

Challenges and Barriers to the Use and Provision of Assistive Technology in Africa: A Systematic Review

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INTRODUCTION

People living with different types of disabilities often require assistive technologies (ATs) to improve their body function and performance. Assistive technologies include any type of device or system whose primary purpose is to maintain or improve an individual's functioning and independence to facilitate participation and enhance quality of life [1]. These devices can also help prevent secondary health conditions and further impairment [2]. A large variety of ATs are available ranging from low to high-tech products that provide the opportunity for persons with disabilities to enhance their well-being and quality of life. People who may benefit from assistive technologies move through various institutional processes to access these tools and resources, however, there are documented inequities in both access to services and funding mechanisms throughout the traditional processes [3].

It is estimated that currently more than one billion people need one or more assistive products globally and more than two billion people will need at least one assistive product by 2030 [4]. The distribution and access to AT in most African countries has not been clearly quantified. However, according to the World Health Organization, access to appropriate assistive technology and services is often poor in resource limited settings such as Africa. For instance, a study conducted in the region of southern Africa found that only 15–25% of people with disabilities who need AT have access to it [5]. Poor AT coverage and access in resource limited countries can be due to poverty of the individual and country, environmental barriers, poor procurement systems, a lack of support services, as well as a shortage of service providers and inadequate training of the available service providers [6]. The purpose of this systematic review is to comprehensively evaluate the challenges and barriers governing access to AT.

METHODS

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocols were implemented [7].

Eligibility Criteria

This review aimed to include all research investigating the challenges and/or barriers to using assistive technology for persons with disability in Africa. The population of interest for this evaluation included persons who use AT of any age within the countries identified within the continent of Africa. Articles were included if they were published in peer-reviewed journals written or translated into English before 2020. Each had to include an assistive technology intervention, including mobility aids, vision aids, hearing aids, and communication and cognitive tools. Articles were excluded from this study if they did not include participants who were in Africa, or if the data from participants in Africa could not be differentiated from populations from other countries within the article.

Information Sources and Search Strategy

Embase, PubMed, Medline, and Web of Science databases were searched for journal articles to be included. The last search was completed on Feb. 7, 2020. References of papers found through this method were also searched to identify any relevant articles not retrieved in the database search process. The database search string included 'assistive technology' and appropriate variations or synonyms. The term 'Africa' and the name of each country within the continent was also included in the search.

Study Selection and Quality Assessment

All articles retrieved via database searches were included for screening. Initial screening and full-text screening were completed using Covidence Systematic Review Software [8]. A minimum of two reviewers independently evaluated each article against the inclusion and exclusion criteria. Conflicts in screening decisions were resolved through discussion between reviewers until consensus was reached. After full-text screening, data was extracted from articles identified for inclusion. Variables extracted from each article include study location, study design, method of data collection, inclusion and exclusion criteria, sample population, study purpose, outcomes, and

conclusions. Quality assessment of each study was completed using the GRADE evaluation scale [9] and the Joanna Briggs Institute Levels of Evidence [10].

RESULTS

Following database searching and the screening process, a total of 19 journal articles were included for review. Variability in outcomes of interest and lack of quantitative data limited the applicability of a meta-analysis. All articles included received a GRADE score of ‘low’, with most of the articles being case studies or qualitative cross-sectional research. Limited representation of research on AT in North and Central African countries was evident as shown in (**Table 1**).

Table 1. Number of Articles per Country

No	Country	Number of Articles
1	South Africa	3
2	Kenya	3
3	Nigeria	3
4	Sierra Leone	2
5	Tanzania	2
6	Malawi	1
8	Ghana	1
9	Zimbabwe	1
10	Botswana and Swaziland	1
11	Sierra Leone & Malawi	1
12	Sudan, Namibia, Malawi, South Africa	1

Table 2. Main categories of outcomes

Outcome Category	Method of Evaluation
<i>Satisfaction, Use/Efficacy, Usability</i> [11-17]	-Self-developed questionnaires/questions -Functioning Every day in a Wheelchair (FEW) instrument. -Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST survey) -Observations -Follow-up emails w/ questions -Structured interviews
<i>Engagement, Experiences, Challenges</i> [13, 18]	-Individual Child Engagement Record – Revised -Structured interviews -Observations
<i>Accessibility, Mobility, Awareness of Barriers</i> [19-22]	-Self-developed questionnaires -Observational checklists -In-depth interviews -Architectural and Transportation Barriers Compliance Board Guidelines
<i>Psychosocial</i> [23]	-Psychosocial Impact of Assistive Devices Scale (PIADS)
<i>AT Sources</i> [6]	-Self-developed questionnaires

Measuring Outcomes

Most notable among the reviewed articles, is the discrepancy in methods utilized for obtaining results and evaluating outcomes. Five main categories of outcomes were identified in the literature, many with multiple approaches to evaluation (**Table 2**). Interviews, observations, and self-developed questionnaires are the most common forms of data collection utilized, however specific questions and observations vary across studies and the reliability and validity of these methods is unclear.

DISCUSSION

Based on the search results and overall analysis of materials collected in the review process, key barriers and challenges of AT provision in Africa are presented and discussed as a set of generalized themes which can be considered as inputs for policy makers and researchers in the field.

Physical and Environmental Barriers

It is evident in the literature that many users of assistive technology (AT) in Africa have difficulty within their activities to daily living due to physical and environmental barriers. The primary physical barrier includes the inaccessibility of buildings in Africa for those with sensorimotor impairments. Public buildings and educational institutions are often not compliant with accessibility guidelines or have assistive facilities that were installed for general use rather than purposefully for those with disabilities [20, 22]. Examples include the absence of elevators in multi-level buildings, lack of braille services, or the disregard for identification of available assistive facilities. Environmental barriers including difficult terrain such as large hills and rough roads or seasonal flooding in some areas of Africa have been shown to exacerbate difficulties experienced by rural AT users [6, 11]. These environmental barriers place a burden on older persons who do not have the strength needed to navigate the landscape, as well as persons with mobility impairments who feel their devices are unsafe in these environments. These physical and environmental challenges can lead to a loss of independence and the need for additional AT devices to improve access for indoor and outdoor services [24]. Ensuring that persons with disabilities are included in the design of public facilities and services should

be paramount, as participatory processes have been identified as essential to ensure the mainstreaming of accessibility [25]. In addition, it is important to educate the public on the value of an accessible environment to all members of society to encourage inclusivity and buy-in.

Financial Limitations and Lack of Access to AT Service and Repair

In almost every study, financial and resource constraints were identified as major bottlenecks to access AT devices in Africa. This results in a large proportion of persons with disabilities left without access to assistive technology devices [13, 15, 19, 23, 26, 27]. The distribution of AT is significantly hindered in rural places as compared to urban areas due to the very low socioeconomic status of the people. Some countries have acknowledged the need for AT support to persons with disabilities through policies, but they have not identified a clear provision strategy to assist in the acquisition of assistive products [11, 26].

In addition to the financial constraints experienced in obtaining AT, a lack of access to prescription services and technical repair of AT exists. Service provision in rural areas is limited and some users have to purchase AT without the opportunity to be assessed in-person. A lack of training facilities has been noted in both the physical and digital AT contexts, impeding ease and efficiency of use [19, 24]. For those in rural areas, it is often difficult to find a technician capable of repairing assistive devices, most notably wheelchairs [11, 24]. Even when AT education services and health centers are available, providers of AT service and repair experience difficulties performing their duties due to lack of accessories and well-trained technicians [18]. Shipping times are prolonged preventing immediate provision. Moreover, transportation to attend AT service provision appointments has regularly been identified as a barrier to accessing services [11, 12, 14]. This barrier is associated with environmental obstacles that make transportation difficult, amplifying the problem for rural AT users who often must travel long distances.

Policy Implementation Gap

Most African countries, 41 out of 54 (75%), have accepted and ratified the United Nation convention on disability, the Convention on the Rights of Persons with Disabilities (CRPD) [28]. According to the Convention, assistive devices for disabled people need to be equitably available, accessible, and affordable irrespective of gender, age, or type of impairment. The successful implementation of international policy in individual countries depends on country-level policy that directs implementation, political will, and adequate government structures to facilitate implementation [29]. However, many states in Africa do not properly implement policies and guidelines to ensure provision of assistive devices. For instance, a study in Malawi has demonstrated that despite many sectoral policies and laws, there remains poor positive input for persons with intellectual disability to access assistive technologies when considering availability (provision), affordability (cost), suitability and quality [30]. It has also been suggested that the lack of information and communication technology resource centers for people with vision impairment is largely caused by the absence of representatives for blind people within the governments' policy-making members in Nigeria [19]. Policy implementation problems in many African countries are more pronounced in rural areas due to a variety of reasons including a very limited number of providers, poor infrastructure, and lack of skilled personnel for training and maintenance of AT devices [20, 28].

Societal Awareness Problem and Information Gap

In developing nations including Africa, due to the cultural and religious beliefs of the society there is a misconception and lack of understanding pertaining to disability. This often results in discrimination and abuse of people with disability, even from their own family members. Because of this, some families usually do not think that their children would be empowered or accepted by society if they use AT. A study in Malawi has found that "persons with intellectual disabilities are believed to be a curse upon the family and are consequently severed and hidden from the public," implying that they do not need to have the exposure to AT devices [30]. A number of studies have found that people with different impairments faced challenges, not for a lack of ability or intelligence, but a lack of knowledge. An information gap was evident with respect to available facilities, options, tools, and technology that could better integrate persons with disabilities into mainstream society to realize their full potential [13, 19, 20].

CONCLUSIONS

This systematic review presents findings of the existing challenges and barriers experienced by AT users in Africa. Broadly translated, the findings indicate major issues that include physical and environmental barriers, financial and resource constraints, poor policy implementation, and societal ignorance. AT provision and service in African countries is highly impacted by the economic status of countries and individual people. When comparing rural and urban settings, AT coverage is worse in rural places due to very poor economic status of people, lack of

infrastructure, and unavailability of AT services. Further evidence is the lack of information or data on disability and assistive devices which limits the ability of policy makers and government officials to make informed decisions about demand, supply, quality, and effect of assistive technology. Consistency in research of AT is needed, including the use of established guidelines and questionnaires developed by health and governmental organizations.

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