomous) result (e.g., alive/dead, success/failure, yes/no) with at least one indicator which might be either categorical or continuous. (Ranganathan et. al., 2017). Logistic regression is appropriate for depicting and testing hypotheses about connections between a categorical outcome variable and at least one all out or consistent predictor factors. (Peng et. al., 2002). Thus, in this research using SPSS software, logistic regression analysis together with ANOVA regression analysis was used to organize and analyze the survey data collected from the questioner paper.

### **3.5.3 Expected Positive Effects on The Travel Behavior of The User?**

In this study a questionnaire paper designed in the form of a hypothetical scenario coupled with quantitative analysis was used to identify the expected positive effects on the travel behavior of the user of the mobility assistive technology Viamigo among people with intellectual disability in Addis Ababa, Ethiopia. In addition, a Likert scale was applied to each set of questionnaires to inspect how solid the subjects concur or differ with articulations of five-point scale with the accompanying anchors:(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree. One-Way ANOVA ("analysis of variance") is a statistical approach for analyzing variation in a response variable (continuous random variable) recorded under discrete conditions (classification variables, often with nominal levels). ANOVA is frequently used to test

equality between different means by comparing variation between groups to variance within groups (random error). (Larson, 2008). Thus, in this research using SPSS software, One-Way ANOVA ("analysis of variance") was used to organize and analyze the survey data collected from the questioner paper.

#### **3.5.4 Factors That Hinder and Promote the Use of Viamigo**

SWOT analysis is a qualitative research tool that is a widely used statistical method that organizes survey data into data that represents strength, weaknesses, opportunities, and threats of an organization or product or service that provides a holistic picture of competition. After quantitative analysis of the acceptability and possible impact of Viamigo in Ethiopia, qualitative SWOT analysis was performed to analyze the possible use of Viamigo in Ethiopia and to test its transferability towards other regions. The SWOT analysis was performed using the analyzed quantitative survey data as an input. In this way the analyzed survey data will be used for the qualitative SWOT analysis. The SWOT analysis was also the qualitative part of this research. The SWOT analysis helped to identify what changes are needed (technical, organizational, etc) to make Viamigo work in developing country such as Ethiopia.

## CHAPTER FOUR

### 4. RESULT

This part deal with the analysis of the data obtained through the questionnaire survey. It consists of three sections. Section one contains the result of part one of the research travel behavior and transport problems of people with intellectual disability. Section two contains the result for the acceptability of the mobility assistive device Viamigo. Section three contains the result for the possible impact of Viamigo among people with intellectual disability in Ethiopia. Both descriptive and inferential statistics are used to arrive at conclusion. For the study purpose, the key variables were clearly defined. Technology acceptability is one's perception of a system before use and acceptability refers to an imminent judgment toward an innovation or measures to be presented later. The target group will not yet have experienced the new measures, or the new technology. (Schade & Schlag, 2003). Assistive technology can impact day by day working, local area living and incorporation in the public arena for individuals with intellectual disabilities. (Owuor et al. 2017).

*Table 1: Roll of participants*

	Frequency	Percent %
Parents of person with intellectual disability	69	32.1
Other family member of person with intellectual disability	25	11.6
Educator of person/persons with intellectual disability	35	16.3
Caregivers of person/persons with intellectual disability	20	9.3
Special need teacher	47	21.9
Doctors/nurses	18	8.4
Missing	1	0.5
Total	214	99.5

Based on the above table parents of persons with intellectual disability were the highest number of respondents with a percentage of 32.1% from the total number of respondents. Regarding special need teachers and Doctors/nurses who work with

intellectual disabilities as their number is very small and an attempt was made to address all of them who were available at the time of gathering the data.

*Table 2: Demographic characteristics of the person/persons with intellectual disability*

	Frequency	Standard Deviation	Percentage %
<b>Age</b>	214		99.5
1 to 5	7		3.3
6 to 10	40		18.6
11 to 15	38	1.103	17.7
>15	87		40.5
Various age groups	42		19.5
<b>Gender</b>			
Male	78		36.3
Female	90	0.748	41.9
Male and Female	46		21.4
<b>Care Center</b>			
Jimma Town	113		53.3
Mekanyesus	76	0.681	35.3
Fikir	23		10.7

Based on the above table, the respondents represent 78 male and 90 female persons with intellectual disabilities. The minimum age of the person with intellectual disability the respondents represented was 1.00 years, while the maximum age was greater than 15 years. The data is collected from care centers in Mekaneyesus and Fikir in Addis Ababa and Jimma town, Ethiopia

#### **4.1 RELIABILITY ANALYSIS OF THE RESULT**

Before presenting the questionnaire items' results and inferential results, the following reliability test was conducted to assure the consistency of the items.

*Table 3: Reliability result*

Sub Scales	N of Items	Cronbach's Alpha
Acceptability of Viamigo	8	0.781
Impact of Viamigo	9	0.881
Travel behavior and Transport Problems	6	0.644



The correlation between distinct items on the same test determines an instrument's internal consistency. This correlation reflects if a group of items intended to measure the same construct yield similar results. Internal consistency can range from zero to one for Cronbach's Alpha, which is calculated using correlations between all pairs of items. A typical rule of thumb is that a reliability level of 0.6-0.7 is satisfactory, and 0.8 or more is extremely good. Values greater than 0.95, on the other hand, aren't always beneficial because they could indicate redundancy (Hulin et. al., 2001 as cited in Ursachi et. al., 2015).

Cronbach's coefficient alpha was determined for each field of the questionnaire in the table above. Cronbach's Alpha ratings range from 0.644 to 0.881, indicating that all the results are satisfactory. The six items that aren't satisfactory are deleted from the questionnaire's third section (Travel behavior and transport problems) due to missing items in the third part of the questionnaire. As a result, the resulting spectrum is deemed satisfactory, ensuring the validity of each section of the questionnaire. The results for the items are reliable and acceptable in these instances. Because of the test, the results for the items are reliable and appropriate for measuring the study's intended objectives.

*Table 4: Descriptive Summary of Variables*

	N	Minimum	Maximum	Mean	Std. Deviation
Acceptability of Viamigo	211	1	4	2.66	0.628
Travel behavior and Transport problem	213	2	5	2.77	0.536
Impact of Viamigo	209	1	5	3.24	0.778
Valid N (Listwise)	206				

The respondents' responses on the above-mentioned variables were tallied on a five-point Likert scale, with 1 indicating strong disagreement, 2 indicating strong disagreement, 3 indicating neutrality, 4 indicating agreement, and 5 indicating strong agreement. However, when it comes to interpreting the results of mean, to make it easier to grasp, the scales were renamed as follows and easy to understand. According to the above table, the variables fall on the mild disagreement and slight

agreement range. In terms of Acceptability of Viamigo, this indicates the respondents doesn't perceive Viamigo as acceptable. (mean = 2.66 and SD .628). Regarding travel behavior and transport problems the results also showed similar patterns with a mean value of 2.77 and SD 0.536. This result generally indicated the respondents disagree that the person/persons with intellectual disabilities use public transport, participate in social activities, and feel safe to go out on their own. Furthermore, the respondents do not believe developed, supportive, and inclusive transportation systems exist in the city to accommodate people with intellectual disabilities. Moreover, the respondents do not also believe smartphones are common among the person/persons with intellectual disability and the person with intellectual disability has ever used any assistive mobility devices. The impact of the mobility assistive device Viamigo falls in the neutral range (mean = 3.24 and SD .778). The results showed slight agreement on the impact of Viamigo on the increase of the number of trips performed, boosting confidence to travel more, impacting social inclusion.

#### **4.2 ASSOCIATION BETWEEN THE VARIABLES USED IN THE STUDY**

The Chi-square statistic is a non-parametric (distribution free) tool used when the dependent variable is measured at a nominal level, this method is used to investigate group differences. Like all non-parametric statistics, the Chi-square is resilient in terms of data distribution. It does not, for example, demand that the study groups' variances be equal or that the data be homoscedastic. It can be used to evaluate both dichotomous independent variables and studies with multiple groups. (McHugh, 2013). The Chi-Square Test of Independence ( $\chi^2$ ) was used to see if there was a connection between the categorical variables in this study. Furthermore, after significant chi square was obtained Cramer's V was used to test the strength of the data. The Chi-square statistic is a significance metric that should be followed by a strength metric. When a significant Chi-square result has been obtained, the Cramer's V is the most typical strength test employed to test the data. (McHugh, 2013). Cramer's V varies between 0 and 1 without any negative values. A value close to 0 means no association, > 0.05 means a weak association, > 0.10 means a moderate association, > 0.15 means a strong association and a value bigger than 0.25 is named as a very strong relationship for the Cramer's V. (Akoglu, 2018).

Components		ROL of Participants	Acceptability of Viamigo	Travel Behavior and Transport Problems	Impact of Viamigo	Age of the person with intellectual disability	Gender of the person with intellectual disability
Acceptability of Viamigo	Pearson Chi-Square value	130.549		724.478	1496.576	96.924	32.507
	p-value	0.592		0	0	0.769	0.991
	Cramer's V	0.352		0.415	0.517	0.339	0.278
	N	211		210	207	211	211
Travel Behavior and Transport Problems	Pearson Chi-Square value	129.06	724.478		783.464	64.824	31.129
	p-value	0.027	0		0	0.891	0.841
	Cramer's V	0.348	0.415		0.434	0.276	0.27
	N	213	210		208	213	213
Impact of Viamigo	Pearson Chi-Square value	161.054	1496.576	783.464		110.262	61.979
	p-value	0.108	0	0		0.529	0.271
	Cramer's V	0.393	0.517	0.434		0.363	0.385
	N	209	207	208		209	209

*Table 5: Cross Tabulation of the association of the variables used in the study*

The above table illustrates, there is no statistically significant association between acceptability of Viamigo with the roll of the participants and age of the person with intellectual disability  $\chi^2 = 130.549$ , p value = 0.592 and  $\chi^2 = 96.924$ , p value = 0.769, respectively and looking at the strength of the association Cramer 's v (0.352) and (0.339), there exist a very strong association between the variables. Regarding the association between the acceptability of Viamigo and travel behavior and transport problems and, impact of Viamigo, the above table showed a statistically significant association between the acceptability of Viamigo and travel behavior and transport problems and, impact of Viamigo  $\chi^2 = 724.478$ , p value = 0.000 and  $\chi^2 =$

1496.576, p value = 0.000, respectively and looking at the strength of the association Cramer's v (0.415) and (0.517), there exist a very strong association between the variables. Regarding the travel behavior and transport problems of people with intellectual disabilities, the above table showed a statistically significant association between the travel behavior and transport problems of people with intellectual disabilities with the roll of the participant, acceptability of Viamigo and impact of Viamigo  $\chi^2 = 129.06$ , p value = 0.027 and  $\chi^2 = 724.478$ , p value = 0.000, and  $\chi^2 = 783.464$  p value = 0.000 respectively and looking at the strength of the association Cramer's v (0.348), (0.415) and, (0.434), there exist a very strong association between the variables. Regarding, the association of the travel behavior and transport problems of people with intellectual disabilities with age of the person with intellectual disability and gender of the person with intellectual disability showed no statistically significant association.  $\chi^2 = 64.824$ , p value = 0.891 and  $\chi^2 = 31.129$ , p value = 0.841, respectively and looking at the strength of the association Cramer 's v (0.276) and (0.27), there exist a very strong association between the variables. Finally, for the impact of Viamigo the above table showed there is a statistically significant association between impact of Viamigo with the acceptability of Viamigo and, travel behavior and transport problems of the person with intellectual disability  $\chi^2 = 1496.576$ , p value = 0.000 and  $\chi^2 = 783.464$ , p value = 0.000, respectively and looking at the strength of the association Cramer 's v (0.517) and (0.434), there exist a very strong association between the variables. Furthermore, the above table showed that there is no association between the impact of Viamigo and roll of the participants, age of the person with intellectual disability and gender of the person with intellectual disability.  $\chi^2 = 161.054$ , p value = 0.108 and  $\chi^2 = 110.262$ , p value = 0.529, and  $\chi^2 = 61.979$ , p value = 0.271 respectively and looking at the strength of the association Cramer 's v (0.393), (0.363), and (0.385) there exist a very strong association between the variables.

### 4.3 Transport Problems and Travel Behavior of persons with intellectual disabilities in Ethiopia

#### 4.3.1 Descriptive Statistics

Table 6: Descriptive statistics

Mean Score of Transport Problems and Travel Behavior					
	N	Mean	Std. Deviation	Minimum	Maximum
Male	77	2.77	0.528	2	4
Female	90	2.75	0.531	2	5
Male and Female people with intellectual disability represented together in the survey	46	2.79	0.571	2	5
Total	213	2.77	0.536	2	5

Based on the above table, participants of the study represented male persons with intellectual disability = 77, female persons with intellectual disability= 90, and 46 = males with intellectual disability and female people with intellectual disability together. Regarding males with intellectual disabilities and female people with intellectual disabilities represented together in the survey. Participants who had/have an experience with both male people with intellectual disability and the female person with intellectual disability preferred to represent them both on the survey, or they preferred to talk about both males and females with intellectual disability in the survey. Accordingly, the number of male people with intellectual disability and female persons with intellectual disability represented together in the survey was = 46. According to the above table, the variables fall in the moderate disagreement range. In terms of respondents responding about the transport problem of both male and female persons with an intellectual disability, the results indicated people with

intellectual disability are not independent of family, caregivers, and friends to travel from one place to another. They do not use public transport and do not feel safe going out on their own to visit their families or friends. Furthermore, to go to care centers, markets, education, or jobs. Additionally, respondents also do not feel safe if people with intellectual disabilities go out on their own for activities such as visiting families or friends to go to care centers, markets, education, or jobs. Moreover, respondents do not agree that a developed, supportive, and inclusive transportation system exists in the city designed to accommodate people with intellectual disabilities (mean = 2.79 and SD .571).

### 4.3.2 Travel behavior and Transport Problems

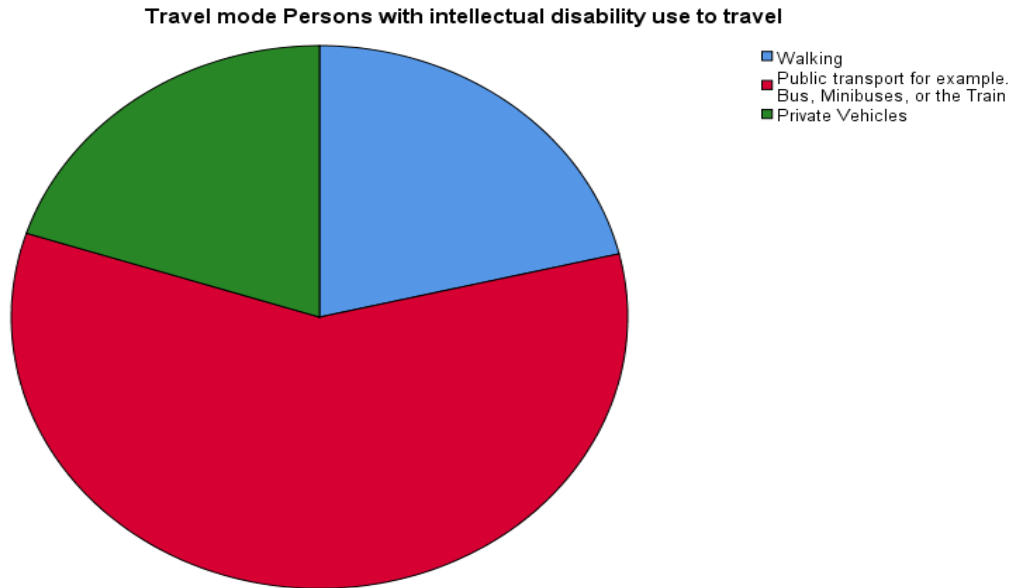


Figure 4: Travel mode the person with intellectual disability uses to travel

The above pie chart illustrates the travel mode the person with intellectual disability uses to travel. Based on the pie chart 52.8% of the person with intellectual disabilities uses the public transport such as Buses, Minibuses, or the Train. 19.1% walking and 18% uses the private transport.

Reasons for avoiding the usage of public transport	Frequency	Percent
Absence of supportive and accessible public transportation	42	47.2
Due to infrastructure that is not adopted for people with intellectual disability	27	30.3
Challenges in using public transport and poor transportation services	16	18.0

*Table 7: Reasons for avoiding the usage of public transport*

Based on the above table, 47.1% of the participants believed the reasons persons with intellectual disability avoids the use of public transports are due to absence of supportive and accessible public transportation. 30.3% due to infrastructure that is not adopted for people with intellectual disability and 18% are due to challenges in using public transport and poor transportation services.

Factors that restrict them from going out on their own		
	Frequency	Percent
Challenges in using Public Transport	1	1.4
Lack of cognitive-processing skills	2	2.7
Unsafe and unsupportive transportation system	10	13.5
Fear of robbers, thieves or being robbed on the way	30	40.5
Fear of traveling alone due to difficulties caused by unsupportive people	31	41.9

*Table 8: Factors that restrict them from going out on their own*

The above table describes factors that restricts persons with intellectual disabilities going out on their own. Based on the table Fear of traveling alone due to difficulties caused by unsupportive people as well as social stigma (frequency = 41.9%) and Fear of going out due to horrible perspectives with respect to the public towards persons with intellectual disability (frequency = 40.5%) are the top two reasons that prevents persons with intellectual disability from going out on their own. In addition, 13.5% due to fear of robbers, thieves or being robbed on the way and challenges in using

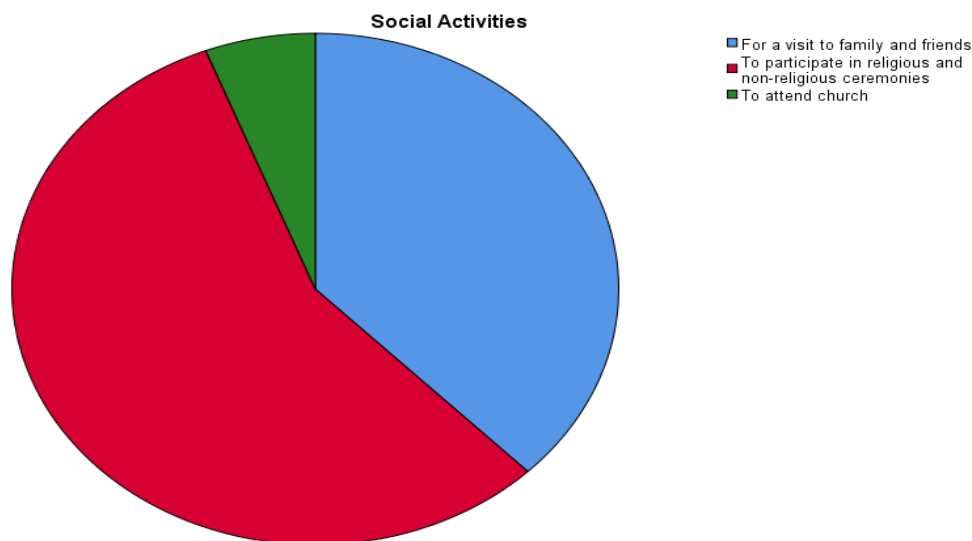
public transport (frequency = 1.4%) and lack of cognitive processing skills (frequency= 2.7%).

Reasons for dependencies	Frequency	Percent
Due to absence of accessible transportation	9	10.1
Challenges in using Public Transport	18	20.2
Due to fear of traveling alone due to difficulties caused by unsupportive people as well as social stigma.	20	22.5
Due to lack of security	37	41.6

*Table 9:Reasons for dependencies*

The table illustrates the top 4 reasons people with intellectual disabilities dependent on family, care givers and friends to travel from one place to another. Based on the above table 41.6% of the participants believe the reasons for the dependencies are due to lack of security and 22.5% of the participants believe it's due to fear of traveling alone, due to difficulties caused by unsupportive people as well as social stigma. 20.2% of the participants believe it's due to challenges in using public transport and 10.1% of the participants believed its due to due to absence of accessible transportation.





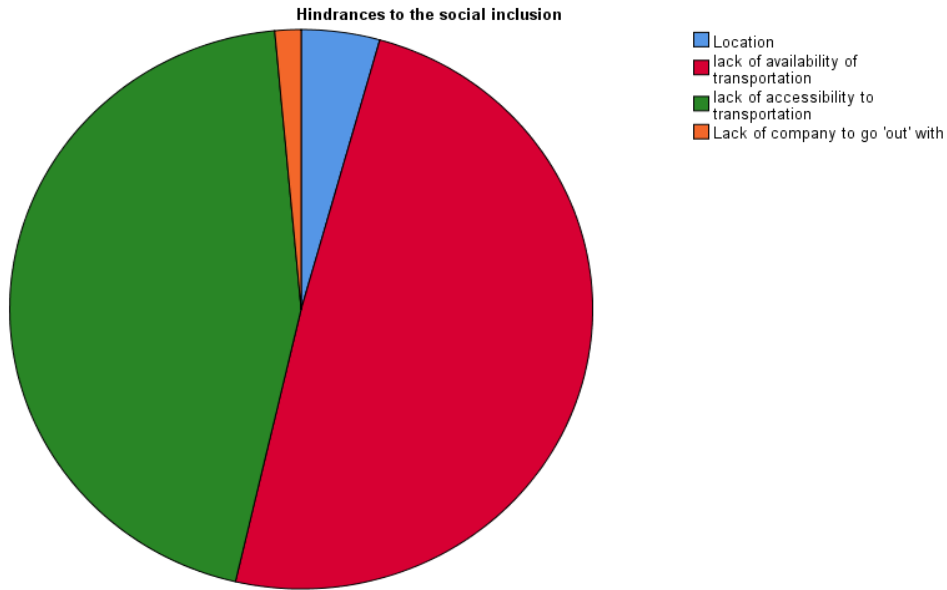
*Figure 5: Social activities*

The above pie chart illustrates the travel behavior of persons with intellectual disabilities in Ethiopia regarding participation in social activities. More than 55% of the social activities are due to participation in religious and non-religious ceremonies. 35% for a visit to family and friends and close to 5% to attend church.

Frequency of participation in social activities		
	Frequency	Percent
Daily	3	3.4
Weekly	45	50.6
Several times a week	35	39.3
Several times a month	1	1.1

*Table 10: Frequency of participation in social activities*

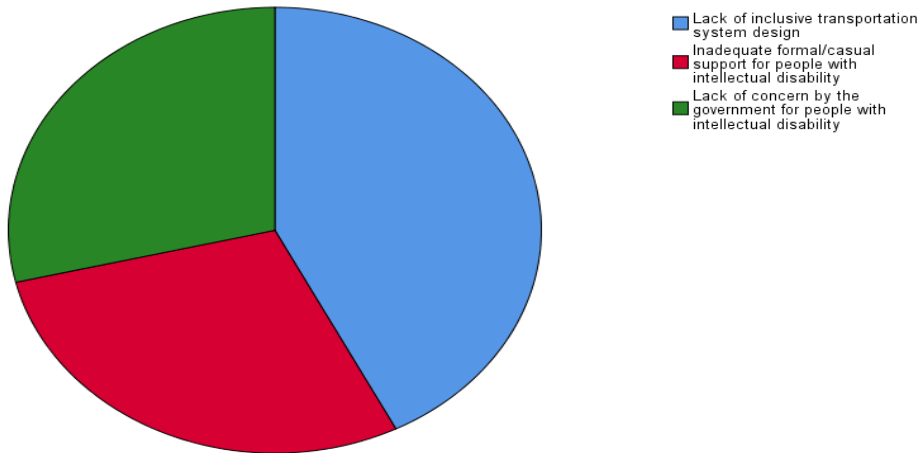
The above table shows the frequency of participation by people with intellectual disabilities in social activities. Based on the above table, 50.6% participate in social activities on a weekly basis. 39.3% several times a week and only 3.4% of people with intellectual disabilities participate daily.



*Figure 6: Hindrance to social inclusion*

The pie chart demonstrates the hindrance to social inclusion of people with intellectual disabilities. Based on the pie chart lack of availability of transportation (frequency= 49.3%) and lack of accessibility to transportation (frequency=44.9%) are the top two reason for the hindrances to the social inclusion of people with intellectual disabilities.

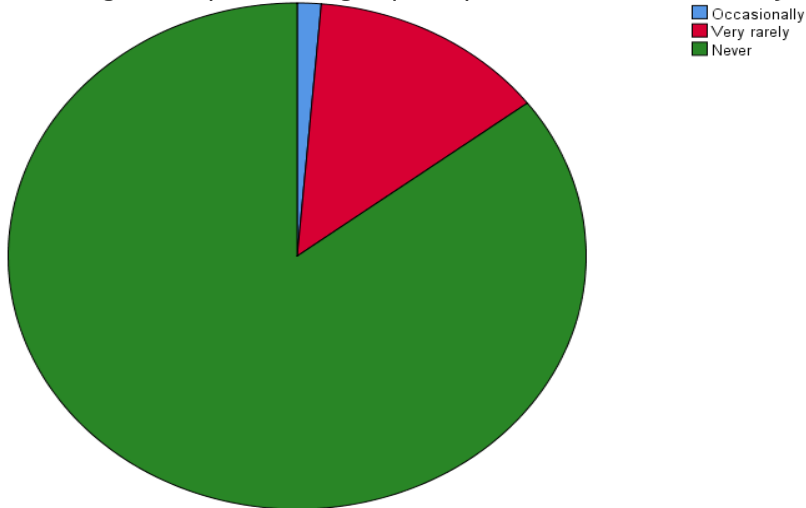
**Reasons for lack of supportive specialized transport systems**



*Figure 7: Reasons for lack of supportive specialized transport systems in Ethiopia*

The pie chart depicts reasons for lack of supportive specialized transport systems in Ethiopia. Based on the pie chart lack of inclusive transportation system design (frequency greater than 40%) are the top reasons for lack of supportive specialized transport systems. Inadequate formal/casual support for people with intellectual disability (frequency=28.7%) and lack of concern by the government for people with intellectual disability (28.7%) are also the reason for the lack of supportive specialized transport systems in Ethiopia.

**Usage of smartphones among the person/persons with intellectual disability**



*Figure 8: Usage of smartphones among the people with intellectual disabilities in Ethiopia*

The pie chart shows the usage of smartphones among the person/persons with intellectual disabilities in Ethiopia. Based on the pie chart 85.3% never used a smartphone and 13.3% very rarely used a smartphone. The result shows the usage of smart phone among persons with intellectual disabilities is not common and shows very rare usage.

Reasons for rare usage of Smartphones among people with intellectual disabilities		
	Frequency	Percent
Due to difficulties of understanding and usage	18	25.7
Due to lack of necessity	16	22.9
Due to lack of availability of accessible cellphone for person with intellectual disabilities	36	51.4

*Figure 9: Reasons for rare usage of Smartphones among people with intellectual disabilities*

The above table shows reasons for rare usage of smartphones among people with intellectual disabilities in Ethiopia. Based on the above table the number one reason for the rare usage of smartphones among people with intellectual disabilities is due to lack of availability of accessible cellphone for person with intellectual disabilities (frequency = 51.4%). In addition, due to difficulties of understanding and usage (frequency = 25.7) and due to lack of necessity (frequency = 22.9%) are also reasons for rare usage of smartphones among people with intellectual disabilities in Ethiopia.

#### 4.4.1 ANOVA Regression Analysis Difference with Respect to Gender in Transport Problems and Travel Behavior of Persons with Intellectual Disability

Transport Problems and Travel Behavior					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.046	2	0.023	0.080	0.924
Within Groups	60.967	210	0.290		
Total	61.013	212			

*Table 11: ANOVA Regression Analysis Difference with Respect to Gender in Transport Problems and Travel Behavior of Persons with Intellectual Disability*

An analysis of variance showed that the difference with respect to gender in transport problems and travel behavior of persons with intellectual disability was insignificant,  $F(2,200) = 0.080$ ,  $p = .924$ . Post hoc analyses using Tukey's post hoc analysis for significance indicated that there were no significant differences in response between the respondents representing male and female person/persons with intellectual disability, as well as respondents representing male and female people with intellectual disability together ( $M = 2.77$ ,  $SD = .737$ ), ( $M = 2.75$ ,  $SD = .528$ ,  $p=1.000$ ) and ( $M = 2.79$ ,  $SD = .571$ ,  $p=1.000$ ) respectively.

## 4.4 Acceptability of the Mobility Assistive Technology Viamigo

### 4.5.1 Logistic Regression Analysis of Acceptability Regarding Usefulness Dimension of Viamigo

The Wald test ("Wald" column) is used to determine statistical significance for each of the independent variables. From these results it's found that Family member of person with intellectual disability ( $p = 0.077$ ), added significantly to the model/prediction but Parent of person with intellectual disability ( $p = .823$ ) age group 1 (parents who have children from 1 to 5) and Special need teacher on age group 1(1 to 5 years) ( $p = .0.884$ ) did not added significantly to the model/predicti

Table 12: SPSS output Block 1

Classification Table <sup>a</sup>					
Observed			Predicted		Percentage Correct
			ACCEP1 Viamigo Not useful	Yes, Viamigo is useful	
Step 1	ACCEP1	Viamigo Not useful	22	33	40
		Yes, Viamigo is useful	10	139	93.3
		Overall Percentage			78.9

a. The cut value is .500

Based on the above table for one of the acceptability dimensions of usefulness 93.3 % Of the participants believed that Viamigo is useful. A logistic regression was performed to ascertain the effects of roll of the participants, age of the person with intellectual disability the participants represented and care center the data is collected on the likelihood that the participants accepted the usefulness of Viamigo. The logistic regression model was statistically significant,  $\chi^2(14) = 59.02, p < .05$ . The model explained 36.5% (Nagelkerke R<sup>2</sup>) of the variance in acceptability regarding usefulness of Viamigo and correctly classified 78.9% of cases.

Special need teachers were 1.040 times more likely to exhibit acceptability for usefulness of Viamigo than the other respondents. Respondents representing age group (11 - 15) were 1.883 times more likely to exhibit acceptability for usefulness of Viamigo than the other age groups. However, parents and family member of persons with intellectual disability representing person with intellectual disability (age group 1 to 5) was associated with a reduction in the likelihood of acceptability regarding usefulness of Viamigo.

#### **4.6.3 ANOVA Regression Analysis of Affordability, Social Acceptability, Efficiency, Reliability, Simplicity, Safety and Aesthetics with Respect to The Roll of the Participants**

		<b>ANOVA</b>				
		Sum of Squares	df	Mean Square	F	Sig.
Acceptability regarding Affordability	Between Groups	10.73	5	2.145	1.937	0.09
	Within Groups	227	205	1.107		
	Total	237.8	210			

Social acceptability with respect to easing the burden of parents, care givers and coaches by sharing the responsibility of taking care of the person/persons with intellectual disability (a)	Between Groups	8.143	5	1.629	1.062	0.382
	Within Groups Total	318.9 327	208 213	1.533		
Acceptability regarding social acceptability (b)	Between Groups	4.112	5	0.822	0.765	0.576
	Within Groups Total	223.5 227.6	208 213	1.075		
Acceptability regarding efficiency	Between Groups	10.85	5	2.17	1.856	0.103
	Within Groups Total	243.2 254	208 213	1.169		
Acceptability regarding reliability	Between Groups	22	5	4.4	3.619	0.004
	Within Groups Total	252.9 274.9	208 213	1.216		
Acceptability regarding simplicity	Between Groups	12.8	5	2.559	2.284	0.048
	Within Groups Total	233.1 245.9	208 213	1.121		
Acceptability regarding safety	Between Groups	19.94	5	3.988	3.531	0.004
	Within Groups Total	234.9 254.9	208 213	1.13		



Acceptability regarding aesthetics	Between Groups	17.83	5	3.566	3.531	0.004
	Within Groups	210.1	208	1.01		
	Total	227.9	213			

*Table 13: ANOVA Regression Analysis of Affordability, Social Acceptability, Efficiency, Reliability, Simplicity, Safety and Aesthetics with Respect to The Roll of the Participants*

An analysis of variance showed that acceptability regarding affordability, social acceptability concerning easing the burden of parents, caregivers, and coaches by sharing the responsibility of taking care of the person/persons with intellectual disability (a) , acceptability regarding social acceptability (b), and acceptability regarding efficiency concerning the different roll of the participants of the study was insignificant, regarding affordability,  $F(5,205) = 1.937$ ,  $p=0.09$ , social acceptability concerning easing the burden of parents, caregivers,  $F(5,208) = 1.062$ ,  $p = 0.382$ , acceptability regarding social acceptability,  $F(5,208) = 0.765$ ,  $p = 0.576$  and acceptability regarding efficiency,  $F(5,208)= 1.856$ ,  $p = 0.103$ .

On the contrary, analysis of variance showed that acceptability regarding reliability, acceptability regarding simplicity, acceptability regarding safety, and acceptability regarding aesthetics concerning the different roll of the participants of the study was significant, acceptability regarding reliability,  $F(5,208) = 3.619$ ,  $p=0.004$ , acceptability regarding simplicity  $F(5,208) = 2.284$ ,  $p=0.048$ , acceptability regarding safety,  $F(5,208) = 3.531$ ,  $p=0.004$  and acceptability regarding aesthetics,  $F(5,208) = 3.531$ ,  $p=0.004$ .

#### **4.6.4 Summary of the Multiple Dimensions of Acceptability of Viamigo**

Multiple Dimension of Acceptability	N	Mean	Std. Deviation	p-value	Overall Percentage	Type of Analysis Used
Acceptability regarding Usefulness	204				93.3%	Logistic Regression analysis

Acceptability regarding affordability	211	2.43	1.064	0.09	ANOVA Regression Analysis
Social acceptability with respect to easing the burden of parents, care givers and coaches by sharing the responsibility of taking care of the person/persons with intellectual disability	214	2.71	1.034	0.382	ANOVA Regression Analysis
Acceptability regarding social acceptability (b)	214	2.71	1.034	0.576	ANOVA Regression Analysis
Acceptability regarding efficiency	214	3.29	1.092	0.103	ANOVA Regression Analysis
Acceptability regarding reliability	214	3.02	1.136	0.004	ANOVA Regression Analysis
Acceptability regarding simplicity	214	3.02	1.075	0.048	ANOVA Regression Analysis
Acceptability regarding safety	214	3.02	1.094	0.004	ANOVA Regression Analysis
Acceptability regarding aesthetics	214	3.15	1.034	0.004	ANOVA Regression Analysis

*Table 14: Summary of the Multiple Dimensions of Acceptability of Viamigo*

The above table summarizes the multiple dimensions of acceptability of Viamigo. Based on the above table, the usefulness dimension of acceptability shows that 93.3 % Of the participants accepted that Viamigo is useful. Logistic Regression analysis was used for this specific item due to the dependent Variable being dichotomous (measured using Yes or No). For the rest of the eight items on the acceptability, Viamigo ANOVA regression analysis was used because the measurement scale was a five scale Likert scale. Regarding affordability, social acceptability and efficiency analysis of Variance showed there is no significant difference in acceptability with respect to the different roll of the participants. Acceptability regarding affordability and social acceptability the participants showed disagreement, and regarding efficiency they showed neutrality. Concerning reliability, simplicity, safety, and aesthetics analysis of variance showed there is a statically significant difference in acceptability with respect to the roll of the participants.

## 4.7 Impact of the Mobility Assistive Device Viamigo

### 4.7.1 Descriptive Statistics

Table 15: Descriptive Statistics

Mean Score of Impact of Viamigo by Roll						
	N	Mean	Std. Deviation	Upper Bound	Minimum	Maximum
Parent of person with intellectual disability	67	3.17	0.737	3.35	1	4
Family member of person with intellectual disability	25	3.15	0.725	3.45	2	4
Educator of person/persons with intellectual disability	35	3.13	0.835	3.41	1	5
Caregivers of person/persons with intellectual disability	18	3.59	0.928	4.05	1	4
Special need teacher	46	3.23	0.777	3.46	1	4
Doctors/nurses	18	3.50	0.669	3.83	1	4

Total	209	3.24	0.778	3.35	1	5
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According to the above table the variables fall on the moderate agreement range. Regarding Caregivers of person/persons with intellectual disability and Doctors/nurses, they moderately agree that the mobility assistive device Viamigo will have an impact on increasing the number of trips performed, it will help in boosting their confidence to travel more, increasing trip to travel to visit friends and family, increasing trip to travel to the market, increasing trip travel for recreational purposes, expanding their admittance to jobs, markets, health facilities and schools, increasing their social inclusion and the mobility assistive device Viamigo will encourage them to explore new transport routes and unfamiliar destination, they have never traveled before (mean = 3.59 and SD .928 and mean = 3.50 and SD .669) respectively. Regarding parents of person with intellectual disability, family member of person with intellectual disability, educator of person/persons with intellectual disability and special need teacher they fall on the slight agreement range for the factors mentioned above (mean = 3.17 and SD .737, mean = 3.15 and SD .725, mean = 3.13 and SD .835 and mean = 3.23 and SD .777) respectively.

#### 4.8.2 ANOVA Regression Analysis of The Potential Impact of Viamigo with Respect of the Roll of the Participants

Mean score of  
Impact by Roll

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.412	5	.882	1.474	.200
Within Groups	121.520	203	.599		
Total	125.932	208			

*Table 16: ANOVA Regression Analysis of The Potential Impact of Viamigo with Respect of the Roll of the Participants*

An analysis of variance showed that the perceived impact of Viamigo depend on the role of the participants was insignificant,  $F(5,203) = 1.474$ ,  $p = .200$ . Post hoc

analyses using Tukey's post hoc analysis for significance indicated that there were no significant differences between the parent of ID ( $M = 3.17$ ,  $SD = .737$ ) and other groups: family member of ID ( $M = 3.15$ ,  $SD = .725$ ,  $p=1.000$ ), educator of ID ( $M=3.13$ ,  $SD=.835$ ,  $p=1.000$ ), caregivers of ID ( $M=3.59$ ,  $Sd=.928$ ,  $p=.325$ ), special need teacher ( $M=3.23$ ,  $SD=.777$ ,  $p=.999$ ), and doctors/nurses ( $M=3.50$ ,  $SD=.669$ ,  $p=.608$ ).

#### **4.9 SWOT Analysis**

The geographic information system-based application "Viamigo" ([www.viamigo.be](http://www.viamigo.be)) was developed to support the independent outdoor mobility of persons with intellectual disabilities themselves and reduce the caregivers' burden, allowing a personal coach to monitor an individual in real-time from a distance. Using this platform, people with intellectual disability can now also go out without guidance. To evaluate the potential transferability of this technology in African context, it is important to be aware of the strengths, weaknesses, opportunities, and threats (SWOT) associated with the potential use of this technology in developing country. SWOT analyses are widely used to plan strategic development processes. (Pickton and Wright, 1998; Tao and Shi, 2016 as cited in Duking et al., 2018). Together with the literature review, the analyzed data from the study was used as an input for the SWOT analysis. From the analyzed data aspects more inherent to the mobility assistive technology Viamigo and aspects more related to the potential adoption of Viamigo in Ethiopia were considered as strength/weaknesses and opportunities/threats, respectively.

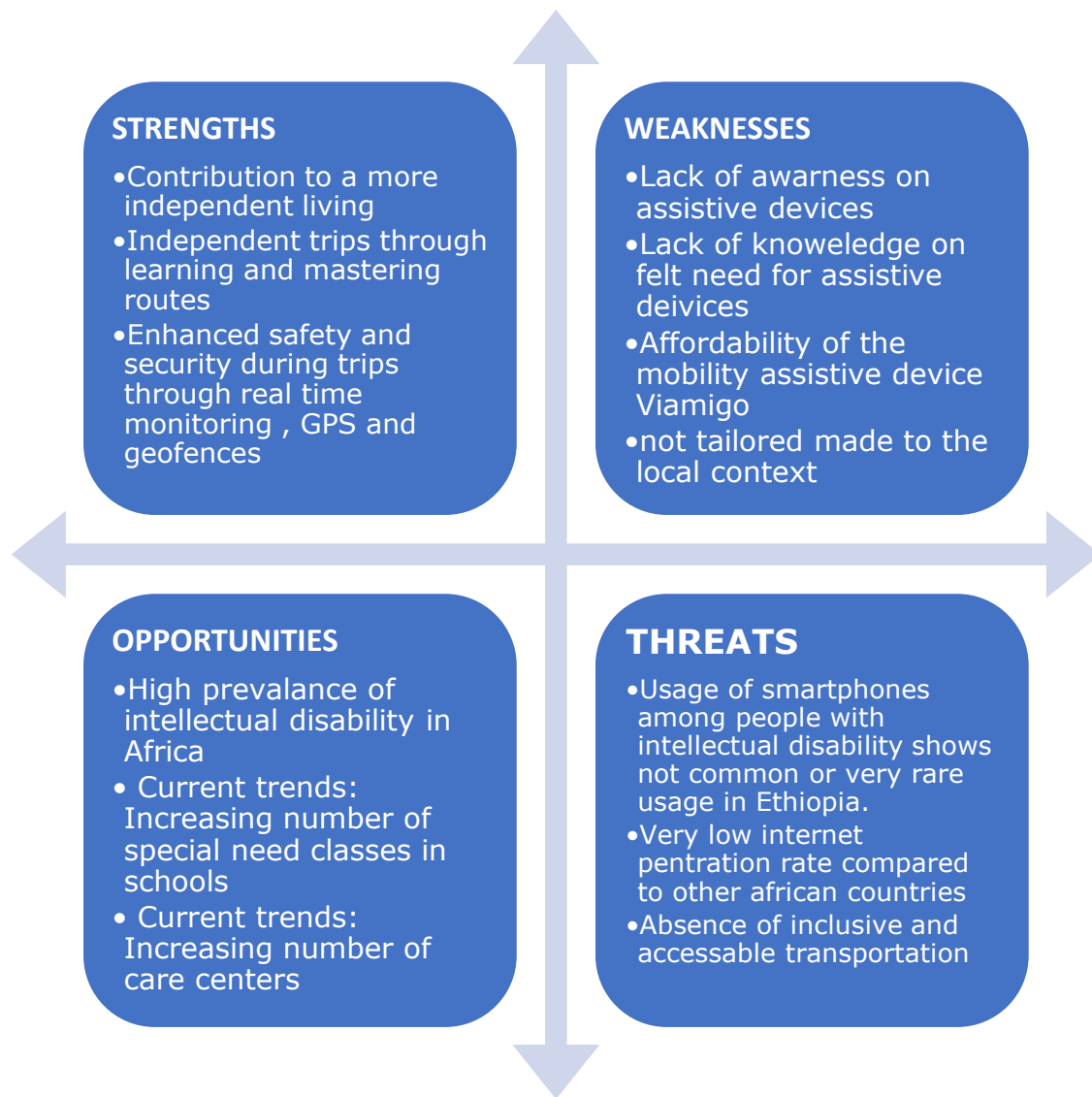


Figure 10: SWOT Analysis

### Strength

The analyzed data from the study indicates that people with intellectual disabilities are dependent on family, care givers and friends to travel from one place to another. As indicated by the survey data, the reasons for the dependencies of people with intellectual disabilities includes, lack of security (41.6%), fear of traveling alone due to difficulties caused by unsupportive people as well as social stigma (22.5%) and are due to challenges in using public transport (20.2%). In addition, Factors that restrict them from going out on their own includes fear of traveling alone due to difficulties caused by unsupportive people as well as social stigma (41.9%), fear of going out

due to horrible perspectives with respect to the public towards persons with intellectual disability (40.5%), due to fear of robbers, thieves or being robbed on the way (13.5%) and challenges in using public transport (1.4%) and lack of cognitive processing skills (2.7%). The possible adoption of Viamigo can contribute to more independent living of people with intellectual disability in Ethiopia because the use of Viamigo facilitates the movement of people with intellectual disability in and around the community by eliminating transportation barriers. (Neven. A, 2017). By using Viamigo People with intellectual disability are shown an individual route, which they can achieve freely subsequently, while nonintrusive being observed by an individual mentor (parental figure, relative or companion), who deals with this individual while making the outing. The individual coach or (parental figure, relative or companion), will control the person with intellectual disability until he has mastered the route and can travel it freely. ([www.viamigo.be/](http://www.viamigo.be/)). Furthermore, Viamigo uses GPS to determine the client's location and considers it to be within a predetermined range, allowing deviations from the planned roadway, off-base speed, and entering a dangerous zone, among other things, to be detected. If Viamigo detects an irregularity, it automatically sends a signal to the mentor, and the client's exact location can be identified progressively. Aside from this 'on route' functionality, Viamigo also allows users to create geofences around goals (to see whether the client is still within a preset zone) and start crisis following (to gradually identify the client's location). (Neven. A, 2017).

### **Weakness**

The acceptability regarding affordability of the mobility assistive device Viamigo based on the survey result (total mean score of acceptability regarding affordability = 2.43) shows affordability of Viamigo can limit the usage of Viamigo in Ethiopia. Moreover, Full adaptation of the technology in Ethiopia has been troublesome because of absence of national guidelines and predictable data and correspondence policy, absence of scholastic establishments that go about as well grounded of all around grounded concentrate in data innovation, lack of computer proficiency in essential and auxiliary instruction, feeble schooling foundation, deficiency of gifted human resource and computing infrastructure universities and colleges, lack of software engineers in custom and new frameworks' improvement low quality of internet

providers, prohibitive data looking for culture, restricted admittance to programming and preparing materials, various local languages, contents and dialects in Ethiopia. (Information technology growth in Ethiopia, n.d).

### **Opportunity**

The predominance of intellectual disability is almost two times more in low- and middle-income countries contrasted with high income countries. (Maulik et al., 2011). This high prevalence of people with intellectual disabilities can be an opportunity for a future market of the mobility assistive device Viamigo together with further research awareness and education of assistive technology. Furthermore, the prevalence of intellectual disability in low- and middle-income countries showed, there is an increasing number of people who seek this type of application.

The idea of mobility assistive device in Ethiopia is unique and new which can lead the market. The current trend in Ethiopia showed the number of special need classes in schools and number of care centers for people with intellectual disability is increasing. (Teshome, 2020). This is encouraging people with intellectual disability to go out more and creating awareness among parents of people with intellectual disability this can be an opportunity to promote the use of mobility assistive devices among people with intellectual disabilities.

### **Threat**

The research finding indicated that the usage of smartphones among the person/persons with intellectual disabilities is not common and shows very rare usage in Ethiopia. Based on the survey results 85.3% never used a smartphone and 13.3% very rarely used a smartphone. The reason for the rare usage of smartphones among people with intellectual disabilities is due to lack of availability of accessible cellphone for person with intellectual disabilities (51.4%). In addition, due to difficulties of understanding and usage (25.7) and due to lack of necessity (22.9%) are also reasons for rare usage of smartphones among people with intellectual disabilities in Ethiopia. This rare usage of smartphones among persons with intellectual disabilities can be seen as a perceived barrier for the potential adoption of Viamigo in Ethiopia, Due to Viamigo being a service based on mobile. ([www.viamigo.be/](http://www.viamigo.be/)). Furthermore, according



to Internet World Statistics\* of July 2021, internet penetration in Ethiopia is currently 18.6 percent, which is less than half the African average, whereas Morocco, Egypt, Nigeria, Kenya, Sudan, and Djibouti have an Internet penetration rate of 68.5%, 52.5%, 73.0%, 85.2%, 29.2% and 54.8% respectively, while African average penetration rate is 46.2%. Together with the rare usage of smartphones among persons with intellectual disabilities in Ethiopia, lack of internet penetration can be seen as a perceived barrier for the potential adoption of Viamigo in Ethiopia, Due to Viamigo being a service based on mobile. ([www.viamigo.be/](http://www.viamigo.be/)). Moreover, based on the research findings people with intellectual disabilities avoid using public transports due to absence of inclusive and accessible public transportation (47.1%), due to infrastructure that is not adopted for people with intellectual disability (30.3%) and due to challenges in using public transport and poor transportation services (18%). Furthermore, the research findings indicated, lack of availability of transportation (49.3%) and lack of accessibility to transportation (44.9%) are the reasons for the hindrances to the social inclusion of people with intellectual disabilities. This factor restricts the mobility and social activities of people with intellectual disabilities. The avoidance and rare use of the public transport by people with intellectual disability, due to the reasons mentioned above can be seen as a perceived barrier for the transferability of the mobility assistive device Viamigo.

## **CHAPTER FIVE**

### **DISCUSSION**

This study aimed to evaluate the acceptability and impact of Viamigo among people with intellectual disabilities based on the determinant variables. According to the survey, the dominant respondents in number were parents of person with intellectual disability compared to the roll of the other respondents. The dominant gender of people with intellectual disability the respondents represented in the survey were females compared to the number of male and both genders, which may affect the generalization of the result to the population. According to the survey result, the acceptability of Viamigo was strongly associated between the travel behavior and transport problem of people with intellectual disabilities. Moreover, the impact of the mobility assistive device Viamigo was strongly associated with the acceptability of Viamigo and the travel behavior and transport problems of people with intellectual disability.

The research findings on part one of the research concern, the transport problem of people with intellectual disabilities in Ethiopia showed people with intellectual disabilities are dependent on family and care givers to travel from one place to another due to absence of accessible transportation, due to lack of security, due to fear of traveling alone, due to difficulties caused by unsupportive people as well as social stigma and due to challenges in using public transport. Reasons for avoiding the use of public transports persons with by intellectual disabilities were due to absence of supportive and accessible public transportation, due to infrastructure that is not adopted for people with intellectual disability and due to challenges in using public transport and poor transportation services. The hindrance to social inclusion of people with intellectual disabilities showed lack of availability of transportation and lack of accessibility to transportation were the top two reasons for the hindrances to the social inclusion of people with intellectual disabilities. The other reasons for hindrance to social inclusion includes location and lack of company to go out with. Factors that restrict persons with intellectual disabilities going out on their own includes, fear of traveling alone due to difficulties caused by unsupportive people as

well as social stigma, fear of going out due to horrible perspectives with respect to the public towards persons with intellectual disability, fear of robbers, thieves or being robbed on the way, challenges in using public transport and lack of cognitive processing skills. Reasons for lack of supportive specialized transport systems in Ethiopia includes, lack of inclusive transportation system design, inadequate formal/casual support for people with intellectual disability and lack of concern by the government for people with intellectual disability. The research findings also indicate the usage of smart phone among persons with intellectual disabilities is not common and shows very rare usage. Reason according to the survey results, for the rare usage of smartphones among people with intellectual disabilities was due to lack of availability of accessible cellphone for person with intellectual disabilities, due to difficulties of understanding and usage and due to lack of necessity.

The research findings on the travel behavior of people with intellectual disabilities showed that majority of people with intellectual disabilities uses the public transport such as Buses, Minibuses, or the Train. In comparison it showed low percentage of walking and private transport usage. Majority of the social activities are due to participation in religious and non-religious ceremonies. In comparison, it showed few social activities for a visit to family and friends and to attend church. Majority of the participants responded people with intellectual disabilities participate in social activities on a weekly basis and some of them several times a week and the research result showed daily participation for social activities was very rare. Analysis of variance on transport problems and travel behavior, showed no significant differences with respect to gender in travel behavior and transport problems of people with intellectual disability in Ethiopia. These analyses are fully and partially supported by different scientific studies such as Davies et al. (2010), absence of accessibility of or admittance to transportation as a hindrance to community inclusion is an unending issue for many persons with intellectual disability. People with intellectual disability avoid public transport because the infrastructure is not adopted for them, being dependent on family and care givers to travel from one place to another, restricted exercises because of challenges in using public vehicle and poor transportation, Undeveloped, not supportive and unsafe but costly bus transportation system for people with intellectual disabilities in cities and fear of traveling alone due to

difficulties caused by unsupportive people as well as social stigma.( Alanazi. A, 2020). The hindrances to social inclusion as seen by individuals with intellectual disability includes Location, Lack of available and reasonable transport and no company to go 'out' with (Abbott & Mcconkey, 2006). Absence of accessible transportation as an exceptionally basic issue for individuals with disability, it fills in as a significant hindrance that influences their life. (The Committee on Disability in America, Field and Jette, 2007 as cited in Alanazi, A., 2020). Furthermore, findings on the transport and mobility problems of people with intellectual disability on low and middle income countries by Kett et al (2020), showed lack of accessible and inclusive transport infrastructure, lack of public transport that serves long journeys specially journeys for educational or income-generation purposes, affordability and subsidies for individual journeys, measuring access to services, lack of availability of special transport services, holistic approaches that includes subsidies and accessible public transports, lack of data giving technologies, applications which give live updates about planes, trains, transports and other (usually public) transport, just as live trackers and advanced guides. According to Stock et al. (2008), limited access to cellphones is due to financial issues, as many people with intellectual disabilities cannot afford the cost of cellphone services; however, limited cognitive accessibility is caused in part by the proliferation of features included on cellphones and the ever-shrinking size of cellphone hardware and user interfaces. Furthermore, according to a study conducted by Bryen et al. (2007), also indicates 42% of the 83 individuals with intellectual disabilities had ever used a cellphone and only about 28% utilized one on a regular basis.

Part two of the research concern acceptability of Viamigo is analyzed using logistic regression analysis and ANOVA regression analysis. Based on the logistic regression analysis of the acceptability of Viamigo regarding the usefulness dimension of acceptability special need teachers were more likely to exhibit acceptability for usefulness of Viamigo than the other respondents. Respondents representing people with intellectual disability age group (11 - 15) more likely to exhibit acceptability for usefulness of Viamigo than the other age groups. However, parents and family member of persons with intellectual disability representing person with intellectual disability (age group 1 to 5) was associated with a reduction in the likelihood of

acceptability regarding usefulness of Viamigo. In addition, analysis of variance showed that acceptability regarding reliability, acceptability regarding simplicity, acceptability regarding safety and acceptability regarding aesthetics varies with respect to the different roll of the participants. There was a statistically significant difference regarding the reliability dimension of acceptability between parents of people with intellectual disability and special need teachers. Parents of people with intellectual disability moderately agree with the reliability of Viamigo and special need teachers highly agree that Viamigo is reliable. There was also a statistically significant difference regarding the acceptability dimension of safety among parent of person with intellectual disability, educator of person/persons with intellectual disability and caregivers of person/persons with intellectual disability. Parents of people with intellectual disability and educator of person/persons with intellectual disability moderately agree that Viamigo is safe, in comparison caregivers of person/persons with intellectual disability highly agree with the safety of Viamigo. There was also a statistically significant difference on acceptability regarding the aesthetics attributes of Viamigo among educator of person/persons with intellectual disability, special need teachers and caregivers of person/persons with intellectual disability. Parent of people with intellectual disability moderately agreed that Viamigo is attractive. However, special need teachers and caregivers of person/persons with intellectual disability highly agreed with the attractiveness of Viamigo. On the contrary, acceptability regarding affordability, social acceptability with respect to easing the burden of parents, care givers and coaches by sharing the responsibility of taking care of the person/persons with intellectual disability (a), acceptability regarding social acceptability (b) and acceptability regarding efficiency there is no significant difference with respect to the role of the participants. Regarding affordability the acceptability agreement level was low with respect to all the participants. Regarding social acceptability with respect to easing the burden of parents, care givers and coaches by sharing the responsibility of taking care of the person/persons with intellectual disability (a), acceptability regarding social acceptability (b) and acceptability regarding efficiency the survey results indicated moderate agreement by all participants. These analyses are fully and partially supported by different scientific studies—such Dekelver et al. (2015), In general, caregivers are late

adopters of technology, and their workspaces are rarely outfitted with the most up-to-date technology. Parents are frequently above 50 and unskilled in technology. Caregivers under the age of 50 are more likely to use the benefits of caregiving technology than older persons. Early technology adopters said they'd like to explore all the available technologies, but affordability is a concern. (National alliance for caregiving, 2012, as cited in Dekelver et al., 2015). Families may incur an excessive financial expense for assistive technology tools, and their abandoning is an inefficient use of a finite service system (Kolatch, 2001; Parette, 2000, as cited in Kintsch, et al., 2002).

Findings on part three of the research concern impact of Viamigo indicates a slight to moderate agreement by the participants of the study on the potential impact of the mobility assistive device Viamigo. The potential impacts include increasing the number of trips performed, helping boost confidence to travel more, increasing trip to travel to visit friends and family, increasing trip to travel to the market, increasing trip travel for recreational purposes, expanding admittance to jobs, markets, health facilities, and schools, increasing social inclusion and the assistive mobility device Viamigo will encourage people with intellectual disabilities to explore new transport routes and unfamiliar destination; they have never traveled before. These analyses are fully and partially supported by different scientific studies—such Alanazi (2020), the impact of using assistive technology for transportation purposes on people with intellectual disabilities includes increasing mobility, boosting confidence to travel more, to identify routes effectively, expanding admittance to jobs, education, shopping centers which helps in affecting their inclusion in the community, on turning out to be free and empower them explore the public transportation frameworks, discover the vehicles they need and spare significant time without waiting be reliant on others application. Boot et al. (2021), also stated that assistive technology can assume a significant part to keep up or improve a person's working and wellbeing to empower individuals to live freely and to improve participation in society. Using assistive technology can improve day by day working, local area living and incorporation in the public arena for individuals with intellectual disabilities. (Owuor et al. 2017).

## **CHAPTER SIX**

### **CONCLUSION AND RECOMMENDATION**

#### **6.1 CONCLUSION**

The study aimed to identify the acceptability and impact of the mobility assistive device Viamigo among people with intellectual disabilities in Ethiopia. The study included 214 participants, and the dominant respondents in number were parents of persons with intellectual disability. The dominant gender of people with intellectual disability the respondents represented in the survey were females compared to the number of male and both genders. The result implies that the acceptability and impact of Viamigo shows variation and similarity according to the different roll of the participants. Regarding the usefulness dimension of acceptability special need teachers were more likely to exhibit acceptability for usefulness of Viamigo than the other group of respondents. Respondents representing people with intellectual disability age group (11 - 15) more likely to exhibit acceptability for usefulness of Viamigo than the other age groups. However, parents and family member of persons with intellectual disability representing person with intellectual disability (age group 1 to 5) was associated with a reduction in the likelihood of acceptability regarding usefulness of Viamigo. For acceptability regarding the other dimensions of acceptability such as reliability, simplicity, safety, and aesthetics acceptability also shows variation with respect to the different roll of the participants. For the reliability dimension of acceptability, parents of people with intellectual disability and special need teachers showed moderate and high agreement respectively. Regarding the safety dimension, parents of people with intellectual disability, educator of person/persons with intellectual disability and caregivers of person/persons with intellectual disability showed moderate to high agreement with the safety of Viamigo. Regarding the aesthetics attributes of Viamigo special need teachers and caregivers of person/persons with intellectual disability highly agreed with the attractiveness of Viamigo. On the contrary, acceptability regarding affordability, social acceptability with respect to easing the burden of parents, care givers and coaches by sharing the responsibility of taking care of the person/persons with intellectual disability (a),

acceptability regarding social acceptability (b) and acceptability regarding efficiency there is no significant difference with respect to the role of the participants. Regarding affordability the acceptability agreement level was low with respect to all the participants.

Regarding the potential impact of the mobility assistive device Viamigo there is no significant variation in response according to the different group of respondents. The survey result found out that the participants of the study moderately agreed, on the potential impact the mobility assistive device Viamigo on increasing the number of trips performed, on helping boost confidence to travel more, increasing trip to travel to visit friends and family, increasing trip to travel to the market, increasing trip travel for recreational purposes, expanding their admittance to jobs, markets, health facilities and schools, increasing their social inclusion and the mobility assistive device Viamigo will encourage people with intellectual disabilities to explore new transport routes and unfamiliar destination, they have never traveled before.

## **6.2 RECOMMENDATION**

The following general and specific recommendation are forwarded based literature review on important factors that influence assistive technology adoption, access, and use for people with intellectual disabilities such as (1) attitudes from the community, (2) knowledge and awareness to identify assistive technology need and (3) assistive technology training and instructions to support the user and care network. (Boot et al., 2021) and characteristics of successful adoption of assistive technology. Successful adoption of assistive technology necessitates collaboration between four groups: the user, those who support and interact with him/her daily, such as family members, friends, educators, therapists, doctors, and employers, and assistive technology specialists who are knowledgeable about a variety of tools and who fosters a collaborative decision-making process and assistive tool developers. (Kintsch, et al., 2002).



## **Inclusive Transportation System Design**

The survey results on transport problems of people with intellectual disabilities in Ethiopia indicated absence of supportive and accessible transportation, infrastructure that is not adopted for people with intellectual disability, poor transportation services, lack of availability of public transport and challenges in using public transport and lack of inclusive transportation system design. As a collective good, accessibility and inclusive transportation system design should be promoted. Government and development organizations should define and capture the socioeconomic added value that benefits the entire population, not just a specific set of people, such as people with disabilities. In this endeavor, the ministry of transport, the Ethiopian road authority, and other stakeholders, including the private sector, need to join hands to increase and improve availability of accessible and inclusive transport for persons with intellectual disabilities in Ethiopia.

## **Attitudes from the Community**

Attitude from the community is one of the important factors that influence assistive technology access and use. (Boot et al., 2021). According to a research finding from Weldeab & Opdal, (2007), in Ethiopia inadequate formal/casual backings, horrible perspectives with respect to the public towards youngsters with intellectual disability is one of the difficulties parents face raising children with intellectual disability. Work should be done to change community attitudes toward disability through the creation of inclusive communities (both in terms of the physical and constructed environment, as well as civic life), the protection of rights, justice, and legislation (being statutory protections - that includes anti-discrimination measures for parties), Personal and community assistance for people with disabilities (including their active involvement in society with the adoption of a person-centered model); learning and skills (related to early childhood schooling, further education, and vocational education); and health and wellness. (Gauntlett, 2019).

## **Knowledge and Awareness to Identify Assistive Technology Need**

Knowledge and awareness to identify assistive technology need is one of important factors that influence assistive technology access and use. (Boot et al., 2021). Model

of the acceptability of assistive technology developed by (McCREADIE et al, 2005) suggests that the acceptability of assistive technology relies upon the cooperation between a 'felt need' for help, the acknowledgment of 'Product quality' – the efficiency, dependability, straightforwardness and safety of the technology or device, and its availability and cost. People must be aware of the available assistive technology providers to receive an assistive technology assessment. Retailers and producers of assistive equipment said that social media was assisting caretakers in finding them, but that they would not know where to look otherwise. (Boot et al., 2021). Knowledge and awareness program should be done to identify assistive technology need as well as assistive technology availability. This can be done through creating awareness of the need/problem and demonstrating the basic solution to that need/problem.

### **Assistive Technology Training and Instructions to Support the User and Care Network**

Assistive technology training and instructions to support the user and care network is one of important factors that influence assistive technology access and use. (Boot et al., 2021). Furthermore, Boot et al., (2021), states that the provision of assistive technology support, including assistive technology training and instructions, is the most important aspect in ensuring continuous use. If assistive technology is delivered to a user and their care network without any training or instructions, it is likely that they will not use it. Furthermore, people who can use their assistive technology independently will be more likely to continue doing so. Thus, training on the mobility assistive device Viamigo and instruction should be provided to the user and the care network for the successful transferability access and use of the mobility assistive device Viamigo among people with intellectual disabilities in Ethiopia.

### **General Recommendation for Stakeholders for Successful Transferability of Viamigo in Ethiopia**

The following recommendation was made based on participants/stakeholders' characteristics for the successful adoption of assistive technology. As indicated by Kintsch et al. (2002), each participant or stakeholder in assistive technology adoption brings certain contributions and attributes to the device's creation, selection, learning

to operate, and integration into the user's daily life. According to Kintsch et al. (2002), an assistive technology user should want to alter what they can accomplish, be self-disciplined and have a high frustration tolerance, be pleased to use the device, and be willing to incorporate the tools into their daily routine. Caregivers should be able to put forth the effort necessary to learn to use and personalize the tool, support the user in using the new tool, welcome the changes the tool brings to the social dynamic, and understand that customization is not a one-time deal and may need to be continued throughout the technology's life. Furthermore, assistive technology specialists/adopters should have a broad understanding of assistive technology, a willingness to learn about new tools as they become available, facilitate a collaborative rather than directive process, provide training and support in both programming and integration, and be sensitive to family values and cultural differences. Developers should have a thorough understanding of functional limitations, create configurable tools, create tools that are easy to set up, create tools that are durable, accommodate customer aesthetic preferences, and provide users with technical assistance and quick repair times. Thus, for the successful transferability of the mobility assistive technology Viamigo there should be collaboration between stakeholders such as the user, those who support and interact with him/her daily, such as family members, friends, educators, special need teachers, therapists, doctors, and employers, policy makers and assistive technology specialists who are knowledgeable about a variety of tools and who fosters a collaborative decision-making process and assistive tool developers

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## Appendices

### Appendix I: English Questionnaire guides

#### **The Acceptability and Impact of the Use of the Mobility Assistive Technology Viamigo Among People with Intellectual Disability in Ethiopia.**

Viamigo offers passive monitoring of trips by a remote coach. The geographic information system–based application “Viamigo” was first developed, in order to both support the independent outdoor mobility of persons with intellectual disabilities themselves and reduce the caregivers’ burden, which allows a personal coach to monitor an individual in real time from a distance. Purpose of the questionnaire is to assess the acceptability and impact the mobility assistive device Viamigo among people with intellectual disabilities in Addis Ababa, Ethiopia with special focus on coaches, care givers, special need schoolteachers and relevant stakeholders in Ethiopia. My name is Amanuel Nigatu Regassa, this questionnaire is in the context of my Master thesis about the acceptability and impact of Viamigo, in the Master of Transportation Sciences of Hasselt University (Belgium). Thus, your contribution has a paramount importance for the quality of the paper. The average duration to complete the questionnaire takes 10 to 15 minutes. Only give 1 answer option (unless mentioned differently). Confidentiality is guaranteed, so pleas answer questions openly and honestly. With respect to GDPR (General Data Protection Regulation), I kindly ask your consent to use this data in the in the context of my research.

**Sincerely,** Amanuel Nigatu Regassa

**Phone:** +32 478 05 94 57

**Email:** amiyeeee@gmail.com

## **I thank you in advance for your cooperation**

### **Roll of Participant:**

- Parent of person with intellectual disability
- Family member of person with intellectual disability
- Educator of person/persons with intellectual disability
- Caregivers of person/persons with intellectual disability
- Other

### **Relationship with the person with intellectual disability:**

- Parent of person with intellectual disability
- Family member of person with intellectual disability
- Educator of person/persons with intellectual disability
- Caregivers person/persons with intellectual disability
- Other

**Sex of the person with intellectual disability: .....**

**Age of the person with intellectual disability: .....**

**Name of Care Center/Organization: .....**

### **Part 1: Acceptability of the mobility assistive device Viamigo among people with intellectual disabilities in Ethiopia.**

1. To what extent do you feel that the mobility assistive technology Viamigo will be of use to people with intellectual disability? A score of 0 means that the system will be of no use to them while a score of 1 means that the system will always be of use to them.

- 0**
- 1**

If you gave a score of '0', why do you think the mobility assistive technology Viamigo will be of no use to them (You can choose the top 4 reasons and rank them from 1 to 4)?

- They never travel outside of their homes and care centers.
- They prefer only to travel with only the people they know.

- They are afraid to go out on their own and they will be exposed to danger.
- Their families and care givers won't let them go out on their own
- They know their surrounding very well and they can travel on their own
- Traveling with assistive device doesn't make any difference to their safety
- Other

2. In what ways do you think traveling with the mobility assistive technology Viamigo will make the person with intellectual disability travel any differently?

- By contributing to a more independent living
- By eliminating transportation barriers
- By Facilitating their mobility
- Other

3. As a family, coach or care center provider do you think a monthly subscription fee of 718,50 Ethiopian Birr is an affordable price for the service of the mobility assistive technology Viamigo if it was able to be offered to the person with intellectual disability?

*Note: Price variation include if people subscribe for a longer period (which can be cheaper). Care institutions or organizations (e.g. schools for special needs children) can also obtain a package price with several licenses (which will be cheaper than the individual cost).*

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

5. As a family, coach or care center provider did you expect people with intellectual disability will have a problem regarding the usage of the mobility assistive technology Viamigo?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

If you agree, was it because (you can select more than one response)

- Because of the device being too advanced
- Because of the device being too complicated
- Because of the rare usage of even smart phone by people with intellectual disability in Ethiopia
- Because of unwillingness of families to let them go on their own
- Other

<p>4. To what extent do you agree or disagree with each of the following statements? The options range from strongly disagree to strongly agree.</p>	
<p>(a) The mobility assistive technology Viamigo eases the burden of parents, care givers and coaches by sharing the responsibility of taking care of the person/persons with intellectual disability?</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Strongly agree</li> <li><input type="checkbox"/> Agree</li> <li><input type="checkbox"/> Neither agree nor disagree</li> <li><input type="checkbox"/> Disagree</li> <li><input type="checkbox"/> Strongly disagree</li> </ul>
<p>(b) The mobility assistive technology Viamigo is recommended for all people with intellectual disability</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Strongly agree</li> <li><input type="checkbox"/> Agree</li> <li><input type="checkbox"/> Neither agree nor disagree</li> <li><input type="checkbox"/> Disagree</li> <li><input type="checkbox"/> Strongly disagree</li> </ul>

6. The mobility assistive device Viamigo will efficiently assist the independent movement of the person with intellectual disability.

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

7. Persons with intellectual disability can rely on Viamigo to travel independently.

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

8. The mobility assistive technology Viamigo is simple enough to be used by persons with intellectual disability.

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

9. The mobility assistive technology Viamigo is reliable enough to be used by persons with intellectual disability.

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

10. The mobility assistive technology Viamigo is attractive enough to be used by persons with intellectual disability.

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

**Part 2: Impact of the mobility assistive device Viamigo among people with intellectual disabilities in Ethiopia.**

1. If the person with intellectual disability uses the mobility assistive device Viamigo, do you think that the number of trips performed by them will increase?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree.

If your answer you agree with the above statement, how do you think Viamigo will increase their mobility? You can select more than one answer.

- By boosting confidence to travel independently
- By encouraging users to try diverse mode of transports
- By promoting independent travel
- By promoting trips both short and longer excursions
- Other

2. If the person with intellectual disability uses the mobility assistive device Viamigo will it help in boosting their confidence to travel more?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree.

If you agree with the above statement to what extent do you think it will boost their confidence to travel more independently and confidently? You can select more than one answer.

- Traveling alone both for short and longer trips
- Traveling using public transport independently
- Encouraged to travel to Unfamiliar destinations independently
- Empower them to explore the public transportation systems
- Empower them to try new mode of transports not used before
- Other

3. What effect the mobility assistive technology Viamigo have on the travel behavior of the person with intellectual disability for the following reasons? You can select more than one answer.

- Increase trip to travel to visit friends and family
- Increase trip to travel to the market
- Increase trip travel for recreational purposes
- Other

4. If the person with intellectual disability uses the mobility assistive device Viamigo it will expand their admittance to jobs and schools. To what extent do you agree or disagree?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

5. If the person with intellectual disability use the mobility assistive device Viamigo it will expand their trip to markets and health facilities. To what extent do you agree or disagree?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

6. If you agree to question 5 and 6 to what extent do you agree with the statement below

*The expanded trip and admittance to jobs, schools, markets and health facilities increase the social inclusion of the person with the intellectual disability.* To what extent do you agree or disagree?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

7. If the person with the intellectual disability starts utilizing the mobility assistive device Viamigo it will empower them to explore the public transportation systems in the city. To what extent do you agree or disagree?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

8. If people with intellectual disability use the mobility assistive device Viamigo it will encourage them to explore new transport routes and unfamiliar destination, they have never traveled before. To what extent do you agree or disagree?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

9. If people with intellectual disability use the mobility assistive device Viamigo does the utilization of the application helps them overcome transportation challenges they encounter?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

If you agree with the above statement what sort of transportation challenges do you think it can help them overcome?

- Overcoming lack of confidence and fear of traveling alone
- Overcoming challenge of using public transport alone
- Overcoming fear of traveling to longer distances
- Overcoming fear of traveling to unfamiliar destinations
- If other, please specify.....

10. If you agree with question number 9 to what extent do you agree with the statement below?

*Overcoming transportation challenges helps people with intellectual disability accomplish higher social inclusion in the community.*



(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree

### **Part 3: Travel behavior and Transport problems of people with intellectual disabilities in Ethiopia**

1. Do the person/persons with intellectual disability travel alone?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree.

If you agree, how often do you think the person with intellectual disability travel alone?

- A. Daily
- B. Several times a week
- C. Weekly
- D. Several times a month

2. Do the person/persons with intellectual disability travel with others?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree.

If you agree, how often do you think the person with intellectual disability travel with others?

- A. Daily
- B. Several times a week
- C. Weekly
- D. Several times a month

3. Do people with intellectual disabilities dependent on family, care givers and friends to travel from one place to another?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree.

If you agree, what is the reasons for their dependencies? You can choose the top 3 reasons and rank them from 1 to 3

- Due to absence of accessible transportation
- Challenges in using Public Transport
- Due to fear of traveling alone due to difficulties caused by unsupportive people as well as social stigma.
- Due to lack of security
- Other

4. Do the person/persons with intellectual disability use the public transport?

- (1) Strongly disagree
- (2) Disagree
- (3) Neutral
- (4) Agree
- (5) Strongly agree

5. Which travel mode do you think people with intellectual disability use to travel?	Frequency of using travel mode	What is the reason, the person with intellectual disability avoid using the public transport? You can select more than one answer.
<ul style="list-style-type: none"> <li><input type="checkbox"/> Walking</li> <li><input type="checkbox"/> Public transport for example. Bus, Minibuses, or the Train</li> <li><input type="checkbox"/> Cycling</li> <li><input type="checkbox"/> Private Vehicles</li> <li><input type="checkbox"/> Ride Taxies</li> <li><input type="checkbox"/> Other</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Daily</li> <li><input type="checkbox"/> Weekly</li> <li><input type="checkbox"/> Several times a week</li> <li><input type="checkbox"/> Several times a month</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Absence of supportive and accessible public transportation</li> <li><input type="checkbox"/> Due to infrastructure that is not adopted for people with intellectual disability</li> <li><input type="checkbox"/> Challenges in using public transport and poor transportation services</li> <li><input type="checkbox"/> Unsafe and undeveloped transportation system</li> <li><input type="checkbox"/> Due to costly transport</li> <li><input type="checkbox"/> lack of public transport that serves long journeys.</li> <li><input type="checkbox"/> lack of data giving technologies for example applications which give live updates about the public transport</li> </ul>

6. For which social activity people with intellectual disabilities participate in the community?	How often you think is the frequency of participation of the person/persons with intellectual disabilities in the social activity?
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<input type="checkbox"/> Never/they rarely participate in social activities <input type="checkbox"/> For a visit to family and friends <input type="checkbox"/> To participate in religious and non-religious ceremonies <input type="checkbox"/> To attend church <input type="checkbox"/> For paying condolences <input type="checkbox"/> To participate in traditional organization For Example Edir and Ekub <input type="checkbox"/> Other	<input type="checkbox"/> Daily <input type="checkbox"/> Several times a week <input type="checkbox"/> Weekly <input type="checkbox"/> Several times a month
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**7.** If your answer to the above question is Never/they rarely participate in social activities what do you think is the hindrances to the social inclusion?

- Location
- lack of availability of transportation
- lack of accessibility to transportation
- Lack of company to go 'out' with
- Other

**8.** Do you think people with intellectual disability feel safe to go out on their own to visit their families or friends, to go to care centers, market, education or jobs?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree.

If you disagree, what are the factors that restricts them from going out on their own? You can select more than one answer

- Challenges in using Public Transport
- Lack of cognitive-processing skills such as time management, literacy, problem-solving skill, attention span requirements and etc
- Unsafe and unsupportive transportation system
- Fear of robbers, thieves or being robbed on the way

- Fear of traveling alone due to difficulties caused by unsupportive people as well as social stigma.
- Fear of going out due to horrible perspectives with respect to the public towards persons with intellectual disability
- Other

**9.** Do you feel safe if people with intellectual disability go out on their own to visit their families or friends, to go to care centers, market, education, or jobs?

- (1) Strongly disagree
- (2) Disagree
- (3) Neutral
- (4) Agree
- (5) Strongly agree

**10.** Do you think developed, supportive and Specialized transportation system exist in the city that are designed to accommodate people with intellectual disabilities?

(1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree.

If you disagree, what do you think is the reason for lack of supportive specialized transport systems equipped with multichannel and multisensory Signage technology used easy for dissemination of information and technology which offers a support for people with intellectual disabilities in the city of Addis Ababa, Ethiopia?

- Lack of inclusive transportation system design
- Inadequate formal/casual support for people with intellectual disability
- Lack of concern by the government for people with intellectual disability
- Economical condition of the country to develop the transport system as needed
- Other

**11.** Does the use of smartphones common among the person/persons with intellectual disability you support?

- A. Very common
- B. Occasionally
- C. Very rarely
- D. Never

If your answer is very rarely or never what is the reason? You can select more than one answer

- Due to financial hinderance
- Due to difficulties of understanding and usage
- Due to lack of necessity
- Due to lack of availability of accessible cellphone for person with intellectual disabilities
- Due to fear of losing and damaging
- Other

12. Do the person with intellectual disability has ever used any mobility assistive devices?	If Agree which type of device does the person with intellectual disability used?	If you disagree what do you think is the reason they don't use?
<ul style="list-style-type: none"> <li><input type="checkbox"/> (1) Strongly disagree</li> <li><input type="checkbox"/> (2) Disagree</li> <li><input type="checkbox"/> (3) Neutral</li> <li><input type="checkbox"/> (4) Agree</li> <li><input type="checkbox"/> (5) Strongly agree</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Wayfinding tools</li> <li><input type="checkbox"/> Smart phone applications such as Ride and ZayRide applications to assist them travel independently on ride taxies or public transports?</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Mobility assistive device is not common in Ethiopia</li> <li><input type="checkbox"/> They don't travel alone</li> <li><input type="checkbox"/> They don't have smartphones</li> <li><input type="checkbox"/> They don't have enough financial means to purchase mobility assistive devices or smartphone application technologies which offers support for transport</li> <li><input type="checkbox"/> Other</li> </ul>

## Appendix II: Amharic Questionnaire guides

### **የመንቀሳቀስ (ጉዞ) ድጋፍ ቴክኖሎጂ (ቪዲዮ) አጠቃቀም ተቀባይነት እና ተፅእኖ በኢትዮጵያ ውስጥ የአእምሮ ፊደግት ውስንነት ካለባቸው ሰዎች መካከል።**

ቪዲዮ ገቢ በርቀት አሰልጣኝ እንቅስቃሴን/ጉዞን መከታተል ያስችላል። የጂዮግራፊያዊ የመረጃ ስርዓት-ተኮር ትግበራ “ቪዲዮ” በመጀመሪያ የተገነባው ፣ የአእምሮ ፊደግት ውስንነት ያለባቸውን ሰዎች ነፃ ከቤት ውጭ እንቅስቃሴን ለመደገፍ እና የእንክብካቤ ሰጪዎችን ሸክም ለመቀነስ ፣ የግል አሰልጣኝ አንድን ግለሰብ በእውነተኛ ጊዜ እንዲከታተል ያስችለዋል። የመጠይቁ ዓላማ በአዲስ አበባ ፣ ኢትዮጵያ በአሰልጣኞች ፣ በእንክብካቤ ሰጪዎች ፣ በልዩ ፍላጎት ትምህርት ቤት መምህራን እና በሚመለከታቸው ባለድርሻ አካላት ላይ ልዩ ትኩረት በማድረግ የእንቅስቃሴ ድጋፍ ሰጪ መሳሪያ ቪዲዮ ተቀባይነት እና ተፅእኖን ለመገምገም ነው። ስሜ አማኑኤል ንጋቱ ረጋሳ ነው።፣ ይህ መጠይቅ በሃሴልት ዩኒቨርሲቲ (ቤልጂየም) የትራንስፖርት ሳይንስ ማስተርስ ትምህርት መመረቂያ ጥናታዊ ጽሁፍ፣ ትኩረቱን የመንቀሳቀስ (ጉዞ) ድጋፍ ቴክኖሎጂ (ቪዲዮ) ተቀባይነት እና ተፅእኖ ላይ ባደረገው ማማያነት ያገለግላል። ስለዚህ የእርስዎ ድርሻ ለወረቀቱ ጥራት እጅግ አስፈላጊ ነው። መጠይቁን ለማጠናቀቅ አማካይ ቆይታ ከ 10 እስከ 15 ደቂቃዎችን ይወስዳል። 1 መልስ አማራጭን ብቻ ይስጡ (በተለይ ካልተጠቀሰ በስተቀር)። ምስጢራዊነት የተረጋገጠ ነው ፣ ስለሆነም ጥያቄዎችን በግልጽ እና በጠቀኝነት ይመልሱ። ከ ጂዲፒር (አጠቃላይ የመረጃ ጥበቃ ደንብ) ጋር በተያያዘ ፣ ይህንን ምርመራ በጥናቱ አውድ ውስጥ ለመጠቀም የእርስዎን ፈቃድ በትህትና እጠይቃለሁ።

ከሠላምታ ጋር ፣ አማኑኤል ንጋቱ ረጋሳ።

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ከተስማሙ ፣ የአእምሮ ዕድገት ውስንነት ያለው ሰው ብቻውን የሚሄድ ይመስልዎታል?

ሀ. በየቀኑ ሐ. በየሳምንቱ

ለ. በሳምንት ብዙ ጊዜ ሙ. በወር ብዙ ጊዜ

3. የአእምሮ ዕድገት ውስንነት ያለባቸው ሰዎች ከአንድ ቦታ ወደ ሌላ ቦታ ለመጓዝ በቤተሰብ ፣ በእንክብካቤ ሰጪዎች እና በጓደኛዎቻቸው ላይ ጥገኛ ናቸው ።?

(1) በጥብቅ አልስማማም ፣ (2) አልስማማም ፣ (3) ገለልተኛ ፣ (4) እስማማለሁ ፣ (5) በጥብቅ እስማማለሁ ።.

ከተስማሙ ለጥገኛነታቸው ምክንያቶች ምንድናቸው?? ዋናዎቹን 3 ምክንያቶች በመምረጥ እና ከ 1 እስከ 3 ደረጃ መስጠት ይችላሉ ።

- ተደራሽ የመጓጓዣ አለመኖር
- የሕዝብ መጓጓዣን የመጠቀም ችግር
- ድጋፍ ሰጪ ባልሆኑ ሰዎች እና በማህበራዊ መገለል ምክንያት ለብቻው መጓዝ መፍራት.
- በደህንነት ስጋት ምክንያት
- ሌላ

4. የአእምሮ ዕድገት ውስንነት ያለበት ሰው የህዝብ መጓጓዣን ይጠቀማል?

(1) በጥብቅ አልስማማም ፣ (2) አልስማማም ፣ (3) ገለልተኛ ፣ (4) እስማማለሁ ፣ (5) በጥብቅ እስማማለሁ

5. የትኛውን የጉዞ ሁኔታ የአእምሮ ዕድገት ውስንነት ያለባቸው ሰዎች ለመጓዝ ይጠቀማሉ ብለው ያስባሉ ?	የጉዞ ሁኔታን የመጠቀም ድግግሞሽ።	ምክንያቱ ምንድነው ፣ የአእምሮ ዕድገት ውስንነት ያለው ሰው የህዝብ መጓጓዣን ከመጠቀም ይቆጠባል።? ከአንድ በላይ መልስ መምረጥ ይችላሉ ።.
<input type="checkbox"/> መራመድ <input type="checkbox"/> የህዝብ ትራንስፖርት ፣ ለምሳሌ. አውቶቡስ ፣ ሚኒባስ ወይም ባቡር። <input type="checkbox"/> የእግር ጉዞ <input type="checkbox"/> የግል ተሽከርካሪዎች። <input type="checkbox"/> ሪይድ ታክስ። <input type="checkbox"/> ሌላ።	<input type="checkbox"/> ዕለታዊ <input type="checkbox"/> ሳምንታዊ <input type="checkbox"/> በሳምንት ብዙ ጊዜ። <input type="checkbox"/> በወር ውስጥ ብዙ ጊዜ።	<input type="checkbox"/> ደጋፊ እና ተደራሽ የሆነ የህዝብ መጓጓዣ አለመኖር። <input type="checkbox"/> የአእምሮ ዕድገት ውስንነት ላለባቸው ሰዎች ተቀባይነት የሌለው መሰረተ ልማት <input type="checkbox"/> የህዝብ ትራንስፖርት እና ደካማ የመጓጓዣ አገልግሎቶችን በመጠቀም ላይ ያሉ ችግሮች ። <input type="checkbox"/> ያልተስተካከለ እና ያልተሻሻለ የመጓጓዣ ስርዓት። <input type="checkbox"/> ውድ ዋጋ ያለው ትራንስፖርት ። <input type="checkbox"/> ረጅም ጉዞዎችን የሚያገለግል የህዝብ ትራንስፖርት እጥረት።



		<input type="checkbox"/> ለምሳሌ ስለ ህዝብ መጓጓዣ የቀጥታ አየር ላይ መረጃ የሚሰጡ ቴክኖሎጂዎችን የሚሰጥ የመረጃ እጥረት ።
6. ለየትኛው ማህበራዊ እንቅስቃሴ የአእምሮ ፅድገት ውስንነት ያለባቸው ሰዎች በማህበረሰቡ ውስጥ ይሳተፋሉ ።?	በማህበራዊ እንቅስቃሴ ውስጥ የአእምሮ ፅድገት ውስንነት ያለባቸው ሰዎች / ግለሰቦች ተሳትፎ ድግግሞሽ ምን ያህል ጊዜ ይመስልዎታል??	
<input type="checkbox"/> በጭራሽ / በማህበራዊ እንቅስቃሴዎች ውስጥ ብዙም አይሳተፉም ። <input type="checkbox"/> ለቤተሰብ እና ለጓደኞች ጉብኝት ። <input type="checkbox"/> በሃይማኖታዊ እና ሃይማኖታዊ ባልሆኑ ሥነ ሥርዓቶች ውስጥ ለመሳተፍ ። <input type="checkbox"/> በቤተክርስቲያን ለመገኘት ። <input type="checkbox"/> ሀዘንን ለመክፈል። <input type="checkbox"/> በባህላዊ ድርጅት ውስጥ ለመሳተፍ ለምሳሌ ዕቁብ እና ዕድር ። <input type="checkbox"/> ሌላ።	<input type="checkbox"/> በየቀኑ <input type="checkbox"/> በየሳምንቱ <input type="checkbox"/> በሳምንት ብዙ ጊዜ <input type="checkbox"/> በወር ብዙ ጊዜ	

7. ከላይ ለተጠቀሰው ጥያቄ መልስዎ በጭራሽ / በጭራሽ በማህበራዊ እንቅስቃሴዎች ውስጥ አይሳተፉም ። ለማህበራዊ ማካተት እንቅፋቶች ምንድን ናቸው ብለው ያስባሉ።?

- የሚኖሩበት ቦታ
- የመጓጓዣ እጥረት
- የመጓጓዣ ተደራሽነት አለመኖር
- አንድ ላይ አብሮ የሚጓዙ ጓደኛ አለመኖር
- ሌላ

8. የአእምሮ ፅድገት ውስንነት ያለባቸው ሰዎች ቤተሰቦቻቸውን ወይም ጓደኞቻቸውን ለመጎብኘት ፣ ወደ እንክብካቤ ማዕከሎች ፣ ወደ ገበያ ፣ ትምህርት ወይም ስራዎች በራሳቸው ለመሄድ ደህንነት ይሰማቸዋል ብለው ያስባሉ?

- (1) በጥብቅ አልስማማም ፣ (2) አልስማማም ፣ (3) ገለልተኛ ፣ (4) እስማማለሁ ፣ (5) በጥብቅ እስማማለሁ

ካልተስማሙ በራሳቸው እንዳይሄዱ የሚከለክሏቸው ምክንያቶች ምንድናቸው?? ከአንድ በላይ መልስ መምረጥ ይችላሉ ::

- የሕዝብ መጓጓዣን መጠቀም
- እንደ ጊዜ አጠቃቀም ፣ ማንበብና መጻፍ ፣ የችግር መፍታት ችሎታ ፣ የትኩረት ጊዜ ፍላጎቶች እና ወዘተ ያሉ የእውቀት (ኮግኒቲቭ) ሂደት ችሎታዎች እጥረት።
- ደህንነቱ ያልተጠበቀ እና ድጋፍ የማይሰጥ የመጓጓዣ ስርዓት።
- ዘራፊዎች ፣ ሌቦች ወይም በመንገድ ላይ ዘረፋዎች ፍርሃት ።
- ድጋፍ ሰጪ ባልሆኑ ሰዎች እና በማህበራዊ መገለል ምክንያት በተከሰቱ ችግሮች ምክንያት ብቻውን መጓዝ ፍርሃት ።
- የአእምሮ ሰደገነት ውስንነት ላለባቸው ሰዎች ከህዝብ ጋር በተያያዘ ጥሩ ባልሆኑ አመለካከቶች የተነሳ የመውጣት ፍርሃት ።
- ሌላ።

9. የአእምሮ ሰደገነት ውስንነት ያለባቸው ሰዎች ቤተሰቦቻቸውን ወይም ጓደኞቻቸውን ለመጎብኘት ፣ ወደ እንክብካቤ ማዕከሎች ፣ ወደ ገበያ ፣ ትምህርት ወይም ስራዎች ለመሄድ ቢወጡ ደህንነት ይሰማዎታል?

- (1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

10. በከተማ ውስጥ የአእምሮ ሰደገነት ውስንነት ያለባቸውን ሰዎች ለማስተናገድ የተነደፉ የተሻሻሉ ፣ ደጋፊ እና ልዩ የትራንስፖርት ሥርዓት አለ ብለው ያስባሉ?

(1) በጥብቅ አልስማማም ፣ (2) አልስማማም ፣ (3) ገለልተኛ ፣ (4) እስማማለሁ ፣ (5) በጥብቅ እስማማለሁ

ካልተስማሙ ፣ በኢትዮጵያ በአዲስ አበባ ከተማ ውስጥ ለአእምሮ ሰደገነት ውስንነት ድጋፍ የሚሰጥ የመረጃ እና የቴክኖሎጂ ማሰራጨት ቀላል እና ድጋፍ ሰጪ ልዩ የትራንስፖርት ስርዓቶች እጥረት ምክንያት ምን ይመስልዎታል?

- ሁሉን አቀፍ የትራንስፖርት ስርዓት ንድፍ አለመኖር።
- የአእምሮ ሰደገነት ውስንነት ላለባቸው ሰዎች ተገቢ ያልሆነ መደበኛ / አልፎ አልፎ ድጋፍ።
- የአእምሮ ሰደገነት ውስንነት ላለባቸው ሰዎች መንግስት አሳቢነት የጎደለው ነው ።
- እንደአስፈላጊነቱ የትራንስፖርት ስርዓቱን ለማዳበር የአገሪቱ ኢኮኖሚያዊ ሁኔታ።
- ሌላ።

11. እርስዎ በሚደግፉት የአእምሮ ሰደገነት ውስንነት ያለባቸው ሰዎች መካከል ስማርትፎኖችን መጠቀም የተለመደ ነው?

ሀ. በጣም የተለመደ

ሐ. በጣም አልፎ አልፎ

ለ. አልፎ አልፎ

መ. በጭራሽ

መልስዎ በጣም አልፎ አልፎ ከሆነ ወይም ምክንያቱ ምን እንደሆነ።? ከአንድ በላይ መልስ መምረጥ ይችላሉ

- በገንዘብ አለመኖር ምክንያት።
- የመረዳት እና የአጠቃቀም ችግሮች ምክንያት።
- አስፈላጊነት አለመኖር።
- የአእምሮ ሰድገት ውስንነት ላለባቸው ሰዎች ተደራሽ የሆነ የሞባይል ስልክ አለመኖር።
- መጥፋት እና ጉዳት ማድረስ መፍራት።
- ሌላ።

<p><b>12. የአእምሮ ሰድገት ውስንነት ያለበት ሰው ማንኛውንም የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያዎችን ተጠቅሞ ያቃል?</b></p>	<p>የአእምሮ ሰድገት ውስንነት ያለበት ሰው የእንቅስቃሴ መሣሪያ እንደሚጠቀም ከተስማሙ የትኛውን ዓይነት መሣሪያ?</p>	<p>ካልተስማሙ የማይጠቀሙበት ምክንያት ምን ይመስልዎታል??</p>
<ul style="list-style-type: none"> <li><input type="checkbox"/> (1) በጥብቅ አልስማማም ፣</li> <li><input type="checkbox"/> (2) አልስማማም ፣</li> <li><input type="checkbox"/> (3) ገለልተኛ ፣</li> <li><input type="checkbox"/> (4) እስማማለሁ ፣</li> <li><input type="checkbox"/> (5) በጥብቅ እስማማለሁ</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> የአቅጣጫ መፈላጊያ መሳሪያዎች</li> <li><input type="checkbox"/> ገለልተኛ የስልክ ትግበራዎች እንደ ሪይድ እና ዛይራይድ አፕሊኬሽኖች በሪይድ ታክስ ወይም በሕዝባዊ መጓጓዣዎች ላይ በግል እንዲጓዙ ለመርዳት</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> የእንቅስቃሴ ድጋፍ መሣሪያ በኢትዮጵያ ውስጥ የተለመደ አይደለም ።</li> <li><input type="checkbox"/> እነሱ ብቻቸውን አይጓዙም ።</li> <li><input type="checkbox"/> እነሱ ስማርትፎኖች የላቸውም።</li> <li><input type="checkbox"/> የትራንስፖርት ድጋፍ ሰጪ መሣሪያዎችን ወይም ስማርትፎን መተግበሪያ ቴክኖሎጂዎችን ለመግዛት በቂ የገንዘብ አቅም የላቸውም ።</li> <li><input type="checkbox"/> ሌላ።</li> </ul>

**ክፍል ሁለት-በኢትዮጵያ ውስጥ የአእምሮ ሰድገት ውስንነት ላለባቸው ሰዎች የመንቀሳቀስ (ጉዞ) ድጋፍ ቴክኖሎጂ (ቪዲዮ) ተቀባይነት ::**

1. የመንቀሳቀስ (ጉዞ) ድጋፍ ቴክኖሎጂ (ቪዲዮ) የአእምሮ ሰድገት ውስንነት ላለባቸው ሰዎች ጠቃሚ እንደሚሆን እስከ ምን ድረስ ይሰማዎታል?? የ 0 ውጤት ማለት ስርዓቱ ለእነሱ ምንም ፋይዳ የለውም ማለት ሲሆን የ 1 ውጤት ደግሞ ስርዓቱ ሁል ጊዜ ለእነሱ ይጠቅማል ማለት ነው::

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የ '0' ውጤት ከሰጡ ታዲያ የመንቀሳቀስ (ጉዞ) ድጋፍ ቴክኖሎጂ (ቪዲዮ) ለእነሱ ምንም ፋይዳ የለውም ብለው ያስባሉ ( እስከ 4 ምክንያቶች ድረስ በመምረጥ እና ከ 1 እስከ 4 ደረጃ መስጠት ይችላሉ) ::?

- ከቤታቸው እና ከእንክብካቤ ማዕከሎቻቸው ውጭ በጭራሽ አይጓዙም ::.
- እነሱ ከሚያውቋቸው ሰዎች ጋር ብቻ መጓዝ ይመርጣሉ ::.
- እነሱ በራሳቸው ለመሄድ ይፈራሉ እናም ለአደጋ የተጋለጡ ይሆናሉ ::.
- ቤተሰቦቻቸው እና የእንክብካቤ ሰጪዎቻቸው በራሳቸው እንዲወጡ አይፈቅድም ::
- አካባቢያቸውን በደንብ ያውቃሉ እናም በራሳቸው መጓዝ ይችላሉ::
- በረዳት መሣሪያ መጓዝ ለደህንነታቸው ምንም ለውጥ አያመጣም::
- ሌላ::

2. ከተንቀሳቃሽነት ድጋፍ ሰጪ ቴክኖሎጂ ጋር መጓዝ . የአእምሮ ሰድገት ውስንነት ያለባትን ሰው በተለየ መንገድ እንዲጓዝ የሚያደርገው በምን መንገድ ነው??

- ይበልጥ ገለልተኛ ለሆነ ኑሮ በማበርከት::
- የመጓጓዣ መሳናክሎችን በማስወገድ::
- ተንቀሳቃሽነታቸውን በማመቻቸት::
- ሌላ::

3. እንደ ቤተሰብ ፣ አሰልጣኝ ወይም የእንክብካቤ ማእከል አቅራቢ ወርሃዊ የደንበኝነት ምዝገባ ክፍያ 720 የኢትዮ ብር ለመንቀሳቀስ (ጉዞ) ድጋፍ ቴክኖሎጂ (ቪዲዮ) አገልግሎት ተመጣጣኝ ዋጋ ነው ብለው ያስባሉ??

- (1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

**ማሳሰቢያ**- የዋጋ ልዩነት ሰዎች ረዘም ላለ ጊዜ ከተመዘገቡ (ርካሽ ሊሆን ይችላል) :: የእንክብካቤ ተቋማት

4. በሚቀጥሉት መግለጫዎች ምን ያህል ይስማማሉ ወይም አይስማሙም?? አማራጮች በጥብቅ ካልተስማሙ እስከ ጠንካራ እስማማለሁ ነው።	
(ሀ) የእንቅስቃሴ ድጋፍ ሰጪ ቴክኖሎጂ ሺያሜን የወለጆችን ፣ የእንክብካቤ ሰጪዎችን እና የአሰልጣኞችን ሽክም ያጠፋል / የአእምሮ ሰዎች ውስንነት ላለባቸው ሰዎች እንክብካቤ የማድረግ ሃላፊነት በማካፈል።?	<input type="checkbox"/> 1) በጥብቅ አልስማማም ፣ <input type="checkbox"/> (2) አልስማማም ፣ <input type="checkbox"/> (3) ገለልተኛ ፣ <input type="checkbox"/> (4) እስማማለሁ ፣ <input type="checkbox"/> (5) በጥብቅ እስማማለሁ
(ለ) የእንቅስቃሴ ድጋፍ ሰጪ ቴክኖሎጂ ሺያሜን ለሁሉም የአእምሮ ሰዎች ውስንነት ላለባቸው ሰዎች ይመከራል።	<input type="checkbox"/> 1) በጥብቅ አልስማማም ፣ <input type="checkbox"/> (2) አልስማማም ፣ <input type="checkbox"/> (3) ገለልተኛ ፣ <input type="checkbox"/> (4) እስማማለሁ ፣ <input type="checkbox"/> (5) በጥብቅ እስማማለሁ

ወይም ድርጅቶች (ለምሳሌ የልዩ ፍላጎት ልጆች ትምህርት ቤቶች) እንዲሁም በበርካታ ፈቃዶች (ከግለሰብ ዋጋ ይልቅ ርካሽ) የጥቅል ዋጋ ማግኘት ይችላሉ ።

5. እንደ ቤተሰብ ፣ አሰልጣኝ ወይም የእንክብካቤ ማእከል አቅራቢ የአእምሮ ሰዎች ውስንነት ያለባቸው ሰዎች የእንቅስቃሴ ድጋፍ ቴክኖሎጂ ሺያሜን አጠቃቀምን በተመለከተ ሊቸገሩ ይችላሉ ብለው ያስባሉ።?
- አዎ
  - የለም

«አዎ» የሚል ምላሽ ከሰጡ ምክንያቱም (ከአንድ በላይ ምላሽ መምረጥ ይችላሉ) ።

- መሣሪያው በጣም የላቀ ስለሆነ ነው።
- መሣሪያው በጣም የተወሰነ ስለሆነ ነው።
- በኢትዮጵያ የአእምሮ ሰዎች ውስንነት ላለባቸው ሰዎች ስማርትፎን እንኳን አልፎ አልፎ መጠቀምን ያሳያል ።
- ቤተሰቦች በራሳቸው እንዳይወጡ ፈቃደኛ ባለመሆናቸው ምክንያት።
- ሌላ።

6. የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያ ሺያሜን የአእምሮ ሰዎች ውስንነት ያለበትን ሰው ገለልተኛ እንቅስቃሴን በብቃት ይረዳል።
- (1) በጥብቅ አልስማማም ፣
  - (2) አልስማማም ፣

- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

7. የአጸምሮ ዕድገት ውስንነት ያለባቸው ሰዎች በተናጥል ለመጓዝ በቪዲዮ ሊተማሙ ይችላሉ።

- (1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

8. የእንቅስቃሴ ድጋፍ ቴክኖሎጂ ቪዲዮ ላይ የአጸምሮ ዕድገት ውስንነት ላለባቸው ሰዎች ለመጠቀም ቀላል ነው።

- (1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

9. የእንቅስቃሴ ድጋፍ ሰጪ ቴክኖሎጂ ቪዲዮ በአጸምሮ ዕድገት ውስንነት ላለባቸው ሰዎች ጥቅም ላይ ቢውል አስተማማኝ ነው

- 1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

10. የእንቅስቃሴ ድጋፍ ሰጪ ቴክኖሎጂ ቪዲዮ ላይ የአጸምሮ ዕድገት ውስንነት ያለባቸው ሰዎች ጥቅም ላይ እንዲያውሉት ማራኪ እና ሳቢ ነው ብለው ያምናሉ።

- 1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

**ክፍል ሦስት- በኢትዮጵያ ውስጥ የአእምሮ ፅድገት ውስንነት ላለባቸው ሰዎች የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያ ሺያሜጎ።**

1. የአእምሮ ፅድገት ውስንነት ያለበት ሰው የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያን የሚጠቀም ከሆነ ሺያሜጎ በእነሱ የሚከናወኑ የጉዞዎች ብዛት ይጨምራል ብለው ያስባሉ።?

- (1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

መልስዎ ከዚህ በላይ ባለው መግለጫ ከተስማሙ ሺያሜጎ ተንቀሳቃሽነታቸውን እንደሚጨምር ያስባሉ ።? ከአንድ በላይ መልስ መምረጥ ይችላሉ ።.

- በተናጥል ለመጓዝ በራስ መተማመንን ከፍ በማድረግ።
- ተጠቃሚዎች የተለያዩ የመጓጓዣ ሁኔታዎችን እንዲሞክሩ በማበረታታት።
- ገለልተኛ ጉዞን በማስተዋወቅ።
- አጭር እና ረዥም ሽርሽር ጉዞዎችን በማስተዋወቅ።
- ሌላ።

2. የአእምሮ ፅድገት ውስንነት ያለበት ሰው የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያን የሚጠቀም ከሆነ ሺያሜጎ የበለጠ ለመጓዝ ያላቸውን እምነት ከፍ ለማድረግ ይረዳል ።?

- (1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

ከዚህ በላይ ባለው መግለጫ ከተስማሙ በበለጠ ገለልተኛ እና በራስ መተማመን ለመጓዝ ያላቸውን እምነት የሚያበላጹግ ይመስልዎታል?? ከአንድ በላይ መልስ መምረጥ ይችላሉ ።.

- ለአጭር እና ረዥም ላለ ጊዜ ጉዞዎች ብቻውን መጓዝ።
- የህዝብ መጓጓዣን በመጠቀም መጓዝ።
- ወደ ያልታወቁ መድረሻዎች በተናጥል እንዲጓዝ በማነሳሳት።
- የህዝብ ትራንስፖርት ስርዓቶችን እንዲመረምሩ ያበረታቷቸዋል ።
- ከዚህ በፊት ጥቅም ላይ ያልዋሉ አዲስ የትራንስፖርት ዓይነቶችን እንዲሞክሩ ያስገድድቸዋል።
- ሌላ።

3. የእንቅስቃሴ ድጋፍ ሰጪ ቴክኖሎጂ ሺያሜጎ በሚከተሉት ምክንያቶች የአእምሮ ሰድገት ውስንነት ላለው ሰው የጉዞ ባህሪ ላይ ምን ተጽዕኖ ያሳድራል?? ከአንድ በላይ መልስ መምረጥ ይችላሉ ።
- ጓደኞችን እና ቤተሰብን ለመጎብኘት ጉዞን በማሳድግ።
  - ወደ ገበያው ለመጓዝ ጉዞን በማሳድግ።
  - ለመዝናኛ ዓላማዎች ጉዞን በማሳድግ።
  - ሌላ።
4. የአእምሮ ሰድገት ውስንነት ያለበት ሰው የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያ ሺያሜጎን የሚጠቀም ከሆነ ለስራዎች እና ለት / ቤቶች ያላቸውን አድናቆት ያስፋፋል። እስከ ምን ድረስ ይስማማሉ ወይም አይስማሙም??
- (1) በጥብቅ አልስማማም ፣
  - (2) አልስማማም ፣
  - (3) ገለልተኛ ፣
  - (4) እስማማለሁ ፣
  - (5) በጥብቅ እስማማለሁ
5. የአእምሮ ሰድገት ውስንነት ያለበት ሰው የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያ ሺያሜጎን የሚጠቀም ከሆነ ጉዞቸውን ወደ ገበያዎች እና የጤና ተቋማት ያስፋፋል ። እስከ ምን ድረስ ይስማማሉ ወይም አይስማሙም??
- (1) በጥብቅ አልስማማም ፣
  - (2) አልስማማም ፣
  - (3) ገለልተኛ ፣
  - (4) እስማማለሁ ፣
  - (5) በጥብቅ እስማማለሁ
6. በጥያቄ 5 እና 6 ላይ ከተስማሙ ከዚህ በታች ባለው መግለጫ ምን ያህል ይስማማሉ?
- የተዘረጋው ጉዞ እና ለስራ ፣ ለት / ቤቶች ፣ ለገበያዎች እና ለጤና ተቋማት ተቀባይነት ያለው የግለሰብ የአእምሮ ሰድገት ውስንነት ያለበት ሰው ማህበራዊ ማካተት ይጨምራል ። እስከ ምን ድረስ ይስማማሉ ወይም አይስማሙም??*
- (1) በጥብቅ አልስማማም ፣
  - (2) አልስማማም ፣
  - (3) ገለልተኛ ፣
  - (4) እስማማለሁ ፣
  - (5) በጥብቅ እስማማለሁ
7. የአእምሮ ሰድገት ውስንነት ያለበት ሰው የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያን ሺያሜጎን መጠቀም ከጀመረ በከተማው ውስጥ ያሉትን የህዝብ ትራንስፖርት ስርዓቶች ለመመርመር ያስችላቸዋል ። እስከ ምን ድረስ ይስማማሉ ወይም አይስማሙም??
- (1) በጥብቅ አልስማማም ፣
  - (2) አልስማማም ፣
  - (3) ገለልተኛ ፣
  - (4) እስማማለሁ ፣



(5) በጥብቅ እስማማለሁ

8. የአእምሮ ዕድገት ውስንነት ያለባቸው ሰዎች የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያን ሺያሜጎን የሚጠቀሙ ከሆነ አዳዲስ የትራንስፖርት መስመሮችን እና ያልተለመዱ መድረሻዎችን እንዲመረምሩ ያበረታታል ፣ ከዚህ በፊት በጭራሽ አልተጓዙም ። እስከ ምን ድረስ ይስማማሉ ወይም አይስማሙም??

- (1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

9. የአእምሮ ዕድገት ውስንነት ያላቸው ሰዎች የእንቅስቃሴ ድጋፍ ሰጪ መሣሪያን የሚጠቀሙ ከሆነ ሺያሜጎ የትግበራውን አጠቃቀም የሚያጋጥሟቸውን የትራንስፖርት ችግሮች ለማሸነፍ ይረዳቸዋል ።?

- (1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ

ከዚህ በላይ ባለው መግለጫ ከተስማሙ ምን ዓይነት የትራንስፖርት ፈታኝ ሁኔታዎች ለማሸነፍ ይረዳቸዋል ብለው ያስባሉ ።?

- በራስ የመተማመን ስሜትን እና ብቸኝነትን መፍራት።
- የህዝብ መጓጓዣን ብቻ የመጠቀም ፈታኝ ሁኔታ።
- ወደ ረዥም ርቀቶች የመጓዝ ፍርሃትን ማሸነፍ።
- ወደ ያልተለመዱ መድረሻዎች የመጓዝን ፍርሃት ማሸነፍ።
- ሌላ ከሆነ እባክዎን ይግለጹ ። .....

10. በጥያቄ ቁጥር 9 ከተስማሙ ከዚህ በታች ባለው መግለጫ ምን ያህል ይስማማሉ??

*የትራንስፖርት ተግዳሮቶችን ማሸነፍ የአእምሮ ዕድገት ውስንነት ያላቸው ሰዎች በማህበረሰቡ ውስጥ ከፍተኛ ማህበራዊ ተሳትፎ እንዲያገኙ ይረዳቸዋል ።*

- (1) በጥብቅ አልስማማም ፣
- (2) አልስማማም ፣
- (3) ገለልተኛ ፣
- (4) እስማማለሁ ፣
- (5) በጥብቅ እስማማለሁ