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A qualitative synthesis to explore clinician and user experiences of accessing prosthetic and orthotic services in low- and middle-income countries using the three-delays model as a framework

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ABSTRACT

Purpose: To use the “three delays model” as a framework to identify and synthesise qualitative literature that identifies barriers to accessing and utilising P&O services in low-middle-income countries from the perspective of individuals with disabilities and clinicians.

Methods: A systematic search of four databases was used to identify research exploring user and clinician experiences in accessing P&O services in LMICs. Selected search terms and combinations identified through an adapted version of the SPIDER tool were used to identify studies. All retrieved articles were critically appraised using the CASP tool. Data were extracted, and themes were synthesised using a deductive thematic approach guided by the three-delays model.

Results: Ten key themes were generated and linked to the three-delays model. Fear of perceived financial implications, transportation, and respectful care were some of the themes affecting accessibility in the first, second, and third delays, respectively. The findings suggest that the delays are interconnected components that might have a cascading effect on access to P&O services as a whole. Minimising delays can improve the accessibility of P&O services in low-middle-income countries.

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KEYWORDS

P&O users; P&O clinicians; low middle-income countries; user and clinician experience; three-delays model

> IMPLICATIONS FOR REHABILITATION

- Prosthetic and orthotic services in low- and middle-income countries present with perceived high costs, transportation, limited resources, and sex-related challenges, limiting access to care.
- The findings of this synthesis suggest that the three-delays model has practical implications for improving rehabilitation services and overcoming barriers to accessing and utilising prosthetic and orthotic services in low- and middle-income countries.
- The highlighted barriers are categorised into delays and form interlinked components that can impact overall access to prosthetic and orthotic services.
- Implementing strategic measures to address the underlying causes of delays can improve the accessibility to prosthetic and orthotic services in low- and middle-income countries.



Introduction


The global need for rehabilitation is extensive and growing, driven by expanding and ageing populations and an increase in the prevalence of health conditions [1]. In low- and middle-income countries (LMICs), over 29 million people have limited access and remain in need of prosthetic and orthotic (P&O) services [2]. Over the past decade, this number has significantly risen, mainly due to shifts in population dynamics and disease patterns. These include a growing population, an increase in chronic conditions such as diabetes and stroke, and an ageing demographic that lives longer but often experiences functional limitations [3].

Approximately 1.5% of the world population, equating to 118 million people, may require P&O interventions for their functional and cosmetic needs [4]. However, the World Health Organisation (WHO) estimates that only 5–15% (approximately two in ten

persons) in need have access to P&O devices and services [5,6]. The extent of the problem is often difficult to assess due to a lack of data on access to rehabilitation services, making it challenging to understand the met and unmet needs of existing services [7,8]. Factors limiting access to P&O services include the high cost of devices, disrupted supply chains, and a shortage of trained personnel [9]. While these factors can vary significantly from one country to another based on local circumstances, commonalities do exist across different settings [1].

A range of studies have advanced the understanding of the barriers to accessing and utilising P&O services in LMICs. Quantitative research conducted in Cambodia [10], Tanzania [11], and Uganda [12] has offered valuable insights into the demand for prosthetic services, the impact of prostheses on users' quality of life, and the demographic and clinical profiles of lower and upper limb prosthetic users, respectively. Complementing this, a

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growing body of qualitative research has explored the lived experiences of individuals accessing and utilising P&O care in LMICs, including studies by Urva et al. 2023 [13], Allen et al. 2020 [14], and Andregård & Magnusson, 2017 [15]). Notably, Urva and colleagues undertook a qualitative study in Tanzania, highlighting the barriers to prosthetic provision and uncovering opportunities to enhance access [13]. While much of the existing literature provides valuable accounts of service provision and user experience, it tends to focus on isolated findings. There remains a critical lack of synthesis across studies, particularly qualitative research, within LMIC contexts. This gap hinders the development of a cumulative evidence base necessary for robust advocacy and the strategic improvement of P&O services globally. A qualitative meta-synthesis interprets similar and unique findings within interpretive studies to develop a theory [16]. In the P&O field, Bosman and colleagues identified factors influencing prosthesis use in adults with transfemoral or knee disarticulation amputations through a qualitative meta-synthesis [17]. They described 94 factors affecting lower-limb prosthesis use, offering insights that enhance shared decision-making between users and clinicians in high-income countries (HICs) [17]. However, the study focused on experiences with amputation and prosthetic use, not accessibility. In addition, most of the included studies were conducted in HICs and only one study was from Nepal, which is an LMIC. This highlights the need for a meta-synthesis of qualitative literature focusing on user and clinician perspectives on accessing P&O services in LMICs through a conceptual framework. A holistic approach to synthesising previous qualitative research findings will improve the understanding of barriers to accessing P&O services in LMICs.

The three-delays model (3DM) is a framework developed by Thaddeus and Maine in 1994 [18,19]. It has been widely used to identify barriers to the provision and use of high-quality, timely obstetric care from Malawi to Ethiopia to explain high maternal mortality rates [20,21]. It involves three critical phases: delay in the decision to seek care (First delay), delay in identifying and reaching the health facility (Second delay), and delay in receiving appropriate care at the facility (Third delay) [18,19]. For example, Tesfaye et al. used the 3DM in their qualitative study and identified a broad range of contextual barriers that overshadowed access and utilisation of maternal health services [21]. Key elements addressed in their study, such as knowledge, physical accessibility, and service quality, [21] could also effectively highlight the complexities faced by individuals with disabilities who experience impaired mobility. As such, this framework can contribute to making the delivery of P&O services in LMICs more inclusive and better aligned with the needs of individuals experiencing mobility challenges.

In this study, the 3DM was mapped to identify barriers to receiving high-quality P&O services and factors affecting the use of P&O devices, considering both clinician and user experiences through a literature review of studies conducted in LMICs. The study employs a deductive approach, utilising the 3DM conceptual framework to synthesise literature and understand the experiences of users and clinicians. This approach identifies and highlights barriers to accessing and utilising P&O services in LMICs.

Methods

Research design and question development

A qualitative meta-synthesis study design that employs a deductive thematic approach, [22] guided by the 3DM [18,19]. It combines both framework and thematic analysis techniques to complete the synthesis [23]. The 3DM conceptual framework serves as a comprehensive approach to connecting the “pieces”

[24], guiding the inquiry, and establishing boundaries for comparing and contrasting the results.

Key terms

Selected search terms were identified through an adapted version of the SPIDER tool for Qualitative Evidence Synthesis [18,25] as shown in Table 1.

Selection criteria

Studies were selected if they met the following inclusion criteria as shown in Table 2.

Search strategy

A systematic electronic literature search strategy, detailed in Supplementary Table S1, was conducted in April 2023 across ProQuest Health & Medicine, Medline (Ovid), Science Direct, Scopus, and *via* reference searches of the selected articles using the keywords and their combinations as outlined in Table 1. All retrieved articles were uploaded to Rayyan software. Authors EK, YP, HLA, SD, and MDH screened the titles and abstracts for inclusion independently based on the inclusion criteria in Table 2, blinded to other reviewers’ decisions. A duplicate publication was identified and removed. Following this, two reviewers (EK and MDH) independently assessed the results sections of the remaining studies to ensure they addressed qualitative outcomes. Once the results sections were evaluated for eligibility, the reviewers (EK and MDH) proceeded to read the full texts of the studies. In cases of disagreement, all reviewers (EK, YP, HLA, SD, and MDH) discussed the issues until consensus was reached. Some studies included qualitative and quantitative outcomes, but only the relevant portions (qualitative) were considered for the review.

Quality appraisal

The Critical Appraisal Skills Programme (CASP) tool for qualitative studies provides a set of checklists that help researchers and readers critically appraise the methodological rigour and validity of qualitative studies [30]. This tool includes two screening and eight detailed questions regarding study design, sampling, data collection, reflexivity, ethical issues, data analysis, findings, and research value [31]. The studies were rated as high, medium, and low quality when the articles met at least 8–10, 5–7, and 4 or fewer criteria, respectively [32]. The primary reviewer, EK, conducted the appraisal, which the secondary reviewer, MDH, confirmed. In instances of disagreement, all the reviewers (EK, YP, HLA, SD, and MDH) discussed the issues until consensus was reached. This process assessed the papers’ quality, summarising the findings as shown in Table 3 and Supplementary Table S2.

Characteristics of selected studies

In total, 405 studies were reviewed at the title and abstract stage. Seventeen full texts were screened, including eight hand

Table 1. Search terms using the SPIDER tool.

Sample	P&O users OR people with limb loss OR people with physical disabilities
Phenomenon of interest	Amputation=limb loss OR prosthes* OR prosthetics AND Physical disability=AND Low middle-income country=low middle-income OR developing country OR LMICs
Design	interview* OR focus group*
Evaluation	experiences OR views OR preferences OR attitudes
Research type	qualitative OR mixed method

Table 2. Inclusion/exclusion criteria.

Criteria	Description	Rationale
Inclusion	Qualitative studies that have involved users of P&O devices and services and clinicians.	Qualitative studies are useful in gathering user experiences and views which offer diverse perspectives for analysis and interpretation [26].
	Sequential mixed methods study where only findings from the qualitative phase including users and/or clinicians will be included.	In a sequential mixed methods design, it is more likely that the data analysis of one type of data will precede that of the other type, with little consequence for integrating the two types of data [27].
	Studies that have used interviews, focus group discussion data collection methods and the analysis of audio- or video recorded speech or behaviour.	Utilising a variety of data collection methods from different sources ensures a wider range of perspectives for comprehensive analysis and interpretation [28].
	Studies that have drawn interpretations based on examination of evidence and are supported by verbatim focusing on user experiences with P&O devices will be included for synthesis.	Interpreting findings from multiple qualitative studies enables the identification of gaps and inconsistencies in the existing literature [23].
	Papers written in English.	If there is no article translation to English available for review, limiting searches to only English language is feasible [28].
Exclusion	Qualitative studies that were conducted from January 2011 to March 2023 will be included.	The limit set will help narrow down or focus the search results for select types of results [28].
	Qualitative studies not conducted in LMICs as classified by the World Bank.	The established norms of what prosthetic users want from a prosthesis do not apply equally to all individuals from the same demographic, emphasising the uniqueness of prosthetic users' requirements [29].
	Qualitative meta-synthesis studies.	Different study designs addressing the same question have the potential to yield varying results [28].

searched studies. Of these, 13 papers [13–15,33–42] were identified using the selection criteria in Table 2 and presented in the PRISMA flow chart in Figure 1.

All papers were published between January 2011 and March 2023. Studies were conducted in Africa (Sierra Leone ($n=4$), Tanzania ($n=2$), and Kenya ($n=1$)), Asia (Cambodia ($n=2$), Bangladesh ($n=1$), and Nepal ($n=1$)), and Oceania (Kiribati ($n=1$)). One paper described a multi-centre study conducted in Tanzania, Malawi, Sierra Leone, and Pakistan. Sample sizes ranged from 2 to 49 participants. Twelve papers were qualitative studies, and one [14] was a sequential mixed-methods study, but only the results from the qualitative phase were included. The CASP scores for the majority of the studies ($n=11$) were graded as “high priority” while two studies were graded as “medium priority” as shown in Table 3.

Based on the CASP scores see Supplementary Table S2, key strengths across most studies, such as those by Hussain [35] and Andregård & Magnusson [15] effectively considered ethical issues and participant needs, demonstrating sensitivity to participants' context. Multiple studies, including those by Farrar et al. [38] and Ibrahim et al. [40] provided sufficient information regarding data saturation, which enhanced the thoroughness and robustness of their data analysis. One study by Magnusson & Ahlström [42] used a two-phase data collection, adding depth and credibility to their results. A key weakness identified across all studies, except one by Mattick et al. [39], was a lack of reflexivity. In these studies, information regarding reflexivity was limited, with researchers not providing sufficient descriptions about their roles, potentially affecting data interpretation. It is important to note that the CASP scores in Supplementary Table S2 reflect the quality of the reporting, not the quality of the research itself [43].

Data analysis and synthesis

Author EK read each paper thoroughly, extracting important descriptive information such as publication date, authors, study aim, sample size, etc., and tabulating it in a research matrix, as shown in Table 3. The deductive thematic analysis was shaped by existing theoretical constructs of the 3DM, which provided the lens through which to read, code the data, and develop themes [22].

Data familiarisation was done where the text of the results sections of each included article was read, re-read, and summarised by EK and entered in NVIVO software. EK and MDH captured the results segments and participant quotes from the identified papers relevant to the research question and assigned code labels to provide a meaningful description [22]. Codes are abstract terms assigned to qualitative data, in this case texts, where a specific code is assigned to lines in texts from participant quotes [28]. A total of 146 codes were generated from the included studies.

The codes with similar characteristics were grouped into initial themes by EK and MDH, as shown in Figure 2, to explore potential patterns of shared meaning that could address the research question [22]. The text was coded independently with a deductive approach, using the three delays model by Thaddeus and Maine [19]. This model consisted of three critical phases: delay in the decision to seek care (First Delay), delay in identifying and reaching the health facility (Second Delay), and delay in receiving appropriate care at the facility (Third Delay). The 146 codes were grouped across 27 initial themes. The initial themes were then revised to reflect patterns in the coded data and the dataset. The relationship between initial themes was carefully examined by comprehensively re-evaluating the entire dataset to ensure that the developed initial themes accurately reflected the data and effectively narrated its story [22]. The similarities and differences between initial themes [30] were then collectively organised.

Across the 27 initial themes, 10 final themes were created, reviewed, and included by the research team, consisting of a P&O clinician, psychologist, sociologist, and occupational therapist. The final themes were then organised using the 3DM [18], beginning with delay in the decision to seek care, then delay in identifying and reaching the health facility and finally delay in receiving appropriate care at the facility. A clear audit trail of the synthesis was maintained and reported in all the stages. An in-depth, interpretive analysis was reported chronologically, integrating both the analytic narrative and data extracts, which were participant quotes from the identified papers [22] as shown in Figure 2.

Table 3. Data extraction tool.

Author, publication year	Country	Aim	Sample size	Study design; data collection and data analysis	Limitations	CASP	Themes
Allen et al. 2020 [14]	Sierra Leone	To explore the perceived barriers that lower limb amputees and service providers face when accessing or providing rehabilitation services.	10 lower limb amputees 11 clinicians	A mixed methodology cross-sectional study where Phase 2 involved a qualitative exploration of both the perceived barriers from users and clinicians.	The relatively low number of participants	High priority	<ul style="list-style-type: none"> Transport and costs Mobility aids and physiotherapy Prosthetics Beliefs, stigma, and support.
Ramstrand et al. 2021 [33]	Cambodia	To explore the life experience of people who use lower-limb prosthetic or orthotic devices in Cambodia.	13 Prosthetic and 2 Orthotic users	A qualitative study	Results are not generalisable. Did not explore non-users Language barriers	High priority	<ul style="list-style-type: none"> A more positive outlook with an assistive device Assistive devices reduce barriers but do not eliminate them. Disability creates social exclusion while assistive devices facilitate inclusion.
Andregård & Magnusson, 2017 [15]	Sierra Leone	To explore experiences of attitudes in the society of Sierra Leone from the perspective of people with polio or amputations using orthotic and prosthetic devices.	6 prosthetic and 6 orthotic users	A qualitative cross-sectional study with individual interviews were conducted using open-ended questions.	Only P&O users were included; people who had not received these services are not represented.	High priority	<ul style="list-style-type: none"> Experience of negative attitudes Neglected and respected by family. Traditional beliefs. The importance of assistive devices People with disability struggle with poverty. The need for governmental and international support.
Aenishänslin et al. 2022 [34]	Sierra Leone	To explore the experiences of persons with Physical disabilities accessing and using rehabilitation services in Sierra Leone.	14 prosthetic and 9 orthotic users	A qualitative study	Varied depth of the content related to rehabilitation, and the length of interviews	High priority	<ul style="list-style-type: none"> The initial and ongoing need for rehabilitation throughout life. Challenges with the cost of rehabilitation and transportation to reach rehabilitation services. Varied experiences with rehabilitation staff.
Hussain, 2011 [35]	Cambodia	To understand the social implications of using prosthetic legs for Cambodian children	6 children, prosthetic users, 5 adult prosthetic users	A qualitative study	Results are not generalisable.	Medium priority	<ul style="list-style-type: none"> Children's perspectives on their prosthetic legs Other people's perceptions of prosthetic legs. Children's accounts of the limitations imposed by their disability. Integration and discrimination Ideas about the causes of disability
Svensk, 2018 [36]	Kiribati	To describe activity and participation at home and in the community for individuals who have received a lower limb prosthesis.	7 prosthetic users	A qualitative study	The gender distribution did not meet the requirements for variation.	Medium priority	<ul style="list-style-type: none"> Outcomes of Mobilisation Importance of Relationships
Magnusson, 2019 [37]	Tanzania, Malawi, Sierra Leone, and Pakistan	To compare and synthesise findings related to experiences of prosthetic and orthotic service. delivery in Tanzania, Malawi, Sierra Leone and Pakistan from the perspective of local professionals	49 associate P&Os Tanzania (<i>n</i> = 12) Malawi (<i>n</i> = 7) Sierra Leone (<i>n</i> = 15) Pakistan (<i>n</i> = 15)	A qualitative study	Only included the perceptions of associate prosthetists/ orthotists and prosthetic/ orthotic technicians	High priority	<ul style="list-style-type: none"> Low awareness and prioritising of P&O services. Difficulty managing specific pathological conditions and problems with materials. Limited access to prosthetic and orthotic services. The need for further education and desire for professional development People with disabilities have low social status in Sierra Leone

(Continued)

Table 3. Continued.

Author, publication year	Country	Aim	Sample size	Study design; data collection and data analysis	Limitations	CASP	Themes
Farrar et al. 2022 [38]	Nepal	To identify barriers and facilitators to accessing prosthetic services in rural areas of western Nepal and explore strategies to improve access from the perspective of local stakeholders.	13 Key stakeholders in prosthetic services	A qualitative study	Service Users were underrepresented	High priority	<ul style="list-style-type: none"> Awareness & literacy of prosthetic services Attitudes and Beliefs Financial supports Geographical access, Health systems & referral processes Service provider capacity
Mattick et al. 2022 [39]	Kenya	To explore the factors influencing motivation of lower limb amputees engaging with prosthesis services.	10 users of transtibial prostheses	A qualitative study	The generalisability of findings may be limited	High priority	<ul style="list-style-type: none"> Acceptance Self-determination A source of hope Clinician Relationship Perception
Urva et al. 2023 [13]	Tanzania	To examine barriers to prosthesis provision as perceived by patient, carer, and healthcare professional, at a single tertiary referral hospital in Tanzania	5 users of Transfemoral prostheses and 4 caregivers	A qualitative study	Perspectives were largely speculative and possibly more positive than if they were not provided for free	High priority	<ul style="list-style-type: none"> Perceived impact of amputation Perceived impact of prosthesis Perceived obstacles to prosthesis provision
Ibrahim 2019 [40]	Tanzania	To elucidate the Prosthesis Provision Pathway (PPP) and identify barriers of at the Muhimbili Orthopaedic Institute (MOI) in Dar es Salaam, Tanzania.	18 key stakeholders	A qualitative study	Findings may be limited given that study was restricted to one setting	High priority	<ul style="list-style-type: none"> Prosthetics are expensive patients. Misperceptions of the distribution of cost Inefficient communication Surgical education Amputee stigma, but prosthetic acceptance
Stuckey et al. 2020 [41]	Bangladesh	To explore the experience of people in Bangladesh following lower limb amputation and prosthetic rehabilitation to understand the facilitators and barriers to their work participation	10 lower limb prosthetic users	A qualitative study	The generalisability of findings may be limited	High priority	<ul style="list-style-type: none"> Spirituality Attitudes Meaning of work Planning for future work Traditional gender roles Social support Mobility aids Environmental challenges and ergonomics adaptations
Magnusson & Ahlström 2012 [42]	Sierra-Leone	To explore the experiences of prosthetic and orthotic service delivery in Sierra Leone	15 prosthetic and orthotic clinicians	A qualitative study	Generalisability of findings may be limited	High priority	<ul style="list-style-type: none"> Sense of inability to deliver high-quality prosthetic and orthotic services.

Results

The analysis of the 13 studies included in the meta-synthesis generated ten themes regarding user and clinician experiences in accessing and utilising P&O services in LMICs (Table 3). The final ten themes were organised according to the 3DM, as shown in Figure 3.

Delay 1: delay in the decision to seek care

Themes related to the first delay focus on factors influencing individuals with physical disabilities in their decision to seek P&O

care. These themes highlight the complex interplay of barriers that can deter potential users from initiating contact with P&O services, such as knowledge/awareness, cultural beliefs, and perceived high costs of P&O devices and associated services. Collectively, these factors played a critical role in shaping whether individuals pursue P&O support, often contributing to significant delays in accessing timely and appropriate care.

Theme 1: initiating contact with P&O services

Initiating contact with P&O services was met with barriers related to knowledge, awareness, and health literacy levels of

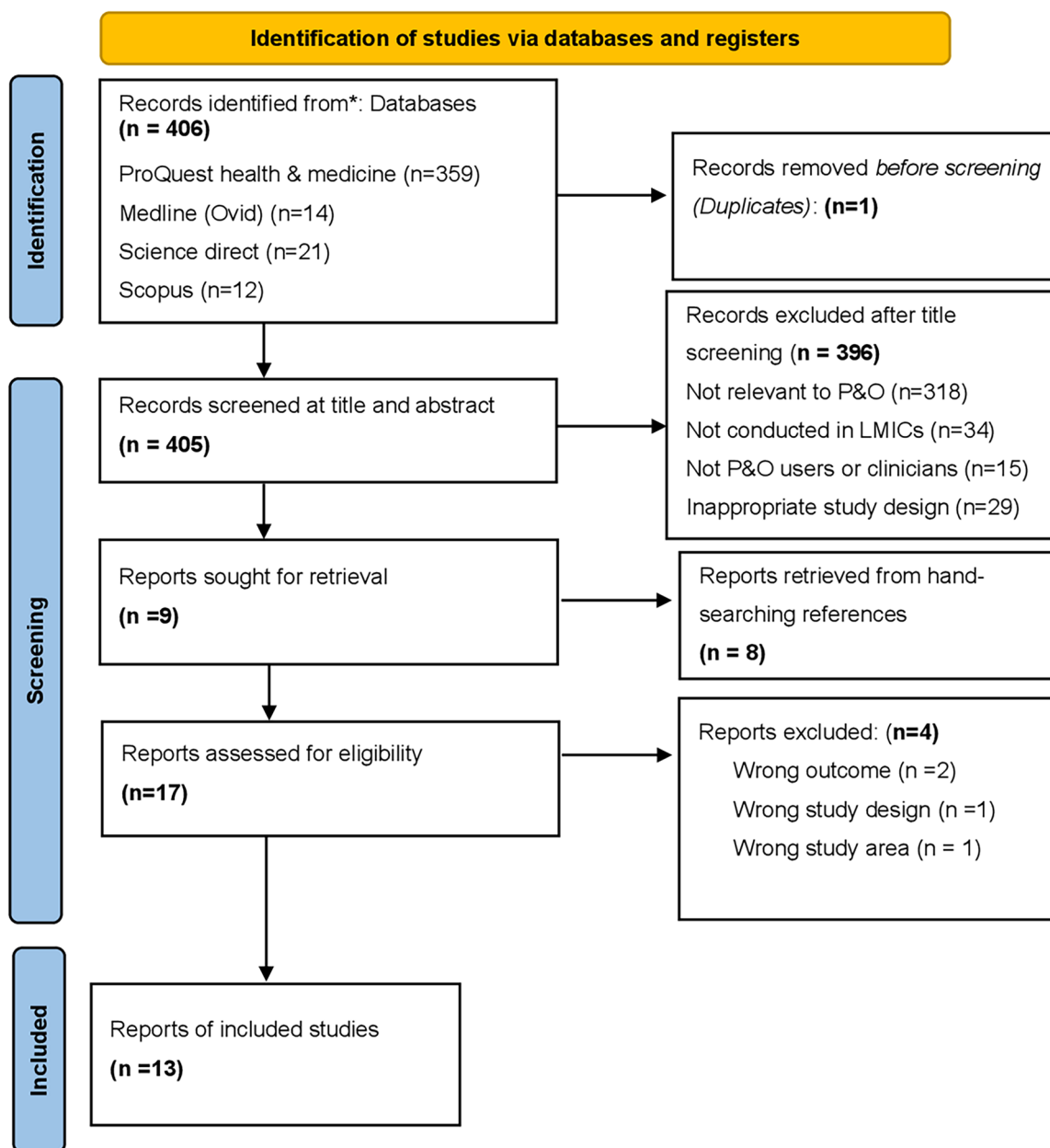


Figure 1. PRISMA flowchart of included studies.

Text	Code	Theme	Delay
<i>'Once we get the prosthetic and the follow-up is finished [...] we will try our best to save up to get a new prosthetic. I don't know how long this prosthetic will last'.</i>	Durability and longevity of prostheses	Perceived high costs of P&O devices.	Delay in the decision to seek care

Figure 2. Data analysis process.

potential users. Across the papers, participants also shared perceptions of rehabilitation or assistive devices impeding the initiation of contact with P&O services. Knowledge on the availability of P&O services and deciding to seek care was linked

to the cause and time of occurrence of having a disability. For example, participants who acquired a disability in Cambodia because of a landmine explosion were aware of rehabilitation services, possibly due to the high quality of coordinated care

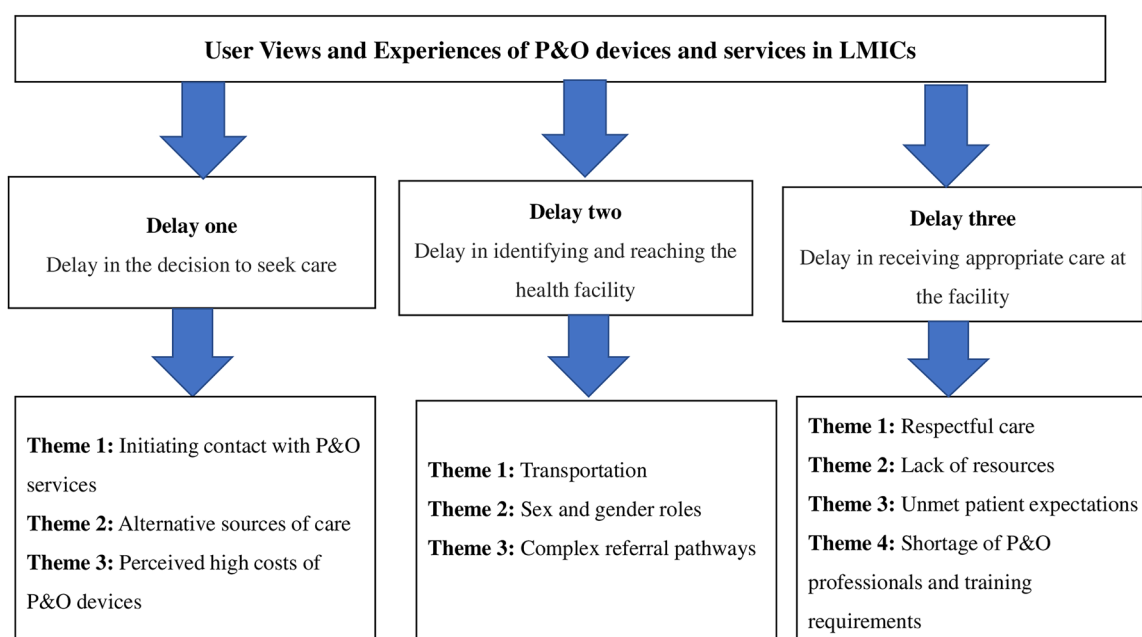


Figure 3. Schematic representation of the three delays and their related themes.

provided to victims [33]. This suggests that communication regarding available P&O services had been enhanced for this patient group, unlike others who also required the same service [33].

"I use the crutches made from bamboo because I didn't know some place that make prostheses, so I use the crutches and sometimes I jumping." [33]

By contrast, the motivation for participants with childhood disabilities in Cambodia often occurred after parents received information about rehabilitation through health promotion messaging or from other people with disabilities who had accessed services [35]. However, most participants cited in another study conducted in Sierra Leone, were aware of the role of crutches and other assistive devices; however, they had limited knowledge on the availability of P&O devices.

"The awareness that there are [prosthetic] centres within the country that people can access. ... Is yet to be – SP3." [14]

Service providers in a study conducted in Nepal also reported a lack of community awareness and limited health literacy, which hindered access to information about P&O services and rehabilitation in general. Participants in the study also reported that health workers were not effective in educating and informing patients across all levels of society about available devices and support, particularly in rural areas.

"Maybe because of the education level, so many of them do not know that they can get these devices. Lack of communication, lack of work done by the health workers, lack of penetration to that level." [38]

Theme 2: alternative sources of care

This theme explores how traditional beliefs, cultural practices, and stigma influence potential users and parents of children with disabilities, often leading to delays in deciding to seek P&O care. In Sierra Leone, decisions were highly influenced by traditional beliefs where participants cited various reasons, including seeking

healing from traditional remedies, societal norms, discrimination, faith, maternal nutrition, and reincarnation.

"... I have seen in one village; they took one boy with polio. They took him far out into the bush and left him close to a cotton tree, thinking that before the next day he would disappear. They did it because they thought he was the devil." [15]

Another study conducted in Tanzania found that the stigma surrounding disability was primarily due to traditional beliefs and contributed to participants' difficulty in deciding to seek rehabilitation services [40]. However, participants who received P&O devices in Sierra Leone and Cambodia, expressed an increased sense of social inclusion and a "remarkable change" in their life [15,33] since the disability was less apparent.

"When I got amputated, I felt shy and it was very difficult, but when I got my first device I was very, very happy to get it, because sometimes when I go to the market or something, when I walk around, they think I'm a beggar, I felt very shy. When I got the prosthesis, I can walk like a normal person." [33]

However, in Cambodia, society's perception of a person with a prosthesis changes depending on how the individual presents and whether the prosthesis is visibly exposed or hidden. When a person wears shorts that reveal the prosthesis, they may be perceived differently compared to when they wear trousers that conceal it. This visibility can influence how individuals are treated, including their level of social inclusion and participation in community activities [35].

"I think that it is good. When I put on trousers, at first glance, maybe [people] do not know about the leg. [With shorts] I think it is not good because many people will say, "Oh they have an artificial leg, that person lost a leg." Or they might say, "That person has a good education, but the leg is not good." [35]

Theme 3: perceived high costs of P&O devices

Participants perceived high costs associated with their beliefs about the expenses of prosthetic devices, repair, and maintenance

before incurring them. Moreover, the absence of insurance or having coverage that excludes P&O care further limited their decisions to seek P&O services. Participants cited that due to economic constraints, many were forced to delay repairs and stop treatments, because they could not afford necessary services, especially for people not in formal employment [34].

"As a government worker with a salary I can afford it, but some people find it extremely difficult. For me on a payroll yes, but what about someone who is not working? The living conditions in Sierra Leone are very hard. Some people I came here (rehabilitation centre) with, unfortunately, some of them stopped coming because they can't afford it. For ordinary people who are not working it's expensive." [34]

Although the costs of prosthetic limbs were perceived as high, there were also concerns about the cost of the repair process and the service life of a prosthesis. Participants in the studies done in Tanzania raised concerns about the durability and longevity of prostheses. These concerns related not only to the effectiveness of the prosthesis but also to the long-term costs associated with maintenance or the need to replace it frequently.

"Once we get the prosthetic and the follow-up is finished [...] we will try our best to save up to get a new prosthetic. I don't know how long this prosthetic will last." [13]

Some studies conducted in Nepal [38], Sierra Leone [34] and Cambodia [33] reported the presence of rehabilitation camps and Non-Governmental Organisations (NGOs) offering free rehabilitation services, including P&O devices. However, outside designated rehabilitation camps, no subsidies were provided for the indirect costs (e.g. transport, accommodation, loss of income for individuals and support network) associated with rehabilitation [34,38]. Similarly, service providers in Tanzania indicated that most patients did not have insurance or insurance that did not cover the cost of the prosthesis, limiting access to P&O services [40].

"Many of the patients cannot afford to purchase the appliances on their own. Very few have their own insurance which pays for them and very few have employers that can cover expenses. The rest they have to meet the cost on their own, or they have to seek for donors who can cover the cost" [40]

Delay 2: delay in identifying and reaching the health facility

The second delay involves themes addressing challenges in identifying and reaching the health facility. These themes involved transportation, sex and gender roles, and referral pathways that are complex and affect people with physical disabilities when accessing P&O care. These factors create significant barriers to timely access to P&O care, further complicating the rehabilitation process of those in need.

Theme 1: transportation

This theme relates to transportation difficulties in accessing P&O services, where issues such as high transport costs, long distances to travel, and lack of appropriate transportation options, especially in rural areas are explored. Barriers to accessing P&O centres manifested in many ways, including lack of money or support to pay for transport, long distances, the absence of appropriate transportation and weather conditions, especially for users residing in rural areas [14,33,34]. Having to choose between providing for their family or paying for transport for participants included in Sierra Leone and Tanzania studies resulted in shortened treatment

plans, compromising P&O care [34]. This meant that some aspects of the treatment, such as gait training, were reduced, leading to a less comprehensive approach than what is typically recommended.

"We have very few centres, so we have patients traveling from far away to Dar es Salaam [...] we need time to make a prosthetic, from two weeks to 1 month [...] if it's one month, these patients coming from elsewhere have to stay here, which costs a lot of money [...] so things like gait training get shortened, because the patient has to go back home before they are able to walk well on the prosthetic." [13]

In a study conducted in Sierra Leone, P&O users often found themselves competing for public vehicles to secure a seat if transportation was available [14]. For people with disabilities, this becomes a challenge because their disability prevents them from competing for public vehicles for fear of being injured or worsening their condition [14]. This challenge mainly affected women using P&O devices because they couldn't compete with men, leaving them at a disadvantaged position towards accessing public transport, such as a bus.

"But at times it is not the money but the difficulty getting there, getting transportation. You know people fight for transportation, so all that difficulty, that's the main problem." [14]

Participants in the included studies conducted in Bangladesh and Tanzania stated that during the rainy season, dirt roads, especially in rural areas, became muddy and slippery, preventing users of P&O services from reaching healthcare facilities [13,41].

"For instance, today it has been raining and most of our patients don't have private cars. There is no way to escape the mud. The infrastructure in this country is not suitable for prosthetics." [13]

Theme 2: sex and gender roles

This theme highlights the challenges that women primarily face when accessing P&O care. These challenges are frequently linked to gender-specific roles that restrict women's access to P&O services and impede their rehabilitation process. In some studies conducted in Sierra Leone [14,15,34], it was apparent that women perceived that they had more challenges than men when accessing P&O services, possibly due to the need to pay for child carers or the lack of funds to cover transport and P&O care.

"When I didn't have the money, they [personnel at the hospital] said I had to wait. They kept away from me, and I didn't see them for 3 days." [15]

Female participants in the study conducted in Kiribati [36] mainly provide for their families by caring for their children or grandchildren, while men serve as breadwinners [36]. Similar to women in Sierra Leone [34] many of them rely on their spouses for financial support to cover transport and accommodation costs during long stays in rehabilitation centres [34]. This reliance may possibly be due to cultural influences.

"In our culture our main food is fishing...most of the men will do fishing." [36]

In one study conducted in Bangladesh [41], women were perceived to have a strong motivation to fulfil their conventional duty as homemakers, which encompassed tasks such as cooking, cleaning, and tending to the needs of elderly family members or children even after undergoing limb loss surgery, often without assistance from their spouse or family. When the male counterpart lost a limb, the woman assumed numerous occupational responsibilities; however, this dynamic did not occur in the reverse

situation, where a woman lost a limb [41]. This was possibly due to religious and cultural influences.

"If I ask someone [to help] it might be hard for them too. It becomes very difficult for my mother and sister-in-law when I go home. When I am dependent on them, this actually increases their workload." [41]

These cultural and religious influences in countries like Bangladesh could potentially create additional barriers to P&O service provision, where female patients in patriarchal societies may feel uncomfortable or be restricted from receiving care from male clinicians.

Theme 3: complex referral pathways

Complex referral pathways highlight the fragmented healthcare system for individuals needing P&O care. The delays were associated with variations in referral pathways based on the cause of amputation, poor communication, and lack of coordination between healthcare providers within the same hospital. Fragmented care was a prominent theme across several studies conducted in Sierra Leone, Cambodia, and Tanzania [13,14,33]. It appeared that the referral pathways were primarily dependent on the cause of disability, especially in Cambodia. Traumatic amputations were categorised as lifesaving services where the primary concern is the immediate risk to the patient's life, necessitating urgent medical intervention. In contrast, non-traumatic amputations like those from diabetic foot ulcers primarily pose a risk to a person's mobility and occur in a more controlled and planned medical process, aimed at preventing further complications. For example, in the study conducted in Cambodia by Ramstrand et al. [33], amputations from land mine explosions appeared to have a much clearer referral pathway compared to other disabilities requiring orthotic intervention.

"When I was small, I like unable to walk as a normal In 2001 [as an adult] I got in an accident ... after that I went to the doctor ... they recommended me to use an orthosis so now I use an orthosis." [33]

Similarly, in other studies conducted in Tanzania [13,40], fragmented care was attributed to the lack of information and communication between health providers within the same hospital setting. These healthcare workers operate independently, preventing multidisciplinary cooperation when developing a patient's treatment plan [13,40].

"We came for two visits to see the surgeon after [patient's] amputation when we were advised about PT [physical therapy], but we weren't told about prosthetics [until later]. It seems like knowledge of where and how we can get a prosthetic has been lacking, and that's the biggest hurdle to his care so far." [13]

Delay 3: delay in receiving appropriate care at the facility

Themes associated with the third delay focus on factors influencing both individuals with limb loss and those with physical disabilities in receiving appropriate P&O care at healthcare facilities. These themes highlight the complex interaction of challenges in receiving appropriate care at the facility, including the need for respectful care, insufficient resources, unmet patient expectations, and shortages of P&O professionals and training opportunities.

Theme 1: respectful care

This theme captures the range of both positive and negative interactions with rehabilitation staff, emphasising the profound impact that undignified or uncompassionate care can have in delaying access to appropriate P&O services for people with disabilities. It also highlights how unequal treatment often influenced by a patient's financial

status, can undermine respectful care and compromise transparency in the provision of health services. Promoting respect at interpersonal and health system levels attracts more people with disabilities to access P&O services, irrespective of their economic status. In a study conducted in Sierra Leone, participants reported being ignored and denied access to devices in the hospital unless they could pay. Interestingly, participants expressed that they received the same treatment as anyone else when they could pay [34].

"You get treated normally if you have money. They will give you preferential treatment. If you don't have money, forget it! Money answers everything. If you have money, you get attention and respect. If you go with money and there is someone without money, they will treat you differently!" [34]

In Sierra Leone, a P&O user with both clinical experience and personal insight into living with a disability raised concerns about the fees charged to patients, as the management of rehabilitation centres provided minimal transparency [42]. Other participants indicated that since the government had taken over the services, they were not functioning as well as before.

"If it's only the government providing rehabilitation services there'll be a lot of problems. The government will ask for money for cost recovery. I know most of the disabled in Sierra Leone are poor." [42]

Other negative experiences shared by users from Sierra Leone included the harsh or distrustful treatment by rehabilitation staff when attempting to replace a broken device. Staff often accused them of selling parts of the device rather than being damaged [34]. However, participants trusted their service provider's ability to address their issues in Cambodia [33] and Kenya [39]. They felt confident in reaching out for assistance when necessary, willingly returning to the clinic, and expressing profound appreciation for the clinician's guidance. [39].

"When I go the doctor asks me my problem and I explain, if my leg has broken he repairs it for me, when I tell him my problems he listens." [39]

Theme 2: lack of resources

The delays in receiving appropriate P&O care also arise not only from the behaviour of health care workers but also from the limits of the health care system. Such limits reported by service providers include shortages of materials and components, compromised quality of locally produced materials, and the limited availability of appropriate machinery and electricity to fabricate P&O devices. In Sierra Leone, service providers attributed delays to persistent shortages of the materials needed to produce prostheses [14,34]. The lack of government financial support mainly caused the shortage of materials, thereby leading users to pay upfront to source materials before production can begin [14].

"When the National Rehabilitation Centre (NRC) was handed over to the government to run in 2009 these supply chains collapsed, and the prosthetic supplies left behind by Handicap International (HI) have since been exhausted." [14]

In Sierra Leone, when service providers sourced locally produced materials like polypropylene, which is commonly used for fabricating prosthetic sockets and orthotic devices, they were dissatisfied with the quality of these materials, which hindered their use [15]. Service providers also reported that the availability of appropriate machinery and reliable electricity were other confounding factors [37].

"We need support for now, so we can have the chance to give better quality prostheses to our patients. The materials, these materials need to be available." [42]

Theme 3: unmet patient expectations

Unmet patient expectations focus on the various challenges prosthetic users face when interacting with prosthetic services at the facility. It focuses on how these interactions met or did not meet prior patient expectations. The importance of personalised fitting and consideration of individual preferences and physical conditions, especially in prosthetic fitting, were key in the third delay. Prosthetic fitting is often seen as a potential solution to help individuals with limb loss regain mobility and independence. However, the expectations for prosthetic fitting may vary considerably from the reality of what is achievable with prosthetic technology [13,33, 35,36,41]. In Tanzania, insufficient counselling regarding these constraints can result in a discrepancy between patient expectations and actual outcomes, ultimately leading to feelings of disappointment and the abandonment of prosthetic devices [13].

"The other day, I did a prosthetic [...] the patient didn't like the cosmetic cover because it didn't match the colour of his skin [...] His prosthetic was fit to be used by a farmer, as he needs it to fit in gumboots, etc. At the end of the day, he left the prosthetic because he didn't understand how much it could impact his life." [13]

Participants cited in the studies conducted in Sierra Leone questioned the quality of P&O care based on several factors, including the likelihood of ulceration, discomfort with the prosthesis, cost of the devices, and the perception that the prosthesis would hinder mobility [14].

"During when the [NGO] Handicap International was working at the rehabilitation centre, they made [a prosthesis] for her. But because her stump is very short, she was finding it very difficult to use." [14]

Despite these barriers, some individuals in studies conducted in Cambodia, Kiribati, Nepal, and Kenya viewed their prostheses as positively impacting their independence [33], enhancing mobility, promoting activities such as walking and using public transport [36], and allowing them to undertake work that would otherwise be impractical or impossible [41].

"Just wanted to get prosthesis and be able to walk again; those were my expectations. I had been told that there are false legs that one can get, and they help one to be able to walk." [39]

Theme 4: shortage of P&O professionals and training requirements

The shortage of qualified P&O professionals was a recurring issue highlighted by service providers in various studies conducted in Sierra Leone [37,42]. Clinicians reported a shortage of P&O professionals and, in cases where professionals were present, an inadequacy of expertise and skills required to handle complex cases [37,42]. Some clinicians reported a desire for further training in undergraduate and postgraduate programmes in P&O [37,42]. The need for education was primarily based on theoretical knowledge to better inform the management of specific pathological conditions related to P&O.

"I need an education; I'd like to know more about prosthetics and orthotics. I can do the practical work even though the theoretical aspects are difficult for me. Not every time do I understand what to do. I'd like to study anatomy, pathology, and physiology." [42]

Local P&O training programmes were described as non-existent in Sierra Leone [14], subsequently leading to a lack of human resource in the field. Participants expressed concerns about the

future of P&O services, citing apprehension that qualified individuals would not be available to fill their roles upon retirement.

If we go out of the profession, because of the lack of training, who is coming to take over? [14]

In-house workshops and seminars were also seen as training opportunities for the professional development of service providers in Tanzania and Malawi [37]. Such opportunities were considered highly impactful if they exposed service providers to hands-on training. However, identified challenges included recruiting enough participants from urban and regional areas to make training viable.

Discussion

Based on our knowledge, this is the first qualitative meta-synthesis to use the 3DM to highlight barriers contributing to delays in the P&O field in LMIC settings. Our findings contextualise barriers to accessibility, integrate experiences from P&O users and clinicians, and further inform strategies to improve P&O care for users in low-resource settings. Several key factors, including socioeconomic, environmental, clinical pathways, service provider-centred, and facility-centred themes, contributed to barriers to accessing P&O services.

Delay in the decision to seek care

Across the studies identified, the lack of knowledge on the availability of P&O services was one of the key barriers affecting the decision to initiate contact. This was compounded by the nature of the disability and the health literacy levels of people with disabilities. Recent studies in LMICs [44,45] have documented low health literacy levels as the most common challenge to seeking care. None of the included studies explored the education level of P&O users, making it unclear whether the education level impacted health literacy levels. While using traditional health literacy interventions is common in LMICs [45], knowledge translation practices are often limited [44]. Hence, it is uncertain whether potential users could understand health information and decide to seek care.

Seeking alternative care sources in LMICs was shown to be highly influenced by traditional, cultural, and spiritual beliefs, leading individuals to pursue alternative treatments before considering P&O services. These beliefs also contribute to social stigma and discrimination, which are deeply embedded in local cultures and vary across different countries. For example, in Cambodia and Sierra Leone, studies have shown that disability in children was sometimes associated with karma from past lives, witchcraft, or the will of God [35,42]. Previous research has highlighted that overlooking cultural beliefs when setting global standards can hinder the uptake of appropriate services in LMICs [46]. Our synthesis of findings suggests that P&O devices often serve as a means for users to conceal their disability from the surrounding community. Therefore, researchers should be encouraged to understand specific cultural practices and beliefs as this could help integrate cultural context into research, thereby defining more appropriate services and reducing stigma [46]. Additionally, involving local stakeholders, including community leaders, in collaboration with researchers is essential for identifying and addressing cultural challenges and opportunities that influence health-seeking behaviours.

The findings suggest that perceived high costs, service life, cost of repairs of P&O devices, and the lack of health insurance in Sierra Leone and Tanzania could deter potential users, influencing them to seek cheaper alternative sources of care. These findings resonate with those from studies conducted in Ghana, South Africa, and Uganda where costs, a lack of government health system support, poor socioeconomic circumstances and inconsistent repair costs were identified as barriers to prosthetic rehabilitation [47–49]. Earlier studies have indicated that social health insurance coverage is 30% of the entire population in Kenya and 5% in Tanzania [50], but it is still unclear if coverage includes P&O services and devices.

The findings also highlight the dominant role of NGOs and charitable organisations in providing P&O services in Sierra Leone, Nepal, and Cambodia with no subsidies to cover the transport and accommodation costs associated with rehabilitation [33,34,38]. Financing for rehabilitation in LMICs is fragmented and needs effective coordination to achieve national goals [1]. Similar findings suggest that these services in LMICs very often depend on NGOs and charitable organisations, [51] whose involvement in supplying and providing the P&O services has improved access to and utilisation of these services [52,53]. However, it is still unclear whether this model of P&O care guarantees sustainability and continuity of care. Further evidence on successful models showcasing collaborations and coordination between the government and non-governmental providers [53] is needed. A starting point could be to map health system inefficiencies and misalignments, explicitly focusing on critical health programs like rehabilitation [1], to identify potential collaboration opportunities on rehabilitation financing between governments and NGOs within the broader health system where appropriate.

Delay in identifying and reaching the health facility

In the second delay, various transport-related reasons, which include lack of transportation means, unaffordable transportation costs, long travel distances, and time to facilities, influenced accessibility to P&O care. These factors mainly affected participants residing in rural areas with limited access to healthcare services, including rehabilitation. These findings correspond with the conclusions of studies conducted in South Africa and Uganda, where factors such as limited public transport options, long travel distances [12], and high transport costs [48] were mentioned. Despite the geographical spatial parameters, the included studies do not help us clearly understand questions such as: How far is too far? Additionally, they fail to elucidate concepts like: What constitutes long travel distances? Importantly, who requires services, why, and where do they live? Consequently, this lack of clarity hinders the comprehension of the intricate interplays within patient journeys concerning available P&O services. Understanding these dynamics is crucial as they can inform management strategies to mitigate barriers to potential users, thereby improving access to services.

In considering transport-related factors as barriers, a potential means to overcome this may include decentralising rehabilitation services through Community Based Rehabilitation (CBR). CBR is a globally proposed strategy to improve the quality of life of people with disabilities that promotes the provision of health care, including rehabilitation, in regions where the infrastructure for primary care is limited [54]. There is a need to integrate rehabilitation at the primary level of care [38,48], which is often the first contact point with the health system [53]. A starting point could be stationing CBR workers in basic-level centres in villages where

potential users could access information, initial consultation, maintenance, and repair services for P&O devices. The CBR workers could be tasked to identify potential users and provide basic care to P&O users. Complex cases requiring specialised expertise could be referred to high-level centres/hospitals whose resource settings and professional knowledge meet the requirements for providing these services.

Women with limb loss were perceived to have more challenges accessing services than men because of cultural and/or religious influences. From a cultural and religious perspective in countries such as Bangladesh and Kiribati, women are regarded as the primary carers for their children. Consequently, women had to seek childcare services to look after their children when they were away, and the absence of financial independence played a significant role. Unlike HICs, many women in LMICs work in informal settings, reducing the likelihood of affording childcare services, thereby exacerbating the accessibility to P&O services. Being a woman in other countries such as Bangladesh, came with the expectation of maintaining domestic roles even after acquiring an amputation and was attributed to cultural and religious norms where roles were often defined by sex [41]. In instances where the male counterpart had acquired an amputation, gender roles could inequitably change, where the woman could assume both work and domestic roles, irrespective of sex [41], leaving women as the sole providers and carers for their families [36].

Similar results have been reported in Bangladesh and Pakistan, where cultural and religious beliefs related to gender roles [55] and *Purdah* (the veil Muslim women wear) [56] create barriers when it comes to accessing certain services, particularly in healthcare, where male professionals might be involved. These findings align with the broader challenges of access to care in patriarchal societies where gender-sensitive service provision [56,57] is necessary. The availability of female clinicians can play a crucial role in ensuring access to care for women. Female P&O clinicians could help create support systems where context-specific tools for communication, independent living skills, information on disability and women's rights [58] could be used to improve access for women with disabilities.

The studies revealed that clinical referral pathways to care for potential users of P&O are more intricate and varied, expanding our understanding beyond a simple linear progression. The most prominent structural barrier to care in Cambodia was attributed to its dependency on the cause of disability rather than the need for P&O care. In Tanzania, communication barriers between health care professionals across hospital departments were prominent. These findings are consistent with evidence from similar settings showing that weak and fragmented referral evidence can limit access to available care [38]. Contextual multi-stakeholder initiatives advocating for a shift within referral systems and clinical pathways in different settings could be used to tailor interventions accordingly [48]. In addition, collaboration between healthcare professionals, community health workers, and relevant stakeholders is essential to create a more cohesive and integrated approach to P&O care.

Delay in receiving appropriate care at the facility

Factors related to respectful care, lack of P&O resources, unmet patient expectations, and training requirements were reported as barriers contributing to the third delay in this study. In countries such as Sierra Leone, much of the evidence suggests negative experiences from rehabilitation staff faced by the users when receiving care. Some evidence has also linked the lack of

respectful care to personnel, equipment, and resource shortages [18,38], creating a gap between patient expectations and the reality of care provision. However, resource limitations do not solely and directly determine communication, which is a crucial aspect of respect. It is also untrue and unfair to claim that all healthcare professionals have an equal chance to practice effective communication [59]. Since none of the studies reported accountability practices in place to improve the culture of respectful care from clinicians/service providers, it may be helpful to deploy tailored innovative interventions to enhance respectful P&O care in LMICs.

One of the factors affecting the quality of P&O services is a lack of components and materials used for the fabrication of P&O devices. Much of these resources are often imported from HICs and can be expensive due to shipping, import taxes, and mark-ups by distributors [60]. This cost burden usually falls on patients or healthcare systems, limiting access to those who can afford it. Similar findings in other LMICs also suggest that government-imposed sanctions make it challenging to import equipment and technology [52], exacerbated by the lack of clarity on tax exemption for P&O products [60]. In regions where P&O devices were crafted using locally sourced materials, their inadequate performance hindered their utilisation. Similar results have been reported in Uganda where P&O clinicians used non-ideal alternatives like melting jerrycans to replace polypropylene plastic sheets during socket fabrication [60]. This shows the pressing need for building local manufacturing capacities, where more of the innovation process and production is done in a local setting [61].

Receiving appropriate care at the facility was influenced by challenges faced with the prostheses and problems observed from other users. Some studies have linked this to emotional ambiguity [43] and minimal focus on outcomes that affect individuals in their context [29]. Others have stated differences in prioritised decisions and goals between prosthetists and prosthetic users [62]. There is a need to actively engage patients in discussing and balancing the multiple contributing factors when considering prosthetic design options [62].

The participants' expectations of the rehabilitation process were met and unmet regarding regaining mobility and limited technological choices influencing the cosmetic appearance of the prosthesis, respectively. Our findings also revealed that insufficient counselling regarding the limitations of prosthetic technology can lead to a significant gap between what patients anticipate and what can realistically be achieved. Murray [63] reported that individuals without sufficient knowledge or experience, especially in fitting prosthetic limbs, often became passive and relied on "experts" when they felt they could not actively contribute to decision-making despite being encouraged to participate. Ostler et al. [64] suggested that patients tend to adopt a passive role only during their hospital stay, indicating that their structured environment could play a significant role in their coping mechanisms. There is a need for patient involvement, where patients play a more active role in the decision-making process [65]. Clinicians should aim to share more information, use simpler language, and offer more opportunities for patients to make choices in P&O care. Education on typical challenges encountered is also crucial as it can better equip individuals when transitioning from the hospital to the home [65].

The third delay is also attributed to shortages of P&O professionals; where available, an inadequacy of knowledge and skills to manage complex cases was reported. The shortage of clinicians stems from the lack of training programmes within specific countries to train P&O professionals according to international standards

[66]. Similar findings suggest that this underrepresentation of professionals creates inefficiency of P&O care, [67] where P&O professionals assume other rehabilitation or supervisory roles. For example, associate P&Os (diploma holders) who are more experienced with technical work assume supervisory responsibilities that should typically be assigned to P&Os (bachelor holders). In such cases, inadequate knowledge and skills might have arisen from undertaking duties for which a professional had not received prior training. Without more trained and educated personnel, services will remain inadequate, uncertain, or at the point of crisis [5]. Given the critical importance of P&O training in LMICs, urgent actions are needed to address the challenges. Investing in local training P&O programs makes it possible to cultivate professionals who are well-equipped to meet the demands of providing effective P&O care.

Strengths and limitations

A key strength of this study is that it shows how the 3DM, which was initially developed for maternal health, can be used to understand barriers to P&O service from existing literature in LMICs, thereby providing helpful implications for policy and clinical practice. Based on our knowledge, this is the first qualitative meta-synthesis that has used the 3DM to highlight barriers contributing to delays in the P&O field in LMIC settings. The model's simplicity and adaptability make it a useful deductive tool for understanding delays in P&O care across different socio-cultural contexts and healthcare systems.

Some limitations of this study were noted. First, this meta-synthesis mainly drew from papers conducted in Sierra Leone ($n=4$), Tanzania ($n=2$), and Cambodia ($n=2$), which introduces a potential bias. As a result, the findings cannot be generalised to most LMICs, where different cultural norms and values may lead to distinct experiences with P&O services.

Secondly, the model does not provide the rich and detailed set of factors, social interactions, shared experiences, work, and the interplay between health care system characteristics and potential users in specified areas [24]. Nonetheless, it is crucial to appreciate its focused utility and explore complementary approaches for a more nuanced analysis of the factors mentioned.

Finally, the model only considers delays after access to necessary services has occurred. Therefore, it cannot be used to identify problems and assess preventative strategies before access to services [18]. Regardless, it is essential to recognise that the model focuses on post-access delays, which may provide valuable insights into refining and optimising the ongoing care and support processes.

Conclusion and recommendations

The synthesis of qualitative findings from different studies has provided a detailed understanding of barriers facing users accessing P&O services in LMICs. Using the 3DM as the conceptual framework, it has not only helped provide a firm base of evidence to make recommendations but has also highlighted the need to address traditional/cultural/religious beliefs about the causes of disability, financial barriers, and challenges hindering access to the available P&O services in LMICs.

This study's findings suggest that delays are interconnected components that might have a cascading effect on access to P&O services. Addressing one delay could reduce other delays. For instance, lowering the perceived cost of P&O devices and enhancing insurance coverage can help remove financial obstacles and encourage people to seek care earlier, potentially minimising delays in deciding to seek care and eventually reaching and receiving care.

Identifying the links between the three delays and implementing strategic measures to address the underlying causes can reduce delays and improve the overall quality and accessibility of P&O services in LMICs. Future research should focus on understanding the role of current access to information through technology, family, shared experiences, and community-based rehabilitation services in linking potential users to P&O services, especially in LMICs. Moreover, employing geospatial parameters to understand patient journeys and integrating P&O health insurance schemes to mitigate out-of-pocket expenses present a potential solution for further improving access to care.

Notably, negative encounters with rehabilitation staff and discrepancies between patient expectations and the provision of P&O care were prevalent in the third delay. This emphasises the need to develop strategies to allow patients to play a more active role in the decision-making process in P&O care. Furthermore, the shortage of qualified P&O professionals was linked to the absence of local training programs. Urgent collaborative efforts are recommended to expand training opportunities across LMICs and ensure a sustainable supply of qualified P&O professionals in the region.

Author contributions

CRedit: **Eunice Kombe**: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Resources, Software, Validation, Writing – original draft, Writing – review & editing; **Yeliz Prior**: Conceptualization, Formal analysis, Funding acquisition, Methodology, Project administration, Supervision, Validation, Visualization, Writing – review & editing; **Helen Louise Ackers**: Methodology, Software, Supervision, Visualization, Writing – review & editing; **Sarah Day**: Conceptualization, Formal analysis, Methodology, Writing – review & editing; **Maggie Donovan-Hall**: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Supervision, Validation, Visualization, Writing – review & editing.

Disclosure statement

The Authors declare that there is no conflict of interest.

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Data availability statement

The data that support the findings of this qualitative meta-synthesis study are derived from previously published articles and are publicly available. The references for the included studies can be found in the reference list of this manuscript. No additional primary data were collected for this study.

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