OUTLINING A “LOW-RESOURCE SETTING” IN THE CONTEXT OF REHABILITATION TO FACILITATE HEALTH EQUITY

by

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DECLARATION

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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December 2020

ABSTRACT

BACKGROUND

Global health systems are under constant pressure due to demographic transitions, epidemiological trends and limited resources. Access to rehabilitation, an acknowledged holistic intervention for anyone with a condition that limits their ability to function, appears most limited in health systems in resource-constrained settings. The resource constraints, specific to the setting, that limit access to and availability of rehabilitation, are unclear. A lack of understanding of what constitutes a “low-resource setting” may limit evidence synthesis, knowledge transfer, and rehabilitation program implementation. The aim of this thesis is to unravel the concept of “low-resource settings”, in the context of rehabilitation, to facilitate health equity.

METHODS

A systematic scoping review was undertaken to identify published articles in the field of rehabilitation medicine, that were conducted in a self-reported “low-resource setting”. Four electronic databases were accessed and searched from their inception to 24 June 2019: PubMed, Africa Wide, Web of Science and Scopus. Qualitative content analysis through an inductive approach, using in vivo and descriptive coding, was employed to analyse the data. Codes were grouped into content categories, guided by the use of a socio-ecological framework. These content categories were subsequently grouped to identify major themes relating to the term “low-resource setting” in the included studies. The findings informed the development of a case study, detailing the intersection of two methodological approaches to unravel a broad concept in existing, published literature. The case study aims to provide a detailed account and critical reflection on the methods used to answer the research question.

RESULTS

A total of 48 studies were included in the systematic scoping review. Following the qualitative content analysis, a total of 410 codes were grouped into 63 content categories, which helped identify nine major themes relating to the term ”low-resource setting” in the context of rehabilitation. These themes include (i) financial pressure, (ii) suboptimal

healthcare service delivery, (iii) underdeveloped infrastructure, (iv) paucity of knowledge, (v) research challenges and considerations, (vi) restricted social resources, (vii) geographical and environmental factors, (viii) human resource limitations and (ix) the influence of beliefs and practices.

CONCLUSION

Healthcare administrators, clinicians and researchers now have the opportunity to actively engage with the nine themes developed in this thesis when planning, designing and implementing rehabilitation interventions in “low-resource settings”. Moreover, these themes may provide a breeding ground for future research activities to support greater transparency (e.g. framework development) in reporting of research conducted in “low-resource settings”. Greater transparency may alleviate barriers in knowledge translation, across settings, and assist in reducing the unmet needs for rehabilitation, globally. Using qualitative content analysis as a means to unravel complicated constructs derived from a scoping review of existing literature, relative to the research inquiry, is a valuable intersection of methods that could be utilised more often

OPSOMMING

AGTERGROND

Wêreldwye gesondheidstelsels is onder konstante druk as gevolg van demografiese oorgange, epidemiologiese tendense en beperkte hulpbronne. Toegang tot rehabilitasie, 'n erkende holistiese ingryping vir enige iemand met 'n toestand wat hul vermoë om te funksioneer beperk, blyk om meer beperkend te wees in gesondheidstelsels met verminderde hulpbronne. Die hulpbronbeperkings, spesifiek tot die omgewing, wat toegang tot en beskikbaarheid van rehabilitasie beperk, is onduidelik. 'n Gebrek aan begrip van wat 'n “verminderde hulpbroninstelling” is, kan die sintese en oordrag van kennis, en implementering van rehabilitasieprogramme beperk. Die doel van hierdie tesis is om die konsep van “verminderde hulpbroninstellings”, in die konteks van rehabilitasie, te ontrafel en om sodoende, gesondheidsgelykheid te verbeter.

METODES

‘n Stelselmatige literatuuroorsig is uitgevoer om gepubliseerde artikels, in die rehabilitasiegeneeskunde veld, te identifiseer wat uitgevoer is in 'n self-gerapporteerde “verminderde hulpbroninstelling”. Vier elektroniese databasisse is hiervoor gebruik en daar is gesoek vir gepubliseerde artikels vanaf elke databasis se ontstaan tot 24 Junie 2019: PubMed, Africa Wide, Web of Science en Scopus. Kwalitatiewe inhoudsontleding, deur middel van 'n induktiewe benadering, met hulp van “in vivo” en beskrywende kodering, is gebruik om die data te ontleed. 'n Sosio-ekologiese raamwerk is gebruik om kodes in inhoudskategorieë op te deel. Hierdie kategorieë is verder gegroepeer om belangrike temas te identifiseer wat verband hou met die term "verminderde hulpbroninstelling” in die ingeslote studies. Die bevindings het die ontwikkeling van 'n gevallestudie ingelig en die kruising van twee metodologiese benaderings uiteengesit om 'n breë konsep in bestaande, gepubliseerde literatuur te ontrafel. Die gevallestudie het ten doel gehad om gedetailleerde verslag te gee, en krities te besin, oor die metodes wat gebruik word om die navorsingsvraag te beantwoord.

RESULTATE

Altesaam is 48 studies by die stelselmatige literatuuroorsig ingesluit. Na die kwalitatiewe inhoudsanalise is 410 kodes in 63 inhoudskategorieë gegroepeer, wat gehelp het om nege hooftemas te identifiseer wat verband hou met die term “verminderde hulpbroninstelling”, in die konteks van rehabilitasie. Hierdie temas sluit in (i) finansiële druk, (ii) suboptimale gesondheidsorgdienslewering, (iii) onderontwikkelde infrastruktuur, (iv) gebrek aan kennis,

(v) navorsingsuitdagings en oorwegings, (vi) beperkte sosiale hulpbronne, (vii) geografiese en omgewingsfaktore, (viii) beperkings op menslike hulpbronne en (ix) die invloed van oortuigings en praktyke.

GEVOLGTREKKING

Administrateurs van gesondheidsorg, klinici en navorsers het nou die geleentheid om aktief betrokke te raak by die nege temas wat in hierdie tesis ontwikkel is, tydens die beplanning, ontwerp en implementering van rehabilitasie-intervensies in "verminderde hulpbroninstellings". Boonop dit, kan hierdie temas 'n teelaarde bied vir toekomstige navorsingsaktiwiteite om groter deursigtigheid (bv. raamwerkontwikkeling) te ondersteun in verslagdoening oor navorsing wat in 'n “verminderde hulpbroninstelling” uitgevoer word. Groter deursigtigheid kan hindernisse in die oordra van kennis, in verskillende instellings, verbeter, en help om wêreldwyd die onvervulde behoeftes vir rehabilitasie te verminder. Die gebruik van kwalitatiewe inhoudsanalise as 'n middel om ingewikkelde konstruksies, afkomstig vanaf 'n stelselmatige literatuurorsig, te ontrafel, relatief tot die navorsingsondersoek, is 'n kragtige kruising van metodes wat meer gereeld gebruik kan word.

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LIST OF ABBREVIATIONS

LMICs:	Low and middle-income countries
LRSs:	Low-resource settings
NCDs:	Non-communicable diseases
WHO:	World Health Organisation
YLDs:	Years Lived with Disability

CHAPTER 1

1.1 INTRODUCTION AND SCOPE OF THESIS

The primary purpose of any health system is to improve health.(1) However, possibly owing to the fact that health systems are highly complex, dynamic, path-dependent and constantly adapting,(2) health system performance differs widely amongst settings.(3) Even countries which share similar health expenditure trends, income levels and education, vary in their ability to achieve essential health outcomes.(3) This variation in health system performance emphasises the fact that a broader understanding of the underlying constructs which affect this performance, is required. The World Health Organisation (WHO) has described a framework in which six key components of health systems have been outlined: (i) leadership/governance, (ii) financing, (iii) service delivery, (iv) health information systems, (v) access to essential medicines and (vi) a health workforce.(1) Understanding that success in strengthening a health system lies in considering each unique contributing aspect,(2) in combination with addressing fundamental constraints in each of these six areas,(1) is imperative.

In the 21st century, health systems are now challenged by shifts in the demographic, epidemiological, and health profiles of global populations.(4,5) The increasing prevalence of non-communicable diseases (NCDs) (6) and aging populations, often associated with chronic conditions, (7) means that more of the global population is likely to experience disability.(4,8) The fact that people are now living longer, with multiple chronic conditions, may result in functional decline, associated activity and participation restrictions and reduced quality of life.(5) As a result, health systems need to respond with services aimed at facilitating and improving physical function, (4) to meet the emerging needs of the population.(8) Given the aforementioned demographic shifts (e.g. aging populations) and epidemiological trends (e.g. increasing chronic disease burden), health systems have been called to expand access to and quality of rehabilitation.(4,6)

Rehabilitation can be defined as “a set of measures that assist individuals who experience, or are likely to experience, disability to achieve and maintain optimal functioning in interaction with their environments”.(9) Rehabilitation plays a vital role in the management of disease symptoms and preventing and reducing limitations to physical function, thereby improving physiological function and quality of life.(7) Of particular importance is that health systems should improve awareness regarding the scope of rehabilitation.(4) In

other words, rehabilitation is not only limited to a specialised intervention for athletes,(8) an optional, return-to-work service following an injury or surgery,(4) an intervention aimed at reducing disability following trauma or acute disease (8) or a service reserved only for minority groups with long-term impairments or disability.(10) Anyone with a health condition, injury or impairment, acute or chronic, which limits their ability to function, may benefit from rehabilitation.(4)

Unfortunately, as the demand for rehabilitation continues to rise,(6) the availability of rehabilitation opportunities continues to differ greatly amongst settings. (9) Some areas have reported significantly unmet rehabilitation needs and multiple barriers to accessing rehabilitation.(6) With regards to physical rehabilitation alone, countries of lower income, which are frequently faced with a lack of rehabilitation infrastructure, had the highest absolute increase in rehabilitation needs from 1990 – 2017.(11) Furthermore, statistics indicate that around 92% of the world's disease burden is associated with an aetiology that may take advantage of assistance from rehabilitation professionals.(6) While the global need for physical rehabilitation alone has not only increased in absolute terms, there has also been an increase in the percentage of total Years Lived with Disability (YLD).(11) Therefore, not only has the need for rehabilitation increased globally, but those living with disability or disease are living longer, with the continued need for access to quality rehabilitative care throughout their lifespan. Given these findings, one could argue that augmenting access to and availability of physical rehabilitation, may have the ability to alleviate a higher burden of global disability and improve equality in healthcare.(11) Hence, strengthening health systems to provide rehabilitation may not only make it possible for people to live longer, but to also live well.(10)

Knowing that rehabilitation resources in many settings, particularly in low- to middle income countries (LMICs), remain quite restricted, it is important to provide these areas with resources and innovative solutions for effective implementation.(11) However, as with many health system structures, health resource availability also differs significantly within nations and regions.(12) To be able to address resource limitations, one would require deep contextual understanding of the inherent aspects of each unique setting. Fortunately, research in "low-resource settings" (LRSs) has become more prevalent,(13) proven by the fact that a simple PubMed (8 September 2020) search shows > 4200 citations referring to some setting of low-resource, in the title or abstract. Reflecting on the research done in these settings may provide insight into how and why certain resource limitations exist. In

the context of rehabilitation, these resource limitations may be diverse and complex, as rehabilitation is a comprehensive and multidisciplinary intervention model throughout the continuum of care. As the momentum of research focussed on LRSs is increasing, the need for the research process to clearly reflect the specific conditions of a particular setting is emphasised.(13) Clear descriptions and/or operationalisation of the setting in which the research is conducted, may facilitate knowledge translation from one setting to another. The scalability and knowledge transfer of innovative healthcare solutions may only be successful and sustainable if there is sufficient and clear understanding of the context from which the solution originated.(2)

To that extent, this thesis has two aims. Firstly, to unravel of the concept of a “low-resource setting” as reported in existing literature and analyse how these settings are described specifically within the context of rehabilitation. The second aim is to provide a detailed account and critical reflection of the methodological approach used to unravel a broad concept (i.e. “low-resource setting”) in published literature, to assist researchers in similar qualitative research endeavours.

1.2 THESIS OUTLINE

This thesis consists of four chapters in which **Chapter 1** provides a brief introduction to the thesis and its overarching aims. Subsequently, Chapter 2 and 3 are written in a “publication” format. **Chapter 2**, where the concept of a LRS is unravelled using previously published literature in the field of rehabilitation, is written with the intent to submit for publication to a high impact and leading journal in the field of public or global health (e.g. Lancet Public Health / BMJ Global Health). The methods used in Chapter 2 are outlined in **Chapter 3**, a method-focussed case study, and is written with the intent to submit for publication in a methodology focussed peer-reviewed journal (e.g. BMC medical research methodology). In **Chapter 4**, the findings and their potential implications for clinical practice and future research are discussed. Please note that for readability purposes, all references used throughout this thesis are collated in a single reference list between Chapter 4 and the addenda.

CHAPTER 2

Unravelling the concept of “low-resource settings” in the context of rehabilitation: a systematic scoping review with qualitative content analysis

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Background: As the demand for rehabilitation is increasing, the capacity to provide rehabilitation is failing to meet existing needs in some parts of the world. The effects of healthcare-related inequalities are most evident in low-resource settings. These low-resource settings are often not explicitly described, and the failure to understand different contextual factors contributing to resource constraints, may inhibit the success of tailored interventions and knowledge translation between settings.

Methods: A systematic scoping review was undertaken to unravel the term “low-resource setting” within the field of rehabilitation, as described in the literature. PubMed, Africa Wide, Web of Science and Scopus were searched from their inception to 24 June 2019 using terms related to "rehabilitation" AND "low-resource setting". Qualitative content analysis through an inductive approach, using in-vivo and descriptive coding, was employed to analyse the included literature. Content categories were developed by grouping codes guided by a socio-ecological framework. These categories were subsequently grouped to identify major themes relating to the term “low-resource setting” in the included studies.

Results: A total of 410 codes were grouped into 63 content categories which helped identify nine major themes relating to the term “low-resource setting”, in the context of rehabilitation. These themes include (i) financial pressure, (ii) suboptimal healthcare service delivery, (iii) underdeveloped infrastructure, (iv) paucity of knowledge, (v) research challenges and considerations, (vi) restricted social resources, (vii) geographical and environmental factors, (viii) human resource limitations and (ix) the influence of beliefs and practices.

Conclusion: The emerging themes assist with the initial process of determining what constitutes a “low-resource setting” in health-related research. Using proxies (i.e LMICs) to describe LRSs undermines the complexity of LRSs and insinuates a level of homogeneity that is unsupported. Further research could a) explore the use of these themes outside of the rehabilitation realm, and b) to inform the development of consensus statements or reporting frameworks that clearly define the (low-resource) "setting”, to further facilitate knowledge transfer.

2.1 INTRODUCTION

The effects of inequality in healthcare are most evident in low-resource settings (LRSs).(14) In such LRSs, vast differences in the burden of disease and life expectancies, are reflective of underlying mechanisms which cause widespread inconsistencies in health statuses.(15,16) Given that healthcare inequalities may be a product of the entire setting (i.e. mechanisms of cause and effect),(15) one would need clear understanding of the "situation" in which such health inequalities exist. A systematic approach to situation analysis may assist in addressing health inequalities and subsequently, meet population health needs.(4)

One could argue that these "situations" are not stagnant and evolve in response to shifts and trends in, for example, population demographics, burden of disease and economic transformation. The 21st century is marked by rapidly aging populations, and a slow, albeit pronounced, shift in the burden of disease from communicable conditions (e.g. tuberculosis) towards chronic, non-communicable disease (e.g. diabetes and cardiovascular disease).(8) It can be hypothesised that the ability of a healthcare system to respond to such shifts, may be one of the key underlying determinants of adequate healthcare. One particularly important model of care for those with chronic conditions and subsequent disability, is rehabilitation.(8) Rehabilitation is a holistic and comprehensive intervention, with a clear evidence base throughout all levels of healthcare.(9) Yet, there is an unmet and increasing need for rehabilitation globally.(6) Unfortunately, in many low to middle income countries (LMICs), health systems have limited ability to provide available and accessible rehabilitation.(6,11) As a result of multi-facetted resource constraints,(4) the inability of healthcare systems to meet the growing need for rehabilitation, particularly in LRSs, has the potential to further exacerbate continued health inequalities.

Developing tailored interventions and localised solutions, designed for needs in specific situations,(17) may assist in alleviating the rehabilitation challenges caused by resource restrictions. Though, successful and sustainable interventions, aimed at improving quality of rehabilitative care, are unlikely to achieve their desired effect if designed with insufficient acknowledgement of different contextual factors inherent to the setting in which the intervention is developed, studied or implemented.(2) As such, improved understanding of the resource-constraints referred to when rehabilitation is studied in LRSs, could aid in the successful development, study and implementation of rehabilitation interventions in these

settings. In other words, when one refers to the research being in done in a LRS, what is actually meant by “low resource”?

Previous studies, which have explored various health system components in LRSs, often define LRSs synonymously with LMICs as classified by the World Bank.(14,18,19) While there is a clear association between healthcare expenditure and healthcare provision,(20) the capacity of a setting to provide adequate healthcare is dependent on many interrelated factors. One could go as far to say that it is an ecological fallacy to cluster countries or settings on the basis of gross domestic product alone (i.e. income classification). If a clear definition or description of the “situation” in which clinical research is conducted is poorly described, knowledge transfer from one setting to another, and sustainability of the research findings, could be inhibited.

Hence, on the one hand there is growing need for rehabilitation globally, which may have a profound impact on LRSs specifically. Yet, on the other hand, there is insufficient understanding and reporting (21) of the “resource constraints” that contribute to the challenges faced when upscaling or rethinking rehabilitation in LRSs. Therefore, it is imperative that we improve our understanding of the resource-constraints faced when developing, testing, and implementing rehabilitation interventions aimed at addressing relevant and pressing health needs. Through the use of qualitative content-analysis, the objective of this review is to identify themes that contribute to how “low-resource settings”, relevant to the field of rehabilitation, are described in published literature. Through unravelling the implicit concept of “low-resource settings”, we aim to improve our understanding of resource shortages within the context of rehabilitation medicine. Furthermore, improving understanding of the concept of LRSs may aid in the transferability of research findings from one setting to another, through improved transparency and reporting.

2.2 METHODS

2.2.1 Study design

A systematic scoping review (22) was undertaken to identify published literature within the field of rehabilitation medicine and conducted in a self-reported “low-resource setting”. The review is reported in adherence to the Preferred Reporting for Systematic Reviews and

Meta-Analyses extension for scoping reviews (PRISMA-ScR) guidelines (Addendum A).(23)

2.2.2 Eligibility criteria

2.2.2.1 Definition of concepts

Rehabilitation was defined as “a set of interventions designed to optimize functioning and reduce disability in individuals with health conditions in interaction with their environment. Health condition refers to disease (acute or chronic), disorder, injury or trauma”.(4) As such, a health condition “may also include other circumstances such as pregnancy, ageing, stress, congenital anomaly, or genetic predisposition”, where rehabilitation may be required “by anyone with a health condition who experiences some form of limitation in functioning, such as in mobility, vision or cognition”.(4) Furthermore, rehabilitation is “characterised by interventions that address impairments, activity limitations and participation restrictions, as well as personal and environmental factors (including assistive technology) that have an impact on functioning.(4)

2.2.2.2 Inclusion and exclusion criteria

The researchers held team meetings to discuss the inclusion and exclusion criteria. We used an iterative process to refine the eligibility criteria throughout the study selection process (the critical decision-making regarding the eligibility criteria is outlined in Chapter 3.2.1). In the end, studies were included if they met the following criteria:

- The title, abstract and/or keywords of the included literature had to include an actual self-reported setting of “low resource”.
- The types of papers included in this review are original research, written in English.
- Finally, as many settings are in constant transition in a continually fluctuating global economy, only articles published in the last five years (2014 onwards) were included, to ensure relative actuality of the review findings.

Studies were excluded if met the following criteria:

- Case studies, case reports, case series or reviews were excluded.
- Articles pertaining to the rehabilitation of the use, misuse or abuse of substances such as, but not limited to, alcohol, smoking, medication, drugs etc. were not included in this review.

- Studies that evaluated healthcare worker perspectives, system or cost evaluations were excluded, to streamline and strengthen the focus of unravelling the setting, in its entirety.

2.2.3 Search Strategy

Four electronic databases were accessed and searched from their inception to 24 June 2019: PubMed, Africa Wide, Web of Science and Scopus. A search strategy for each database (Addendum B) was developed in collaboration with a medical librarian to identify studies. The use of terminology related to rehabilitation components, conducted in low-resource settings, in the title, abstract or keywords, were included. Albeit, only articles published in the last five years (2014 onwards) were included.

2.2.4 Study selection process

Following the execution of the search strategy, the initial screening of identified article titles was done independently by two researchers (CVZ and MH). Potentially eligible titles and abstracts to be included for the second iteration of independent screening (CVZ and MH) were agreed upon, following discussions on any discord in the initial screening results. These discussions were used to refine the in/exclusion criteria. A third researcher (SH) was available for review in the case of discordance between the aforementioned researchers. However, this step was not required. Subsequently, full text review was done independently by two researchers (CVZ and MH) and agreement was reached on the final full text articles included.

2.2.5 Methodological Appraisal

No appraisal on risk of bias or methodological quality was conducted, as is consistent with the guidance provided on scoping review methodology.(22)

2.2.6 Data extraction and analysis

2.2.6.1 Quantitative data extraction

Data extraction to describe the articles included in the study was performed by one researcher (CVZ) and verified by a second researcher (MH). A data extraction form was created to tabulate the description of the included studies by authors and publication dates, methodological design, disease profiles reported according to the Global Health Data Exchange,(24) geographic location, World Bank income group in the year of the

study publication,(25) the setting's most recent GINI index value,(26) and a short synopsis of the rehabilitation model.

2.2.6.2 Qualitative data analysis

The included articles were analysed using qualitative content analysis through an inductive approach.(27,28) Doing content analysis through an inductive approach is text- or data-driven and involved systematically searching for patterns underlying the construct of the text.(28) ATLAS.ti (https://atlasti.com/) software was used to store and organise the data during the process of abstraction and interpretation. This review made use of a research team comprising of four individuals: (i) a clinical physiotherapist and novice researcher, (ii) a physiotherapist and senior academic with qualitative research expertise, (iii) a senior academic and experienced quantitative and qualitative researcher, and lastly, (iv) a physiotherapist and senior academic with vast experience in quantitative and qualitative research. The qualitative data analysis team consisted of the first three described team members.

A combination of in vivo and descriptive coding was used to analyse the included articles.(29) The combination of these two coding techniques helped to identify the significance of the text as it was presented, but also allowed the opportunity for a degree of interpretation to grasp the underlying meaning of the information presented. All of the articles were coded through multiple rigorous iterations of individual and team coding, during which the first version of the codebook was developed and constantly refined. A second, and final, iteration of coding was then conducted by a single researcher (CVZ). This iteration was done to refine the codebook and evaluate whether accurate phrases and words were used for each code, to merge any codes that were conceptually similar, reassess the utility of codes and to remove any redundant codes. The full codebook is available online via the (temporary) link and will be made available open access at the time of publication: https://bit.ly/2R6iMGQ.

During the second cycle of coding, the use of a socio-ecological model was introduced to guide the process of grouping the codes into content categories. This framework was only introduced *after* the initial or first cycle of coding was completed, indicating inductive coding at origin. Public health practice has been guided by socio-ecological models that describe the interactive attributes of individuals and environments that lead to health outcomes, where health interventions are introduced on different levels to meet associated

health needs.(30) Thus, given the aim of our review and the data presented from the coding of the literature, using this model created a relevant, structured platform for the grouping of codes. Subsequently, the codes were then grouped into content categories relating to six layers of the socio-ecological model: personal, interpersonal, community, healthcare organisational, national and academic. The development of the content categories included an iterative and rigorous individual and team process. To express the underlying meaning of the content, the same process was used to group content categories into major themes relating to the term “low-resource setting” (a comprehensive description of the entire content analysis process is outlined in Chapter 3.3.3).

Quality and rigor are steered by researcher reflexivity and rigorous investigator triangulation during the analysis (31) and are important concepts in the field of qualitative research. This study adopted the criteria introduced by Lincoln and Guba (32) to establish trustworthiness: credibility, dependability, confirmability and transferability. To strengthen the scientific and rigorous processing of the data, the included studies were constantly reviewed and revised through debate by a second and third researcher (MH and MB). This debate facilitated a cross-check of codes, content categories and themes. To ensure credibility and confirmability, the researchers committed time and resolve to develop multiple versions of the codebook (n = 12) through reflective and introspective discussion, contemplation and deliberation. Content categories and themes were reviewed and refined through the same continuous, interactive and rigorous deliberation process. A fourth researcher was consulted to review the themes developed from the content categories. In the interest of dependability and transferability, clear and detailed reporting of the research methodology and findings have been articulated in Chapter 3.3.3 of this thesis.

2.3 RESULTS

2.3.1 Search Results

A total of 1426 articles were identified using the search strategy. Of these, 48 articles met the selection criteria (Figure 1). Primary reasons for exclusion, at the stage of full-text review were, “not original research” (n=15), and not meeting the definition of “rehabilitation” (n=13).

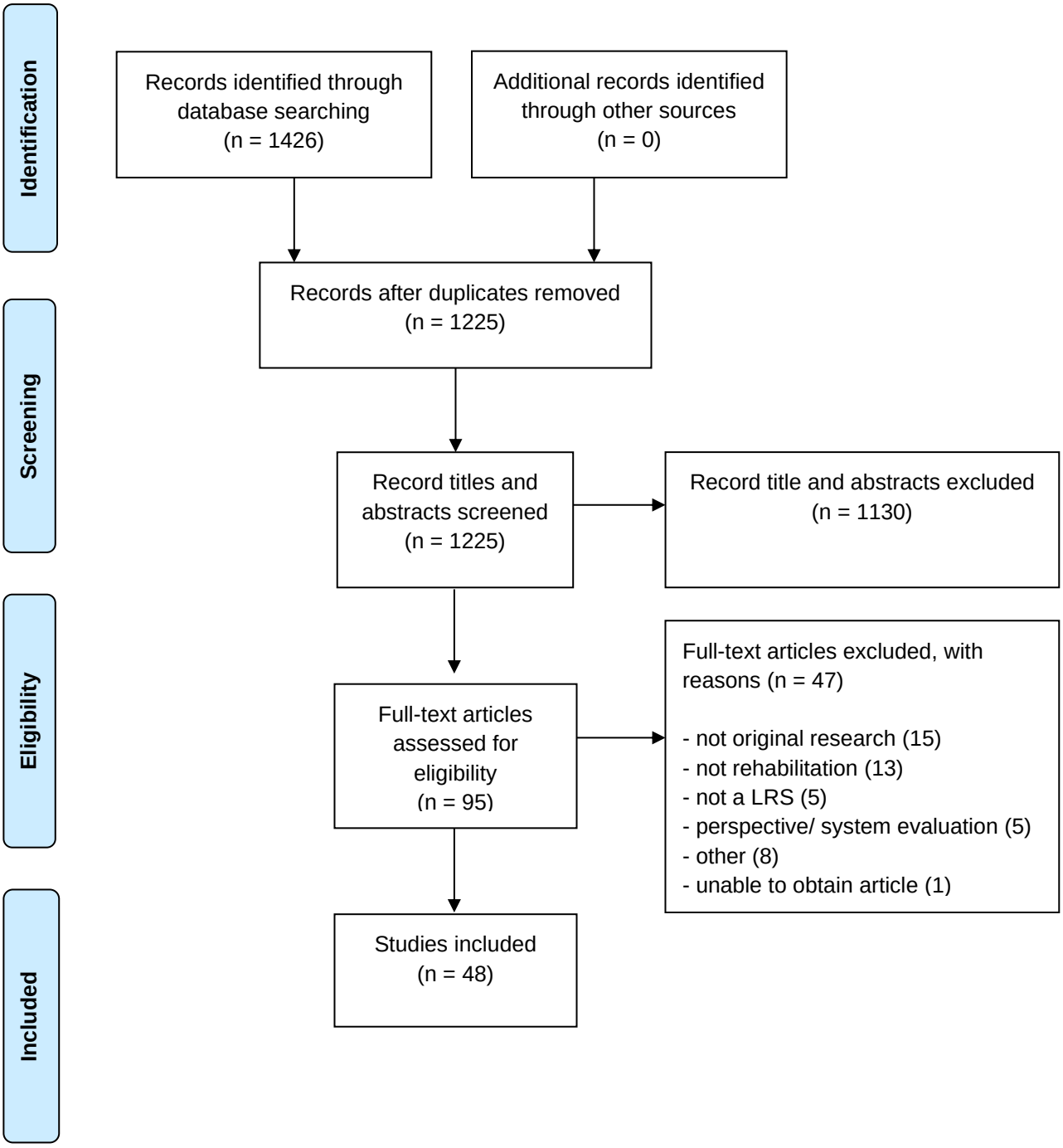

Figure 1: PRISMA flowchart

2.3.2 Description of the included studies

A detailed sample description of the included articles is tabulated in Addendum C. In short, out of the 48 included articles, most used a randomised controlled trial design (n=18, 38%), followed by cohort studies (n=11, 23%), qualitative reports (n=8, 17%), cross-sectional studies (n=5,10%) and others used a different design (n=6, 12%). The included articles reported on patients with non-communicable diseases (including cardiovascular,

respiratory, neurological, mental disorders etc.; n=32, 68%), uncategorised (e.g. obesity, persons with disabilities etc.; n=10, 21%), communicable, maternal, neonatal and nutritional diseases (n=4, 9%) and injuries (n=1, 2%). The World Bank income groups in the year of study publication included lower middle income countries (n=14, 31%), upper middle income countries (n=13, 28%), low income countries (n=11, 24%) and a high income country (n=8, 17%). The highest GINI index, where 100 would mean the highest level of inequality, was 63 (South Africa) and the lowest value was 29 (Kosovo). The interquartile range showed that 50% of the studies fell in the range of 38 to 45. Figure 2 presents a density map of countries in which “low-resource” settings were described.

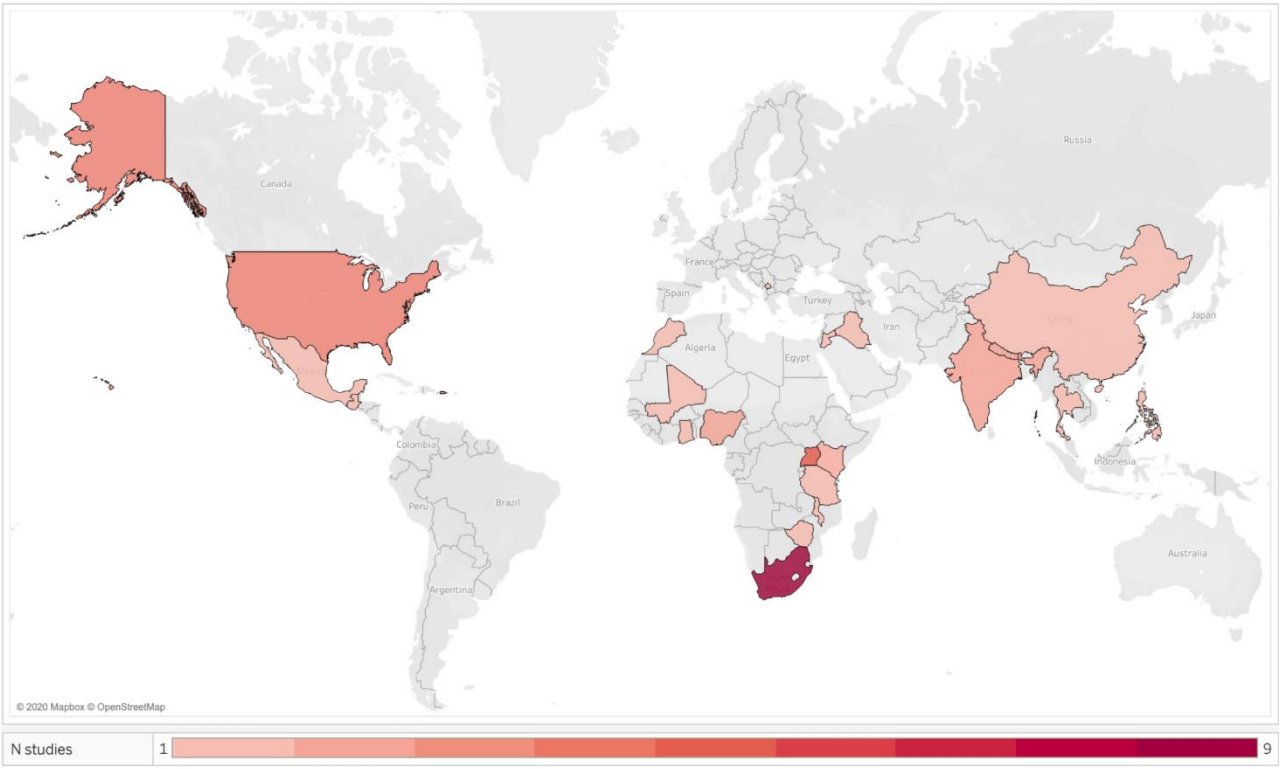

Figure 2: Density map of countries in which "low-resource settings" were described; A more dense colour (red) indicates that, within the included studies, low-resource settings were more commonly described in that specific country.

2.3.3 Content category and theme descriptions

A total of 410 codes were grouped into 63 unique content categories, across six layers of the socio-ecological model. Grouping the 63 categories created nine themes relating to the term “low-resource setting” in the context of rehabilitation. The layers of the socio-ecological model display the content categories amongst multiple levels of influence relating to personal, interpersonal, community, healthcare organisational, national and academic factors, in LRSs. Each theme is individually described, and the collective is visually presented in Figure 3. Table 1.1 through 1.9 provides a comprehensive overview of each content category, organised by theme (rows) and layers within the socio-ecological

model (columns). The content category descriptions are a direct reflection of the underlying codes (also available at https://bit.ly/2R6iMGQ.). Owing to the multiple levels of influence displayed in the socio-ecological model, as well as the multimodal and comprehensive nature of rehabilitation, content categories may be present in more than one theme.

Theme 1: Financial pressure

Financial uncertainties appear to be a core component when describing LRSs, reflected by the presence of content categories related to financial pressure in every layer of the socio-ecological model. The underlying content categories elucidate important factors contributing to uncertainties regarding financial resources such as insufficient income, lack of healthcare insurance, dependency on subsidised healthcare, unemployment, subsistence employment and undernutrition. These appear to directly affect an individual's ability to access, engage and maintain rehabilitation strategies. Furthermore, our findings show that uncertainties around financial resources may restrict national, organisational and research initiatives which should inform and meet the needs of a setting.

> *"As in many low-to-middle income countries, most healthcare expenditures are out-of-pocket."* (33)

> *"The majority of the district's population rely on health care provided by the state, age or disability pensions, and family members who go out to work to sustain the household."* (34)

> *"Participants in our study reported that financial constraints limited access to institutional care and contributed to food scarcity, which affected full participation in the home-based rehabilitation intervention."* (35)

Moreover, the lack of financial resources to govern the associated high cost of managing specific disease clusters, particularly those with increasing incidence and prevalence in these settings, may stretch the burden on health systems already failing to optimise health outcomes.

> *"The increasing prevalence of diabetes and the associated cost of managing this complicated disease have a significant impact on public health outcomes and health expenditures."* (36)

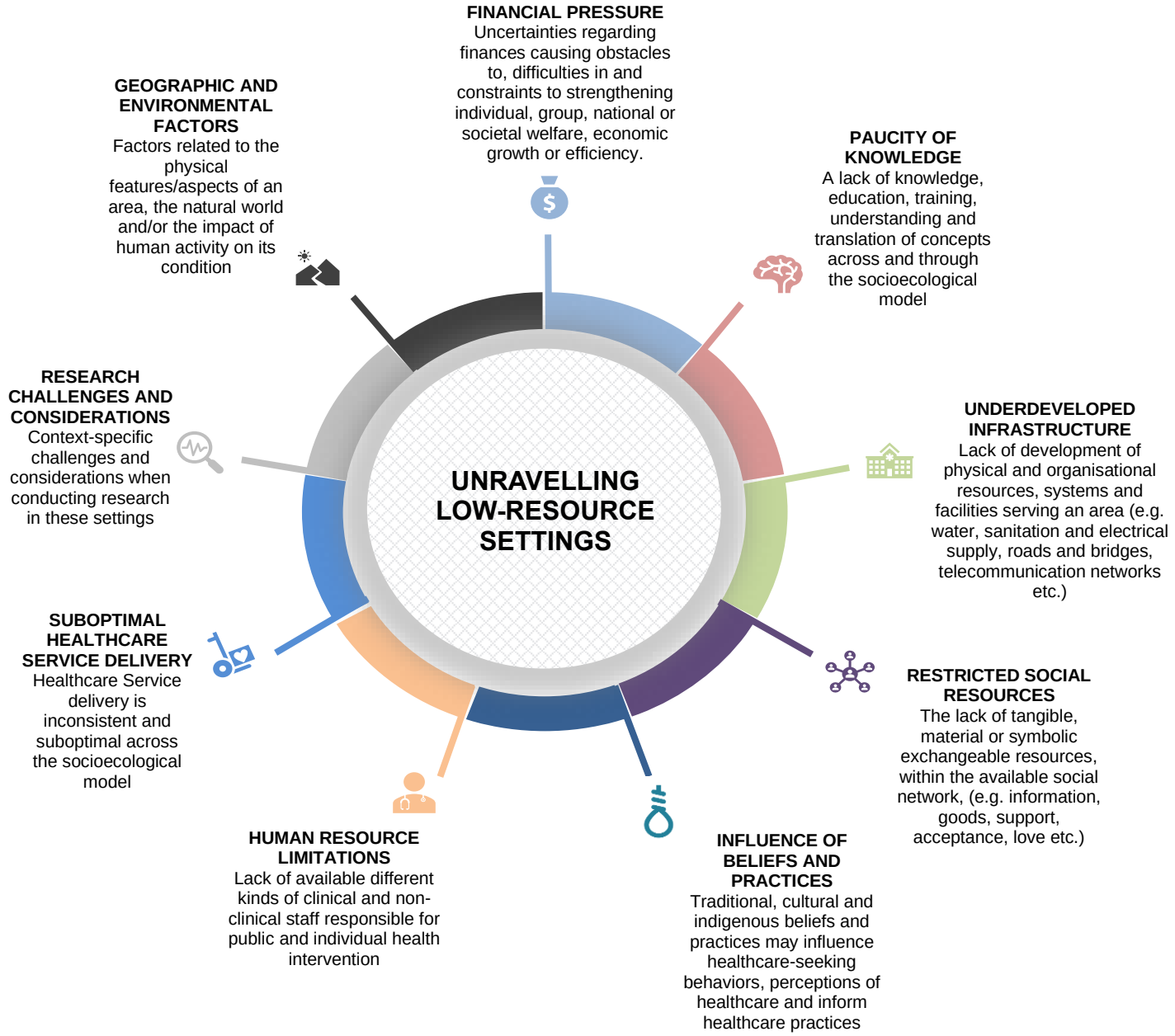

Figure 3: Nine major themes relating to the concept of "low-resource settings"

Table 1.1: Content categories across the socio-ecological layers for the theme: Financial pressure

Socio-Ecological Layer	PERSONAL	INTERPERSONAL	COMMUNITY	HEALTHCARE ORGANISATIONAL	NATIONAL	ACADEMIC
THEME 1: **FINANCIAL PRESSURE** Uncertainties regarding finances causing obstacles to, difficulties in and constraints to strengthening individual, group, national or societal welfare, economic growth or efficiency.	**Financial Hardship** Unavailable, limited, inconsistent etc. access to funds/finances to afford basic amenities and services	**Lack of Family Involvement** Family unable/unwilling to support/ be involved in patient's pathology due to logistical, financial or personal reasons	**Difficulties in obtaining and/or retaining employment** Employment opportunities are lacking, limited and difficult to maintain for able-bodied and disabled citizens within the community setting	**Financial Constraints** Constraints, limitations and gaps with regards to financial affordability of offering an optimal healthcare system	**Dependency on government involvement in healthcare provision** Government's (mainly financial) role in healthcare provision is pivotal in meeting the needs of a nation	**Research Funding Challenges** Funding challenges pertaining to the research design or ability to obtain/maintain funding for research
	Grant usage Use of government subsidised grants	**Lack of Resources for Caregivers** Caregivers lack resources (financial & educational) to be able to fulfil their duties	**Socio-Economically Disadvantaged** Intra-communal background of poverty and limited opportunity		**Economic Variability** As economies tend to fluctuate, different aspects (income, revenue, supply and demand) introduce a measure of variability within and amongst national economies	
	Subsistence/"blue collar" type employment Employment related to the production of goods which are predominantly for own household use and livelihood or employment related to manual labour.				**National Healthcare Service Delivery Challenges** Challenges (financial, infrastructural, resources etc.) specified as national obstacles, limitations, problems etc. to service delivery within the health system	
	Undernutrition Lack of proper nutrition, caused by not having enough food or not eating enough food containing substances necessary for growth and health.				**NGO involvement is necessary** NGO involvement is needed to assist with funding for research and programme implementation	
					World Bank Income Groups Countries/nations grouped by income	

Table 1.2: Content categories across the socio-ecological layers for the theme: Suboptimal healthcare service delivery

Socio-Ecological Layer	PERSONAL	INTERPERSONAL	COMMUNITY	HEALTHCARE ORGANISATIONAL	NATIONAL	ACADEMIC
THEME 2: **SUBOPTIMAL HEALTHCARE SERVICE DELIVERY** Healthcare Service delivery is inconsistent and suboptimal across the socioecological model	**Pathological variance** Pathologies and their complications differ between individuals		**Disease Burden** Impact of a health problem on a given population	**Access Barriers** Accessibility of certain services are restricted	**Dependency on government involvement in healthcare provision** Government's (mainly financial) role in healthcare provision is pivotal in meeting the needs of a nation	
				Communication gaps Communication (e.g. health education, language use, handover/referral etc.) between and across patients, healthcare providers, healthcare environments and stakeholders is lacking	**Disease Burden** Impact of a health problem on a given population	
				Heavy burden of Care Burden of care is overwhelming to the available healthcare providers for reasons such as lack of human resource, lack of support, lack of skills, high disease burden etc.	**National Healthcare Service Delivery Challenges** Challenges (financial, infrastructural, resources etc.) specified as national obstacles, limitations, problems etc. to service delivery within the health system	
				Local Healthcare System Gaps Missing aspects or gaps within the healthcare system leading to failure to administer standard care	**NGO involvement is necessary** NGO involvement is needed to assist with funding for research and programme implementation	
				Suboptimal Quality of Care Quality of care existing is below standard		

Table 1.3: Content categories across the socio-ecological layers for the theme: Underdeveloped infrastructure

Socio-Ecological Layer	PERSONAL	INTERPERSONAL	COMMUNITY	HEALTHCARE ORGANISATIONAL	NATIONAL	ACADEMIC
THEME 3: **UNDERDEVELOPED INFRASTRUCTURE** Lack of development of physical and organisational resources, systems and facilities serving an area (e.g. water, sanitation and electrical supply, roads and bridges, telecommunication networks etc.)	**Access to Technology** Technological resource acquisition varies in type and availability		**Challenges with internet/mobile access** Access to internet/mobile connectivity is limited, lacking or unavailable due to cost, lack of necessary infrastructure or devices	**Access Barriers** Accessibility of certain services are restricted	**National Healthcare Service Delivery Challenges** Challenges (financial, infrastructural, resources etc.) specified as national obstacles, limitations, problems etc. to service delivery within the health system	
	Transport Issues Issues with obtaining transport for travel from one place to another		**Increasing internet/mobile access** Emerging use of/access to internet/mobile connectivity	**Challenges with assistive devices** Challenges with obtaining and issuing suitable and appropriate assistive devices		
			Lack of basic services The lack of infrastructure and resources hinders the community's access to education, health care, water, sanitation, housing and other basic amenities	**Challenges with Physical Resources** Acquiring and maintaining the physical resources to implement healthcare strategies is lacking		
				Facility Limitations Appropriate and equipped healthcare facilities are non-existent, scarce, lacking or inadequate		
				Insufficient Technological Resources Technological resources are difficult to acquire and maintain		

Table 1.4: Content categories across the socio-ecological layers for the theme: Paucity of knowledge

Socio-Ecological Layer	PERSONAL	INTERPERSONAL	COMMUNITY	HEALTHCARE ORGANISATIONAL	NATIONAL	ACADEMIC
THEME 4: **PAUCITY OF KNOWLEDGE** A lack of knowledge, education, training, understanding and translation of concepts across and through the socioecological model	**Lack of Awareness** Lack of knowledge or perception of a situation or fact	**Lack of Resources for Caregivers** Caregivers lack resources (financial & educational) to be able to fulfil their duties	**Low Education Levels** Basic education needs are not met within the community/setting	**Communication gaps** Communication (e.g. health education and information, language use, handover/referral etc.) between and across patients, healthcare providers, healthcare environments and stakeholders is lacking		**Knowledge gaps in published data/information** The available, published literature has an absence or severe lack of knowledge, certain concepts and specific outcomes
	Low Education Levels Below-average level of common knowledge about basic things that people would need to function in daily life (e.g. spelling, reading, writing, maths etc.)	**Language Barriers** Language and communication barriers are created due to a lack of education/exposure		**Providers lack adequate skills and knowledge** The available healthcare providers lack the necessary knowledge and skills to administer and maintain healthcare strategies		**Limited context-specific information** Information, data, analyses etc. specific to the context are lacking, scarce or limited
	Low health literacy A lacking ability to process and understand health information needed to make health decisions					

Table 1.5: Content categories across the socio-ecological layers for the theme: Research considerations and challenges

Socio-Ecological Layer	PERSONAL	INTERPERSONAL	COMMUNITY	HEALTHCARE ORGANISATIONAL	NATIONAL	ACADEMIC
THEME 5: **RESEARCH CONSIDERATIONS AND CHALLENGES** Context-specific challenges and considerations when conducting research	**Access to Technology** Technological resource acquisition varies in type and availability		**Challenges with internet/mobile access** Access to internet/mobile connectivity is limited, lacking or unavailable due to cost, lack of necessary infrastructure or device		**NGO involvement is necessary** NGO involvement is needed to assist with funding for research and programme implementation	**Participant compensation strategies** These compensation/reimbursement aspects were published as strategies/considerations in the setting
	Time Constraints Lack of time limits or controls what you one can do		**Increasing internet/mobile access** Emerging use of/access to internet/mobile connectivity			**Participant recruitment and retention strategies** Plans of action designed to achieve recruitment and retention of study participants
	Transport Issues Issues with obtaining transport for travel from one place to another					**Setting-specific Research Design Challenges** The setting creates challenges to "gold standard" methodology
						Setting-specific research design used The research design/methodology incorporated an approach tailored to the setting because the setting's specific status required it

Table 1.6: Content categories across the socio-ecological layers for the theme: Restricted social resources

Socio-Ecological Layer	PERSONAL	INTERPERSONAL	COMMUNITY	HEALTHCARE ORGANISATIONAL	NATIONAL	ACADEMIC
THEME 6: **RESTRICTED SOCIAL RESOURCES** The lack of tangible, material or symbolic exchangeable resources, within the available social network, (e.g. information, goods, acceptance, love etc.)	**Psychosocial challenges** Challenges to the interrelationship between social factors and personal thoughts, feelings and actions	**Insufficient social support** The patient's social network does not offer sufficient support to help them manage their condition	**Indigenous Community Structure** Native structure of certain communities		**Demographic Transition** Changes in an area's patterns of mortality, fertility and growth rates (can be in opposite directions)	
		Lack of Family Involvement Family unable/unwilling to support/ be involved in patient's pathology due to logistical, financial or personal reasons	**Inequality in Community Structures** Inter-communal inequality where categories of people are attributed an unequal status in relation to other categories of people – extended by inequality in rights, decisions and opportunity.		**Political Instability** Government instability or collapse due to conflicts or competition between political adversaries	
		Negative effects on caregiver well-being Caregiver's responsibilities have negative effects on their health and well-being	**Minority Groups** Groups of people who, because of their physical or cultural characteristics, are observed or treated as different			
		Sufficient social support The patient's social network offers sufficient support to help them manage their condition	**Socio-Economically Disadvantaged** Intra-communal background of poverty and limited opportunity			

Table 1.7: Content categories across the socio-ecological layers for the theme: Geographic and environmental factors

Socio-Ecological Layer	PERSONAL	INTERPERSONAL	COMMUNITY	HEALTHCARE ORGANISATIONAL	NATIONAL	ACADEMIC
THEME 7: **GEOGRAPHIC AND ENVIRONMENTAL FACTORS** Factors related to the physical features/aspects of an area, the natural world and/or the impact of human activity on its condition	**Transport Issues** Issues with obtaining transport for travel from one place to another		**Environmental challenges** Challenges created by the natural world and/or the impact of human activity on its condition	**Challenges with assistive devices** Challenges with obtaining and issuing suitable and appropriate assistive devices	**Political Instability** Government instability or collapse due to conflicts or competition between political adversaries	**Participant recruitment and retention strategies** Plans of action designed to achieve recruitment and retention of study participants
	Subsistence/"blue collar" type employment Employment related to the production of goods which are predominantly for own household use and livelihood or employment related to manual labour.		**Geographical challenges** Challenges created by the physical features/aspects of an area			**Participant recruitment and retention challenges** Challenges described with regards to retaining participants in the study
						Setting-specific Research Design Challenges The research design/methodology incorporated an approach tailored to the setting because the setting's specific status required it

Table 1.8: Content categories across the socio-ecological layers for the theme: Human resource limitations

Socio-Ecological Layer	PERSONAL	INTERPERSONAL	COMMUNITY	HEALTHCARE ORGANISATIONAL	NATIONAL	ACADEMIC
THEME 8: **HUMAN RESOURCE LIMITATIONS** Lack of available different kinds of clinical and non-clinical staff responsible for public and individual health intervention		**Lack of Family Involvement** Family unable/unwilling to support/ be involved in patient's pathology due to logistical, financial or personal reasons		**Heavy burden of Care** Burden of care is overwhelming to the available healthcare providers for reasons such as lack of human resource, lack of support, lack of skills, high disease burden etc.		
				Lack of Trained Professionals Shortage of available trained/skilled staff, personnel, human resource etc.		
				Scheduling Considerations Timing and scheduling of healthcare services needs to be considered to ensure adequate treatment time and patient satisfaction		

Table 1.9: Content categories across the socio-ecological layers for the theme: Influence of beliefs and practices

Socio-Ecological Layer	PERSONAL	INTERPERSONAL	COMMUNITY	HEALTHCARE ORGANISATIONAL	NATIONAL	ACADEMIC
THEME 9: **INFLUENCE OF BELIEFS AND PRACTICES** Traditional, cultural and indigenous beliefs and practices may influence healthcare-seeking behaviors, perceptions of healthcare and inform healthcare practices	**Influence of individual characteristics** Each person's unique personality/individual characteristics affects or influences the way in which they approach, perceive or experience their health rehabilitation	**Discrimination & Stigma** When people are seen or treated differently/negatively because of their underlying conditions	**Cultural Influences** Cultures, traditions and beliefs influence a community's practices, experiences and expectations			**Participant compliance challenges** Extrinsic factors that may lead to compliance challenges within the study sample
			Indigenous Community Structure Native structure of certain communities			**Participant recruitment and retention strategies** Plans of action designed to achieve recruitment and retention of study participants
			Minority Groups Groups of people who, because of their physical or cultural characteristics, are observed or treated as different			

Theme 2: Suboptimal Healthcare Service Delivery

Five of the 11 content categories which contributed to the development of this theme, were allocated to the healthcare organisational layer of the socio-ecological model. We have observed that the six remaining content categories allocated within the personal, community and national layers of the socio-ecological layer, may also influence the quality of healthcare service delivery. Barriers to delivering care in LRSs are multi-dimensional and include issues with access to healthcare, communication gaps, heavy burden of care, gaps in the existing healthcare system and suboptimal quality of care.

> "*…disorders are often poorly managed and treated, particularly in marginalized, impoverished areas, where the mental health gap and the treatment gap can reach 90%."* (37)

> *"Information and assistance in accessing health care services once the patient has been discharged into the community are also difficult to obtain. Patients and caregivers report not routinely being provided with information on how to access the next step in the sequence of care."* (38)

Service delivery may further be hindered by relatively high disease burdens, high prevalence of complications and different pathologies in these settings:

> *"Pelvic organ prolapse (POP) is a common condition for women globally and is one of the most widespread reproductive health problems in Nepal."* (39)

> *"Racial and ethnic minorities bear a disproportionate burden of the diabetes epidemic, along with poor diabetes control and higher complication rates."* (40)

Theme 3: Underdeveloped Infrastructure

Lack of fundamental physical and organisational resources, facilities, systems and services necessary for these settings to function adequately, was multi-faceted. At a personal level, the lack of basic amenities and services may influence ability to travel, ability to work, the execution of rehabilitation strategies, quality of life and accessibility of healthcare services. Service delivery and access to care on a national and healthcare organisational level appeared impeded by non-existent, under-equipped and

underdeveloped facilities and lack of physical and technological resources, including assistive devices.

> *"…the changes in physical activity levels among the urban populace is not reflected in low-resourced communities due to a lack of facilities, a safe environment, and poverty."* (41)

> *"Rural populations in India are primarily served by non-governmental organizations (NGOs) that are not well-equipped because of little financial support from the government and infrastructures that are inadequate for serving most of India's population (68.84%), which is located in rural areas."* (42)

Interestingly, the emerging use of mobile devices and increasing internet connectivity in these settings, has pioneered opportunities for alternative and innovative research initiatives and rehabilitation solutions:

> *"Such programs would take advantage of increased use of smartphones and tablets within the community among children and adolescents."* (43)

Yet, the reality of major challenges with mobile access and reliable and affordable internet connectivity, creates obstacles in employing these types of rehabilitation strategies:

> *"…the poor quality and high cost of internet connections interfered negatively with some participants' motivation to engage in the sessions…"* (44)

Theme 4: Paucity of Knowledge

A lack of knowledge, education, training and understanding of concepts was found across five of the six layers of the socio-ecological model in LRSs. This was mostly evident on in the personal, interpersonal and community levels, where the lack of education (illiteracy, low literacy, low education levels, low numeracy etc.), awareness and health literacy may be significant barriers to healthcare service delivery and individual disease management. Furthermore, barriers imposed by communications gaps between patients and practitioners were created by the limited use of lay or local language and insufficient health education or information.

> *"… due to low literacy levels, including health literacy, that are associated with low education attainment. Low literacy could affect the ability to process and understand information. The effects of low literacy could be exacerbated by the lack of previous participation in structured diabetes education programmes and the fact that not all nutrition education sessions were offered in the local language."* (45)

This may be further exacerbated by the fact that available professionals were insufficiently trained and lacked the necessary skills and knowledge to address specific or shifting needs:

> *"…health workers often lack adequate knowledge about how to effectively manage patients with diabetes…*" (46)

> *"…in many parts of China, especially in rural regions, where there are few health professionals specifically trained in recognition and management of stroke-related complications."* (47)

Moreover, the absence of published and context-specific information and remains a barrier to understanding and informing rehabilitation implementation in a large portion of LRSs:

> "*There are as yet no published data on the non-pharmacological therapy of this debilitating disease from the rural developing world*." (48)

Theme 5: Research Challenges and Considerations

Conducting research within these settings came with context-specific challenges and considerations. Researchers had to adapt to culturally appropriate (familiar concepts and motifs), feasible and context-specific research methodologies and approaches (use of local language, oral or thumbprint consent due to illiteracy, easy to understand material due to low education levels etc.) to pursue research aims. In addition, challenges and considerations ranged from logistical, geographic, transport difficulties, unreliable contact details, innovative recruitment strategies and adapting the timing of interventions to suit the practices of the setting.

> "*The local team developed a culturally appropriate, simple, pictorial 'manual' covering key exercises relevant to activities of daily living*." (49)

> *"A one-day village-wide announcement, facilitated by the village head (traditional ruler) of Tsakuwa was utilized to recruit patients with nonspecific chronic low back pain…"* (50)

Additionally, reference to the need and development for high-quality, evidence-based, and context-specific rehabilitation tailored to the environment was reiterated:

> *"Given the limited therapeutic resources and lack of trained professionals, systematic and resource-effective treatment programmes are needed which are context appropriate."* (51)

Theme 6: Restricted Social Resources

The availability of social resources may indirectly or directly influence health status and management of health threats in these settings. These resources may be concrete or symbolic items that can be exchanged amongst people and may include information, services, affection or love, acceptance and societal status.(52)

> *"In South Africa many social and economic barriers prevent survivors of sexual abuse from gaining access to the treatment they need…"* (51)

The content categories which contributed to the development of this theme and affect the availability of these resources include inequality within community structures, personal psychosocial factors, political instability and national demographic transition.

> *"South Africa is a country where many communities are still going through rapid epidemiological, nutrition, and demographic transition."* (41)

Insufficient social support was clearly defined as a barrier to rehabilitation in this theme, with clear reference to the lack of and need for sufficient social support within LRSs:

> *"…many participants were worried about their social and financial problems during the treatment and asked Kosova Rehabilitation Centre for Torture Victims to help them to access official or other social support."* (53)

In contrast, studies which incorporated strategies targeted at improving social support, found that sufficient social support is possible and a facilitator to rehabilitation in LRSs:

> *"Some of the participants felt further encouraged by the support of family members and, in return, showed a desire to get their families and other community members involved in the exercises."* (35)

Theme 7: Geographical and Environmental Factors

Our findings suggest that factors related to the geographical features of an area, the natural world and/or the impact of human activity on its condition, were components of these settings which need to be considered. Remoteness and rurality were factors commonly referred to, but certain settings were still deemed as 'low-resource", despite semi-urban or urban characterisation. Mention of travel distance, the types of travel terrain and subsistence/blue collar employment all related to the geographic and environmental factors contributing to the context of the setting. These factors were deemed particularly important when considering the accessibility of rehabilitation services and when issuing assistive devices. Geographic and environmental factors differ from area to area and present their own distinctive barriers and rehabilitation adaptations, within the context:

> *"Because of the distances needed to travel in the rural mountainous region, the majority of encounters were provided in the form of phone visits."* (38)

> "*There are not many outpatient therapy departments in the remote parts of the country…"* (49)

> "*mHealth holds great promise for reaching resource-poor populations, especially low-income, urban Latinos."* (36)

Theme 8: Human Resource Limitations

The shortage of different kinds of clinical and non-clinical staff responsible for public and individual health intervention emerged consistently. This reportedly contributes to the heavy burden of care and negatively impacts the time spent with individuals during their care:

> *"Across the continent there are very few neurologists, geriatricians, or psychiatrists and an estimated 200 times fewer trained mental health workers per 100,000 people compared to high-income countries"* (54)

> *"There are also less than 30,000 doctors in Nigeria today and the approximate average doctor: patient ratio of 1:53,333 indicates that their time should not be spent on educational programmes…"* (46)

Strategies and rehabilitation techniques which focussed on task shifting or tapping into unrealised human potential (volunteers, peer-led programmes, support persons or family involvement), to address the unmet need for a rehabilitation workforce, were often a specific focus:

> *"This is potentially a scalable and sustainable model for health care centers in low-resource settings and provides volunteer opportunities for patients who successfully complete community health worker-led diabetes self-management education programs and would like to support other patients grappling with diabetes."* (55)

> *"Task shifting rehabilitation activities to unpaid caregivers might offer a sustainable alternative to conventional rehabilitation"* (56)

Theme 9: Influence of beliefs and practices

Traditional, cultural and indigenous diversity appear to be important features of LRSs. As such, these characteristics may influence healthcare-seeking behaviours, perceptions of healthcare and inform healthcare practices. Our observations suggest that personal attitudes and beliefs may affect healthcare behaviours in any setting. Yet, the existence of disease- and disability-related stigma, use of traditional medicine and specific cultural influences may have particular implications for the planning, execution and understanding of health systems, research and policies in LRSs:

> *"Stroke survivors often resort to alternative forms of treatment and refuse orthodox care due to highly prevalent stroke related stigma."* (57)

> *"Many people in the community believe that children with intellectual disabilities can transfer their disabilities to other children."* (42)

Recognising and acknowledging potential gaps in health knowledge, facilitated by deep contextual understanding, may potentially improve health outcomes, without undermining or discrediting the beliefs of the communities being served:

> *"...most rural dwellers in Nigeria have poor knowledge of the roles and scope of physiotherapy, poor healthcare-seeking behaviour, and patronize traditional health workers."* (58)

2.4 DISCUSSION

In this study we report on nine different themes that emerged from 48 articles specific to the field of rehabilitation in low-resource settings. To our knowledge, this study is the first to unravel this complex concept using a systematic and rigorous approach. The themes that emerged from the data describe resource limitations at a personal, interpersonal, community, healthcare organisational, national and academic level.

2.4.1 A complex network of interrelated concepts

The provision of health care, and the health systems through which health interventions are provided, is complex, dynamic and context-specific.(2,59) The themes that have emerged from this study clearly demonstrate that the lack of "resources" within LRSs requires a holistic frame of mind. Using the socio-ecological model to guide the grouping of codes into content categories, emphasised the fact that there are multiple actors and levels of influence in the provision of rehabilitation in LRSs. Therefore, the themes are not unidimensional, yet rather reflect a complex network of resource limitations and concepts. Addressing a single factor is unlikely to result in the provision of quality care, as each factor should be recognised as equally necessary, yet equally inadequate on their own.(60) Outside of "financial pressure"(Theme 1), our findings reiterate that the paucity of health infrastructure in rural and remote communities limits access to rehabilitation and quality of services.(6) It is important to understand that limited healthcare access was not only related to a lack of healthcare infrastructure, but also due to limitations in societal infrastructure (Theme 3) and restrictions imposed by geographic and environmental factors (Theme 7). Additionally, barriers emerged that related, specifically, to insufficient human resources (Theme 8). One could argue that for successful rehabilitation implementation in LRSs, rehabilitation personnel, both clinical and non-clinical, need to possess adequate and multi-dimensional knowledge and skills (clinical, diagnostic,

problem-solving, decision-making, communication and pathological) to optimally manage the disease burden. Furthermore, traditional, cultural and indigenous diversity appears to be an important factor in these settings. The specific practices and beliefs of the people in a certain setting may have an influence on research initiatives (Theme 9), program implementation, perceptions towards healthcare and acceptance of rehabilitation strategies. Due to the nature of our inquiry, the themes predominantly highlight rehabilitation “shortages” (i.e. “low” resources), yet the literature also supports the role of LRSs, including their specific challenges, in the development of new and innovative approaches to rehabilitation.

While there is a strong link between gross domestic product and healthcare expenditure,(20) the complexity of the settings as supported by the resource themes developed in this study, challenges the validity and proposed homogeneity of “LMIC”. We argue that the concept of “LMICs”, based on World Bank income grouping,(25) which is often used in close conjunction with “low-resource settings” or “developing countries”, undermines the complexity of LRSs and insinuates a level of homogeneity that is unsupported. There is no mandate to make inferences about a specific country or setting, in terms of health care delivery and/or quality, on the premises of being a LMIC alone. Furthermore, inference that all healthcare in high-income countries is fully resourced to meet population needs, is unsupported.(6) The latter is further strengthened by the finding that almost one fifth of the studies in our sample were in fact, from a high-income country (17%).

While our analysis highlights the diversity and complexity of actors and determinants that describe a setting - as it is - it fails to provide a thorough analysis on the processes of interaction between themes, content categories, and layers within the socio-ecological model. In other words, the level by which resource constraints impact health care delivery and quality is, in part, a product of these interactions and the ways they are governed within the different levels of the healthcare system (institutional vs stakeholders vs policy and regulations).(61)

2.4.2 Social determinants of health

The WHO (16) defines social determinants of health as “the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life”. Furthermore, and perhaps most strikingly, the WHO states that

social determinants of health are mainly responsible for health inequalities. In other words, one could argue that a holistic view of the context in which healthcare is provided, is paramount in light of improving health equity, and that the biggest gains in health may not be achieved by improving healthcare alone. Interestingly, various social determinants of health are clearly reflected in many of the derived content categories (insufficient social support, low education levels, employment difficulties etc.) underlying the nine proposed themes. In consequence, one could propose that part of the solution into tackling the unmet need for rehabilitation, can be found in addressing one or more social determinants of health, such as geographical and environmental factors, financial pressure, healthcare organisational service delivery challenges, restriction in social resources and education disparities, amongst others.

Some of the key health inequalities which have been associated with adverse social determinants of health include life expectancy (particularly in children), maternal mortality and prevalence of communicable disease (specifically tuberculosis).(16) While being cognisant of the burden of communicable disease, what remains a concern, is the fact that 87% of premature deaths in LMICs occur as a result of non-communicable diseases (NCDs). In addition, the high cost of disease management associated with NCDs is propelling around 100 million people into poverty, annually.(16) This is further supported by reports of exacerbating poverty due to high costs of care and reducing healthcare access for those without any or sufficient health care insurance, as a result of the dependency on out-of-pocket expenditure.(20) Maintaining an increase in government health spending is imperative as it could supply funding for vital health services and could indirectly influence other health outcomes by reserving household finances for different health determinants, like education and nutrition.(20) However, it should be noted that increasing health expenditure, does not necessarily translate to improvements in healthcare access, quality or outcomes. (20) Furthermore, perhaps alternative healthcare expenditure models can be considered that are more reflective of the local context than conventional models. Such contemporary models may include innovative approaches to rehabilitative care (e.g. community-orientated primary care, use of community healthcare workers etc.). Some of the included articles in this study used rehabilitation models, specifically designed for the disproportionately affected populations, which were directed at the prevention of the progression of disease, prior to the development of incapacitating symptoms or dangerous episodes.(62) Many of these models included innovative approaches (task-shifting, community-based rehabilitation etc.) and were aimed at cost-

effectiveness. Better understanding of the context in which these models were studied may aid knowledge translation between settings.

2.4.3 Common ground

The developed content categories and identified themes confirm what we already know about healthcare systems. Firstly, parts of the healthcare system that need be considered include the relation between the patient, non-clinical and clinical staff members (Theme 8). Here, the necessary material and human resources, instruction, supervision and management, across the various levels of the system - extending from the community to the tertiary referral level may be considered.(2) In addition, health systems need to be prepared to implement effective rehabilitation (4) which may include the provision of: suitable funding for rehabilitation services (Theme 1); efficient service delivery structures (Theme 2); a multi-disciplinary rehabilitation labour force (Theme 8); the availability of affordable assistive devices (Theme 3) and health information systems including rehabilitation data (Theme 4 and 5). However, from our findings, we hypothesize that geographical and environmental factors (Theme 7), social resources (Theme 6), as well as the influence of beliefs and practices (Theme 9), should be considered during the planning and preparation of rehabilitation in LRSs.

2.4.4 A way forward

The nine major themes identified in this review, have the potential to assist in strengthening the evidence base and knowledge transfer between LRSs. That being said, our findings show that settings, irrespective of geographic location and proximity, are unique in many aspects (culturally, environmentally, socially and structurally). To promote prolonged advances in the access to and quality of rehabilitation care in LRSs, a well-developed evidence base of research in these settings is paramount.(2) The themes identified in this review aim to prompt researchers to actively consider the comprehensive context in which research is being conducted. Moreover, if setting- and research-related challenges and considerations are more explicitly recorded when conducting research in these settings, the transferability of the findings may be ensured. This review may be a first step towards the development of support structures, through the development of consensus statements or reporting frameworks, that promote reporting of context (in LRSs and beyond). However, given the complex nature of LRSs, as well as the multi-facetted components of rehabilitation interventions, one would need to ascertain whether the

findings presented here relate solely to the setting, or whether the nature of rehabilitation influenced the concept of a LRS derived from this review.

2.4.5 Limitations

There are some limitations to this study. Firstly, somewhat surprisingly, our search strategy did not identify any articles from countries on the South American continent. While cognisant of the limited association between income classification and resource-constraints described earlier, this may present a gap, as two third of Latin America's population can be allocated to low-income or lower-middle income strata.(63) In part, this could be a reflection of the applied language limitations (i.e. English),and omitting pearling and the inclusion of region specific databases like LILACS. Though, given the level of data saturation reached during the coding process, it is plausible that no further or different themes may have emerged, had we included more articles from different databases or applied a longer publication date limit (e.g the last 10 years). Secondly, this review was specifically focussed on rehabilitation medicine, due to the background of the review team, as well as the holistic nature of rehabilitation. One could argue that due to the multidisciplinary, multimodal, and comprehensive nature of rehabilitation, there is a stronger likelihood of identifying aspects of LRSs that would otherwise have been missed. An important step would be to explore the level of saturation in our themes when mirrored against other fields of study, particularly due to the combination of the complex natures of both rehabilitation and LRSs.

2.4.6 Conclusion

The concept of "low-resource settings", in the context of rehabilitation, can be described in line with nine themes being (1) financial pressure, (2) suboptimal healthcare service delivery, (3) underdeveloped infrastructure, (4) paucity of knowledge, (5) research challenges and considerations, (6) restricted social resources, (7) geographic and environmental, (8) human resource limitations, and (9) influence of beliefs and practices. Healthcare administrators, clinicians and researchers may now actively and purposefully engage with these nine themes when planning a rehabilitation intervention in LRSs.

CHAPTER 3

Using qualitative content analysis to unravel the meaning of a broad concept used in published literature: a case study on lessons learnt from 'low-resource setting"

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Background: Unravelling the meaning of broad concepts in published literature is challenging. Fortunately, several existing methodologies offer the opportunity to achieve research objectives aimed at operationalising complicated concepts. By adopting a pragmatic paradigm and allowing the research question to guide the study design, a detailed description of the intersection of two methodological approaches to unravel and understand a broad concept in existing literature, is provided. In addition, the replication of qualitative analysis methodology is challenged by brief or excluded descriptions of the rigorous process followed to answer the research question. In the interest of applicability, replicability and utility, descriptions of the approaches used to ensure quality and rigour may prove useful to researchers who aim to embark on similar research endeavours.

Methods: This article details the development of a systematic scoping review with a qualitative content analysis, to unravel and understand a broad concept in published literature. The development of the methodological approaches, throughout each phase of the review, are clearly outlined and critically discussed.

Results and Conclusions: Using qualitative content-analysis as a means to unravel complicated constructs derived from a scoping search of existing literature, relative to the research inquiry, is a valuable intersection of methods that could be utilised more often. The detailed description critically reflects on the approaches used to adequately address the research question and establish quality and rigor in the research process, with the ambition that researchers will be able to replicate these practices in future studies.

3.1 INTRODUCTION

Unravelling and understanding the meaning of broad concepts in published research is challenging.(64) Fortunately, several existing methodologies offer the opportunity to examine concepts in the current evidence base and provide innovative and relevant approaches to report findings. In Chapter 2, the research team, who all have an academic and clinical background in the field of rehabilitation medicine, adopted a pragmatic approach to achieve the research aim.(65) Pragmatism, as a paradigm, entails acknowledging the research problem as the most important determinant of the research design, and allows the use of different methods to acquire knowledge to inform practice.(65) As rehabilitation researchers, cognisant of health inequalities through research and clinical experience in South Africa (the most unequal country in the world), we had questions around what exactly was meant when research referred to settings of "low resource". In this chapter, we provide a detailed description of the intersection of two methodological approaches, namely a systematic scoping review (22) with a qualitative content analysis, to unravel the concept of "low-resource settings" when used in literature pertaining to rehabilitation medicine (Chapter 2).

Scoping reviews are becoming an increasingly common research design for searching, mapping and synthesising the existing evidence on a broad topic.(22) They are particularly useful when existing literature is expansive, complex, diverse or has not yet been broadly reviewed. Given the aim of Chapter 2, it was of particular interest that scoping reviews are often used to elucidate definitions and/or identify core factors related to concepts used in existing literature.(66) Furthermore, what sets scoping reviews apart from systematic reviews, is that they are designed to provide an outline of existing literature, regardless of the quality. Therefore, formal methodological quality assessments of the included articles are not usually performed.(22) To that end, one could potentially explore a number of options when synthesising the results of a such a review. Qualitative analysis in the synthesis of a scoping review's results is not unheard of. This may be perceived as an unconventional approach, however, a review by Tricco et al.(67) reported that 21% of the 494 included articles, conducted some form of formal qualitative analysis (e.g. thematic). Albeit, it should be noted that our understanding of the types and methodological processes referred to as "formal qualitative analyses", in this article,(67) is unclear.

Qualitative content analysis is a flexible and multidimensional methodology used to analyse content across many areas of research.(68) Qualitative content analysis is defined

as a “research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns”.(69) This methodological approach can be abductive, deductive or inductive.(28) Employing a deductive approach in content analysis involves testing the implications of existing knowledge (models or theories) against a selected body of data.(28,68,70) The researcher shifts from general and abstract theoretical understanding to specific and concrete data. Doing content analysis through an inductive approach is text- or data-driven and involves systematically searching for patterns underlying the construct of the text.(28,68,70) The researcher analyses the data by identifying differences and similarities, which are then explained using categories and/or themes, at different stages of abstraction and interpretation. During this approach, the researcher shifts from the concrete data to a general and abstract theoretical understanding. Finally, moving back and forth between deductive and inductive approaches during different phases of the data analysis process is called an abductive or complementary approach.(28) Qualitative content analysis can be used to analyse almost any form of material such as surveys, narrative responses, interviews and printed media including manuals, books and articles.(68) Given the degree of interpretation required in qualitative analysis, the repeated calls for the responsibility of the researcher to establish and ensure rigor and quality, are warranted.(31) These concepts aim to reduce the risk of bias and maximize the credibility and accuracy of the results.(31)

In qualitative research, the replication of methodology is often difficult, as the essential detail underlying the thorough and rigorous analysis process, is often only briefly discussed or excluded in publication.(71) Yet, when the aim is to inform clinical practice, trustworthiness and rigor are important components which need to be established – in the interest of applicability, replicability and utility.(71) Therefore, the aim of this chapter is to present a detailed account of a methodological approach used to unravel and understand a broad concept (”low-resource settings”) in existing literature. In addition, it also aims to critically reflect on the approaches used to establish quality and rigor in the qualitative content analysis of the research, with the ambition that researchers will be able to replicate these practices in future studies.

3.2 METHODS

3.2.1 Systematic scoping review

To structure the process and reporting of the systematic scoping review, we made use of established guidelines.(22) An in-house study protocol was developed, including the proposed title, background, objectives, methods for searching and selection and data analysis, before the review was conducted. Ideally, as per the reporting guidelines for scoping reviews,(23) this protocol is either published or registered in an established registry. However, scoping reviews are generally iterative in nature, and amendments to the protocol were made as the researchers became more familiar with the literature.

3.2.1.1 Research question and objectives

When seeking evidence-based research to inform rehabilitative decisions and practices, the term “low-resource setting” appears to be arbitrary when used in research relating to these settings. In the absence of a clear definition of what a LRS entails, proxies are often used that are easier to operationalise, such as World Bank income groups (e.g. LMICs) or “developing countries”. While there is some association between, for instance being a LMIC and health-care expenditure, it is our belief that these proxies do not represent the complexity and holistic nature of what a LRS entails or what leads to the provision of adequate healthcare. Moreover, despite the increase in research activities in or pertaining to “low-resource” or “resource-limited” settings, challenges in clearly communicating specific research findings have been identified as a gap in the reporting of research from these settings.(21) Incomplete reporting is of particular importance in the field of rehabilitation, where multiple factors between the patient and their broader environments need to be considered when implementing evidence-based strategies.

Hence, given the unsatisfactory operationalisation of “setting”, in particular, when pertaining to a setting of low-resource, in conjunction with gaps in reporting on the nature of the settings in which research has been conducted, the question we posed was: when research has been conducted in a “low-resource setting”, what resources are actually constrained, and are there trends in those constraints that can help facilitate the understanding of these settings in the field of rehabilitation medicine? Adopting a pragmatic paradigm helped to guide the research design,(65) based on the research problem and the decision to intersect two methodological approaches to achieve our aim. Two objectives were stipulated to answer this question: (i) identify themes which define the

term “low-resource setting” in the context of rehabilitation and (ii) describe the articles included in the study.

3.2.1.2 Eligibility criteria

An iterative process was used to develop inclusion and exclusion criteria to ensure that the objectives of the review were achieved (Chapter 2.2.2). Firstly, a decision was made that the title, abstract and/or keywords of the included literature had to include a self-reported actual *setting* of “low resource”, not just the word/terms relating to “low resource” without the background of describing an actual setting. As terminology related to “low resource” can be quite broad, it was important that our inclusion criteria provided direction to the attempt to describe these specific settings, in the context of rehabilitation. As an example, the study by Dusing et al. (72) was excluded based on the fact that title/abstract that did not refer to a *setting* of “low-resource”, but reported “describe an example of each of three methods for assessment of parent-child interaction - low-tech, low-resource (Dyadic Mutuality Code), low-tech, high-resource (Parent Children Early Relational Assessment), and high-tech, high-resource (customized behavioural coding)”.

Secondly, as many settings are in constant transition in a constantly fluctuating global economy, only articles published in the last five years (2014 onwards) were included, to ensure relative actuality of the review findings. Global health inequalities, as described by the WHO, are unlikely to change rapidly and the reports of resource shortages of the last 5 years, are deemed to present an accurate reflection of the challenges health systems have faced throughout the 21st century thus far.(73) However, including articles from, for example, the last 10 or 20 years, may have presented valuable insights on the transformation and change in resource-constraints and opportunities (e.g. telehealth) throughout this century, though this was deemed beyond the scope of the review.

Lastly, we needed a clear definition of “rehabilitation” which was suitable to use in a global context. Rehabilitation is a very broad concept with many different aspects to consider, and arguably different interpretations of what rehabilitation is, exist globally. Hence, we settled on a comprehensive and holistic definition of rehabilitation,(4) however decided to exclude articles pertaining to the rehabilitation of the use, misuse or abuse of substances such as, but not limited to, alcohol, smoking, medication, drugs etc. Rehabilitation relating to the substance abuse disorders, although valuable, may require very specific resources and provisions, and may have diluted the focus of the review. Alternatively, had we chosen

a more specific definition of rehabilitation (e.g. exercise-based rehabilitation), we may have encountered different rehabilitation-specific components, in LRSs, to contribute to our findings.

Furthermore, for inclusion in the review, literature needed to be published in English as i) all of the authors are fluent in English and ii) English is currently seen as the “lingua franca” in scientific activity.(74) Excluding research conducted in languages other than English could potentially cause gaps and biases in understanding study environments.(74) This pragmatic decision may pose a limitation in identifying valuable research conducted in LRSs in which English is not a primary language, and further investigation into the findings of the review could be explored.

Finally, we decided that the types of articles included in this review needed to be original research, though case studies, case reports and case series were excluded. Case studies and series tend to focus on unique or very specific examples. Therefore, they may be less likely to reflect on an entire setting and rather focus on one person’s unique pathology or circumstance. However, qualitative studies evaluating rehabilitation, as well as qualitative reports based on patient interviews and experiences were included, which were likely to report on and identify setting-specific circumstances. Non-original research, including systematic reviews, were excluded. Reviews span multiple reports and are, therefore, unlikely to report on a specific setting in which research was conducted. Focussing on original research would most likely reflect the actual ground realities of the settings in which the research was conducted. Studies that evaluated health care worker perspectives, system or cost evaluations were excluded as these may only reflect on a single or particular aspect of the setting only (e.g. financing, human resources etc).

3.2.1.3 Searching

The search strategy is outlined in Chapter 2.2.3. The definition of rehabilitation facilitated the diversity of knowledge and beliefs underlying the concept and we felt that this broad perspective was perpetuated in the search strategy.

3.2.1.4 Study Selection Process

The selection process followed the guidelines conventionally adhered to when doing any type of systematic review, which are outlined in Chapter 2.2.4.

3.2.1.5 Methodological Appraisal

As a formal methodological appraisal would not have contributed to the aims and objectives of the research question, no appraisal on risk of bias or methodological quality was conducted, as is consistent with the guidance provided on scoping review methodology.(22) However, depending on the nature of the inquiry, quality appraisal, although not common, can be included.(67)

3.2.2 Data extraction and analysis

3.2.2.1 Quantitative data extraction and analysis

A data extraction form was created to tabulate the description of the included studies, aiming to provide an in-depth analysis of the quantitative aspects of the data. The details of the form are outlined in Chapter 2.2.6.1 and included in Addendum C. Decisions regarding the included extraction fields were consistent with the guidance provided on scoping review conduct, (22) but were also specifically aligned to assist in answering the research question. Firstly, authors and publication dates were included. In addition, reporting on the types of studies conducted could potentially provide insights into the feasibility of different methodological research approaches within these settings. Similarly, disease profiles and a short synopsis of the rehabilitation model were tabulated in attempt to provide understanding on the variety of pathologies present in these settings, as well as the multitude of potentially innovative rehabilitation strategies employed to meet setting-specific needs. Finally, a description of the country, its World Bank income group and GINI index, are relevant parameters related to LRSs, which were included.

3.2.2.2 Qualitative Content Analysis

To strengthen the trustworthiness and rigor, it was imperative that an academic with ample experience in qualitative research methods and its theoretical underpinnings, was part of the review team. The review team is described in Chapter 2.2.6.2. Structural engagement between team members, at strategic points in the review process (e.g. at protocol stage, prior to codebook development etc.) helped facilitate knowledge transfer between team members. The planning, organising and storing of the coding process, involved in qualitative content analysis, needs to efficiently manage the large quantities of data used in this methodological approach.(75) Based on financial motives and availability of online tutorial content, a choice was made to use Atlas.ti: The Qualitative Data Analysis and

Research Software (https://atlasti.com/) to support the process of content analysis. Albeit, other platforms (e.g. NVivo) would have been equally appropriate.

3.2.2.3 Rigor and trustworthiness

It is imperative to clarify the requirements for demonstrating rigor in the qualitative research design.(76) Chapter 2's study adopted the criteria introduced by Lincoln and Guba (32) to establish trustworthiness: credibility, dependability, confirmability and transferability.

3.3 RESULTS

3.3.1 Reporting the systematic scoping review search results

Initial screening of identified article titles was done independently by two researchers (CVZ and MH) and reported in adherence to the PRISMA guidelines (see PRISMA flowchart; Figure 1).(77) Table 2 illustrates the moderate initial inter-rater reliability agreement (Cohen's Kappa), as measure of observer variability, between these two researchers. In an ideal setting, there is high agreement between the two researchers, reflecting adequate operationalisation of inclusion criteria, in conjunction with the ability to discern the required information needed to make a judgement from the article. Looking back at the reasons for exclusion at full-text review (see PRISMA flowchart; Figure 1), one could argue that in this case, part of the disagreement reflects the broad nature and interpretation of rehabilitation globally, and a lack of detailed reporting of the setting in which the research was conducted.

Table 2: Inter-rater agreement in the article inclusion process.

	A	**B**	**Total**
A	1069	33	1102
B	62	56	118
Total	1131	89	1220

Number of observed agreements: 1125 (92.21% of the observations)
Number of agreements expected by chance: 1030 (84.44% of the observations)

Kappa = 0.499
SE of Kappa = 0.044
95% confidence interval: from 0.413 to 0.586
The strength of agreement is considered to be "moderate".

3.3.2 Reporting of the quantitative results

There are many important variables that could be extracted from each included manuscript, ranging from descriptive variables to specifics of, for instance, the rehabilitation provided (in this case). The reviewers settled on a set of intrinsic descriptors, in conjunction with “add-on” measures available in the public domain (e.g. World Bank income classification for the country in which a study was conducted) that related to the “setting”. Where possible, established frameworks were used to create structure (e.g. disease profile reported according to the Global Health Data Exchange (24)). Visual synopses of the data table (see Figure 2), as well as summary statistics (e.g. percentage of studies with a NCD focus) were included in the main manuscript, while the complete study description was included as a supplement (Addendum C), to ensure transparency while retaining readability (see Table 3 for an example).

Table 3: Example of quantitative data extraction format

Authors	**Year**	**Method-ological design**	**Disease Profile**	**Global Health Data Exchange Grouping**	**Geographic Location**	**World Bank Income Group in study year**	**Most recent GINI index**	**Brief rehabilitation intervention description**
Aikens at el (78)	2015	Non-RCT	Depression	B.6.2	USA	High income	41,4	Patient-selected support person integrated into mobile health support services for depression

3.3.3 Qualitative content analysis process

3.3.3.1 Codes and codebook development

The success of a qualitative content analysis relies greatly on the coding process.(69) Furthermore, the development of a good coding process is essential to ensuring trustworthiness.(69) Using a team approach and developing a codebook during the content analysis process, although very time consuming, has some particular advantages. Some of the benefits include improved efficiency, richer analysis, academic and emotional support and greater possibilities for understanding and interpreting the data.(79)
A “hands-on guide” steered our process of inductive content analysis.(27) Three of the researchers (CVZ, MH and MB) started by randomly selecting one of the included articles and reading and re-reading the content to gain general understanding. Given that “low-resource settings” are often not explicitly operationalised, it became clear that we rather

needed to code parts of the text *relating* to the setting. Originally, this required quite a bit of reflection, as we realised that we would sometimes assume that certain parts of text were unimportant or irrelevant. Depending on the nature of enquiry, one could opt to focus on specific article segments (e.g. introduction only) that are relevant. In this specific case however, it was evident that relevant information pertaining to the study setting was found across all article segments. This understanding evolved through reading and re-reading, rather than an a priori decision. The three researchers then practised dividing texts into smaller parts called “meaning units”. Understanding that codes are these “meaning units” which are condensed or focussed into alternative keywords and phrases, was discussed and implemented (Figure 4 gives an example of this process). Hence, we all “coded” the article together.

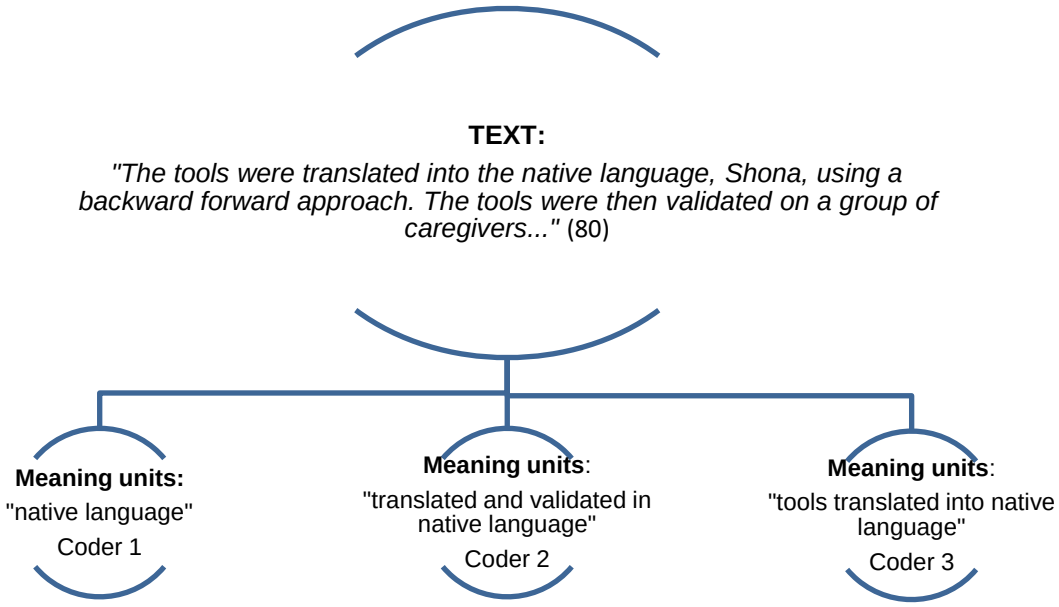

Figure 4: Example of three researchers identifying meaning units

Qualitative analysis can employ different types of elemental coding methods. These may include structural, descriptive, in vivo, process or initial coding.(29) A definitive coding framework was chosen after formative experiences with coding a random 10% of the included articles. In this specific case, it became evident that a combination of in vivo and descriptive coding needed to be used.(29) In vivo coding extracts the text as presented in the literature, though researchers are cautioned to not solely depend on this strategy, as it has the potential to limit the ability to achieve conceptual and theoretical levels of insight.(29) Descriptive coding involves summarising the meaning of the extracted text into a word or short phrase, which may require a degree of interpretation. The combination of the two coding structures assisted in ensuring that the true meaning of the text was maintained, while grasping the underlying meaning of the information presented.

The referred to 10% of random articles were coded by three researchers independently using Atlas.ti or the Adobe .pdf comment function (due to only having a single Atlas.ti license). If applicable, notes and reflections about words, phrases and concepts, were added across all of these mediums. The initial coding, notes and reflections were discussed iteratively and formed the base of a first formal codebook. Table 4 presents an example of the format used in our codebook to describe codes, with columns titled code, definition, inclusion, exclusion and example. This first codebook was subsequently used to initiate a new round of article coding (20%) by two researchers independently, of which the findings were discussed in a series of meetings. Once consensus on the codebook was reached, this codebook was taken forward by a single researcher (CVZ) to code all of the included articles from scratch, while maintaining a critical viewpoint on the codebook by adding, removing, and refining codes where needed. Coding of all articles was organised using Atlas.ti. Where needed, team meetings were organised to reflect on the process, challenges and potential for interpretation bias throughout the coding process. In this case example, these discussions encouraged the review team to reflect specifically on the possibilities of our own assumptions and biases in relation to what constitutes a LRS. The codebook was finalised on its 12th version with a total of 410 codes across the 48 articles (https://bit.ly/2R6iMGQ).

Table 4: Example of code description in the codebook

Code	Definition	Inclusion	Exclusion	Example
Family discouragement	Family members do not "buy in" to the rehabilitation intervention - do not support, encourage or condone the change in behaviours or rehabilitation plan.	Families' negative attitudes towards the rehabilitation goals	Other members of the social "network" - neighbours, friends, colleagues, health providers etc.	"…perceived barriers by the participants of this study…were in the order of subscale of exercise milieu ("I am too embarrassed to exercise"), followed by time expenditure ("exercise takes too much time from family relationship"), family discouragement ("my family members do not encourage me to exercise")…" (80)

This final codebook was then applied to all articles again ensure i) the most accurate phrases or words were used, and ii) each code was used only once throughout each article for analysis purposes. The latter depends on the nature on of the inquiry, as there may be cases where it is worthwhile to use a code multiple times in a specific article if that adds value to the analysis (e.g. specific weighting-related research questions).

3.3.3.2 Content categories

The next step in the process includes sorting codes into content categories that answer the questions where, when, what and who?(27) This can be achieved by comparing and evaluating codes, to establish which codes appear to belong together, thereby creating a content category.(27)

However, it quickly emerged that using this method, without some framework to guide the process, would not be feasible. While many of the codes appeared related to the same concept, it was evident that the codes were referring to different levels within society (e.g. a “lack of education” on a personal level, yet “low education levels” were described in relation to the community of interest in another study). For some time, public health practice has been guided by socio-ecological models that describe the interactive attributes of individuals and environments that lead to health outcomes. (30) Given the aim of our review and the codes presented, using the socio-ecological model created a relevant, structured framework for the development of content categories moving forward.

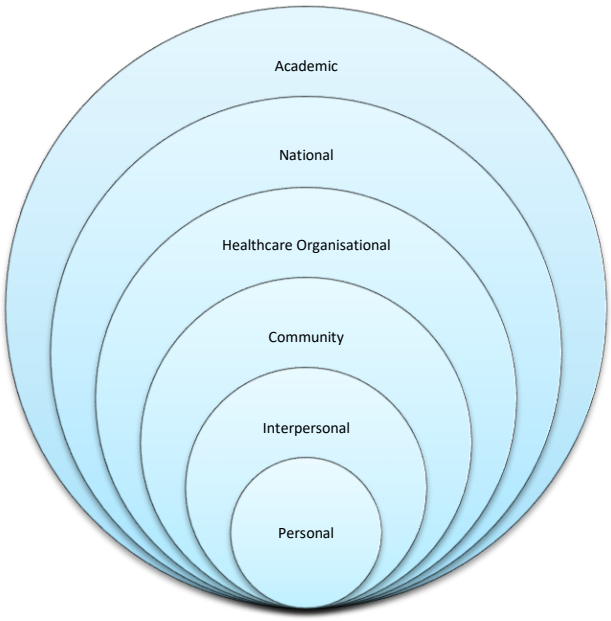

Figure 5: Adapted version of the Socio-Ecological Model used to structure codes when developing content-categories

Content categories were created within these layers, and definitions for each of the content categories were drafted based on the language used in the underlying codes. An example of one category with its related codes, in each layer of the socio-ecological model is presented in Table 5. As in all steps of the analysis, roundtable discussions were used as a platform to ensure trustworthiness and rigor by addressing potential bias.

Table 5: Example of one category with its related codes, in each layer of the socio-ecological model

Layer	Category	Definition	No. of codes	Codes	Code frequency
Academic	Knowledge gaps in published data/information	The available, published literature has an absence or severe lack of knowledge, certain concepts and specific outcomes	**3**	Absence of published data Long term outcome unclear Uncertainty about impact of intervention	21 6 1
National	Disease Burden	Impact of a health problem on a given population	**1**	High disease burden: National	22
Healthcare Organisational	Providers lack adequate skills and knowledge	The available healthcare providers lack the necessary knowledge and skills to administer and maintain healthcare strategies	**6**	Administrators lack skills Attitudinal barriers Health care providers lack required skills Healthcare providers lack disease-specific knowledge Limited access to health information and education Surgical techniques are unavailable	1 1 3 7 3 1
Community	Low Education Levels	Basic education needs are not met within the community/setting	**7**	Basic education challenges Education options are limited Educational problems Lack of access to education Lack of disability-adapted curriculums Lack of education Low education levels	1 1 1 1 2 6 6
Interpersonal	Discrimination & Stigma	When people are seen or treated differently/negatively because of their underlying conditions	**5**	Discrimination against disability Disease-related stigma Isolated from others Public transport is problematic Resort to alternative forms of treatment	3 10 3 1 1
Personal	Low education levels	Below-average level of common knowledge about basic things that people would need to function in daily life (e.g. spelling, reading, writing, maths etc.)	**7**	Illiteracy Lack of education Literacy difficulties Low education levels Low literacy Low numeracy rates Oral consent due to low literacy	7 6 1 6 12 1 1

While the socio-ecological model provided the needed guidance, not all codes could be categorised (i.e. floating codes). In this specific case, these codes were usually hard to categorise due to the background around the code being unclear and as such, preventing an unbiased approach in assigning it to a content category. Two approaches were considered in tackling this challenge, either i) going back to the original reference from which terminology was sourced in the included articles or ii) contacting the study authors directly. In this case, the latter was not necessary, and the few floating codes could be

processed by going back to the original references, where the underlying construct of the code was more transparent. Had we been unsuccessful in returning to the original article/reference, we would have had to contact the authors to gain background into the code definition. After a number of iterations, the 410 codes could be categorised across 63 content categories, spanning six layers of the socio-ecological model.

3.3.3.3 Themes

Further in-depth analysis creates themes in data which is rich with latent meaning.(27) Three team members independently drafted themes from the content categories, by allocating content categories under each theme, then discussed these through a number of iterations, and provided a conceptual description for what each specific theme entailed. Content categories could be included in more than one theme while similarly, themes could span content categories across the six layers of the socio-ecological model. In addition to the descriptive reporting of these themes (Table 1.1 – Table 1.9 in Chapter 2), a visual representation was developed to present the final thematic analysis (Figure 3 in Chapter 2). In the reporting of themes, quotes were included to illustrate some of the most common or striking emerging categories and/or codes.

3.3.3.4 Rigor and trustworthiness

We, as members of the academic community, have the responsibility of ensuring rigor in qualitative methodologies.(31) Achieving rigor is possible through ensuring that the research design, methods and conclusions are clear, open, replicable and open for evaluation. Furthermore, reflexivity in qualitative research facilitates the process of turning back to yourself and investigating and attending to the background of your own knowledge processes throughout the research process.(81) As mentioned, the study in Chapter 2 adopted the criteria set forth by Lincoln and Guba.(32) Table 6 shows each one of these criteria, its purpose and the strategies applied in our study to establish rigor.(31,82)

Table 6: Criteria used for rigour as described by Lincoln and Guba (1985) and how they were applied in this specific case example.

Rigour Criteria	**Purpose**	**Strategies applied in our study to ensure rigor**
Confirmability	The extent to which the results could be confirmed by other researchers	• Reflexivity: regular researcher meetings discussion • Investigator triangulation: the use of multiple researchers to achieve the research aim
Credibility	To instil confidence that the findings are credible, true and believable	• Including an experienced qualitative researcher, with the required knowledge, to

		guide the process and assist the team in fulfilling their roles • Team approach to reflect and question each team members' background and possible inherent biases during abstraction and interpretation
Dependability	Establishing that the results are consistent and repeatable	• A detailed record of the multiple versions of codebook and category and theme development has been kept • Clear methodological descriptions for other researchers to evaluate the research practices have been provided
Transferability	The degree to findings can be generalised of transferred to other contexts	• Providing detailed contextual information for others to determine the applicability of the findings • Clear and detailed sample descriptions presented

3.4 DISCUSSION

In this chapter we reflect on the interaction of two distinct methodologies to unravel a broad and complicated concept, through the use of a scoping review and qualitative content analysis of published literature. By doing so, this chapter aims to strengthen the rigor and trustworthiness of the analysis reported in Chapter 2 by providing a level of methodological detail and reflection conventionally not included in the reporting of such an analysis, while also opening opportunities for colleagues to use a similar approach (replicability).

3.4.1 Strengths

Intersecting these two methodologies to answer our research question, provided invaluable experiences. We did not use the scoping review synthesis in the traditional sense – to scope the available literature on a topic and identify existing evidence in a particular field. Instead, the systematic scoping review provided an effective process of adequately identifying literature related to key concepts pertaining to our research question. Both a scoping review and a qualitative content analysis are iterative in nature and design. By having to read, re-read, revisit, reflect and revise, a level of understanding of the data emerged beyond what could be expected. This contributed to a truly in-depth analysis.

There is no definitive step-wise analysis process that can be utilised during content analysis.(27) Consequently, one could opt to do the analysis individually, or in a team. Using a team approach to conduct the data analysis, although time consuming, was beneficial. Not only did it provide the opportunity to achieve rigor through confirmability, credibility and dependability, but it also provided a valuable support system, and a platform for sharing frustrations, discussing concerns, receiving encouragement and challenging personal perspectives. Most importantly, the different types of clinical experiences and range of research knowledge amongst the four researchers, also contributed to quality, in-depth analysis. In addition, a lot can also be said for the time and resolve that went into developing multiple versions of the codebook. In our opinion, this truly allowed a more focused, efficient and refined approach to analysing the data. Lastly, the value of including a researcher with ample experience in qualitative research methodology, not only contributed to ensure credibility, but also proved a valuable asset in the decision-making processes.

The use of content analysis through an inductive approach allowed the researchers to steer away from preconceived ideas, by allowing the data to lead the process of interpretation, thereby providing credibility and confirmability of the results. However, one could argue that the introduction of the socio-ecological model in the second cycle of coding, may have introduced a shift from an inductive to a more inductive-deductive approach. The initial coding was done completely inductively without any existing theories or models leading the process of analysis. The second iteration of coding followed the same process and was employed to refine the codebook. During the second cycle of coding, where the aim was to initiate the process of grouping codes into categories, the concepts underlying the socio-ecological model emerged from the data and the code definitions, indicating an inductive approach. The intent was always to employ an inductive approach and allow the data to lead the process of abstraction and interpretation, at various stage of analysis. However, qualitative research is a reflective, reflexive and iterative process, whereby one repeatedly visits the data, at the various stages of abstraction and interpretation. This may pose questions as to whether use of the socio-ecological model may have influenced “the way of thinking” during this process of reflection and iteration. On the one hand, the concept of the socio-ecological model emerged from the inductive coding process and simply guided the categorisation of a large amount of codes. On the other hand, the emergence of the socio-ecological model may also be a result of the research team’s clinical and academic background in rehabilitation

(a holistic intervention which focusses on the interactions between person and environment).

3.4.2 Limitations

There are also some drawbacks to using the methods described in this chapter. Firstly, depending on the number of articles included, both the inclusion process and the content analysis take considerable time when following a rigorous approach. In this specific case example, a period of >1 year had lapsed between the search date and final content analysis included in this thesis. However, one can argue that adding articles identified after the original search date may not necessarily add to the analysis, as some level of saturation had already been reached. In other words, identifying and analysing further articles will not necessarily change the themes that originate from the literature, as our coding process reached a point where no new codes were being identified. The inclusion process was also challenged by the nature of the inquiry, in an attempt to clarify a broad concept, that may not necessarily be very clear at onset. As a result, this may affect the ease, agreement and or transparency in following a clear set of inclusion/exclusion criteria.

Secondly, content analysis on published literature is solely dependent on the written word. While in content analysis based on interviews, the interviewer can “guide” the extent of the research inquiry during data collection, this is not the case when doing such an analysis on existing literature. In this case example, the setting and resource constraints in these settings were generally poorly described, thereby requiring multiple, and time-consuming, iterative processes while refining an expansive codebook. Moreover, this added a layer of interpretation to the data which could reflect in the final themes that emerged. Conversely, the absence of structured reporting on a setting and its resource-constraints, exemplifies the need for a better understanding of what LRSs entail.

Finally, despite taking every precaution to acknowledge bias in the analysis through roundtable discussion and ensuring diversity, each researcher in this team comes with his or her own “world view”. In many ways, the researcher is an inherent part of the content analysis, and one needs to be cognisant of the implications of personal bias in the data analysis. Strategic decisions can be made at a protocol stage to ensure diversity in the research team, in an attempt to limit the bias that may arise from a more homogeneous team structure. In that respect, our team comprised of rehabilitation professionals with international experiences in both higher and lower resource, urban and rural settings. The

team had ample experience in qualitative and quantitively research methods at various levels of seniority. One researcher specifically, had experience in using content analysis and was able to steer the methodological and reflective processes. An important future perspective would be to mirror our findings of the review against the views and experiences of a multidisciplinary global panel of experts.

3.4.3 Conclusion

Albeit time consuming, using qualitative content-analysis as a means to unravel complicated constructs derived from a scoping search of existing literature, relative to the research inquiry, is a valuable intersection of methods that could be utilized more often. A detailed and critical reflection of using these methods to unravel the concept of “low-resource settings” in the field of rehabilitation medicine was provided to guide researchers in using these methods moving forward.

CHAPTER 4

4.1 SUMMARY

The aim of this thesis was i) to unravel the concept of a “low-resource setting”, in the context of rehabilitation, using a systematic scoping review with a qualitative content analysis, and ii) to present a detailed account of the development and application of this methodological approach, while critically reflecting on the approaches used to establish quality and rigor in the qualitative content analysis of the research.

In **Chapter 2**, a systematic scoping review with a qualitative content analysis was conducted to unravel the concept of a LRS in the context of rehabilitation. A total of 48 articles met the inclusion criteria. Subsequently, following content analysis, 410 codes were grouped into 63 content categories which helped identify nine major themes relating to the term “low-resource setting” in the context of rehabilitation, spanning across a six-layer socio-ecological model. These themes include (i) financial pressure, (ii) suboptimal healthcare service delivery, (iii) underdeveloped infrastructure, (iv) paucity of knowledge, (v) research challenges and considerations, (vi) restricted social resources, (vii) geographical and environmental factors, (viii) human resource limitations and (ix) the influence of beliefs and practices. These themes may provide an important initial step towards promoting uniformity, detail and understanding of rehabilitation research in LRSs, with the aim to facilitate knowledge transfer and health equity.

Subsequently, in **Chapter 3**, a case study presenting a detailed account of the methods used in Chapter 2, to unravel the concept of “low-resource settings” in the field of rehabilitation medicine, was provided to guide researchers who may want to employ similar methods moving forward . Many disciplines could consider the intersection of a systematic scoping review with a qualitative content analysis, relative to the research inquiry, as a successful means of unravelling complicated concepts derived from existing literature.

4.2 CLINICAL IMPLICATIONS

- The nine major themes that have emerged could potentially assist researchers, healthcare providers, policy makers and stakeholders in identifying context-specific attributes that may contribute or hinder current and future rehabilitation interventions, in LRSs.

- In LRSs, systematic, context-specific analysis of the complex system of interrelated concepts, across the nine themes, may assist the upscaling of rehabilitation interventions.
- Resource-constraints are reported at personal, interpersonal, community, health-care organisational, national and academic levels and may influence rehabilitation implementation in LRSs.
- It is apparent that from the themes that have emerged, and how they transpired at various levels within the socio-ecological model, that health equity is only likely to be achieved if setting-specific contextual factors are clearly identified and addressed simultaneously, and effectively. The themes derived in this thesis could assist in identifying important actors for change.
- A “low-resource setting” is a not a dichotomous concept. Low-resource settings can be present in high-income countries, whereas high-resource settings can be found in low-income countries. Notably, a setting is the product of a spectrum of resources across the nine identified themes, including how these resources are governed, which determines optimal rehabilitation care and outcome.
- Combining a systematic scoping review with qualitative content-analysis, as presented in Chapter 3, is a feasible and potentially valuable methodological approach to unravel complex concepts in existing literature.

4.3 FUTURE STUDIES

Nine proposed themes provide the first step towards improved understanding and operationalisation of the term “low-resource setting” with regards to effective health care provision, and, more specifically, rehabilitation. Despite the importance of this first step, exploration of the findings of this thesis could include the following considerations for future research:

- Evaluating to what extent the nine themes are specific to the field of rehabilitation medicine. It would provide valuable insights to explore the themes identified in the context of rehabilitation, in other healthcare fields (e.g. pharmacology, public health etc.).
- Collaborating globally to develop consensus-based reporting guidelines or frameworks to assist in intra- and inter-setting analysis. Mixed-methods research to support such consensus development could include i) observational cohort studies to determine the relative impact of specific resource constraints on access and

uptake of quality rehabilitative care, and ii) Delphi consensus methods to work towards a consensus definition and reporting framework.

- Structured engagement with stakeholders (community, non-academic and academic), imbedded within these settings, to co-create tools aimed at assisting in the identification and reporting of context-specific resource challenges, on the account of the nine themes reported and/or the consensus work proposed in the previous point for future research.

4.4 CONCLUSION

A clear description and understanding of the term “low-resource setting” in research reported from these settings, in the context of rehabilitation specifically, was lacking. Nine major themes have now been identified to describe the term LRS, in the context of rehabilitation medicine. Healthcare administrators, clinicians and researchers now have the opportunity to actively engage with these nine themes when planning, designing and implementing rehabilitation interventions in LRSs. Improved understanding of what constitutes a LRS with regards to rehabilitation, may be an important step in promoting health equity in this field. Whether this improved transparency will alleviate barriers in knowledge translation across settings, will need to be investigated. While the term “low-resource setting” strays away from the use of income classification (i.e. LMIC), and therefore, presents an important step forward, one must be take caution when using LRS as an “umbrella term” (as we have done with LMIC in the past).

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ADDENDA

ADDENDUM A: Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM		REPORTED ON PAGE #
	TITLE			
Title	1	Identify the report as a scoping review.		9
	ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.		9
	INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.		10
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.		10
	METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.		N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.		12
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.		13
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.		73

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM		REPORTED ON PAGE #
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.		13
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.		13
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.		13-15
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).		N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.		13-15
	RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.		15-16
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.		75-84
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).		N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.		15-35; 75-84 Codebook: 14
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.		15-35
	DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.		35-39
Limitations	20	Discuss the limitations of the scoping review process.		39

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM		REPORTED ON PAGE #
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.		39
	FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.		N/A

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

ADDENDUM B: Search strategy of data bases searched

PUBMED

Limits applied to database: 2014 - 2019

Language: English

Search Terms
(((“low-resource*”[Title/Abstract] OR “low resource*”[Title/Abstract] OR “resource-limited”[Title/Abstract] OR “resource* limited”[Title/Abstract] OR “resource poor”[Title/Abstract] OR “resource-poor”[Title/Abstract] OR “resource* constrain*”[Title/Abstract] OR “resource restrict*”[Title/Abstract] OR “resource-restrict*”[Title/Abstract])) OR ((“low-resource*”[Text Word] OR “low resource*”[Text Word] OR “resource-limited”[Text Word] OR “resource* limited”[Text Word] OR “resource poor”[Text Word] OR “resource-poor”[Text Word] OR “resource* constrain*”[Text Word] OR “resource restrict*”[Text Word] OR “resource-restrict*”[Text Word]))) AND rehabilitation[MeSH]

SCOPUS

Limits applied to database: 2014 – 2019

Searches in abstract, title or keywords

Language: English

Search Terms
(rehabilitation) AND ("low-resource*" OR "low resource*" OR "resource-limited" OR "resource* limited" OR "resource poor" OR "resource-poor" OR "resource* constrain*" OR "resource restrict*" OR "resource-restrict*"))

WEB OF SCIENCE

Limits applied to database: 2014 – 2019

Searches in topics from all databases for “low resource” OR searches in titles from all databases for “low resource” AND searches in research area from all databases for rehabilitation

Language: English

Search Terms
("low-resource*" OR "low resource*" OR "resource-limited" OR "resource* limited" OR "resource poor" OR "resource-poor" OR "resource* constrain*" OR "resource restrict*" OR "resource-restrict*") OR ("low-resource*" OR "low resource*" OR "resource-limited" OR "resource* limited" OR "resource poor" OR "resource-poor" OR "resource* constrain*" OR "resource restrict*" OR "resource-restrict*")) AND SU=rehabilitation)

AFRICA WIDE

Limits applied to database: 2014 – 2019

Language: English

Search Terms
TI ((“low-resource*” OR “low resource*” OR “resource-limited” OR “resource* limited” OR “resource poor” OR “resource-poor” OR “resource* constrain*” OR “resource restrict*” OR “resource-restrict*”)) OR AB ((“low-resource*” OR “low resource*” OR “resource-limited” OR “resource* limited” OR “resource poor” OR “resource-poor” OR “resource* constrain*” OR “resource restrict*” OR “resource-restrict*”)) AND SM rehabilitation

ADDENDUM C: Description of the included articles

COPD, Chronic Obstructive Pulmonary Disease; HIV, Human Immunodeficiency Virus; OCD, Obsessive Compulsive Disorder; RCT, Randomized Clinical Trial; USA, United States of America.

Authors	**Year**	**Methodological design**	**Disease Profile**	**Global Health Data Exchange Grouping**	**Geographic Location**	**World Bank Income Group in study year**	**GINI index (most recent)**	**Brief rehabilitation intervention description**
Aikens et al (78)	2015	Non-RCT	Depression	B.6.2	USA	High income	41,4	Patient-selected support person integrated into mobile health services for depression
Baruah et al (83)	2018	RCT	OCD	B.6.4	India	Lower middle income	37,8	Brief (6 session) family-based including psychoeducation, exposure and response prevention and family intervention for obsessive compulsive disorder
Bhattacharyya et al (48)	2018	Observational cohort	COPD	B.3.1	India	Lower middle income	37,8	Curriculum-based intensive single-session intervention with education, bronchial hygiene and exercise training for Chronic Obstructive Pulmonary Disease patients stabilised with uniform pharmacotherapy
Boivin et al (43)	2016	RCT	HIV - neurocognitive impairments	A.1.1.4	Uganda	Low income	42,8	24 one hour sessions of computerised cognitive rehabilitation training in stage 1 or 2 HIV disease.
Burner et al (36)	2014	Qualitative	Diabetes	B.8.1	USA	High income	41,4	TExT-MED (mobile health intervention) experiences in low-income Latinos with diabetes

Authors	Year	Methodological design	Disease Profile	Global Health Data Exchange Grouping	Geographic Location	World Bank Income Group in study year	GINI index (most recent)	Brief rehabilitation intervention description
Caagbay et al (39)	2017	Qualitative	Pelvic organ prolapse	B.12.3.5	Nepal	Low income	32,8	Brief verbal instruction and illustrative leaflet on how to contract pelvic floor muscles to improve knowledge and muscle contraction in parous women
Cobbing et al (35)	2019	Qualitative	People living with HIV	A.1.1.4	South Africa	Upper middle income	63	Experiences and reflections of people living with HIV involved in a novel home-based rehabilitation intervention
Dambi & Jelsma (84)	2014	Observational cohort	Cerebral Palsy	B.5.7	Zimbabwe	Low income	44,3	Cerebral palsy rehabilitation services in a community setting and outpatient at a central hospital setting.
Debussche et al (85)	2018	RCT	Diabetes Type 2	B.8.1.2	Mali	Low income	33	One year of culturally tailored structured patient education delivered in the community by trained peer educators (peer-led) to adults with type 2 diabetes.
Essien et al (46)	2017	RCT	Diabetes Type 1 and 2	B.8.1	Nigeria	Lower middle income	43	Intensive and systematic diabetes self-management education, using structured guidelines.
Ferreira-Correia et al (44)	2018	Qualitative	Working memory deficits	B.6.10	South Africa	Upper middle income	63	Evaluation of the barriers encountered by participants in a computer-based rehabilitation program (CBRP).

Authors	Year	Methodological design	Disease Profile	Global Health Data Exchange Grouping	Geographic Location	World Bank Income Group in study year	GINI index (most recent)	Brief rehabilitation intervention description
Flood et al (86)	2017	Observational cohort	Diabetes Type 2	B.8.1.2	Guatemala	Upper middle income	48,3	Diabetes self-managed education which consisted of 6 home visits conducted by a diabetes educator using a curriculum culturally and linguistically tailored to rural Mayan populations.
Foley & Masingila (87)	2015	Mixed-Methods	Visual impairments	B.10.1	Kenya	Lower middle income	40,8	Design-based research project in which a theoretically-grounded intervention was developed and refined – a model for developing communities of practice to support the use of mobile technology as an assistive technology
Foley et al (88)	2016	RCT	Obesity	No category	USA	High income	41,4	12-month digital weight loss intervention in a community health centre system
Giordani et al (89)	2015	Case-Control	HIV - working memory/attention deficits:	A.1.1.4	Uganda	Low income	42,8	Brain Powered Games for cognitive training and rehabilitation of 45minutes, several times a week, for two months (24 sessions) , for at-risk African children
Haddad et al (90)	2014	Observational cohort	Diabetes Type 2	B.8.1.2	Iraq	Upper middle income	29,5	Weekly SMSs (text messaging) to support education and self-management of Type 2 diabetes over 29 weeks.

Authors	Year	Methodological design	Disease Profile	Global Health Data Exchange Grouping	Geographic Location	World Bank Income Group in study year	GINI index (most recent)	Brief rehabilitation intervention description
Hamid et al (91)	2017	Cross-sectional study	Physical disabilities	No category	Uganda	Low income	42,8	Description of disability characteristics of community-based rehabilitation accessed through community-based organisations
Hasan et al (92)	2015	RCT	Schizophrenia	B.6.1	Jordan	Upper middle income	33,7	12 weeks of a booklet form of psycho-educational, with follow-up phone calls and treatment as usual for people diagnosed with schizophrenia and their primary care-givers
Ibrahim et al (50)	2018	RCT	Low Back Pain	B.11.3	Nigeria	Lower middle income	43	Motor control exercise and patient education program for low resource rural community dwelling adults with chronic low back pain
Järnhammer et al (93)	2018	Qualitative	Persons with disabilities	No category	Nepal	Low income	32,8	Experiences of people using lower-limb prostheses in Nepal
Johnson et al (94)	2014	RCT	Stroke	B.2.3	Mexico	Upper middle income	45,4	Theradrive system in a robot gym (circuit training system with 6 stations) for upper limb stroke rehabilitation
Jones et al (95)	2017	Observational cohort	Post tuberculosis lung disorders	A.2.1	Uganda	Low income	42,8	A culturally appropriate, 6-week, twice weekly, pulmonary rehabilitation program in Uganda for people with post-tuberculosis lung disorder.

Authors	Year	Methodological design	Disease Profile	Global Health Data Exchange Grouping	Geographic Location	World Bank Income Group in study year	GINI index (most recent)	Brief rehabilitation intervention description
Khabbache et al (37)	2017	Qualitative	Mental, neurological and substance use (MNS) disorders	B.5; B.6	Morocco	Lower middle income	39,5	Evaluations of the reactions and feelings of the patients receiving rehabilitation at a mental rehabilitation centre
Kitzman et al (38)	2017	Observational cohort	Stroke	B.2.3	USA	High income	41,4	An assessment of the effectiveness of using specifically trained community health workers to support community transitions for individuals with neurological conditions (strokes) and their caregivers.
Ku & Kegels (33)	2014	Observational cohort	Diabetes Type 2	B.8.1.2	Philippines	Lower middle income	44,4	Context-adapted diabetes self-management education and support given by trained pre-existing local government healthcare personnel
Lakhan (42)	2014	Case-Control	Intellectual impairments - Behavioural problems	B.6.9	India	Lower middle income	37,8	Non-Government Organisation (NGO)-implemented interventions for behavioural problems in a clinical or a community setting
Lee et al (40)	2016	Mixed-Methods	Diabetes Type 2	B.8.1.2	USA	High income	41,4	Two- year pilot intervention of undergraduate volunteers as Patient Partners (assisting during classes, weekly patient calls and accompanying patients to clinic appointments) to foster diabetes self-management education participation

Authors	Year	Methodological design	Disease Profile	Global Health Data Exchange Grouping	Geographic Location	World Bank Income Group in study year	GINI index (most recent)	Brief rehabilitation intervention description
Lindley et al (56)	2017	RCT	Stroke	B.2.3	USA	High income	41,4	Stroke survivors, with residual disability and an informal family-nominated caregiver, received structured rehabilitation training - including information provision, joint goal setting, carer training, and task-specific training
Luyten et al (96)	2016	Observational cohort	Cleft (lip and) palate	B.12.1.3	Uganda	Low income	42,8	Short, intensive speech therapy focussed on phonetic placement and contrasts between oral and nasal airflow and resonance, in Ugandan patients with cleft (lip and) palate
Muchiri et al (97)	2015	RCT	Diabetes Type 2	B.8.1.2	South Africa	Upper middle income	63	One year RCT including a nutrition education programme including education materials and participation in eight weekly (2–2·5 h) group nutrition education sessions and follow-up sessions to affect clinical status and dietary behaviours
Muchiri et al (45)	2016	RCT						

Authors	Year	Methodological design	Disease Profile	Global Health Data Exchange Grouping	Geographic Location	World Bank Income Group in study year	GINI index (most recent)	Brief rehabilitation intervention description
Muchiri, Gericke & Rheeder (98)	2016	Qualitative						Subject's experiences of a one year RCT including a nutrition education programme including education materials and participation in eight weekly (2–2.5hr) group nutrition education sessions and follow-up sessions
Onagbiye et al (80)	2016	Observational cohort	Non-communicable diseases	B	South Africa	Upper middle income	63	Exercise intervention (3 days a week for 4 weeks) for managing noncommunicable diseases in an African community
Paddick et al (54)	2017	RCT	Dementia	B.5.1	Tanzania	Low income	40,5	Cognitive stimulation therapy led by occupational therapists, 14 sessions, twice weekly, over seven weeks, for dementia
Pandian et al (49)	2015	RCT	Stroke	B.2.3	India	Lower middle income	37,8	Structured home-based rehabilitation delivered by trained and protocol-guided family caregivers of stroke patients with residual disability.
Puckree & Naidoo (34)	2014	RCT	Stroke	B.2.3	South Africa	Upper middle income	63	Physiotherapy focused balance and stability exercise program to improve stability and balance in patients after acute stroke.
Rispin & Wee (99)	2014	Cross-sectional study	Persons with disabilities	No category	Kenya	Lower middle income	40,8	Outcomes study comparing two paediatric wheelchairs for low-resource setting

Authors	Year	Methodological design	Disease Profile	Global Health Data Exchange Grouping	Geographic Location	World Bank Income Group in study year	GINI index (most recent)	Brief rehabilitation intervention description
Rispin & Wee (100)	2015	Cross-sectional study	Persons with disabilities	No category	Kenya	Lower middle income	40,8	Comparison (using skills tests) between performances of three types of manual wheelchairs often distributed in low-resource settings
Sarfo et al (57)	2018	Observational cohort	Stroke	B.2.3	Ghana	Lower middle income	43,5	Tele-rehab intervention (Smartphone with the 9zest Stroke App®), to deliver individualised, goal-targeted, 5 days-a-week exercise program that was remotely supervised by a tele-therapist for 12 weeks, in stroke patients
Seshan & Muliira (101)	2015	Case-Control	Urinary incontinence	B.12.3.7	India	Lower middle income	37,8	Video-Assisted Teaching for Kegel's Exercises for urinary incontinence.
Spencer et al (55)	2018	RCT	Diabetes Type 2	B.8.1.2	USA	High income	41,4	A community health worker (CHW)-led, 6-month diabetes self-management education program followed by either 12 months of CHW-delivered monthly telephone outreach or 12 months of weekly group sessions delivered by peer leaders, with telephone outreach to those who were unable to attend.
Tongsiri et al (102)	2017	Observational cohort	Persons with disabilities	No category	Thailand	Upper middle income	36,4	Home modification programme for persons with physical disabilities

Authors	Year	Methodological design	Disease Profile	Global Health Data Exchange Grouping	Geographic Location	World Bank Income Group in study year	GINI index (most recent)	Brief rehabilitation intervention description
Tyson et al (103)	2015	RCT	Post-operative pulmonary complications following laparotomy	No category	Malawi	Low income	44,7	Routine post-operative care (deep breathing instruction and early ambulation) with incentive spirometry following exploratory laparotomy.
Verusia et al (104)	2015	Cross-sectional study	Disability - amputations	No category	South Africa	Upper middle income	63	Experiences of physiotherapy rendered to acute and sub-acute in-patients with lower-limb amputations
Visser & du Plessis (51)	2015	Qualitative	Sexual abuse	C.3.2.3	South Africa	Upper middle income	63	10 weekly sessions including expressive art activities, followed by reflective group discussions for sexually abused adolescent females
Wang et al (53)	2016	RCT	War-related trauma/PTSD	No category	Kosovo	Lower middle income	29	Bio-psycho-social (10 weekly individual 60-minute sessions of cognitive behavioural therapy, individual 20-min breathing exercise and 90-min group physiotherapy and once-daily multi-vitamins) approach for rehabilitation of traumatised victims of torture and war
Washburn et al (105)	2014	Cross-sectional study	Aging - older adults/physical activity	No category	USA	High income	41,4	Community-based lay-led physical activity program for older adults

Authors	Year	Methodological design	Disease Profile	Global Health Data Exchange Grouping	Geographic Location	World Bank Income Group in study year	GINI index (most recent)	Brief rehabilitation intervention description
Zhou et al (47)	2019	RCT	Stroke	B.2.3	China	Upper middle income	38,5	Task-shifting / training-the-trainers model, supported by a custom-designed smartphone application, where stroke patients and caregivers received evidence-based in-hospital education and stroke rehabilitation training, delivered by trained nurses before hospital discharge, and 3 post discharge support telephone calls