



Accessibility of Prosthetic and mobility device Technology to promote Activity and social participation: A review in the perspective of physical environment of Mizoram

Madhav Kumar Mishra

NILD-RC, SCERT Campus,
Chaltlang, Aizawl 796012, Mizoram,
India

Background / Introduction

Mizoram is a landlocked state in North East India with rolling hills, valleys, rivers & lake. It is the 5th smallest state of India with 21,087 square kilometers. Its total area constitutes only 0.64 percent of the total area of India and 722 km long international border with Myanmar & Bangladesh. Population of Mizoram in the year 2018 as per estimated data is 1.584 Million, around 52% population lives in urban & over 33% people live in Aizawl territory. The sex proportion is 976 female for each 1000 males, total 8 districts & PWDs approx. 3%. Where the number of disabling barriers is larger in scale and heighten the risk and vulnerabilities. PWDs with mobility limitations, i.e. those having difficulty walking, or who are unable to walk, and absence of limb can be provided with prosthetic devices include Bk prosthesis, AK prosthesis, modified Syme's prosthesis, BE Prosthesis & A E prosthesis & Other. Mobility devices such as canes, Crutch, rollators, wheelchairs, Tricycle and scooters so as to facilitate mobility and thus enable activity and social participation. The prevalence of mobility devices is highest among the oldest age groups, with the risk of limited walking capacity increasing with advancing age.

Paper Received date

05/01/2026

Paper Publishing Date

10/01/2026

DOI

<https://doi.org/10.5281/zenodo.22031907>



The provision of mobility devices is generally considered to be of great importance, and the United Nations (UN) as well as the World Health Organization (WHO) recommend assistive technology as important tools in creating equal opportunities for people with disabilities. In the developing countries, assistive technology, including mobility devices, is mostly provided free of charge if it is considered to have a great impact on a citizen's everyday life. Considerable resources are consequently spent on the provision of mobility devices, while an ageing population will realistically result in an increasing need for such interventions.

For example, In India spending on mobility devices has increased from approximately 2010 to 2017. Given the scale of use and importance of mobility devices, their effectiveness needs to be investigated and described.



Existing reviews in the area of mobility assistive devices have focused mainly on outcome aspects other than activity and participation. One critical review has assessed the research literature concerning the effectiveness of seating interventions only, such as wheeled mobility devices International Classification of Functioning, Disability and Health (ICF) The review showed very low grades of evidence in most of the research designs.

The ICF is a commonly used framework within rehabilitation, which identifies and classifies the domain of activity/participation

as one of its health-related domains. The ICF defines activity as the execution of a task or action by an individual & participation

as involvement in a life situation. However, the ICF is not distinct in discriminating between activity and participation, which means that each study sets its own specific definitions. In the ICF, mobility, including walking etc., is seen as a subcategory of activities and participation; however, mobility can also be a prerequisite for activity and participation and may be seen as a necessity for the person's real aims, for example to shop, work, take care of oneself, and visit friends and family, rather than as

an end in itself. In this review, when mobility is an aim in its own right it is not included in the primary outcome dimension

studied, that is the domain of activity and participation, but is considered to be a secondary outcome dimension.

The effectiveness of an assistive device is the extent to which it produces a beneficial outcome in a routine setting. An effectiveness study looks at whether an intervention works under ordinary day-to-day circumstances. Context has an impact on a person's activity and participation. According to the ICF, environmental factors include the physical, social and attitudinal environments in which people live and conduct their lives. Therefore, it can be argued that outcomes for mobility devices geared to activity and participation should not be evaluated without connection to real-life contexts.



This review assesses the evidence for the effectiveness of any kind of Prosthetic and mobility device interventions in terms

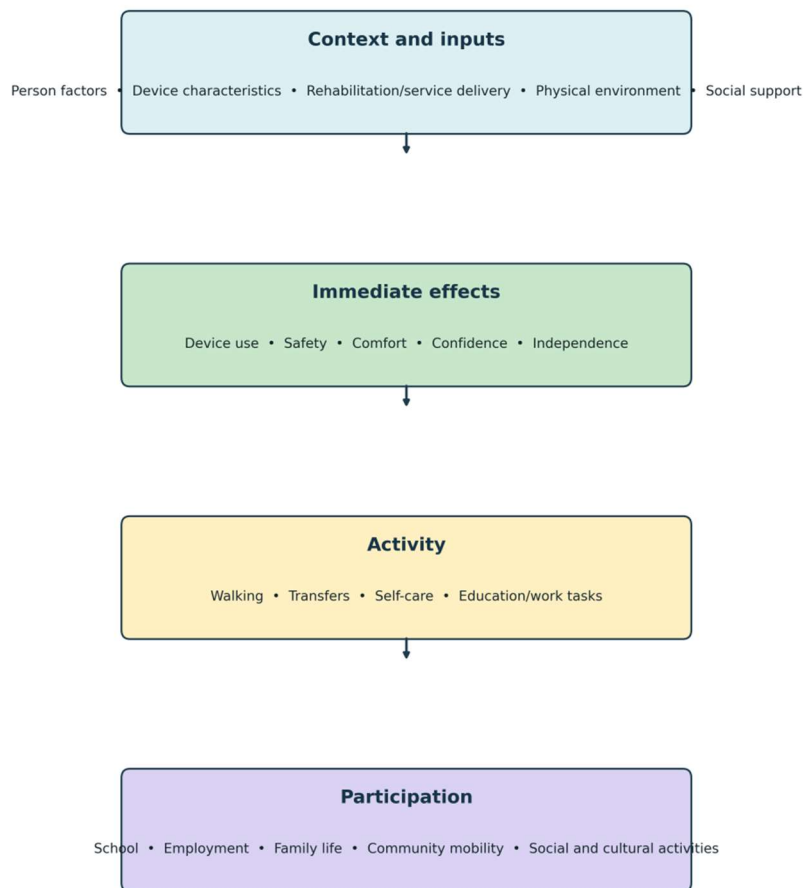
of activity and participation in real-life contexts for people with mobility limitations.

Aim: To determine the effectiveness of Prosthetic & mobility device interventions in terms of activity and social participation for person with disabilities with mobility limitations in north east region (Mizoram) where the number of disabling barriers is larger in scale and heighten the risk and vulnerabilities of the PWDs face and they seek out assistance, support & protection.

Methods:

Search Strategy: We performed a search without language restrictions for studies on Prosthetic & mobility device interventions from the following databases: Systematic review. Search of NILD - RC, Aizawl databases during the period 2011 to 2018 given aids & appliances to the PWDs through out reach camp and center. Controlled studies and non-controlled follow-up studies were included if they covered both baseline and follow-up data and focused on activity and participation. Study participants had to be aged over 05 years with mobility limitations. Prosthetic device includes Below Knee prosthesis, Above knee prosthesis, modified Syme's prosthesis, Below Elbow Prosthesis & Above Elbow prosthesis. Mobility device interventions encompassed Axillary crutches, walking stick, Elbow crutch, walker (walking frame) Rollators, CP chair, manual wheelchairs and powered wheelchairs (including scooter types). Reviewers independently selected the studies, performed the data extraction, and assessed the studies' methodological quality. This strategy was modified for the other database searches, while the some were based on the inclusion criteria.

Figure 2. Conceptual model of prosthetic and mobility-device effectiveness



Device effectiveness is expected to depend on the interaction between the person, the device, rehabilitation services, and the physical and social environment.

Inclusion criteria and study selection: We included all kinds of controlled studies and all types of follow-up studies on Prosthetic & mobility device interventions, which included both baseline and follow-up data. Both quantitative and qualitative designs were allowed, but we excluded studies that were conducted only in laboratory settings. We did not limit the number of participants, and included participants aged over 05 years with mobility limitations due to injury,



disability, ageing or chronic illness. Prosthetic device includes Below Knee prosthesis, Above knee prosthesis, modified Syme's prosthesis, Below Elbow Prosthesis & Above Elbow prosthesis. Mobility devices encompassed crutches, Walker (walking frames), rollators, CP chair, manual wheelchairs and powered wheelchairs (including scooter types). In controlled studies, all kinds of control interventions were allowed. We considered activity and participation as a primary outcome, and mobility, frequency of use, mobility without personal assistance, user satisfaction, quality of life and adverse effects as secondary outcomes. Only articles that studied the primary outcomes were included. In cases where secondary outcomes were also studied, these were reported in this review.

The search yielded 524 documents for consideration in the systematic review. The main reason for the large number of documents was the broad list of keywords. A reviewer independently reviewed the title, keywords, and abstract to determine whether the study potentially met the inclusion criteria regarding design, participants and intervention. If there was disagreement between reviewers about whether to include a study, at this stage it was solved by including the document. Most of the documents were either descriptive studies or dealt with outcomes relating to service provided i.e Distributed List of annexures III.

DISCUSSION

Principal findings:

The objective of this review was to identify and evaluate the effectiveness of Prosthetic & mobility device interventions in terms of the activity and participation of PWDs with mobility limitations. performed a thorough literature search, we found only a few studies that fulfilled our inclusion criteria, most of which displayed methodological shortcomings. The selected studies had a different focus and the instruments used were diverse, making it impossible to draw overall conclusions, even though single studies demonstrated some evidence of positive effects of Prosthetic & mobility device interventions that targeted mobility impaired adults & Child in their activities and participation. This literature review of mobility device research has revealed what little effectiveness data are available that are of sufficiently high quality.



The available evidence:

As an intervention, assistive technology is complex to investigate and therefore controlled studies are difficult to perform.

The results rely on several aspects, such as environmental support, personal expectations, and the prerequisites of the device itself. Designing an intervention involves skilled assessment of these aspects, so as to reflect the circumstances of device used. Environmental factors constitute an especially important role in mobility device use, since even with a high quality device it is difficult to be active and participate if the environment is not accessible and supportive. In Mizoram due to hilly, sharp bended and very up and down road, no any single manual tricycle are used. One reason for the lack of randomized studies could be the ethical difficulty in using controls for a group of people who are in need of mobility devices, amounting to withholding these devices. In addition, locating a homogenous group of individuals in need of a specific type of assistive device may be difficult. Furthermore, evaluating the effects on activity and participation, which are very individually related to personal needs, habits and social and physical contexts, may be difficult, complicating the application of controlled studies in this field.

The methodological gaps in the available evidence may be due to the reasons above and the fact that research on the outcomes of assistive technology is still in its infancy. If we had included all types of outcome studies, in addition to the actual effectiveness studies, i.e. studies with before and after data, the results would have been more voluminous. Furthermore, the review's focus on activity and participation, although being the traditional core of occupation within occupational therapy, is generally relatively new, since this focus within the field mainly emerged after the launch of the ICF classification. In addition, the decision to include studies in real-life contexts only limited the number of included studies.

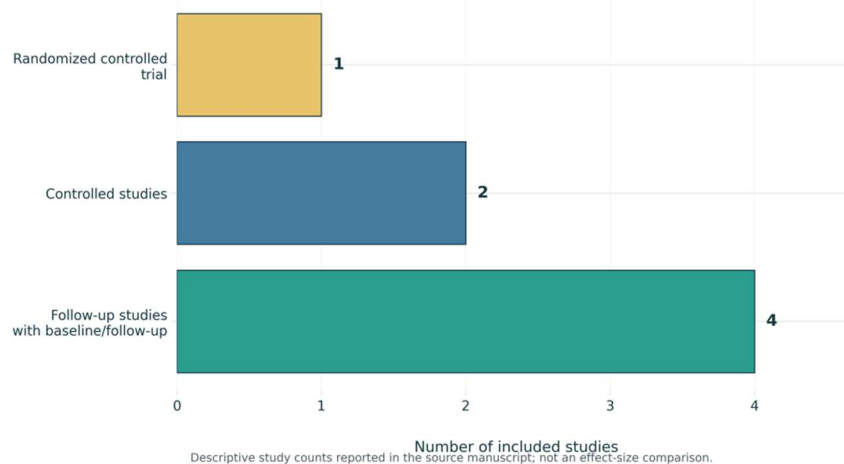
**Strengths and limitations of the review:**

The strength of our review is that we have applied the generally accepted criteria for a systematic review .We have

conducted a comprehensive literature search in order to obtain all relevant published articles (as well as conference proceedings)

and have carefully assessed the available studies. In this review, we faced the conceptual difficulty of mobility in relation to activity and participation. Even if within the ICF classification mobility is seen as coming under activity and participation, and walking as coming under mobility, in daily life mobility of itself is rarely the aim. A Prosthetic & mobility device is required to enhance the ability of persons to move about their homes, travel to work or school, and be mobile in the community and attend cultural things with respect & self -dependent. More work is required to develop a conceptual framework within the ICF as well as to develop measures focusing on activity and participation level outcomes. In this review, we used 7 outcome dimensions. It may be that the use of fewer outcome dimensions would increase the repeatability of the review.

The methods for assessing the study quality used in this review were adopted from the traditions of systematic reviews found in medicine, which were adapted slightly. The future criteria of the quality assessment could benefit from further consideration, rendering them more suitable for the evaluation of assistive technology related research. We did not include an evaluation of co-interventions, which would be essential in any intervention study. On the other hand, we considered the lack of diagnosis as a methodological weakness, which may not be a fair judgement, since many elderly people using mobility devices do not have a specific diagnosis as a reason for obtaining the device. Nevertheless, a description of the studied group should include some kind of medical description or, more importantly, a description of any functional limitations in order to enable the generalization of the study results with respect to other clinical settings.

Figure 3. Evidence profile by study design**Implications for future research:**

A systematic quality assessment of the included studies clearly demonstrated the methodological challenges of the research with respect to the effectiveness of assistive technology (AT). Even if the effect of mobility devices as well as other assistive technologies is often quite obvious, there is a need for outcomes research in order to provide the most appropriate solutions to people with activity and participation limitations and for decisions on societal prioritizations. Furthermore, there is a need to evaluate the effect on peoples' daily lives as well as to compare this type of intervention with other interventions and also one product with another. Quite a few studies in the field of assistive technology are follow-up studies based on user satisfaction with specific kind of device. These studies are valuable in considering users' opinions on AT function and delivery services. However, these kinds of studies should be complemented with studies on device effectiveness concerning the users' Activities of Daily living. AT-interventions should include a description of the device intervention process in order to make the results more comparable across studies. In addition, it would be important to understand whether study participants have other assistive devices for activity and participation, since the devices and thereby their effects interact with each other. Further studies should also focus on only one AT-type to demonstrate the effectiveness of a specific type of device i.e manual Wheel chair. Furthermore, study-specific



questionnaires should be avoided; in order to increase the comparability of the evidence, the psychometric properties of the used instruments should be thoroughly investigated and reported in studies, and some consensus on the use of the instruments should be sought. Also, it is necessary to use designs such as comparative studies with before and after measurement, and with sufficiently long follow-up times. Follow-up studies do not show effectiveness.

The need for well-designed and long-term studies on the effects of Prosthetic & mobility devices on the activity and participation of mobility-impaired PWDs is clear. The motivation and selection of Prosthetic & assistive devices should be based on research evidence, which should be used for the benefit of people with disabilities and for the provision of better-informed and efficient services. This systematic review has been necessary to show the state-of-the-art of outcome research on Prosthetic & mobility devices and thus to put forward the developments within outcomes research on assistive technologies. We hope that this will stimulate further research and the development of more valid and appropriate study designs.

Results: seven studies were included: one randomized controlled trial, 2 controlled studies, and 4 follow-up studies that included before and after data. Two studies dealt with prosthetic device intervention & two studies of utilization & effects of wheelchair interventions and the other studies with various other types of mobility device. Two studies were of high, internal and external methodological quality. Interventions were found to be clinically effective in terms of activity and participation in 5 studies. The results did not, however, give a unanimous verdict on the effectiveness of mobility devices in enhancing the activity and participation of mobility impaired PWDs.

Conclusion: Interventions and outcome measurement methods varied between the studies; consequently, it was not possible to draw any general conclusions about the effectiveness of prosthetic & mobility device interventions. However, evidence was found that prosthetic and mobility devices improve users' activity and social participation and increase mobility. Paper examine the evidence of how technology of prosthetic & Mobility device draws an advance in community living and social inclusion of PWDs in his/ her society with self-respect & self-



dependent. A lack of high-quality research hampers conclusions about effectiveness. There is clearly a need for more research of a higher quality, more original and well-designed research is required.

Reference:

1. Modern Mizoram : History , Culture, Poetics by P.Thirumal, Laldinpui & C.Lalrozami
2. Mizoram : Past & Present by H. G Joshi
3. Atlas of Orthoses and Assistive Devices Published by Elsevier and co edited by Douglas P. Murphy, Joseph B. Webster and William Lovegreen
4. <https://jbjs.org>
5. <https://en.wikipedia.org>
6. www.physio-pedia.com
7. www.ncbi.nlm.nih.gov
8. World Health Organization. Assistive technology. 2024.
9. World Health Organization and UNICEF. Global report on assistive technology. Geneva: WHO; 2022.
10. Page MJ, et al. PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021;372:n71.
11. World Health Organization. International Classification of Functioning, Disability and Health: ICF. Geneva: WHO; 2001.



Jessy Runremsanga kolasib district ready for going school



Pts Lalnunpui at lengpui, Aizawl



Pts Using Wheelchair at home



Pu lalruatfela & Lallinpuia using Wheelchair



Lalruatfeli 93 yr /F at Her home in Kolasib



Pts Uses his wheel chair at serchhip, Mizoram



Use Different Adoptive Device in Aizawl